Life – a user's manual
Part I

Gunnar Björing

Boksidan

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and

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We sincerely thank those who participated in the interview studies on which the material is partially based.

Translated from Swedish to English, by Google translator and Gunnar Björing.

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Part I

About the content

The reality may seem complicated, although most things are really quite simple. The reasons that things sometimes seem complicated, may be that the overall picture is hidden behind exclusion or superficial differences. In addition, I believe that persons in control of subjects to some extent emphasize differences of detail, rather than show the similarities on the whole. In this publication, however, the larger patterns are highlighted at the expense of the details. Details that perhaps is interesting only to those who wish to immerse themselves in a smaller area.
The text, as many other[1] writings, claims to present facts, I. e. things that are true. But its probably not entirely true. That is partly because there are often differing opinions about what is true.

A comparison of some randomly selected phenomena described in four books (table 1), showed that it actually seems to be somewhat different views on what is true, even when it comes to things that should be pretty easy to verify. The differences are seen foremost in the texts about the foundation of Addis A'bebas and about Albatrosses and the least in the texts about arcades. The reason for the differences may, to some extent, be that our knowledge increases over time, the differences between the 1961 and 1922 version of Bonnier encyclopedia indicates that.

Table 1. A comparison of how some "randomly" selected phenomena are described in the National Encyclopedia, Wikipedia, 2012, and Bonnier encyclopedias from 1961 and 1922. The selection of things was done like this: I flipped randomly in the first part of the National Encyclopedia for subjects that ought to be fairly constant over time. Then I searched for the same subjects in the other three sources, and where I got a hit in all four, the results are reported in the tables. The texts, from foremost Wikipedia, are strongly shortened. The sentences are in some cases longer, and for the comparison irrelevant sentences are excluded.

Subject	National Encyklopedia 2009, A - Assyriska	Wikipedia April 2012
History: Found-ation of Addis A´bebas	Founded 1887 and Ethiopias	The capitol was founded in the end of the 1800s.
Geography: Isle Anholt	Island in the Kattegat, Denmark, 50 km north-east of Grenaa; 22 km^2,164 inhabitants. Anholt consists mainly of sand fields and dunes.	Danish island, covering an area of approx-imately 21.75 km² and it has about 160 inhabitants. The eastern part of the island is Northern Europe's largest desert.
Zoology: Albatrosses: family,+ number of species + food	Fulmars, with 21 species. No text about the food.	Albatrosses is a family closely related to the families fulmars and storm petrels. There are different opinions about how many species that is included in the family. Their diet consists of squid, fish and krill.
Architecture :	The texts are very similar.	

1. For example, they had in the 43 Libraries belonging to the City of Stockholm in January 2012 a total of 1 762 544 books, 1 067 711 of which were non-fiction books (as library officer Peter Eklund).

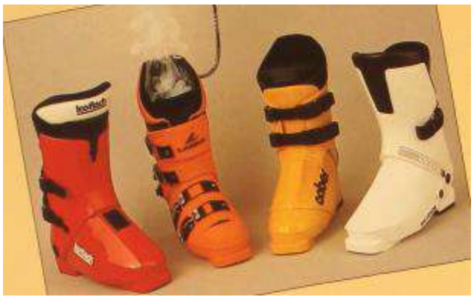
Table 1. Continued. The same subjects described in Bonnier's encyclopedias from 1961 and 1922.

Subject	Bonniers encyclopedia 1961, A - Barth	Bonniers encyclopedia 1922, A - Bizet
History: Foundation of A.	Founded and Ethiopias capitol 1896.	Not in the text about the city.
Geography: Isle Anholt	Danish island with a lighthouse in Kattegatt, at the latitude of Halmstad. 22 km^2. Beach resort. Whetherstation.	Danish island in Kattegatt, straight west of Halmstad. Lighthouse place.
zoology: Albatrosses: family,+ number of species + food	A family of fulmars with about 15 species. The food is mostly squid and molluscs.	Family of the type fulmars, with a number of species. Not text about the diet.
Architecture: Arcades	The texts are more or less copies of each other.	

It is reasonable to believe that we still have not come to the real truth regarding many things. Within even well-investigated subjects like downhill skiing, the “truth” changes quite radically over time.

In the 1980s, skiing boots should have as few clips as possible, the skis should be 5-10 cm longer than the skier and they should have an almost straight shape. Twenty years later, there were many buckles on the boots and the skis were shorter with a clear hourglass shape.

1977

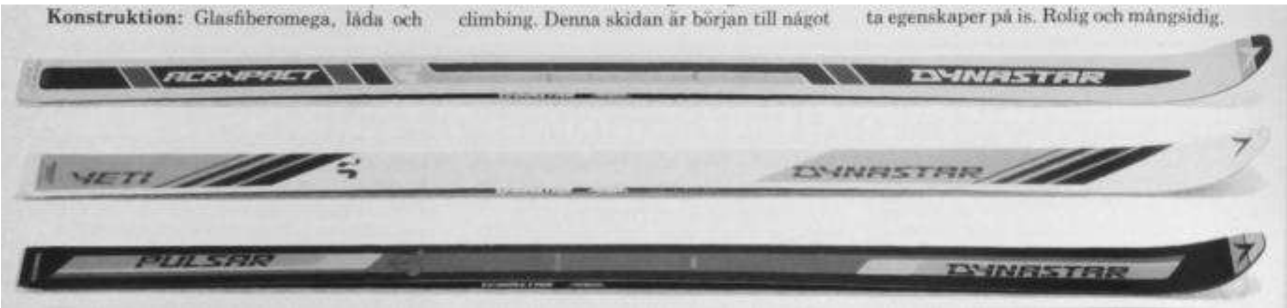


1983

1989

1999

2011



1977

1989

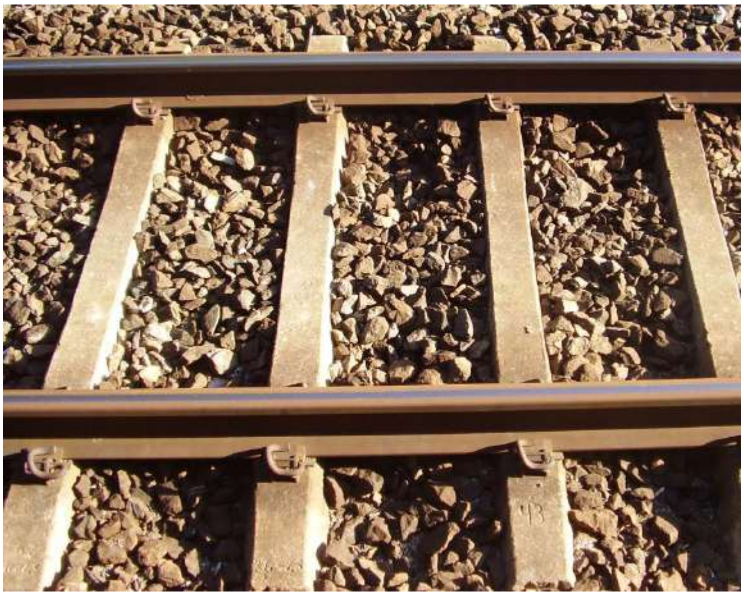
2011

Warning! Some of the things we believe are true are actually false.

Another reason for un-true statements is that true statements often become very long and un-descriptive or confusing.

This is a description of parts of the public rail based transport system in Stockholm. The information given is partly un-true, since the stations in reality aren´t placed along strait lines. And, for instance, Flemingsberg is situated much more far away from Gullmarsplan than Hagsätra.

This model is much more true.



But this one is the most true.

Moreover the truth is sometimes lost in mistakes such as misinterpretations. Such as in this book in which, in which the misinterpretations probably are numerous.

In addition, there are certainly things in this book that I have the wrong idea about, even though they really are undisputed among the experts. Other phenomena I may have explained so bad, that you as readers misunderstand them, and more of other things you may misunderstand because the explanations are un-consistent with your previous, incorrect knowledge. In summary, this book probably provides about as little of the real truth as other books.

Probably nobody has use for everything in this book, especially not during the same stage of life. Though, hopefully everyone's life conditions and focus change throughout life. Because those who mainly focus on the same things in their 50s, as they did when they just turned 20, are likely to miss important pieces of what life has to offer. And my hope is that this book, to some extent, increases the courage to switch focus, occasionally through life.

Warning! Someone that never changes focus throughout life, suffers a great risk of getting an empty life.

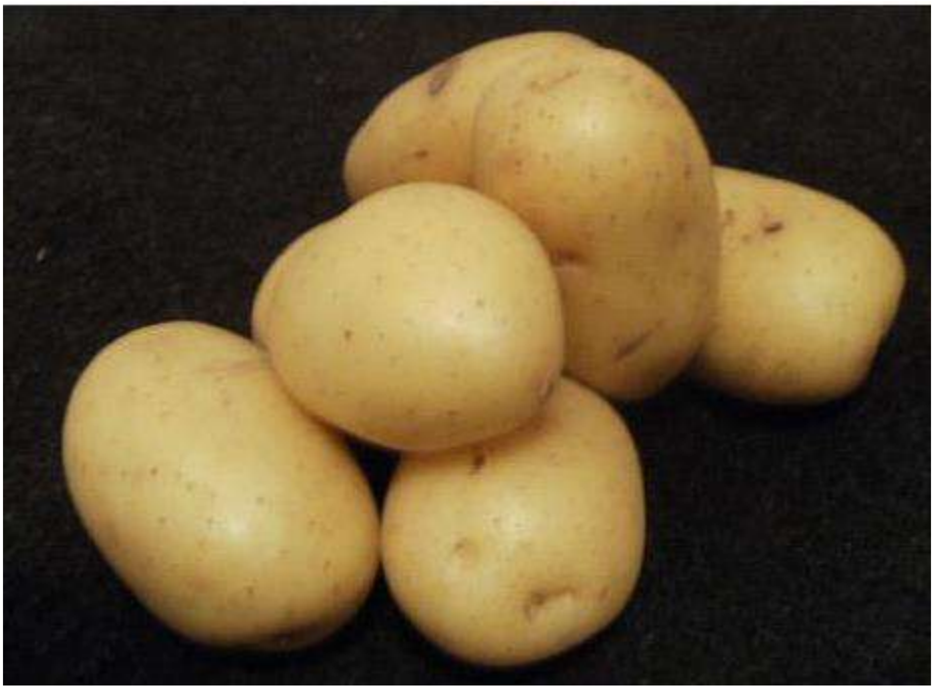
Roughly the various chapters presumably fit into life as follows:

Life stage	Chapter	
Childhood	Games in the 1800s Dad is mad	
Youth	Candy Guide in crime Mathematics Guide in working life	A quick lesson in languages Crazy Swedish What's love? Il-/legal street art
Early adulthood	A quick lesson in cooking Popular drugs A quick lesson for future inventors The ergonomics of tools About talking Human properties The logarithmic man What's normal – in Sweden	How we want to make love How to get laid Get accommodation in Stockholm A quick lesson in writing Prestige Political ideologies About getting rich Differences between countries
Middle age	The history of technology The history of states Food & beverage history The history of amusements The development in Sweden during the 1900s About manuals Risk analysis	About proverbs Work environment Building management at a small scale Picture art The purpose of sport consumption The purpose of pets The purpose of clothing Differences with age
Aged	Before getting old	

Subjects

Food and beverages

Food & beverage history



The major events in the human culinary history probably are:

- Every time someone came up with a new successful fishing or hunting method.
- Every time we adopted a new type of vegetarian foodstuff.
- The introduction of various technologies to collect and transport the raw materials, such as bowls/bags to pick and carry fruit in. Because it increased the efficiency in the collecting and to some extent protected the goods from vermin's.
- The use of knife-like objects to cut raw materials instead of, for example, ripping chunks of meat with our teeth.
- The use of fire to cook the ingredients, which made the food tastier (I think), more easy to chew and more easily digested.
- The introduction of pans, an innovation that enabled the cooking of stews, soups and porridge, et cetera.
- The finding that the taste of the food can be improved by mixing different ingredients, water and herbs.
- The invention of bread. It was important because it is easy to store the raw material (grain), it does not require very much tools to create bread on a hot stone surface, and bread can be easily stored and it can be eaten cold. In addition, no plates, cutlery etc. is needed to eat it (such tools came to the general public rather late in our history). Finally, bread is suitable as a complement to a variety of other things such as meat.
- The introduction of salt. Common salt is necessary for us otherwise our cells salt balance is jeopardized, most things are tastier with salt and salted raw materials are not destroyed as quickly as unsalted ones.
- The discovery that raw materials containing sugar can be converted to "refreshing" drinks if; they are mashed and in some cases mixed with water, provided that a fermentation process starts. The method was developed to wine, cider and beer, depending mainly on the raw materials used.

All of these innovations and discoveries were made long before the year 0 and it was certainly parallel in several parts of the world, more or less independent of influences from other cultures. Then, not so much happened during a very long time. That's because the alimentation for most ordinary people depended on a number of factors:

Energy shortages and undeveloped stoves
The food was heated with wood (maybe in some places also with coal) and the stoves that were available were ineffective (in Sweden we had fireplaces with the frying pan on top of the fire). Fireplaces are cosy and they provide light, but they are difficult to cook on, because the chefs have little control over the cooking temperature. Moreover, is not very fuel efficient because much of the heat does not get under the pan. The latter was particularly problematic in the regions[1] where there was a shortage of firewood. Especially when they did not have use of the heat to warm up their homes.

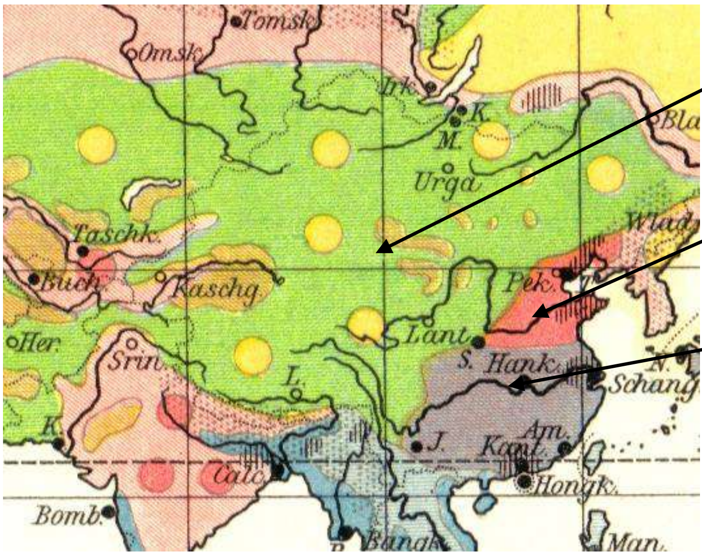
Lack of long-distance food transports
Both sea and land transport took a long time and their storage capacities were, compared to today's vehicles, small. Which resulted in that long-distance transport was only relevant for food that was well paid in relation to weight/volume, and had a long durability at room temperature. In other words, mainly spices, but also dried meat/fish, cereals and alcoholic beverages. Though it was only the very rich, who could afford to pay for long distance goods. Others had to make do with what was in the neighborhood.

Fear of trying new foods
In Sweden, for example, the rural population did not eat mushrooms, horse meat or crawfish right up to the 1900s. Although there were plenty of edible mushrooms in the forests in the autumn, and it was easily stored when dried, there were plenty of horses, and there is plenty of meat on a slaughtered horse, and many Swedish rivers and lakes were full of crayfish.

Poor storage facilities
In Northern Europe, we rely on to harvest once a year. While in southern Europe and elsewhere in the world the farmers could reap some foods several times per year. This limitation meant that we either consumed all of the harvest for a short period after it (fresh fruit, etc.), focus on growing things that can be stored for long periods (cereals can tolerate long storage as long as its dry) or to preserve[2] the harvest (most of the other foods). And as knows preservation methods characterize the taste quite much, each in its own way.

Hard work
It was important, therefore, with high energy content and that there was enough protein and fat in the food[3].

1. Eastern China, for example, has long been very densely populated. One effect of this was the lack of fuel (wood). This meant that it was a great advantage if the food had a short heat treatment time, which probably contributed greatly to that the food often is cooked shredded, the vegetables (apart from rice) and meat are fried or boiled in oil instead of boiled in water or heated in the oven, and that Chinese food often has no browning. They could also not afford to use the productive farm land for cattle grazing, so they had neither dairy products and beef or mutton. In contrast, they held pigs because pigs could be fed with kitchen waste.



Hunting, fishing and ranching with cattle, sheep, horses and farming of vegetables.

Rice, sugar, tea and vegetables, pigs + fishing in the coastal areas.

Wheat, durra, corn, soy, vegetables, pigs + fishing in the coastal areas.

2. Fish, pork, meat and vegetables can be dried in the sun. Fish, pork and meat can also be preserved through storing in salt and/or by smoking.

3. The energy in the Swedish diet came largely from animal products, see for example the content of a daily ration for a Swedish soldier in 1866 (more about the diet later). Note that the energetic content resemble pretty well to modern dietary guidelines, in terms of both energy and the energy components distribution.

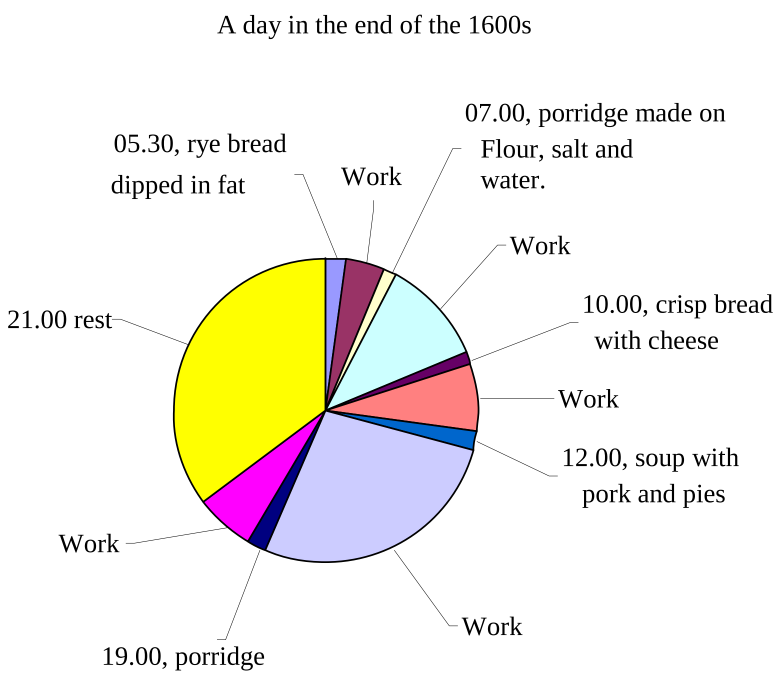
Amount (In old units)	Unit	Approx. Weight in grams	Type	Similar modern product	Energy/ day (MJ/day)	Fat (g/day)	Carbons (g/day)	Proteins (g/day)
117	ort	497	Dry ryebredd	Rebred with approx. 5% fibres	5,0	8,0	229,2	35,3
25	ort	106	Cumin cheese	Cheese 31% fat	1,6	32,9	1,5	27,8
50	ort	213	Smoked ham	Smoked ham	3,5	79,7	0,0	32,7
2	Cubic inch	25	Vodka	Vodka 40% alkohol	0,2	0,0	0,0	0,0
Total weight (g)		841		Total daily energy (MJ/day)	10,3			
Distribution between the energy types (%)						27	52	21

Nowadays the Swedish national food administration recommends (Svenska näringsrekommendationer, Livsmedelsverket, 2005) that an active man between 31-60 years should consume 13.3 MJ energy/day. Out of that 50-60% should come from carbohydrates and proteins 10-20%.

There is a big difference between what ordinary people in Sweden eats today and what their counterparts eat for not so long ago. The same probably applies to many of the other, nowadays, rich countries. When and how did the change take place?
In 1573, even the most powerful person in Sweden (King Erik XIV) and his guardian had, according to the state accounts (Eli F. Heckscher, Sveriges ekonomiska historia, Bonnier, Stockholm, 1935), a diet that must have been extremely monotonous, since they foods listed are (per person per day):

- 3 kg cereals (reasonably largely consumed in the form of beer),
- 460 g of hops (in the form of beer),
- 76 g butter,
- 50 g of salt (= very much, suggesting that the salt was used for salting meat, pork and fish. Moreover the large amount of salt explains the large amount of beer),
- 290 g of salt beef and pork,
- 150 g of fresh meat,
- 370 g of salt fish,
- 93 g of dried fish.

Already in 1640 we imported, however, a lot of the herbs we use today (table 1) and the animals that were consumed were virtually the same. And many of the drinks available today was present/manufactured/imported even then, like water, milk, spririts[4], beer, cider, wine, and probably also different juices. What then has been added are primarily: coffee[5], chocolate[6], sodas[7], orange juice, assorted spirits, and a number of variants on milk such as "light vanilla yogurt."
The largest differences in the raw materials for the food are that today's most common "stomach filling" food: pasta and potatoes[8] were completely missing in the 1600s, as well as many vegetables, for example, tomatoes[9] and fruits (table 2). Rice however was available, but it was unusual. Ordinary people had in the 1600s a daily routine and a diet that perhaps looked something like this (my guesses based on various sources):



The beverages where water or a sweetened malt beverage with low alcohol content. Milk was not used as a beverage since the farmers made butter and cheese out of it. Beer was only consumed at special occasions.

Probably the conditions were rather the same over large parts of the world, but with other commodities and a larger proportion of fresh vegetables in areas with warmer and more even climates.

4. In Sweden, many made their own vodka. The technique we learned in the late 1500s and 150 years later the technology was well spread across the Swedish countryside (an inventory of a number of farms in a region about in 1750 showed that 60% of the farmers had their own equipment). Cooking vodka was, however, not such a waste that it was later claimed to be. Since the leftovers in the boiler when the liquid was boiled away became popular and nutritious animal feed.

5. Coffee came to Europe from the Arab world in 1517 and it was introduced in Western Europe in 1669 by the Ottoman ambassador in Paris.

Coffee was during a large fraction of the 20: th century sold un-roasted and un-milled. Thus in every home that could afford it, there were a coffee roaster and a coffee grounder.

In Sweden the use appears to spread, at least in the bourgeoisie, around 1770. Since from 1769 to 1770 the import of coffee beans increased from 65.361 units to 507.719 units (Historisk statistik för Sverige, del 3 Utrikeshandel 1732-1970, Statistiska Centralbyrån (SCB), 1972, Stockholm).

Anyway it took a long time before the use was spread over the Swedish countryside. A woman born in the early 1890: s remembered[10] that her mother said that the first time she saw coffee was in the beginning of the 1880: ies, when a stranger came with coffee beans to an old woman in the neighborhood. He asked her to boil them till he came back the same afternoon. She, who had never seen coffee beans, boiled them the whole day in the same way as one boils dried pies. But anyway they were still hard (and at that time they probably tasted awful).

Table 3. Coffee import and inhabitants according to SCB.

	1861	1881	1901
Imported amount coffee (kg)	6 740 000	12 341 000	30 971 000
Inhabitants (persons)	3 917 339	4 572 245	5 175 228
Kg/pers. and year	1.72	2.70	5.98

Why did they choose to use some of the very little money they earned, on coffee beans, despite that it does not fill the stomach and it takes time to get used to it’s bitter taste?

A reasonable explanation is that the use came in handy with the big movements against alcohol consumption during the latter part of the century.

6. Around 1530, the Spanish had knocked out the two dominant cultures in Latin America (Aztecs and Incas). From there, they took with them for instance: corn, peanuts, chilies and cocoa beans. To the New World the Spaniards brought “in return" horses, sheep, cows, pigs, dogs, chickens, wheat, sugarcane, onions, citrus fruits and bananas.
Of cocoa beans was initially only done a chocolate drink, and in the 1600s the use came to Sweden. Even in the 1800's were still drinking chocolate made from cakes with the cocoa butter still remaining. It was therefore a very bold drink and it probably looked pretty un-tasty as the fat does not dissolve in the drink. Instead it is floating on top. But in 1828 f the Dutchman van Houten found out a method to squeeze out the fat and make a powder (cocoa) of the rest, which paved the way for both the modern cocoa drink and chocolate bars. The latter was first produced in the mid 1800's and in 1875 the milk chocolate came.

7. Carbon dioxide was discovered in the 1700s by Joseph Black. 1741 the Englishman William Brownrigg invented carbonated water (soda). In 1886 the American chemist Pemberton created the soft drink Coca-Cola.

8. During the 1500s the potatoes spread from South America to North America, then to Spain and from there to Europe. 1655 it was first cultivated in Sweden (in the botanical gardens of Uppsala). But first in 1724 a Swedish entrepreneur (Jonas Alströmer), who has been in the UK and probably got inspired by their potato fields, began making larger growing trials. The Swedish rulers liked and encouraged this, since they realized that it would reduce imports of cereals (it is often enough to harvest a few potato plants to feed one person) and thereby significantly reduce the trade deficit. Thus, a number of attempts were made to introduce potatoes on a wide scale. Though the peasants were un-interested because the fields at that time, where divided on so many owners that it was customary, or more or less necessary, that all cultivated the same thing at the same time. Additionally potatoes were harvested later than cereals which meant that they could not send out cattle to graze on the remains until much later in the fall. In addition, people thought that it was not particularly appealing to eat potatoes, and it could not, as the grain be stored in the farm barns, because potatoes do not tolerate temperatures below 0 ° C. Finally, the authorities were not good at getting potatoes from abroad. Over time, however, the popularity of potatoes increased. 1820 the potato harvest was more than five times as large as in 1802nd. One explanation is that it was found to be suitable as a raw material for vodka production, which enabled farmers to a greater extent sell the access seeds. A clear proof of this is that from about 1820 Sweden began to export grain. A milestone in the introduction of potatoes as staple food in Swedish homes was also the massive construction of food cellars from 1827, when a large area reform took place, which led to that the small land platelets were merged into larger units, all the buildings were moved and new ones were built on everyone's new estate. And the food cellars offered first class storage capabilities of onions, potatoes, beets and other vegetables.
In my uncle's cellar, for example, his annual potato harvest remained fine and good until the next harvest the year after (which is impressive considering that a bag of potatoes do not survive more than, like, a month in a refrigerator).

9. Tomatoes came from America with the Spanish. But it was not until 1847 that it was mentioned in a Swedish cook book. And it took until the 1900s before we dared eating them raw. Tomato mash on the other hand, was imported already in the mid 1800s and ketchup was invented, in USA, 1876.

Table 1. Plants/plant parts used as flavouring of food, their probable area of origin, and if they occurred in Swedish import statistics in the1640th.

	Probably origin from	Imported volume/weight 1640 (old measures)	Measure
Anise	Eastern Mediterranean	31 025	pundh
Basil	Mediterranean, India		
Fenugreek	Mediterranean & Asia		
Cayenne pepper	South America		
Chilies	South America		
Lemon grass	South East Asia		
Cocos	Asia and Polynesia		
Dill	Asia		
Dragon	Russia		
Juniper	Grows wild in Sweden		
Fennel	Mediterranean		
Turmeric	South East Asia		
Ginger	Asia	11 820	pundh
Caper	Mediterranean	3 566	pundh
Cinnamon	Asia	1 808	pundh
Cardamom	India & South East Asia	334	pundh
Coriander	Asia	320	pundh
Allspice	West Indies		
Caraway	Grows wild in Sweden	1 315	pundh
Cloves	South East Asia	660	pundh
Savory	Mediterranean		
Chervil	Europa & North Amerika		
Bay leaves	Mediterranean		
Lingonberries	Grows wild in Sweden		
Marjoram	Mediterranean		
Nutmeg	South East Asia	701	pundh
Mint	Mediterranean and Western Asia		
Oregano	Europe & South America		
Paprika	Central America		
Parsley	Mediterranean & USA	0	tunnor
Pepper		15 115	pundh
Horse reddish	Easter Russia	4 606	bundt
Piri-piri	Central America/Africa		
Rose pepper	Brazil		
Rosemary	Mediterranean & USA		
Saffron	Iran	132	pundh
Sage	Mediterranean & Eastern Europe		
Mustard seeds	Mediterranean		
Sugar	Grows wild in Sweden as honey	55 554	pundh
Cumin	Mediterranean & Orient		
Thyme	Mediterranean & Eastern Europe		
Garlic	South East Asia	0	knippor

Table 2. Fruits, grains and such, their probable area of origin, how long they have been grown on a large scale in Europe, and if they occurred in Swedish import statistics during 1640.

	Probably stems from	Cultivated in Europe since	Imported volume/weight (old measures)	Measure
Oranges	Southern China	1400s		
Apricot	Central Asia	Before 0?	13	tt
Pineapples	Brazil	-		
Eggplant	East Indies, tropical Africa and Egypt	700's		
Avocado	Northern South America	-		
Banana	Asia	-		
Cauliflower	Syria, Turkey and Egypt	The Middle Ages		
Broccoli	Mediterranean	Before 0		
Brussels sprou	Belgium	1400s		
Beans	Probably Central America	1500s		
Cashews	America	-		
Lemon	North India	1000's		
Dates	North Africa	?		
Figs	Turkey	?	307	fjärdingar
Grapefruit	North America	1910		
Chives	China	The Middle Ages		
Yellow onion	Asia	The Middle Ages	64 760	refuer
Cucumber	India	?		
Oats	Mediterranean	Before 0		
Millet	Asia	Before 0		
Peanuts	South America	-	0	pundh
Barley	Asia	Before 0		
Artichokes	?	Before 0		
Turnip	Siberia or northern Europe	Before 0		
Cherries	Asia	Before 0		
Mangos	Asia	-		
Corn	Mid & South America	?		
Almond	North Africa and West Asia	Before 0	12 985	pundh
Melon	Africa	?		
Carrot	Mediterranean	Before 0	9	tunnor
Olives	Mediterranean	Before 0	775	kannor
Parsnips	Southern and central Europe and southwe	Before 0	3	tunnor
Papaya	Middle America	-		
Paprika	Mid & South America	1500s		
Peach	China	Before 0		
Plums	Asia	Before 0		
Leeks	Mediterranean	Before 0		
Potato	South America	1500s		
Pears	Several origins	Before 0	203	tunnor
Rice	Asia	1400s	25 299	pundh
Rye	Asia	Before 0	7 295	tunnor
Beetroot	?	?		
Satsumas	Japan	?		
Asparagus	Mediterranean	Before 0		
Spinach	Orient	At the beginning of our era		
Tomato	South America	1500s		
Grapes	Asia	Before 0		
Cabbage	Asia	The Roman Empire	186	skåck
Peas	Eastern Mediterranean, Iran, Afghanistan	Before 0		
Wheat	Asia	Before 0	140	tunnor
Cocoa	Mid & South America	-		
Soybeans	East Asia	?		
Apple	Several origins	Before 0	5 703	tunnor


Dag- och Spisnings-Ordning för Stockholmske Galey Escadren, på Siu Man i Batlaget, enligit Hans Kongl. Maj:ts Nådige förordnande under d. 21. April, och d. 4. Maji 1741.

Måndagen
Middag: Erter ⅛ kanna. Hafregryn ¼ kanna. Fläsk 3 marker.
Afton: Korngryn ⅜ kanna. 1½ quarter sött win, som blandas med wattn.

Onsdagen
Middag: Erter ⅛ kanna. Hafregryn ¼ kanna. Fläsk 3 marker.
Afton: Korngryn ⅜ kanna. 1½ quarter sött win, som blandas med watn.

Fredagen
Middag: Erter ⅛ kanna. Hafregryn ¼ kanna. Salt kiött 8 marker.
Afton: Korngryn ⅜ kanna. Smör ¼ mark. Sill 2½ mark.

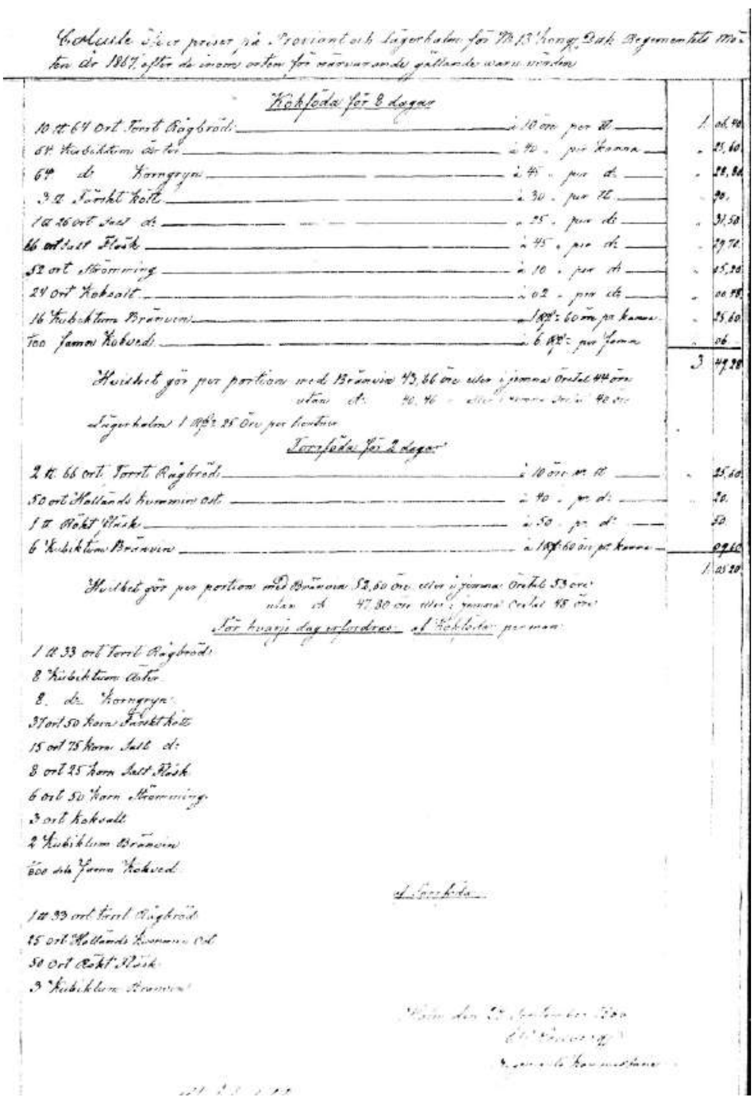
Söndagen
Middag: Erter ⅛ kanna. Hafregryn ¼ kanna. Salt kiött 8 marker. Fläsk 1½ mark.
Afton: Sill 2½ mark. Holstensk Ost 2¼ mark. eller Hällensk Ost 1½ mark.

Tisdagen
Middag: Erter ⅛ Kanna. Hafregryn ¼ Kanna. Salt kiött 8 marker.
Afton: Korngryn ⅜ Kanna. Smör ¼ mark.

Torsdagen
Middag: Erter ⅛ kanna. Hafregryn ¼ kanna. Salt kiött 8 marker.
Afton: Korngryn ⅜ kanna. Sött win 1½ quarter, som blandas med wattn.

Lördagen
Middag: Erter ⅛ kanna. Hafregryn ¼ kanna. Fläsk 3 marker.
Afton: Korngryn ⅜ kanna. Sött win 1½ quarter, som blandas med wattn.

The king order concerning the alimentation in the Swedish navy per weekday under the period 21 April to 4 May 1741st. The foods offered were peas, oatmeal, barley, salt, grease, butter, herring, pork, and possibly a few more that I can not decipher.



Extract from a randomly selected list of food costs for a military unit in Sweden, written in September 1866. There the following food consumption per person and day was listed for an 8 days camp.

For every day it was required
1 tt 33 ort dry rye bread
8 cubic inch pies
8 dito barley
37 ort 50 korn fresh meat
15 ort 75 korn salted meat
8 ort 25 korn salted pork
6 ort 50 korn herring
3 ort salt
2 cubic inch vodka

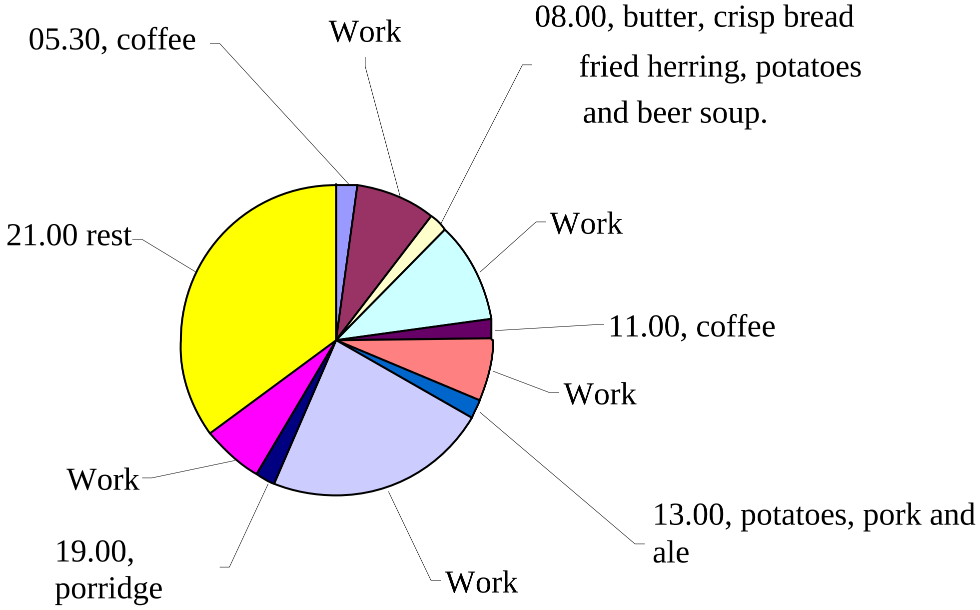
The camp also included two days without cooking facilities, with the following food:

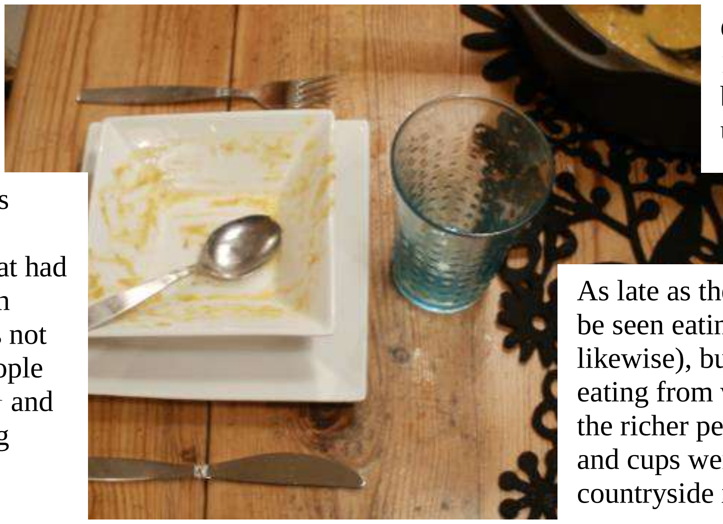
Dry food per person and day
1 tt 33 ort dry rye bread
25 ort Dutch cumin cheese
50 ort smoked pork
2 cubic inch vodka

In a protocol from the same unit written eleven years earlier the same food was listed. Besides that cheese, smoked pork and vodka was missing and rye flour was added. Which indicates that the variation was pretty small?

One tt= 84 ort, 1 ort = 4,25 grams = 100 korn.

A day in the end of the1800s[10]





Glasses were spread in the 1890s[11], but in the beginning they were only used at special occasions.

The cutlery used was knifes and wooden spoons. The fork, that had been used by the rich since the 1600s, was not used by ordinary people until the late 1800s[11] and then also only during special occasions.

As late as the late 1800s, ordinary people could be seen eating directly from the pot (soup and likewise), but many appears also to have been eating from wooden plates or clay ones. While the richer people had tin plates. Porcelain plates and cups were spread over the Swedish countryside in the 1870s[11].

10. Answers to the Nordic Museum's list of questions about food preparation and eating habits from 1928. Written by Anna Sjöbom who was born in Dalarna in the late 1800s (but also reporters from other parts of Sweden describes similar things). According to her, they baked once in spring and once in autumn. The baking lasted two and a half days. The first two days they baked hard bread and the third they baked the soft bread and when it was finished, a part of the soft bread was given away to the rest of the village. Furthermore, the neighbours would during the whole time baking was going on, have fresh bread. But then when it was baked in one of the other farms they got back the gifts. The finest bread, which would be eaten at celebrations, was baked from pure rye flour, but the ordinary bread was made of mixed grain. Wheat did not grow in the area, so those who wanted to bake wheat bread had to buy grain, which made wheat bread unusual.
In addition, they every day made a variety of porridge-like dishes cooked in cream or water, flour and salt. And more filling dishes like barley cooked in pork broth and then fried in lard. They apparently also that ate rice pudding, but only at Christmas. The beer soup mentioned above was cooked through that a beverage similar to beer and water was boiled and then thickened with milk and flour, then pieces of bread was poured into the pot and everything was boiled.

11. From one of the replies on an nation wide interview study made by reporters on a mission from Nordiska museet (The Nordic Museum in Stockholm) in 1941 regarding when industrial products began to show up on the country side.

The instruction from 1923 for field kitchens in the Swedish military (Kokinstruktion, PA Nordstedt & Söner, Stockholm, 1923), counted 60 about dishes. More than 10 of these were "soups", about the same number were fruit soups, 10 were porridge or similar things, 20 were meat dishes (beef stews, stuffed cabbage, dill meat, steak, patents steak, patents buns, minced meat beef, roast beef, veal, cutlets, meatballs, fried pork, pork and potatoes, fragile sausage, hash, potato mash with salted meat, stew with boiled meat), two fish and 6 were flour dishes. As the stomach filling component to combine with the above was suggested: boiled potatoes, mashed potatoes, fried potatoes, stewed carrots, stewed broad beans, creamed peas, browned turnips, beans, pie mash and cabbage mash.
The instructions indicate that the diets differed quite a bit from the current ones. The today still fairly common dishes are meat soup, pea soup, rice pudding, pancake, black pudding and some meat dishes. In addition, noted that rice and pasta still were missing in the military alimentation besides in the form of desserts (apple rice and rice pudding). Although both rice and pasta are very suitable foods in a camp, because they are dry and therefore easy to store in the field, and a portion of pasta/rice generally is less bulky and lighter than a serving of potatoes.
Thus sometime after 1923 today's dishes were introduced in to our kitchens. The supermarkets advertising in the newspapers suggests that started in the 1930s (see the chapter The developments in Sweden during the 1900s), when advertising of rice and pasta began to be seen. But why did so much happened in the food sector after 1930?

Energy shortages and undeveloped stoves
Until the 1860s, we mainly cooked our food in the fireplaces. Then iron stoves gradually came to use in rural areas (see also the chapter History of Technology). In larger cities, such as Stockholm, the gas net was built from the mid-1800s and about 1910 regular gas stoves came to use in homes. The new stoves meant that the environment in the kitchen got much better and it got much easier to cook, since the temperature could be kept even. In addition, these techniques improved the possibilities to bake cakes/buns, which went hand in hand with the growing coffee culture. Much later (in the 1950s) was the time for breakthrough for the electric stoves and they rather quickly out competed the iron stoves.

Lack of long-distance food transports
With the trucks and the modern cargo vessels (from 1920 and onwards) and the refrigeration technique, the transportation problems disappeared (see also how the means of transport development in the chapter History of Technology).

Fear of trying new foods
Increased travel outside the villages, the introduction of mass communication in the form of newspapers, radio, cinema and later television, and advertising about exciting food enticed us to try new products (see further the chapter The development in Sweden during the 1900s). A contributing factor was probably also that the young people from the 1930:s and onwards, due to industrialization and urbanization, to a greater extent than in the past could get their own households with their own diets independent of others (the master's) taste. Urbanization also meant that people had to buy their food, and for them it was more reasonable to try something new, like spaghetti, compared to those who farmed their own food (potatoes).

Poor storage facilities
With the introduction of refrigerators, from the 1930s (see the chapter Prestige), the fresh goods did not need to be consumed within a few days. Instead, they had basically today's possibilities to vary the diet from day to day. Apart from that they had not yet freezers or frozen food (that became common in the 1960s) and that the range of "exotic" products were much more limited.

Hard work
Much of the hardest work tasks were gradually replaced with machines during the 1900s and people were freed to do physically easier tasks, such as industrial assembly and office work. Which probably meant that the interest in heavy food decreased?

The schools in Stockholm served, in spring 1958, some "modern" dishes like spaghetti Bolognese, even if only one time during the semester. Pasta was, however, also served in the form of stowed macaronis (2 times) and macaroni pudding (one time). Even cooked rice was actually on the menu (one time). During the period from 1958 to 1980, the incidence of rice/pasta raised up to 8-10% each, of all the dishes (chart 1). The nowadays so common seasonings ketchup and curry powder were seen in the menus from 1962.

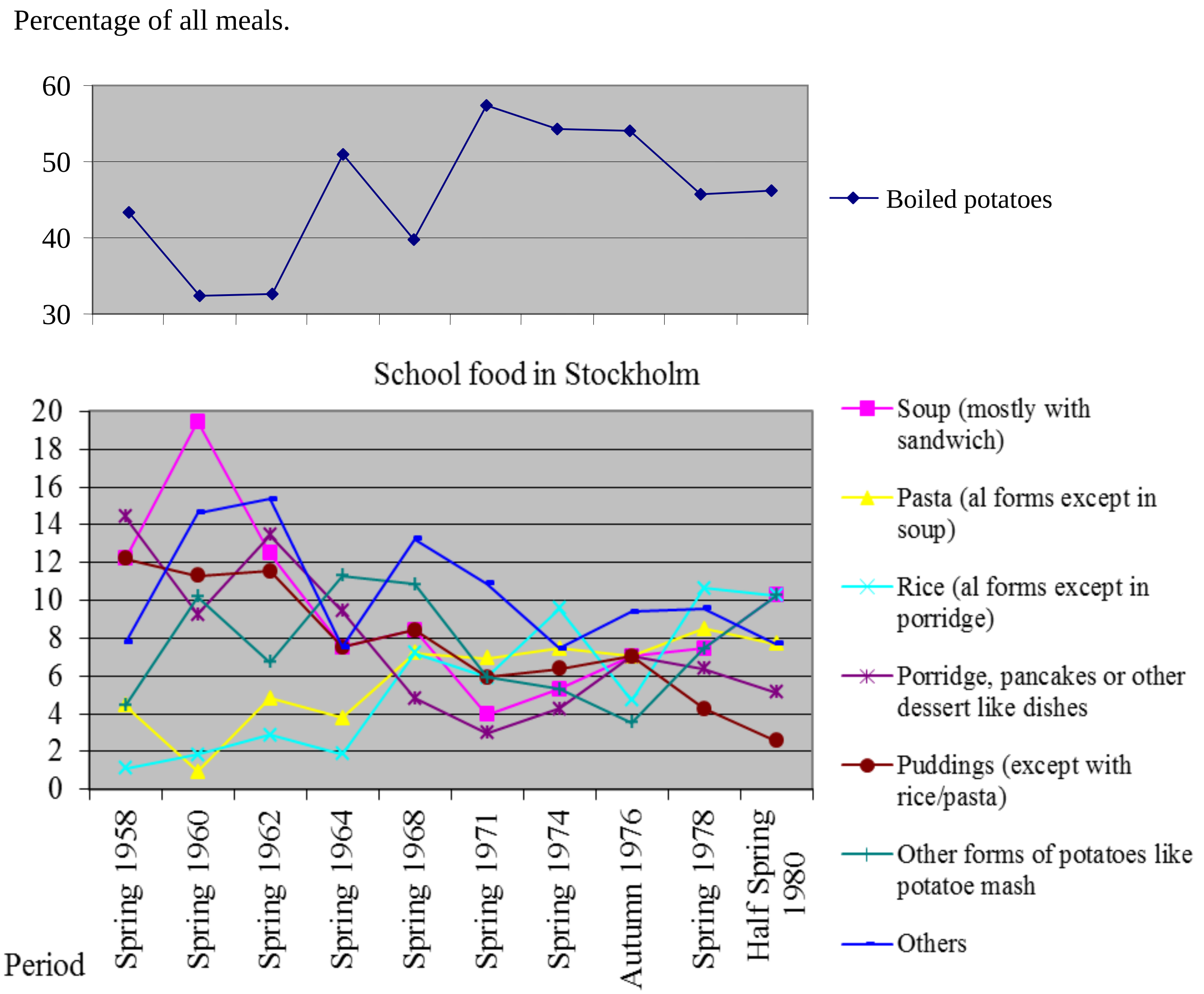
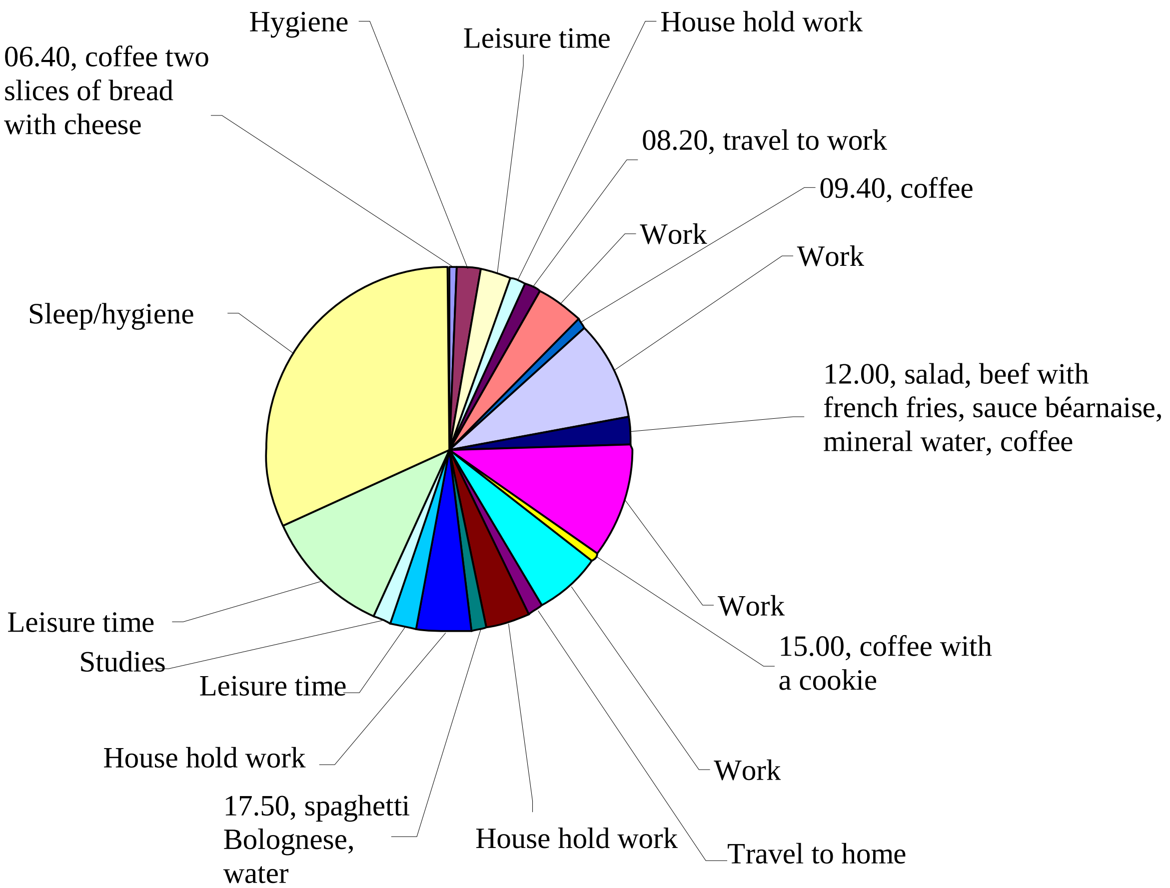


Chart 1a. Percentage of all dishes served with boiled potatoes.
Chart 1b. The distribution between pasta, rice, soups (often pea soup with pork), "sweet" dishes such as porridge/pancake/puddings, other forms of potatoes (mashed potatoes, etc.), and the rest (dishes like sailor steak). Data from old school menus for the public elementary schools in Stockholm.

In 2011, it was, at least in the schools using the studied menu, about as usual to serve rice dishes (19%) or pasta ones (25%) as dishes with boiled potatoes (21%). In addition, a lot of international influences could be seen, and only 10 of the approximately 150 dishes were recognizable from, for example, 1978 years school menu.

A day in the end of the 1900s



The distribution of time between different activities is based on Swedish men's average use of time during an average weekday in the late 1900s, according to Statistics Sweden (Rapport 91 Välfärd och ojämlikhet I ett 20-årsperspektiv, SCB (Statistics Sweden), Stockholm, 1997, table 5.1 about the average time for different activities/day). The report states that men did not use more than a total of 62 minutes a day for meals, which to me sounds a bit unlikely. Because in my experience most people eat breakfast, drink coffee in the morning as well as in the afternoon, have lunch and dinner.

Candy

The candy discussed here is foremost the small pieces that can be picked individually in racks that are available in almost every grocery store in Sweden. I love it. My desire for it is not just a craving for sugar, but also a desire for the concentrated flavours that the pieces offer. I usually buy candy almost every day, but not so much, just like ten bits at a time. This since I noticed that only the first few bits that are really good. Then I eat almost only for them to end. For several years I have occasionally thought about making my own candy. But I have found no recipes on how to do it, besides the usual recipes for fudge, chocolate and toffee. I have therefore experimented in order to make a few basic recipes that yield results similar to what the stores can offer. But I have to admit that the factory-made candy is cheaper, better looking and much tastier.

The history of sweets

Humans have always liked sweets for the Stone Age man candy was what could be found in nature, such as nuts, dried fruits and berries.

In the tropical countries, the people chewed sugarcanes for several thousand years and the Mediterranean’s chewed dried liquorice roots.

More refined sweets like marzipan, comes from the Far East and it spread slowly across Europe. From the beginning it was exclusive items reserved only for the wealthiest in society. But when cane sugar in the 1000's began to be grown more widely in the countries around the Mediterranean, sweets became cheaper and more common.

Chocolate

In the 1500s ravaged the Spaniards in Central America. One of the things they took home with them to Europe from there was chocolate. It was in the beginning consumed only as a beverage. In the 1600s came the habit of drinking chocolate to Sweden. Even in the 1800's the drinking chocolate had the cocoa butter remaining. It was therefore a very fatty drink and it probably it did not look that very tasty as the fat does not dissolve in the drink instead it is floating on top. But in 1828 the Dutchman van Houten found out a method to squeeze out the fat and make a powder (cocoa) of the rest. Chocolate making began in the mid-1800s and 1875 milk chocolate was invented. Sweden got its first chocolate factory in 1873, when the brothers Cloetta founded one in Malmö. Somewhat later started a man named Mazetti another chocolate factory in the same city.

Today in Sweden we eat, on average, about seven kilograms of chocolate per person and year. The overthrow of Swedish manufacturers is:

Marabou
Marabou that was founded in 1916 by a Norwegian chocolate factory owner who previously owned the Norwegian candy manufacturer Freia. With time Marabou was listed on the Stockholm Stock Exchange and further later (in 1990) it became a subsidiary to Freia. A few years later Freia was bought by the international food group Kraft Foods. The Group is Sweden's second-largest candy company and it is the biggest chocolate maker. Their bestsellers include:

- Aladdin that was launched in 1939 quickly became very popular, as it was relatively cheap for being a box of pralines.
- Daim, launched in 1953. Since then it has spread throughout Western Europe. In 1990 the spelling was changed from Dajm to Daim.
- Marabou Milk Chocolate, which has been around since Marabou started. And the chocolate mixture forms the base of many of Marabou products.

Cloetta

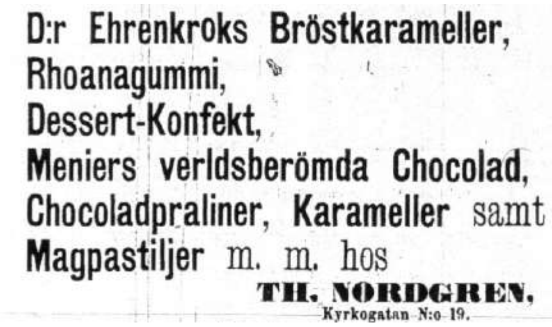
Cloetta grew steadily from the start and it acquired over time, several large companies such as Again (importer of Bassets products and the throat tablets Fishermen's friend). In 2000, they merged with the Finnish manufacturer Fazer, but the merger did not work and they are now once again separate companies. Their best-known products include:

- Kexchoklad, which is the company's biggest product launched 1938.
- Plopp which came 1949th.

A long gone chocolate product from Cloetta.

Toffee, jelly and marshmallows

The art of refining sugar spread slowly during the 1500 - and 1600-centuries throughout Europe. The first candies were probability created in a pharmacy sometime during the 1700s. It was a sugar solution crystallized in a bowl and it resulted in a product called candy sugar. The colour was pale brown and it tasted sweet. Soon we learned to flavour it with spices and aromas of various types, such as vanilla. Over time candy sugar became more common as the production of sugar increased.
Until the end of the 1800s pharmacists, more or less, had a monopoly on the manufacturing of sweets. They developed the art further to include softer candy products, such as throat lozenges based on gum arabicum.
In Sweden, refined sweets were very exclusive until we, in the 1800s, began extracting sugar from the domestic product beet. After which our domestic candy industry emerged. Among other things, we invented polka pigs in the mid-1800s, when the polka dancing was all the rage. And in the early 1900s the gelatinous candy, such as jelly rats and chewy jelly raspberries came.



Advertizing from 1883. Candy made out of pure sugar (candy sugar or as called in this ad “Bröstkarameller”) was the most common sweets at that time. But also chocolate were beginning to spread among common people.

It emerged a number of manufacturers of sweets in Sweden. Now, the number of manufacturers is less, but they produce the more. Today we every year eat about seven kilograms candy per capita.

An advertising about throat lozenges from the mid thirties. Note how they listed health argument, which were common in advertising at this time.

An ad about throat lozenges from the late sixties. Still, it was pill boxes that mattered. Note that the arguments now are rather about taste than health.

Previously, sweets were only sold packaged or over the counter with a salesman who picked what the customers wanted. We, that are a little older, remember how we as children stood and pointed at the boxes, continually anxiously asking about the total sum (because the price then was per piece). It is now, since some twenty years, allowed for customers to put together their own mix, and probably therefore, the sale of sweets has increased from 3-5% of the candy market to about 30%. The largest player in the candy market is Karamellkungen which is a wholesale company owned by Fazer. Some bestsellers include candy in bulk are: Aromas Green Frogs, Toms Jelly Raspberries, Malacos Cola Bottles and Salted Herrings, Cloettas Sugar Bits and Fazer Coco Dots.

The largest "Swedish" manufacturers of candy are:

Malaco
1934 started as Malmö Liquorice Factory (later Malaco). Some of their best known products are:
- Käck (nowadays Kick), from 1954.
- Gott & blandat launched 1979.


A number of my favorite Malaco products. Salted Herrings and Cola Bottles.

Aroma
The company was started 1921 and the first product was cream toffee. In the 1930s they started producing jelly. Many of the products from that time are still big on the market, like jelly rats.

Cloetta
Among Cloettas jelly products are many of my childhood favourites, such as Tutti-Frutti which was launched in 1921. It was initially a mix of hard candy. But about 25 years later the soft version came, and it was introduced on the market in pill boxes. Cloetta has also introduced several other famous pill boxes like Salted Liquorice Figures (1952) and Emser (1933). But their main candy product probably is their marshmallow sugar cubes.

Dals
1946 started Grevskapet Dals Konfektyr AB in Bengtsfors. They make, among other products, Marshmallow Bananas and Dals Cream Toffee.

Toms-Webes

Tom Chokoladefabrikk is a Danish company founded in 1924. The company has grown through the acquisition of several candy manufacturers like Anton Berg, Penguin Liquorice and the Swedish company Webes (2002). Webes had several big sellers in Sweden, such as Liquorice Boats, Jelly Raspberries and Ferrari Cars.



Karamellpojkarna

The company started in 1952 in Alingsås, now it is owned by Cloetta. They mainly manufacture various clubs and bags of candies such Fünf Kräuter and Extra Strong. Among the things that tend to be among picking candy Home fudge is perhaps their main product.

Chewing gum

People have eaten gum since immemorial times. In excavations at a Stone Age settlement, archaeologists found something that is probably a primitive chewing gum with bite marks from a small child. The gum was made of birch sap and beeswax. Birch sap was used as chewing gum all the way into the modern era. At the forty-fifties it was popular with chewing gum in the U.S. and the practice spread to Europe. There have been several Swedish manufacturers of chewing gum, but now there is only one dominant player: Wrigley's, with brands such as Stimorol and Juicy Fruit.

Gum advertising from the mid-1980s. Large bubbles was what mattered, when it came to chewing gums for children.

Another gum ad from the same time. Hubba-bubba often occurred in children's magazines when I was a kid. The theme was always the same: Cowboys who chewed Hubba-bubba could make bubbles that scared the shirt of all opponents. The motto was "Big bubbles no troubles .... Hubba-bubba" The chewing gum sold today, however, are sold more with themes that it lowers the pH level in the mouth.

Common ingredients

Candy basically consists of sweetening and thickening agents, aroma, flavouring and colouring agents. The sweetener is usually sugar, but it may in some products also be artificial sweeteners. The thickener gives candy its texture and structure. Tastes, flavours and flavour enhancers give the candy its flavour. Dyes are added to give the candy a pleasing colour, which also serves to convey what flavour it is on the candy. Taste, colours, and some other substances are considered to be additives. Most additives have an E-number, which shows that it is approved by the European Union. All ingredients in the candy must be in the list of ingredients. They should be listed in order of importance and the first listed item is the ingredient that it is the most of.

Antioxidant

If there are antioxidants in the candy, it’s probably because the manufacturer wants to avoid fat rancidity. Or if the sweets are fruit based, to prevent discolouring. They also help to preserve vitamins such as A, D, E and B2.

Aroma

Aromas are added to candy for it to have a certain smell and thereby also contribute to the taste. Aromas can be divided into:
- Natural ones, which comes from fruits and berries.
- Nature identical, which is artificially produced copies of natural substances, such as vanillin, which is artificial but it smells and tastes like vanilla.
- Artificial, which is artificially produced and does not smell or taste like any natural substance.

Some candy manufacturers choose to use nature identical or artificial flavours, although there are natural ones, because the "un-natural" are cheaper.

Essential oils are strong smelling natural flavouring substances in liquid form. The oils are extracted from different parts of plants, like lemon peels or levees of peppermint plants. The candy industry uses a lot of essential oils, where they are often referred to as "natural flavourings." It is much easier to use essential oils than usual spices or grated citrus peels because the flavour becomes smoother. But one must beware of dosage. The essential oils are, unfortunately, so strong that a drop too much can ruin the whole candy batter. They also evaporate quickly if they become hot. So be sure to add them as late as possible in the hot part of the process. Some essential oils that are suitable for candy production are as follows:

- Anise, which is extracted from anise seeds by distillation. The oil tastes like the seed, a liquorice-like and slightly pungent taste.
- Orange, obtained by pressing the peels. It is the oil we extract when we tear orange peel in order to flavour food. It tastes like orange.
- Bergamot, obtained by pressing of bergamot peels. Bergamot is a small citrus fruit that is grown exclusively for its essential oil, which is mainly used to flavour Earl Grey tea and sweets. Bergamot has a more bitter taste than other citrus oils.
- Lemon, obtained by pressing of lemon peels. It tastes like lemon peels, I e considerably softer than lemon juice.
- Eucalyptus, obtained through distilling eucalyptus leaves. It has a very refreshing taste.
- Grape, which is also obtained by pressing the peels. The oil is not as sweet as orange and it has certain bitterness.
- Peppermint, obtained by distillation of peppermint leaves. The oil has a strong aroma and refreshing taste of menthol. Peppermint oil is often used in chocolate (After Eight), throat lozenges and chewing gum.

Chocolate

The base of chocolate is cocoa. Cocoa is extracted from the seeds of a fruit of a tree that originates from Central and South America. Today it is grown in the tropic region worldwide. The fruit grows directly on the branches and looks like twenty centimetres long cucumbers with a number of almond-sized seeds (cocoa beans) inside. The cocoa beans are fermented, and then they are roasted and grounded to a pulp from which the cocoa butter pressed. What is left after the pressing is cocoa.
White chocolate does not contain cocoa, but cocoa butter, dry milk, vanilla and more. Which means that it has a considerably weaker chocolate taste.

Dyes

In candy both natural and artificial dyes are used. The natural colours are produced in different ways depending on the different natural ingredients. Usually it is in-boiled or in-evaporated plant material. Synthetic colours are produced by chemical means.
Semi synthetic dyes are produced by chemical treatment of naturally occurring substances, such as chlorophyll.
Here are some other examples of natural dyes that are suitable for candy manufacturing:

- Yellow = carrot extract.
- Brown = caramelized sugar.
- Orange = Paprika extract.
- Red = Beetroot.
- Black = linden bark. Manufactured through carbonization of linden bark.

Emulsifying agents

Emulsifier’s makes two subjects that do not really want to mix with each other, such as fat and water, mix anyway. If the mixture is a liquid, the liquid is called an emulsion. Emulsifiers, such as lecithin, are used in chocolate.

Thickener/gel

Typically for thickeners are that they may be dissolved or finely dispersed in water and then they form a gel. Many of those are extracted from natural sources such as potato flour or slaughter residues from animals (gelatine). The thickeners used in the candy industry are, except gelatine, mainly thickeners derived from plants such as tragacanth, gum arabicum and starch.
Gum arabicum (E 414) is extracted from resin from the African tree, Acacia senegal. It is often used as a thickener in candies such as gum and lozenges and it is completely tasteless.

Anti-caking agents

Anti-caking agents are added to dry food in powder form in order to make it flow easier and not cluster together, even if exposed to moisture. An anti-caking agents found in candy is Talcum. It is composed of magnesium silicate and it is used as a glazing agent in candies, so that they don’t stick together.

Preservatives

Preservatives inhibit the development of bacteria’s, moulds and yeasts. Which otherwise cause putrefaction, mildew and fermentation. In addition, the taste is maintained better over time. There are also other ingredients in confectionery, such as sugar and salt, which has a preservative effect without being considered as preservatives.

Artificial sweeteners and sugar alcohols

In order to make the candy sweet, we put in different sweeteners, which are either natural or synthetic. The natural sweeteners are different kinds of sugar. Candy may be called for sugar-free if it contains no sugars, however, it may contain sugar alcohols like mannitol, sorbitol or xylitol.
Artificial sweeteners are made entirely chemically. They are usually extremely much sweeter than all natural sweeteners. Aspartame, for example, a conventional artificial sweetener is 100-200 times sweeter and saccharin, and 500 times sweeter than sugar. Therefore, you only need to use very small amounts to get enough sweetness.
Sugar free candy can also be baked using maltitol syrup. It is a sugar alcohol that is produced by chemical means of crops, such as wheat, which has a high content of maltose (which incidentally is the main component of malt).

Liquorice

Liquorice is extracted from a bush. There are dozens of species of liquorices bushes that grow wild in southern Europe and western Asia. The raw material comes from the roots of the liquorice bush. Not the deep-reaching rhizome but up to 8 m long rhizomes in the horizontal direction out of the main root. The root tastes sweet first but eventually something bitter. The dried strains are crushed or milled and the powder is then boiled in water. The decoction is strained and in-evaporated to syrup consistency, and after cooling it is a black mass.

Nougat

Nougat is a mixture of mainly nuts and sugar/honey. Nougat is used as filler for chocolate.

Salmiak

Ammonia is a salt produced by mixing ammonia and chlorine. It is white in colour and easily soluble in water. Ammonia occurs in nature, but the ammonia used in candy is made completely chemically and therefore it is a nature identical flavour.

Salt

Acids and alkalis which are mixed neutralize each other to form salts. The most commonly used salt, is sodium chloride (table salt) which is formed when hydrochloric acid and ammonia neutralize each other. Table salt is extracted through the evaporation of seawater or by mining in salt mines.

Flavourings

The boundary between aroma and flavour is diffuse. Flavours in the strict sense are substances that are perceived by the tongue as sour, sweet, salty or bitter. The flavour is, however, experienced the most with the smelling sense. Flavours are as well as aromas divided in: Natural, nature identical and artificial flavouring. An example of natural flavour is liquorice extract.

Sugar

Sugar is used mainly for its sweet taste. But it also helps fruit liquids to retain their colour and thus contributes to the colour in fruit-based sweets. It also increases the durability through absorbing the water in the candy. The harmful micro organisms then can not grow as fast since they need water to do so.
The most common sugar in sweets is common table sugar, sucrose. In addition, there are a lot of other types of sugar which in some cases are suitable to use in some cases. For example:

- Icing sugar. Icing sugar is regular sugar but with a very small grain size. Icing sugar is appropriate to use when you want to cover the surface of the candy with a fine layer of sugar.
- Brown sugar. Brown sugar is a mixture of powdered sugar and cane sugar syrup. It may be appropriate to use if you want to make fudge.
- Muscovado sugar. Muscovado is a type of cane sugar that comes from the island of Mauritius. Light muscovado sugar gives caramel flavour while dark ditto give a liquorice flavour that can be recognized in some liquorice candy.

Acids

Acids are used primarily to give the candy a sour taste. Though a number of acids such as acetic acid are also have a preservative effect. The most common acids in sweets are:

- Benzoic acid E 210, which only has a preservative effect.
- Citric acid E330.
- Lactic acid E 270.
- Sorbic acid E 200, which only has a preservative effect.
- Tartaric E 334.
- Malic acid E 296.
- Acetic acid E 260.

Anyone who makes their own candy with fruit flavour should preferably use citric acid or lemon juice.

Surface treatment

Candy is surface treated mainly to give it a glossy surface. It is common to use beeswax or carnauba wax.

Recepies

Economically, it is absolutely no point in making candy because the ingredients are often significantly more expensive than what industry made candy costs in the supermarket. There is also pretty hard to get it as good and pleasing to the eye as it is professionally made candy. For those who still want to try, here are some recipes. It may take some experimentation to get the candy as you want it. Start with a small batch when experimenting.

The red slime in my dust bin is a rasberry fudge.

Chocolate truffles

Take out:

- A pot
- A measure deciliter
- A whisk
- A teaspoon, for measuring the appropriately sized beads
- A small bowl to pour cocoa
- A plate, to put the finished balls on

Ingredients:
1-1.5 decilitre of cocoa
1 dl whipping cream
0.5 dl regular sugar or light muscovado sugar
25 grams of coconut fat/margarine/butter
Flavouring [1]

[1] For example, caramel sauce, or whatever you have at home. Note however that if what you add contains much fluid, you need to make up for it by reducing the cream proportionately.

To do this:

1. Melt the butter in a saucepan, on relatively low heat.
2. Add about 0.5 decilitre cocoa.
3. Stir.
4. Add cream, sugar, aroma and flavour.
5. Add another 0.5 decilitre cocoa.
6. Stir.
7. Set the pan in the refrigerator.
8. Pour the cocoa in a small bowl.
9. When the batter is quiet solidified (after about half an hour in the fridge), roll it to balls with the help of hands and a teaspoon (to measure the size of the balls).
10. Roll the balls in cocoa.
11. Put them on the plate.
12. Place the plate in the refrigerator.

Note 1! The balls should be kept relatively cool because otherwise they become sticky.
Note 2! The balls should be eaten pretty soon, because they have no preservatives.

Jelly

Take out:
- A pot
- A measurement kit
- A plastic case, to use as a mold
- A plastic cutting board
- A knife
- A whisk

Ingredients:
1 dl sugar[2]
1.5 dl water + 5 tablespoons of water to dissolve the gelatine powder in
5 teaspoons gelatine powder[3]
Flavors[4]
Matching food colour

2. If you make liquorice candy one should preferably use dark muscovado sugar, otherwise use regular sugar.

3. Candy gets tastier if you use gum arabicum instead of gelatine, but Gum arabicum is pretty hard to get a hold of and it is pretty expensive. A bag of about 25 grams cost about 50 SEK (in 2006). If you have gum arabicum, follow dosage instructions on the packaging.

4. To make fruit candy you can use, for example:
2 teaspoons of citric acid
Raspberry flavour/strawberry flavour/aroma berries or other fruit flavours.
If you want to make liquorice candy you can use for example:
Liquorice extract[5] and 1 teaspoon of salt

5. Liquorices extract is available in health food stores, but it is quite expensive (about 150 SEK for a small bottle).

If you ad wheat flour in the mixture you get a more stabilized product, like liquorice pipes, which in some cases are delicious.

To do this:
1. Dissolve 5 teaspoons gelatine powder in 5 tablespoons cold water.
2. Put water, sugar and possibly also salt in saucepan.
3. Set the pan on the stove and turn it on.
4. Heat the mixture until the ingredients has dissolved in the water.
5. Remove the pan from the stove.
6. Pour in gelatine.
7. Pour the mixture into the mould.
8. Add the aroma and flavour a little at a time, stir it and taste regularly. Stop when you find that the taste is just right.
9. Add the dyes bit at a time. Stop when you think the colour is good. You can also experiment with spreading the colour sloppy and mix colours. Then, if you succeed, you get a nice pattern.
10. Stir, but no more than that the colour and flavour just been distributed evenly in the batter.
11. Place the mould in the refrigerator until the batter has set, (takes one hour).
12. Carefully remove the candy from the mould and place it on the cutting board.
13. Cut out square shaped candy pieces with a knife.

Fudge

Take out:
- A pan, at least 2 litres
- A measure decilitre
- A baking dish
- A small bowl

A variant with 1 deciliter nut cream and only 50 grams of margarine. They where pretty good.

Ingredients:
4 dl sugar[6]
1 dl whipping cream
100 g margarine
25 marshmallows
Aroma, flavor and colour[7]

6. If you want to make fudge with fruit flavour is appropriate with powdered sugar. For fudge with caramel flavour it is advisable to use light moscovado sugar. For liquorice fudge it is advisable to use dark muscovado sugar.

7. For fudge with, for example, fruit or liquorice flavours add the desired essential oil and colouring as below. For caramel fudge add 200 grams light or dark chocolate and 2 teaspoons instant coffee.

To do this:
1. Grease the oven dish with margarine.
2. Turn on the stove (not too high heat) and put a saucepan on it.
3. Put the margarine[8] in the pan.
4. Add the sugar.
5. Add the cream.
6. Add the marshmallows.
7. Stir until all the marshmallows have melted.
8. Remove the pan from the stove.
9. Add the aroma and flavour a little at a time, stir it and taste regularly. Stop when you find the taste is just right.
10. Add the dyes bit at a time. Stop when you think the colour is good. You can also try to distribute it sloppy and mix colours. Then, if you succeed, you get a nice pattern.
11. Spread the batter in the oven dish.
12. Place in the refrigerator until the fudge has set.
13. Cut it up into suitable pieces.

8. To make caramel fudge, start by melting the chocolate (on low heat) and then put the coffee powder into the melted chocolate before adding the other ingredients.

Caramel

Take out:

- An oven tray
- A two-litre stainless steel and heavy-bottomed saucepan with lid, do not use an aluminium pot
- A measurement kit
- A thermometer measuring up to at least 180° C (it is possible also without thermometer, but the risks are greater that you will fail)
- Scissors
- Margarine, coconut fat or vegetable oil with a neutral flavour, such as almond oil, or corn oil
- Clean rubber gloves
- A small bowl
- One or two large towels
- One or two spatulas

Ingredients:
1 dl water
5 1/3 dl sugar
3 decilitre glucose[9]
Icing sugar, for surface treatment
Flavour and colour[10]

9. Glucose is especially convenient to use in toffee making, since it makes the batter more even and un-crystallized. It can be purchased at pharmacies, where a tube of 50 ml cost 33 SEK (in 2006).

10. Fruit flavour
2 teaspoons citric acid or 3 teaspoons if you want extra sour toffees
10 drops of for instance yellow or red food colouring
30-40 drops of an essential oil such as orange-/lemon oil or rasberry-/strawberry flavour

Peppermint
0.5 teaspoons of black food colouring
35-45 drops peppermint oil[11]

11. Peppermint oil is sold at pharmacies for about 40 SEK/ bottle.

Liquorice
5-6 tablespoons liquorices extract[5]
1 teaspoon of salt
0.5 teaspoons of black food colouring

5. Liquorices extract is available in health food stores, but it is quite expensive (about 150 SEK for a small bottle).

To do this:
Be careful not to burn yourself or cause any burns when handling the hot caramel mixture.

1. Start the oven and set it to about 100° C.
2. Grease an oven tray and all utensils that will come in contact with the caramel mixture.
3. Put the oven tray in the oven.
4. Spread towels where you plan to put the oven tray, so that you protect the bench from damage.
5. Fill a small bowl with the icing sugar.
6. Put water, sugar and glucose in the saucepan.
7. Turn on the stove and set the saucepan there.
8. Boil the mixture, without stirring, until it reaches a temperature of approximately 160° C[12].
9. Take the pan off the stove.
10. Remove the tray from the oven and place it on the towels.
11. Pour the batter on the tray.
12. Spread the flavouring and colouring on the batter.
13. After a minute or so, you can begin to scrape it together to a string.
14. Put on the oiled rubber gloves.
15. When the batter has cooled enough for you to handle it, grabs it.
    Note! The batter should be warm and soft, otherwise the race is run.
16. Process the batter by drawing it so that I becomes like a rope. If you then add up the batter again and repeat the drawing you get shinier caramels. The more you pull the smoother, shinier, and less transparent the batter will be.
17. Once the drawing is completed, form profile that you want (for example, cylindrical).
18. Cut bite-sized pieces.
    Note! The cut sweets should not come in contact with each other while they are cooling down, because they easily stick together.
19. Scroll, if you want, the sweets in icing sugar.

12. Keep track of the temperature when you heat the sugar mixture, it rises rapidly towards the end! Temperatures lower than 157° C gives soft and slightly sticky candies. If the temperature is higher than 165° C the batter is getting burned. If you do not have a thermometer, cook until the mixture is darkened and become syrupy. It must definitely pass the drop test: A drop of the mixture hardens and becomes solid when dropped into cold water.

Toffee

Take out:
- An owen dish in glass or ceramics
- A two-litre stainless steel heavy-bottomed saucepan with lid, do not use an aluminium pot
- A measure decilitre
- A tablespoon measure
- A sharp knife

Ingredients:
2 dl whipping cream
2 decilitre sugar
0.5 decilitre light syrup or light muscovado sugar
Butter or margarine
Taste and colour[13]

[13.] For example, one tablespoon of cocoa, or nut cream.

To do this:
1. Grease the oven dish.
2. Turn on the stove and set the pot there.
3. First add the cream, then sugar, syrup and cocoa.
4. Stir fairly often.
5. Boil the mixture until it thickens. The process is complete when it passes the drip test: One drop of the mixture solidifies and becomes solid when dripped into cold water.
6. Stir in 25 grams margarine/butter and pour the batter into the greased oven dish.
7. When the batter begins to solidify cut it into squares with a sharp knife.

Nougat

Take out:
A stainless steel heavy-bottomed saucepan with lid, do not use an aluminium pot
A measurement kit
An Owen dish of glass or ceramics
A kitchen knife

Ingredients:
2 dl almond
2 dl granulated sugar or light moscovado sugar
8 tablespoons water
4 teaspoons lemon juice
Butter/margarine

To do this:
1. Grease the oven dish with butter/margarine.
2. Put water, lemon juice, sugar and almond in the pan.
3. Turn on the stove and set the pot there.
4. Stir constantly.
5. Boil the mixture until thickened, about 15 minutes. The mixture is complete when it passes the drip test: One drop of the mixture solidifies and becomes solid when dripped into cold water.
6. Pour the mixture into the oven dish.
7. When it has solidified a bit, cut it into squares with a knife, and pick them out.

Some health aspects

Allergenic substances in candy

Examples of allergens that may be present in candy:

- Wheat protein and gluten, in the form of glucose syrup that may be made of wheat.
- Eggs. Marshmallow type candy can be made from egg whites.
- Hazelnuts, almonds and peanuts. Traces of nuts may be present in all chocolate products.
- Soy. In many chocolate products there is lecithin from soy.
- Dairy products with cow's milk protein and lactose is present in many chocolate products and candies such as caramels beans and fudge.
- Sulphite occurs both as preservatives and antioxidants in some candy.
- Carmine. Carmine is a red dye that could occur in candy which can cause severe allergic reactions.

Liquorice

Liquorice also acts expectorant and it is therefore used as a treatment for cough. As you may have noticed, some cough medicines tastes liquorice. Liquorice also has a laxative effect, but to notice it one has to eat a lot. Someone who consumes large quantities of liquorice during a long period may also run a higher risk of getting high blood pressure and eventually even heart problems. To be on the safe side one should, at regular consumption, stay under 50 grams of liquorice candy per day.

Salt

Salt is an essential nutrient, but a high intake of salt increases the blood pressure and with it, the risk of cardiovascular diseases.

Salmiak

One should not consume pure salmiak as candy, since it may cause acute health problems.

Sugar and fat

Jelly and sour candies contain mostly carbohydrates, in the form of sugars and starches (see table 1). Chocolate contains besides carbohydrates also fat. “Health sweets”, like chocolate covered nuts and stuff does also contain fat, sugar and starch. The difference compared to regular candy is that Health candy contains more fibres, because they often containing dried fruits or nuts.

Table 1. Approximate nutritional content of 50 grams of sweets of various kinds. In Sweden we eat an average of about 46 grams of candy per person and day. And we on average consume about 1 500 to 3 000 kilocalories (kcal) per day.

	Energy (kcal)	Fat (g)	Carbs (g) not fibers	Fibers (g)	Iron (mg)
Milk chocolate	278	17	27	0,2	1
Dark chocolate	274	16	30	0,5	1,8
Jelly	175	0	40	0	0,7
Caramel	197	0	47	0	0,6
Kit Cat	282	15	33	0,4	1,1
Toffee	228	9	35	0	0,4
Helth candy	193	11	20	8,5	1,6

Sugar alcohols and artificial sweeteners

Just as sugar, sugar alcohols contain energy. Which is important to know, for those who do not want to gain weight. Consumption of large amounts of sugar alcohols may also have a laxative effect. But the bacteria in the mouth do not break down sugar alcohols to acids, making them better for the teeth. Artificial/synthetic sweeteners such as saccharin or aspartame, however, are not only gentle to the teeth but also almost free from energy. But aspartame contains phenylalanine and people who have the innate disease phenylketonuria can not stand that topic. That's why it says "Contains a source of phenylalanine" on some candy products.

A quick lesson in cooking

Important methods of preparation

Boiling

Fish should actually not boil but only semi-boil, i.e. the liquid shall not bubble. Fish should also only semi-boil a short time. If it is left long on the stove, it becomes dry and stringy. You see when the fish meat is ready as it will be white. Check if it is white even inside. Also check if the juice is transparent (= ready) or if it is bloody (= not ready).
Shellfish, such as shrimps, should be cooked a very short time (shrimp, who are usually cooked in advance, should only be heated while fresh raw mussels shall be boiled (simmer) for about 5-8 minutes). Pork, lamb, beef or venison can, however, boil a fairly long time. The longer the meat boils, the more it falls down, thus becomes more easily chewed. In addition, the spices penetrate further and further into the meat with increasing cooking time. For example, put the pan in the oven overnight at 80° C. Poultry, such as chicken, is usually best to split and fry on low heat in a saucepan with a lid, for 20-25 minutes along with the vegetables. Then pour in the liquid and let it boil for a short while.

Vegetables get better the faster they are heated, since a smaller portion of vitamins and flavour is destroyed. Moreover they should be added in the water when it boils vigorously. They are usually tastier if the water is salted (2 teaspoons of salt per litre of water, but the more bitter vegetable, the more salt). Most vegetables shall cook in little water and under a lid. But green vegetables, such as peas and broccoli, shall be cooked without lid, otherwise they lose some of their colour (because the lid prevents certain acids from evaporating). Most vegetables a ready when they have softened. They are usually best when they are just almost soft (try for example with a fork, if the fork easily goes through, the vegetables are ready). Unlike fish and shellfish, vegetables are not destroyed if they cook too long, they just lose flavour and become loose or broken. Additionally they absorb more water and thus can be watery. Baby vegetables should be cooked shorter time than big or long-stored ones. And the more enjoyable the vegetables are raw, the less time they need to cook. Sweet peas and tender carrots, for example, should only be cooked for about 10 minutes. Fresh potatoes, celeriac and fresh beets need a little more time (15-20 minutes).
Winter potatoes and bigger carrots have to boil longer (18-25 minutes). Woody vegetables such as turnips and winter beets even longer time (like an hour). A consequence of that is that when making a vegetable stew one should pour the vegetables that have longer cooking time in the pan earlier than more rapidly boiled ones. To even out the cooking time of the vegetables, the ones with the longest cooking time can be cut into smaller pieces than those who are rapidly boiled.

Note if there is any milk product, like cream, in what is cooked, the risk is quite high that burning the bottom of the pan and it burnt usually taste bad. It does not matter as long as one not scrapes it up from the bottom of the pot, except that the pot becomes more difficult to wash. Thus do not stir in the bottom of the pot with sharp metal tools.

Pots

Many commodities, such as meat, get tastier if they are browned (see frying) before cooking. In particular, if together with onions. For those who do not have a real cast iron pot, it is best to brown the ingredients in a skillet before adding them to the pan. Since it is quite easy to burn the stuff in regular pans. Also note that many commodities, such as meat, emit liquid when heated. And as long as liquid remains in the pan/pot, they are cooked rather than fried (see frying below). To avoid this, the liquid should be gradually poured off and saved for the next step, which is to pour back the liquid to cover the ingredients. Remember! The less liquid, the more the flavour of the ingredients. Those who want a thicker liquid should thicken it before it is poured into the pan, because the thickener gathers in clumps when poured into hot liquid.
It's almost always worth the cost to pot some sort of broth in the water, since it brings rich aromas without taking over flavour-wise. A broth coked of leftovers of comodities[1] taste best but bouillon cubes are a good surrogate.

It is often useful to crumble the bouillon cubes before they are thrown into the pot to make sure that there remains no broth clumps when serving the dish. Just be aware that bouillon cubes are pretty salty, and the salinity increases as the water boils off. Another important thing to consider is that different materials have different cooking times (see boiling above). In summary meat wins on cooking a long time (often the longer the better) but fish, green vegetables and herbs do not. Furthermore, certain spices, such as garlic, milder when cooked. And finally, there is a great risk that milk/cream burns the bottom and there forms unpalatable bottom sediments, so anyone who does not want to stir all the time should wait with these ingredients until the boiling is almost ready.

Cabbage casserole. The cabbage is coarsely shredded and it is combined with sausage, onions, potatoes, broth and spices. I think cabbage taste best if the first browned in margarine, in addition, the raw shredded cabbage has such a volume that it fills the entire pan. If the pan is not big enough for it, brown a little at a time. Then add the remaining ingredients.

Season it as you like, but a given season is white pepper. In addition, for example, ginger and honey as well (which fits very nicelly with pork). This stew was pretty good. Though it would have been even better with ham instead of sausages.

Frying in a frying pan

Make sure that what you are going to fry is dry on the surface, because it makes the browning finer (otherwise it will be boiled rather than browned, the raw materials can be dried on the surface by putting them on paper towels before frying). In addition, meat should have room temperature, otherwise much more liquid disappear from the meat, which both makes the meat more boiled than browned and also it gets unnecessarily dry. An easy way to make the fridge cold meat room tempered is to warm it slightly in the microwave before frying. It should furthermore not be so many raw materials in the pan at once because then the bottom of the pan will be covered with raw liquid, which also makes them cooked rather than fried[2]. In the event that it happens I recommended pouring out the liquid, preferably in a cup or the like because it is an excellent base for the aspiring sauce. Note also that the thicker the bottom of the pan, the less the hot frying pan cool down when throwing down the cold ingredients.
Spice up any time at the end or after you have fried, otherwise you risk that the spices gets burnt, it is especially true if you season with sugar/honey. It is even better, of course, to marinate the ingredients for a good while before the frying so that the spices have time to penetrate the meat. Raw materials that can easily stick to the pan, such as cheese, pancakes and breaded meat, requires quite a lot of fat in the pan otherwise the surface of the cheese, or the breading is left in the pan and dishes like pancakes will taste less good. Butter gives a nutty and caramel-like flavour that I think is better than the taste of oil and in addition the browning will look better, but on the other hand it is easier to burn the food compared to when frying in oil.

1. Parts such as bones or shrimp shells are perfectly possible to make broth on. It works as follows: brown the ingredients to the broth, pour down water and any spices and let it cook for an hour and then strain.

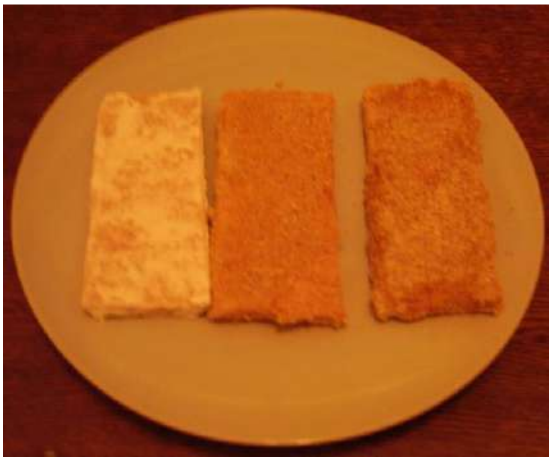
2. There are exceptions like sautés. When making a sauté one pours some liquid in the pan at the end of the frying. The fluid shall the almost completely evaporate. This way the flavours from the pan is transferred to the food, spices and flavours more evenly spread, penetrating the food deeper and makes it a little less dry. For example, try adding a little broth at the end of frying hash.

The thicker vegetables, fish or meat that is fried, the lower the cooking temperature has to be and the longer the cooking time. The more tender and/or thinner materials such as all kinds of fillets and/or thinner materials, the shorter time and higher temperature. For example, a steak shall be fried in like that 20 seconds/side in a hot frying pan (the butter/margarine should be dark brown). Raw meat is soft, a bloody steak is a little harder, pink steak springs back, well done meat is hard. Thus press the meat to check if it's ready. The same applies to fish.
Minced meat dishes, sausage slices, pancakes and herrings shall be fried in hot pan (medium brown butter/margarine).
Herring shall fry 4-6 minutes/side in a hot pan (the butter/margarine should be medium brown). Eggs, onions, raw potatoes, thick steaks or thick fillets should be cooked slowly on a weaker heat (pale brown butter/margarine). Generally, I recommend to rather cook at low temperature compared to high, because the margins to make errors become larger. In addition, it is important to remember that when the pan has reached a high enough temperature, it suddenly goes very fast to burn what is in it.

Pale brown margarine; Suitable for such thick fish fillets. Generally, it is easier to judge the color of the butter / margarine when light is reflected from a bright object like a spatula in stainless steel.

When frying in oil, however, you can not see how hot the pan is because oil can withstand much more heat before its colour is changed. Thus, it is important to keep track of how long the pan has been heated. The oil becomes more viscous when it is hot and a drop of water in it makes it sizzle. Alternatively, put a piece of white bread in it and see if, after a few moments, it has got a light- or dark brown colour (= good, depending on what is to be fried), black (too hot), or white (= too cold).
After frying, there are flavours left in the pan, especially if it is made in cast iron. These can be taken advantage of by pouring the used cooking fat, melt some fresh grease and then pour in a little water, wine or broth to boil for a while. Though if it is fish has been fried, however, it is not appropriate to make sauce of the flavours in the pan, because they taste bad. It is also partly therefore that fish often is breaded[3] before its fried.

3. The breading may be made by putting the ingredients in flour. Raw materials should then be a little damp in order to make the flour to stick. Alternatively, they are dried and brushed with beaten egg and place in bread crumbs. The first way is suitable for frying fish for those who not really want a real breading but just wants to prevent the fish juices to drain into the pan (burnt fish juice tastes bad). The second way is used by those who want to make a regular breading.



Examples of breading on a sliced sausage. The sausage at the far right is breaded in flour alone, the middle is egg & bread crumbs breaded and the one at the far right is breaded with mustard and breadcrumbs. Only flour crumb is in this case not such a great idear, the middle was good, but the right was the very best.
The unusual shape of the sausage slices are due to that I used a straight sausage and cutted it lengthwise.

Gratins

Gratins are done in the oven. Most commodities can be used in a gratin, especially vegetables, preferably with cheese. However, it is important that what is put in the gratin is not watery. In particular, if the raw materials are covered by a blanket of cheese. This is because when the cheese is melted it works as a lid which stops the water from evaporating. Thus the dish becomes watery on the plate and some of the flavour stays with the water which is left in the gratin dish.
Put the raw material in a greased baking dish and sprinkle with grated cheese, eggs whipped with milk and pour over the béchamel sauce with cheese. Some gratins, such as moussaka and lasagne, contain mixed vegetables (eggplant and potatoes) or lasagne plates with meat sauce and béchamel with cheese. Suitable oven temperature is often 200-225° C. The cooking time varies a lot depending on the contents from maybe 15 minutes for pasta gratins with cooked pasta, to maybe 90 minutes for a potato gratin with raw potatoes. As a rule, however, gratins gets tastier the longer they are in the oven, except if they become visibly burned.

A potato gratin that I did using some leftovers in the fridge. The potatoes are grated because it is the fastest way to cut it into small pieces. To further save time and work, I did not even peel them. I do not think it is needed now when they are sold washed. Unfortunately, the potatoes were of a little too hard variety. If I had used a softer variant the gratin had become tastier.

As a frying pan conducts heat better than, say, a glass form, the bottom and the edges of the gratin will get more crispy, which I think is good.

A fish gratin made with mashed potatoes, a frozen piece of fish and instant powder sauce with dill flavor. It looks in some people's eyes may burned, but for me it is perfect. Anyone who shares my delight in browned surfaces can brighten the gratin further through stiring down the existing surface and then put the dish into the oven again.

The work required is to boil the powders according to the packaging instructions, and perhaps round out the seasoning according the personal to taste, anoint a suitably sized baking dish and fill it with the ingredients.

Embedding

Embedding means to heat treat the ingredients in a shell of dough, e.g. pizza dough (calzone) or flour & puff pastry (pie/pastry). A dough for the latter consists of flour, liquid, fat and salt. By varying these ingredients one gets various pies. Suitable proportions are a little more flour than fat and just a little liquid, e.g. 180 g margarine, 210 grams of flour (= 31/2 decilitres) and 7 tablespoons of cold water to a pie dish with a diameter of 25 cm. To get the best results, the dough shall not get hot before the actual heating process. Chop therefore together the flour and fat with, for example, a knife, or even better, use liquid fat because it mixes easily. Add the liquid and gather the dough into a ball and place in the fridge for like 45 minutes like that. Then you just have to dress a pie plate or roll out the dough and cut it into pies and add the filling, which can be almost any commodity whatsoever. Bake in the oven until the pie/pasties has got a suitable colour (usually 15-20 minutes in a 200-225° C oven).

Thickening/sauce making

A sauce usually consists of:

1. Fat.
2. Thickeners.
3. Liquid.
4. Flavourings.

There are two kinds of sauces: those thickened and those that are not. For example, mushroom sauce, curry sauce is thickened, while the red wine sauce is not. The difference between the types doesn't need be greater than thickener.

Thickening

Thickening of sauces can be done in, at least, five ways:

1. Bottom roux. Bottom roux is made by first melting fat in a pan and then pour in thickener[4] and whisk it together. The mixture should be boiled for one minute before the liquid is added. It does not matter if the liquid is hot or cold. The liquid can be milk (gives béchamel sauce, suitable for stews and cheese sauce), broth or something else like crushed tomatoes.
2. Top roux. Those who prepare a powder sauce makes a top finishes. That is, whisks down a thickener[4] in a cold liquid. The thickening of an existing stew or sauce mixture is poured in the hot thin liquid which solidifies when it boils.
3. Thickening with fat like sour cream or mustard (as in Swedish pea soup, which seasoned with mustard).
4. Adding something, such as bread crumbs, that absorbs liquid into the dish.
5. Stows that shall cook an hour or more can be thickened through adding lentils. If they cook about one hour it makes the stow thicker.

[4.] Wheat flour is in this case the most common thickener. The more flour in proportion to the amount of fat, the less fat gravy, but this increases the risk that the sauce becomes too thick and tastes like flour. A too thick sauce can be partially rescued with more fat and then more liquid. The traditional thickener is, as mentioned, wheat flour, but there are also expedient flours (such as arrowroot) that are designed to not clump. Use arrowroot if you want a "transparent" result, which often is the case with Chinese food and the like. Arrowroot is also a good option for people with celiac. Use 1 tablespoon arrowroot for every of 1 litre of soup, but 1-2 teaspoons to 2-3 decilitres of sauce.

Note 1! A thickened sauce very easily burns in the bottom of the pan and the burnt parts taste bad. If that happens, make sure not to scrape off the burnt layer on the bottom. This is preferably done by stirring in the sauce with a ladle which is not pointed.

Note 2! A sauce may cut, in particular if acids, such as ketchup (ketchup contains acetic acid), has been mixed down. That thee sauce cuts mean that the fat does not mix with the liquid. If that happens, it might be fixed by adding an egg yolk, whisk/mix hard or by mixing in more fat.

Note 3! Sauces thicken when cooled down.

Note 4! If the sauce becomes too thick and sticky, it can be remedied by whipping it hard or by heating it and keeping it at a high temperature for a while.

Liquid
Anyone who have the energy to make their own broth using, for example, shrimp shells, bones or fish waste, of course should do that. Preferably in combination with cream or crème fraiche/Turkish yogurt. Every body else usually uses water or milk.

Seasonings
A good way to flavour a sauce is to use a hacked bouillon cube. Other good flavours are Ajvar relish (pepper paste from the Balkans), paprika puree, avocado, cheese, sherry, soy sauce, wine, garlic. Anchovy is also used as a spice in some sauces like pesto. It provides a tasty saltiness (called umami and is considered to satisfy a fifth type of taste receptors), but anchovy is quite expensive. Fish sauce is a simple alternative already used by the ancient Romans. But fish sauce nowadays is produced Thailand and it is both cheap and has a long shelf life, thus it is a must in the modern kitchen!

Commodities

Ground meat

Ground meat (pork, lamb, venison, or ground beef) can be cooked in an enormous number of ways, such as different varieties of burgers with small pieces of cheese, bacon, salami or vegetables in them. But the larger the pieces in the ground meat, the more difficult it is to maintain the shape in the pan. If so, the amount of binder should be increased. A suitable binder is minced egg and a reasonable amount is 1-2 eggs to 500 g of minced meat. Without a binder the mixture easily becomes a meat sauce, but it’s also good.

Potatoes

Likewise, potatoes can be varied in many ways. Here are some suggestions.

Mashed potatoes

1. Peel the potatoes and boil them soft.
2. Drain the water.
3. Pour in milk and butter/margarine.
4. Season with salt, white pepper and maybe also nutmeg.
5. Mash with a mixer.

Mashed potatoes, in turn, can be mixed with eggs and flour and then fried (= potato dumplings) or Made in the oven (duchesse potatoes, served with steak and béarnaise = planked steak, or covered with meat sauce and cheese = shepherds pie).
Regardless of the form in which the mash is served, it goes well with most things that are good, preferably with cream, spinach and/or cheese.

Creamed potatoes

1. Peel, chop and boil the potatoes.
2. Make a béchamel.
3. Pour the cooked potatoes in the sauce.
4. Let it simmer for 5-10 minutes. Stir occasionally so that it does not burn.
5. Season with white pepper, onion, soy sauce and/or dill.

Raw fried potatoes

1. If needed, wash the potatoes and peel if desired, but none of this is necessary nowadays when the potatoes are sold washed.
2. Slice the potatoes thinly and evenly. It is easy for the user of the large groove of a grater.
3. Place the slices in cold water for 15-20 minutes (then some starch disappears and the fry surface gets better).
4. Set the oven at low heat (about 150 ° C).
5. Let the slices dry on paper towels.
6. Brown the slices in oil a frying pan (one layer at a time). The more oil the finer the finish.
7. Place the finished slices in a greased baking dish.
8. Season with, for example, salt, garlic and rosemary.
9. Leave them in the oven until they are soft.

Rice

Rice can actually also be varied. Here are some suggestions.

Yellow rice Indian style
4 dl of rice
3 tablespoon of cooking oil
2 yellow onions
3 bay leaves (to crumble)
one teaspoon whole cumin seeds
6 whole black peppercorns
6 dl water
salt
a little turmeric.

Bay leaves, cumin and black pepper can be exchanged with, for instance, a cinnamon stick and cardamom.

1. Rinse the rice and let it soak for a while (type 20 minutes).
2. Peel and chop the onion.
3. Heat the oil in a saucepan.
4. Add the onion and fry it until it is light brown.
5. Pour the remaining ingredients.
6. Bring to a boil.
7. Reduce heat and cook under a tight-fitting lid until the water is boiled away and/or the rice tastes as it is ready (like, 10 minutes).

Rice with cheese
rice
salt
cheese
cayenne pepper.

1. Boil the rice to taste or package directions.
2. When the rice is ready, add the cheese and cayenne pepper.
3. Heat until the cheese is melted. Note stir, like, all the time so that the cheese does not burn in the bottom of the pan.

Nasi goreng, paella or similar
rice
salt
meat/pork/vegetables/seafood
beef stock/fish stock/soy/wine/pepper sauce or other seasoning.

1. Boil the rice to taste or package directions.
2. Roast beef/pork/vegetable/seafood appropriately.
3. Pour the rice into the pan and fry it a little.
4. Add seasoning and stir it well.

Fat

The most common types of fat are sour cream, cream, margarine, oil and butter. But there are also, for example, lard and peanut butter. Fat is used for three different reasons:

1. As a lubricant, butter/margarine or oil mostly. The choice of frying fat often has quite a large impact on the taste of what is fried. Generally, the milder dish, the greater the reason for choosing butter/margarine. When frying at high temperatures, oil is advantageous because it does not burn like butter/margarine easily does. In between, it may be appropriate to blend butter/margarine with oil. One advantage of this is that the butter does not get as easily burned.

2. As seasoning. Fat mitigates strong flavours and it makes the taste "smoother". Moreover, it can highlight certain flavours. Cream and butter/margarine gives the smoothest taste, while sour cream and yoghurt gives a tarter taste. Oil also provides a rather special taste that sometimes is good. There are also a lot of other fats with special taste, which can contribute very positively to some dishes. For example, a few drops of hickory oil give a barbecue marinade, a delicious smoked flavour. And peanut butter lifts dishes with curry flavour.

3. As thickener. Sauces can be thickened by pouring fats like sour cream or Turkish yoghurt in them. But plain yogurt is too thin, and thus it destroys the sauce. Those who want to use plain yogurt must first mix it with grease before it is poured into the sauce. See the chapter about sauces.

Seasonings

Some argue that the key to good cooking is good ingredients. However, it is not true, for example, even the best of the meat gets pretty boring without spices. While even the dullest piece of meat can form the basis of a good meal with the right choice of spices and heat treatment. The real key is therefore a good supply of spices and knowledge about which spices that fit into what, combined with knowledge about your dinner guests taste preferences. Regarding the latter people can probably be divided into three groups:

1. It does not matter how it tastes just its healthy, inexpensive and satisfying.
2. The food should be tasty. The food should contain many spices and often there is no particular spice that dominates. This approach dominates, for example in the Indian and Creole cuisine.
3. The food must have a certain taste, dominated by a particular season (see table 1) or a commodity. This approach characterizes traditional Swedish cuisine as well as the Persian and Italian cuisine.

Which of these three groups your guests belong to is crucial in your choice of spices? If they belongs to the first group, do what you feel like. If they belong to the second one it is a good rule of thumb to balance the four basic tastes: salty, sweet, sour and bitter (all other flavours, in addition to possibly umami, are combinations of these basic tastes and odours). But it is often wise to exclude the bitter taste, because many people do not think that is so good. In addition, it is important to remember that meat stews are the least sensitive to errors in the seasoning, while mild dishes, such as pancakes are very sensitive. If your guests are from group three, however, you decide on a theme, such as herbs, and pick out what you have of such spices. If you feel uncertain about if a certain spice would add something positive to a dish, take a spoonful of it to try the spice on.

Table 1. What spices fits what? * = fits in a few dishes with the listed main ingredient, ** = fits in quite many, *** = fits most.

	Pork	Lamb	Cow	Birds	Fish	Seafood	Wild meat	Vegetables	Comments
Anise						*			Pronounced liquorice flavour, used in breads, sweets and alcohol, but it is not recommended in cooking.
Basil	*	**		*	*		*	**	Should crumble in your hand to bring out the entire flavour, given ingredient if you want to give the food a taste of herbs. Should be added when the food is taken off the stove.
Fenugreek									Bitter taste, unusual in cooking.
Cayenne pepper [A]	**		*	*	**	**	*	*	Common in many countries, strong flavour if it is not too old.
Chilli	*	*	*	*	*	*	*	*	Chilli pepper is quite mild, fresh chillies, however, are strong. They are widely used in for example Asia, Mexico and Africa. Can dampen other flavours.
Lemon pepper					***				Very good with fish.
Lemon grass	**		*	*	*	*	*		Common in Thailand, can be replaced with lemon oil or lemon zest. Should be balanced with hot spices like chilli.
Cocos	*				*	*		*	Sweet taste, common in Thailand, cocos looks pretty unappetizing in casseroles, use rather coconut milk or coconut fat.
Curry	**	*	*	**	*	*	*	*	Spice mixture, can be strong, but in Sweden it is usually weak, the curry should be browned on low heat in the butter / margarine before adding the food (applies also to the ingredients in curry).
Dill			*		***	***			Delicious in many fish and seafood dishes. Should often be added when the food is taken off the stove.

	Pork	Lamb	Cow	Birds	Fish	Seafood	Wild meat	Vegetables	Comments
Dragon		*	*	*			*		Use with caution because quite pronounced flavour (tastes like hay), important spice in béarnaise sauce, myself, I would never use it.
Juniper	*	*	*				***	*	Nice with wild meat, gives gin its taste, should usually be crushed.
Fennel	*		*		**	*	*	**	Liquorice flavour, fits well in, above all, tomato-based fish stews, but also in vegetable stews.
Turmeric									Almost tasteless, used as a yellow dye.
Garam masala	*	**	*	*	*			*	Indian flavour, like curry but not as versatile.
Sea salt	***	***	***	***	***	***	***	***	Tastier than rock salt, I think.
Honey	**	*	*	*	*	*	*	*	Can be used instead of sugar, but it should be done with caution.
Ginger	**		*	**			*		Fresh ginger gives a fairly sharp flavour, is widely used in Asia, and fits well in little sweeter dishes such as honey marinated pork.
Cinnamon	*	*	**		**		*	*	Underrated spice, fit into minced beef dishes along with cardamom.
Cardamom	*	*	**				*	*	Common in the oriental cuisine, fits in meat dishes, delicious in coffee.
Coriander	*	*			*			**	Should be combined with other spices. Widely used in India and in South America.
Allspice	*	*	**		*		*	*	A little 'Christmassy' flavour, used for example in Swedish stews. It can easily dominate over other spices.
Caraway	*	*	**	*			*	*	Not so common in cooking, but can fit in stews.
Cloves	*								Strong 'Christmassy' flavour used in ketchup and curry.
Savoury					*			*	Mild flavour can be used in fish soups and vegetable soups.
Chervil					*			*	Sometimes with tarragon in meat stews, should be added at the last minute.
Bay leaves	*	*	*		*		*	*	Used whole or crushed in pots in many countries. Often combined with allspice.
Onion powder	*	*	*	*	*	*	*		Can be used instead of onions, but it’s usually not very successful.
Marjoram	*		*		*			*	Use with caution because quite distinct taste, but it fits in tomato dishes such as pizza.
Nutmeg	*	**	**	*			*	**	Provides a mild flavour used for spinach dishes and mashed potatoes, but you can try to have it in stews and minced meat, common in the Middle East, looses the flavour quickly when it is grounded.
Mint		*							(Peppermint) is widely used in India (such as in salad dressing) and in the middle east, not so successful for use in food, I think.
Oregano		**		*				*	Use with caution because it has quite pronounced flavour, fits (according to some) in some tomato dishes such as pizza. It is added after cooking.

	Pork	Lamb	Cow	Birds	Fish	Seafood	Wild meat	Vegetables	Comments
Pepper[A]	*		**	**	*	**	*	**	Fairly mild taste to be a pepper, often used in the Balkans, should not be browned.
Parsley		**	**	*	**	*	*	*	Good for example in soups, sauces and in some minced meat mixtures.
Horseradish	*	*	*		*	*			Very sharp flavour, often served alongside the main course.
Piri-piri[A]	*		*	*	*	*		*	Very strong, used in Mexican and African food, can be replaced with cayenne.
Rose pepper	*		*						Use with caution, because quite pronounced, little sweet but tart flavour, I do not like it.
Rosemary	**	***	*	*	*		**	*	Pretty penetrating flavour, fits well with lamb and also potatoes. Might be good to ground it before using.
Saffron			*	*	**	**		*	Add saffron strands in a little hot water until the water had a strong yellow colour and smells of saffron then pour water in the dish.
Salt	***	***	***	***	***	***	***	***	Used in most dishes, brings out the flavours. Suppresses bitter flavours.
Sage	**	*		*	*		*	*	Use with caution because quite distinct strong flavour. Goes with rosemary well with pork.
Mustard seeds	*		*		*			*	Can be used when you want some "Indian" flavour. Can be replaced with mustard.
Sesame seeds	*		*	*	*			*	Can be used for breading on meat or fish, or you can sprinkle roasted sesame seeds over your Asian dish, noting, however, that the seeds are very fatty.
Sugar	**	*	*	*	*	*	*	*	It can spice up many dishes to add some sugar or raw sugar may give more "foreign" flavour, keep in mind that everything tastes sweeter when it is hot than when it is cold.
Cumin	*	**	**	*	*	*	*	*	Use with caution since it is taking over pretty easy, common in Indian and Mexican dishes, included in curry.
Black pepper	**	*	**	*	*		*	*	Stronger and more distinctive flavour than white pepper, should be used much more conservative than white pepper.
Celery salt					*	*		**	Fits in vegetable stews and some tomato dishes.
Soy	*	*	*	*	*		*		Can be used instead of salt and as a dye, but you should pour in gently because the taste can take over, I think that Japanese soy sauce is much tastier than the Chinese.
Thyme	*	*	*		*			*	Sweet taste, can be used in fish and meat stews and tomato dishes, fresh thyme can be used in everything. Like many herbs it quickly looses taste when heat treated.
Garlic	**	***	**	**	**	**	**	**	Improves many dishes, gives an "oriental" flavour, remember that the strength and sharpness decreases with the heat treatment time.
White pepper	***	***	***	***	***	*	***	**	Can be used in many dishes, often when it tastes as if something is missing, it helps with white pepper, but use with caution together with potatoes.

[A] Cayenne pepper, paprika and piri-piri are three examples of spices that are based on chillies. However, they have different strengths (see table 2).

Table 2. The hotness of different chilli fruits, level 10 is the strongest.

Level	Fruit
10	Indian tezpur
9	Habanero
8	Thai chilli
7	Cayenne pepper
6	Piri-piri
5	Serrano
4	Jalapeno
3	Cascabel
2	Poblano
1	New Mexico
0	Paprika

Spicy sauces

There are now a large variety of spicy sauces with different flavours. The most commonly known ones are ketchup, mustard and soy. These can embellish a variety of dishes. Ketchup gives a little sweetness and fits well in many dishes (but watch up if you pour ketchup in milk-/cream based sauces because it can make the sauce cut). Swedish mustard gives a pretty strong sweetness that not all are so fond of, but in certain combinations it fits very well, as in game sauce with cream and juniper. In addition, I recommend to try French mustard (horseradish-like flavour), preferably with herbs.
Soy provides a little broth-like flavour and is very salty (so if you want to use soy in the dish should use less common salt). The best tasting soy is in my opinion the Japanese type, please try to compare Japanese and Chinese soy. It can also enable an excellent taste, on for example pork. Soy is also used to give the sauce a darker colour and as an ingredient in barbecue oil (along with oil, sweeteners and spices). In addition to these sauces, I recommend to try the "sweet chilli sauce", fish sauce (see chapter for flavouring sauces) and balsamic vinegar.

Basic equipment

Anyone who likes to improvise when cooking should, of course, have a basic range of ingredients, tentatively at least the ones listed in table 3. Among the tools there should be a couple of gratin dishes, a chef's knife, a cutting board made of plastic, a large skillet, an iron pot, a large, medium and a small pot, blender, whisk, ladle, spatula, peeler, potato press, grater, garlic press, can opener and a rice cooker (ensure that the rice is always good and the preparation takes care of itself).

Table 3. My suggestion on the basic range to always have at home, for many varied and tasty meals, without to much waste material due to that the ingredients are too old.

In the freezer	Why?	In the larder	Why?
Ground meat	Very useful, can become sauce, gratin, burgers et cetera. Goes well with rice/potatoes/pasta.	Wheat flour	Included in white béchamel. Together with baking soda it becomes pizza and with liquid margarine it becomes pie.
Chopped onions & ditto dill	Onions improve most dishes. Dill does the same with almost all dishes with fish and seafood.	Ideal flour& baking soda	Ideal flour is useful to thicken sauces. Baking soda, see above.
Cevapici-sausages	Good to combine with other things to make sauces or casseroles. Goes well with rice/potatoes/pasta.	Rice	Good and very useful, easy to store.
Haricot vertes	Easy to prepare through frying in a frying pan or in the oven. Gets very tasty with a little browning.	Pasta	Good, fits pretty much, easy to store.
White fish filet	A simple base for fish au gratin with potatoes mash and a powder sauce. Also a suitable base for a fish stew with tomato puree and fish broth.	Powder mash	"

In the fridge		Among the spices	
Tomato pure	Fits well into many dishes, easy to use.	Cumin	A little cumin compliments many stews, much cumin gives character.
Liquid margarine	Easier to use than solid fat.	Cayenne pepper	Basic spice.
Bouillon	One of the best spices. Since bouillon cubes are inexpensive, small and easy to store, have all kinds at home.	Allspice	A little allspice magnifies the taste experience. A lot gives character.
Fish sauce	Enhances the taste of most things except pancakes.	White pepper	Basic spice.
Japanese soy	Tastes good, also gives the food a richer colour.	Black pepper	Provides character, thus it should not be used routinely.
Concentrated lemon	Adds the dimension of acid that enhances the whole composition of many dishes. Reduces the taste of frying.	Curry	In larger quantities it gives character. Suitable in many “Asian” style dishes.
Milk	Base in béchamel sauce which of course is very useful. In addition, an important part of baked eggs.	Ginger	"
Eggs	Baked eggs + meat / vegetables / rice / pasta / potatoes together make good gratins. Eggs in a broth / tomato based sauce makes it more "Indian".	Juniper	Gives the sauce a wild character, which is nice sometimes.
Bacon	Good spice to anything even pancakes.	Cardamom	In small quantities it can increase the overall flavour. In particular, ground beef with a little cinnamon.
Cheese	Equally good spice in any dish except maybe those consisting fish.	Cinnamon	See cardamom.
Cheap sausage	Sausages are easy to use. A little sausage can brighten many sauces, gratins, mixes and meat dishes.	Nutmeg	Can increase the overall taste in a lot of dishes.
Garlic	Fresh, dried, or "liquid" garlic raises most dishes except maybe Swedish ones.	Salt	Basic spice. Fits well in plenty dishes.
Potatoes	One can do lot with potatoes and it fits great with many commodities. Easy to vary by pressing, roasting, microwave cooking and more.	Piffi allspice	Might as well add a bit of this spice in your food for safety.
Sweet mustard	In quite a few dishes a good alternative to regular sugar.	Dried garlic	Easy to use.
Sweet chilli sauce	"	Sugar	Every dish should contain a certain amount of sweetness.
Peanut butter	Easy to store. Suitable for many "Asian" sauces.	Paprika powder	Can increase the overall taste in a lot of dishes.

Food from around the world

African food

Common commodities in Africa are, for example, bananas, beans, couscous, goats, millet, peanuts, rabbit, cassava, lamb, corn flour, yam and white yam. Common spices are beriberi pepper,
chillies (red or green fresh), lemon, coconut, curry powder, garam masala, turmeric (gives food yellow colour, but adds no flavour), cinnamon, coriander, nutmeg, piri-piri, cumin and garlic.
The bread diet for many includes some form of couscous (in North Africa) or a porridge made of bananas, millet, cassava, corn meal, sweet potatoes or white yams. The bread diets are often eaten with saucy stews.

Ethiopian stew with rice
400 grams of beef, such as stew chunks
750 g onion
100 g butter/margarine
Teaspoon ½ lemon peppers
1 teaspoon chillies
1 teaspoon curry
1 teaspoon cayenne pepper
½ teaspoon cardamom
1 teaspoon cilantro
1 teaspoon paprika
Salt
2 teaspoon white pepper
1 decilitres of water.

1. Cook the rice to taste.
2. Peel and chop the onion and place them in a casserole.
3. Brown the onion over low heat for about 30 minutes without fat. Stir fairly often.
4. Add the butter/margarine and spices (except salt).
5. Chop the meat into pieces and pour it into the pot.
6. Brown the meat.
7. Pour in the water.
8. Add salt according to taste.
9. Boil it all on low heat until the meat is done.

Indian food

Common commodities in India are basmati rice, onions, lentils, oil, potatoes, cheese, butter, spinach, tomatoes, yogurt, and whipped cream. Common spices are chilli powder, chilli peppers (red or green fresh), lemon, coconut, curry powder, garam masala, turmeric, fresh coriander (often as a garnish), ginger (fresh or dried and grounded), cinnamon, bay leaves, nutmeg, saffron, salt, cumin seeds (whole or grounded) black mustard seeds and garlic. In India, most are vegetarians and they have many good vegetarian dishes. But any kind of meat can be cooked in Indian style and it usually gets very good. Many dishes consist of some form of stew and in India it is often eaten with bread or steamed basmati rice.

Lamb balls with coriander
400 grams of grounded lamb
½ -1 teaspoon of salt
1 teaspoon cumin (preferably fresh grounded)
1 teaspoon coriander (preferably fresh grounded)
½ dl of chopped parsley
3 tablespoons of plain yogurt.

For the sauce
3 tablespoons oil
1 cinnamon stick
1 teaspoon cardamom
1 large yellow onion
1 teaspoon ginger (or rather a piece of fresh ditto)
1 teaspoon coriander (preferably fresh grounded)
1 teaspoon cayenne pepper
1 teaspoon cumin (preferably fresh grounded)
3 tablespoons tomato paste
4-6 cloves of garlic
3 tablespoons plain yogurt
2 dl water
½ teaspoon salt.

1. Cook the rice to taste.
2. Mix all the ingredients in the lamb balls.
3. Roll the balls that are a bit larger than ordinary meatballs.
4. Squeeze the garlic.
5. Heat the oil in a pan (the oil may not be hot enough to burn the spices).
6. Add in cinnamon cardamom and chopped onion and fry for 5 minutes, stir occasionally.
7. Add the ginger, cayenne pepper, coriander, cumin, tomato paste, garlic, yogurt, and finally water.
8. Place the balls in the pot when it has started to boil.
9. Turn down the heat and let the pot simmer, uncovered, for 25 minutes.

Chinese food

Some common raw materials in China are, bamboo shoots, broccoli, bean sprouts, pork, Chinese cabbage, chicken, baby corn, pork, rice (preferably long grain) rice noodles, sesame oil, spinach, sweet peas, tofu (cheese made from soybeans), and water chestnuts. Common spices are fresh red or green chillies, hoisin sauce, ginger (fresh or dried minced), coriander (preferably fresh), soy sauce and garlic. Many dishes are quick fried (woked) with a thin sauce. Since they eat with chopsticks in China the rice is sticky and all ingredients are cut into pieces. It is also common with soups of broth and various ingredients such as chicken and noodles.

Beef with peas and rice
500 g beef
500 g sugar peas
3 tablespoons oil
2 teaspoons oyster sauce
2 cloves of garlic
1 teaspoon ginger
Soy.

1. Cook the rice to taste.
2. Shred the meat and crush the garlic
4. Heat a tablespoon oil in a wok or conventional pan (relatively high temperature).
5. Cook the sugar peas in one minute under stirring.
6. Pour in oyster sauce.
7. Take the sugar peas.
8. Pour in the remaining oil.
9. Add the meat, garlic and ginger, dash out soy sauce in batches.
10. Fry for about five minutes, stir occasionally.

Oriental food

Common commodities in the Middle East are apricots, basmati rice, bulgur (crushed wheat), chickpeas, chicken, lamb (often in the form of ground beef), onions (yellow onions and shallots), nuts (such as almonds, hazelnuts and pine nuts), oil, butter, vine leaves and yogurt. Common spices are lemon, dill, chives, honey, cinnamon, cardamom, mint (preferably fresh), nutmeg, coriander, cumin, paprika spice, parsley, pepper, saffron, salt, tahini paste and garlic.
Common dishes are lamb balls, kebabs or stews that simmer a long time (30-40 minutes) on very low heat which are served with rice or bulgur.

Kibbeh
1 kg finely minced lamb (or ground beef)
300 grams of bulgur
1 large onion
1 teaspoon cinnamon
1 teaspoon nutmeg
1/2 teaspoon allspice
olive oil
Salt.
Seasoning can also be supplemented with, for example, lemon, parsley, pine nuts and/or garlic.

1. Place the bulgur in a bowl and cover it with cold water and let it absorb for 10 minutes.
2. Drain and squeeze out the remaining water.
3. Mix in the other ingredients.
4. Knead the mass.
5. Shape the balls so that they are a little smaller than tennis balls.
6. Add the balls in a form with quite some olive oil in the bottom.
7. Fry them in a medium hot oven (about 190 ° C) and roll them occasionally, until they are golden brown and crispy.

Sauce
1 cube of chicken bouillon
parsley
2 tablespoons tomato paste
0.5 litres of water
1 clove of garlic
1 tablespoon of oil
salt and white pepper.

1. Chop the parsley and the bouillon cube.
2. Pour all the ingredients in a saucepan.
3. Cook for a few minutes.

Russian food

Common ingredients in the Russian kitchen are buckwheat, sour cream, onions, carrots, potatoes, beets, pickles, cabbage. Common spices are dill, honey, bay leaves, horseradish, parsley, salt, black pepper, garlic, vinegar. The Russian cuisine is dominated by soups and many eat soup at least once a day.

Russian stew
500 g pot pieces of beef
3 medium yellow onions
5 medium potatoes
2 carrots
2 parsnips
2 tablespoons butter/margarine
2 decilitres water
1/2 beef bouillon cube
2 decilitres sour cream
2 cloves of garlic
2 bay leaves
1 teaspoon black pepper.

1. Chop the vegetables.
2. Put the butter/margarine in a saucepan and let it get warm (rather dark brown butter).
3. Add the meat and the chopped onions and fry it.
4. Add the carrots, potatoes, parsnip, water and bouillon cube.
5. Crush the bay leaves, crush the garlic and add them.
6. Add the black pepper.
7. Let the stew simmer on low heat until the meat is done.
8. Add the sour cream and let it boil.

Swedish food

Common ingredients in traditional Swedish dishes are pork, onions, cream, flour, milk, carrots, potatoes, herring, butter, and eggs. The traditional spices are mostly salt and white pepper, but also, to some extent, for example, cinnamon, juniper, allspice, sugar/sweeteners and lingonberry jam (often as an accessory). Many dishes consist of boiled potatoes with fish or pork fried in butter/margarine and a sauce. The sauce is often a white béchamel sauce with some seasonings such as onions, carrots or spinach (the first is called onion sauce, while the latter two are called stewed carrots/spinach).

Herring burgers with currants and boiled potatoes
potatoes
1 red onion
3 salted herring fillets
300 g minced meat
butter/margarine for frying.

For the sauce
currants or raisins
syrup
vinegar
water
1-2 teaspoons arrowroot
salt.

1. Let the herring fillets lay in water for a few hours so that a portion of the salt is leached out.
2. Peel and boil the potatoes.
3. Chop the onions finely.
4. Mash the herring fillets.
5. Mash or squeeze three boiled potatoes.
6. Mix the minced meat, herring, the mashed potatoes and the onion.
7. Make burgers.
8. Fry the burgers in butter/margarine.

Sauce
1. Boil currants/raisins in about 3 decilitres of water until they are tender.
2. Add a little syrup, and an even smaller dash of vinegar and a little salt.
3. Taste: if it is too hard increase the amount of syrup, if it is too sweet increase the amount of vinegar.
4. Thicken the sauce with arrowroot.

Serve with the cooked or pressed potatoes.

Thai food

Common commodities in Thailand are, for example, bamboo shoots, rice, onions and water chestnuts. Common spices are fresh cilantro, chilli peppers or chilli powder, fish sauce, mint, lemongrass (can be replaced with lemon zest), garlic, pepper, coconut milk, shrimp paste, curry paste, oyster sauce, salt, sugar, turmeric, grounded cumin, ginger, peanuts/peanut butter, lemon.

Meatballs with peanut sauce and rice
500g minced beef (or a package of ready made meatballs)
3 tablespoons oil
2 tablespoons curry paste
4 dl coconut milk
1 ½ tablespoon fish sauce
2 tablespoons of peanut butter.

1. Cook the rice to taste.
2. Shape the mince into ordinary meatballs.
3. Pour 1 tablespoon oil in a frying pan or wok.
4. Fry the meatballs until they are brown.
5. Place them on kitchen paper to remove the oil.
6. Lower the pan temperature.
7. Pour 2 tablespoons oil in the pan.
8. Add the curry paste and mix oil and curry paste.
9. Fry the curry paste in two-three minutes on low heat while stirring.
10. Add the remaining ingredients and stir.
11. Add the meatballs and let it simmer for 5 minutes.

Exercises

Exercise 1, spice testing

Set up all your spices on the table. Close your eyes and take some seasoning in the dark or let someone hold a season at a time under your nose. Try to guess which season it is. Repeat the test, but then taste each season.

Exercise 2, vary the seasoning

Try to vary the seasoning on any dish. Cook it as usual but set up a number of condiments on the table. Season each bite with a new spice and try to judge which one is the best. Consider, however, that apart from herbs, many spices gain a lot on if they are added before the heating of the food.

Exercise 3, "Swedish", "oriental" and "French" mincemeat

500 g minced
1 egg
salt
allspice
white pepper
cardamom
cinnamon
dragon
rosemary
butter/margarine
oil.

1. Mix the minced meat with egg.
2. Divide the batter into three piles.
3. Mix in salt, allspice and white pepper in the first pile.
4. Mix down the salt, cinnamon and cardamom in pile two.
5. Mix salt, dragon and rosemary in the pile three.
6. Shape the ground beef into small patties, fry them and compare the flavours.

Exercise 4, "Indian", "Thai" and "Mexican" sausage

1 big sausage
butter/margarine
garam masala
tomato paste
peanut butter
curry
sweet chilli sauce
cayenne pepper
cumin
chilli sauce
one or two large cans of crème fraiche or boilable yoghurt.

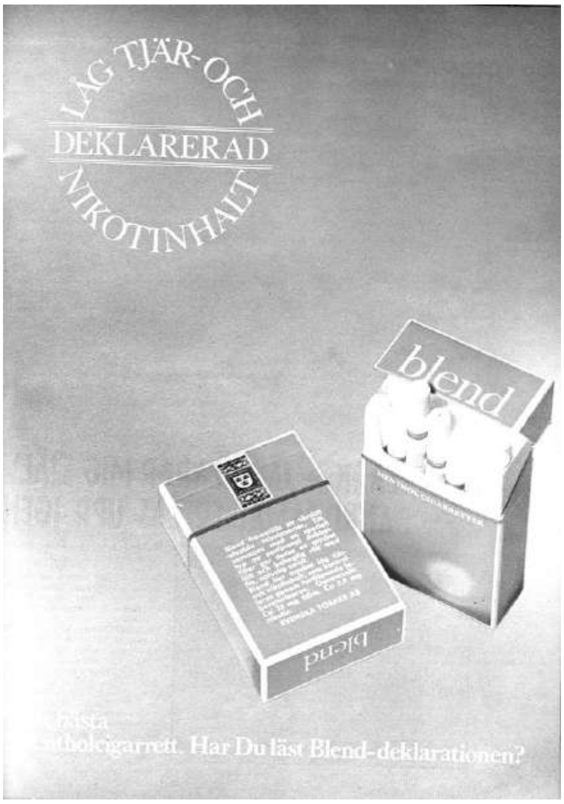
1. Shred the sausage and divide the strips into three piles.
2. Add a relatively decent knob of butter/margarine in a large frying pan.
3. Pour a pile of sausages.
4. When the sausage pieces are just enough coloured: pour in garam masala.
5. Pour a third of the crème fraiche and tomato paste.
6. Let I boil for a while and then pour the sauce into a serving dish.
7. Wipe any time from the pan with a paper or if it burnt slightly, you can rinse out it with water and brush a bit with dish brush.
8. Take one of the other piles of sausages and heat it over low heat in a little butter/margarine.
9. Pour the curry.
10. Add in peanut butter.
11. Pour a third of the crème fraiche and sweet chilli sauce.
12. Let I boil for a while
13. Clean the pan.
14. Take the third pile and fry in a little butter/margarine.
15. Add the cayenne pepper and cumin.
16. Pour in the rest of the crème fraiche and last chilli sauce.
17. Serve with rice, taste and compare.

Popular drugs

Cigars and cigarettes

In the 50's and 60's it was very acceptable to smoke, and smoking was permitted in most contexts.

Maybe because the health risks of the practice was almost unknown.



Cigarette Advertising from 60, 70 and 80's. Note how the forms of advertising were tightened from containing people who smoke (top), to only display the product (bottom left), then supplemented with warning about the harmfulness of smoking (Law 1977). Finally, to be completely banned.

Smoking now appears to be the one, of the drugs discussed here, that is at least accepted in our society.

Street art in Stockholm May 2010.

The label says "Smoking kills".

The practice also implements some disadvantages for the user, such as:
- Spending on tobacco products reduces the economic space to do other things.
- Smoking increases the risk of un-healthyness[1].
- The smoke makes the clothes and home smell bad.
- The practice reduces the smoker's fitness and sense of taste.
- The demand for cigarettes forces the smoker to go out on cold balconies or into smelly smoking rooms.

So why do people smoke?

1. Smoking is believed to cause or aggravate a variety of nasty diseases, including (according to the website of the Centralförbundet för alkohol- och narkotikaupplysning (Central Union for Alcohol and Narcotics Information)): cardiovascular diseases, lung cancer, laryngeal cancer and other respiratory diseases.

Since most smokers quit the habit in adolescence, it might have to do with the situation as a teenager and young adult:

- Teens want to revolt against rules they have to undergo, such as not smoking.
- Smoking can be a part of group identity in some teenage groups.
- Handling of the cigarette and the lighter et cetera, may look cool and it gives teenagers something to do when they hang around doing nothing.
- Cigarettes are a relatively cheap drug and easy to get[2] for a teenager.

When the trials of the teens have passed, the break-up of the parents is completed and a stable self-identity is established, it is for some perhaps quite easy[3] to quit. In particular, as smokers often receive strong support from the environment in these endeavours. Some, however, continue to smoke at higher ages.

2. A pack of cigarettes currently costs about 50 SEK, but it probably last a couple of days. And the age limit for buying cigarettes is 18 years in contrast to alcohol, where the age limit is 20 years. Which means a big difference because an 18-year-old person is still in high school and thus come into contact with even younger boys and girls. Unlike the 20 year olds who often live in a different host with a job or higher studies.

3. The more people who smoke in a group or in a society, the greater the chance that people who are not really as cod on the use or the drug nicotine, will smoke. This is supported by data from Statistiska Centralbyråns (SCB, Statistics Swedens) interview studies about smoking habits. Among all those born in between 1937-1956, approximately 60% of the women and 70% of the men smoked daily at some point in their lives (SCB, Living Conditions, Report 114, alcohol and tobacco use), probably the majority of them smoked in the days when it was very popular to smoke. Today (year 2004-05) fewer than 25% of them still smoke, which means that more than half of them has managed to quit.

The majority (4 persons, table 1) of the seven[4] smokers and former smokers who participated in this study, argued that the biggest advantage of smoking (and thus perhaps the reason for the practice) is that it is social and as many found it soothing. It may be due to the handling of smoking articles giving the smoker something to do, talk about or think about, which to some extent create a community and/or mental escape from the worries of the moment. Another possible explanation is that the smoke itself is socializing and reassuring because it contains the drug nicotine.

Almost all (6 of 7) the participating smokers and former smokers listed the smell of cigarette smoke in clothes and spaces that one of the disadvantages of smoking. In addition, some of them (3 persons) answered that health risks and/or costs (3 persons) are drawbacks. The majority of smokers (4 of 7) did, however, not consider that smoking have/had any significant negative effect on their economy. The question was: *The cost of smoking/month and if it does/did that you could spend less on other things that you want to consume.*

Two of the three who had never smoked thought[5] that the only advantage of the practice is that the users can pause, the third of them thought instead that it tastes good and practice makes you feel tougher. Regarding smoking disadvantages they were fairly consistent with the smokers about that smokers smell bad (2 persons) and that the practice poses health risks (2 persons).

Table 1. Pros and cons of smoking, according to the participants (they answered freely).

What do you think are/were the biggest advantages and disadvantages with smoking?		Answers
Pros	Tastes good	1
	Cosy/nice	2
	Cool	1
	Nicotine kick	1
	Social	4
	Calming	4
	Fell better	1
Cons	Addicting	1
	Expensive	3
	Tastes bad	1
	Poorer fittness	1
	It brings suffering	1
	Health risks	3
	Smokers stinks/it stinks at home	6

4. Four of those involved in this study are smokers and three have been smokers, or is it sporadically. All smoke/smoked only cigarettes and their average daily consumption is/was 17 cigarettes/day. Which is more than the average among Swedish smokers: 11 cigarettes/day for women and 13 for men (SCB, Living Conditions, Report 114, alcohol and tobacco use)?

5. The question was: *What do you think, who have never smoked, appear to be the main drawbacks and advantages of smoking?*

Among all those who continue to smoke up in age, there are reasonably both users and abusers. The boundary between the two categories is unclear and probably varies depending on whether it is considered from a health, economic or social perspective. From a health perspective, it might be possible to draw a line based on health statistics, but to my knowledge it is not yet done. A limit based on economic factors would be difficult because the revenues and expenditures are so individual. Regarding social factors, it is even more difficult because there is no uniform view on the practice in our society. Since in some groups it is a social advantage to smoke. In other groups, however, smokers are more or less bullied and the use/abuse is thus a social burden.

The lack of a clear boundary between use and abuse was also reflected in the participants' responses regarding this (table 2). In one direction, there was a non-smoker who thought that all smoking is an abuse and on the other hand there was a smoker who thought that all smoking is a use, except if the smoker is pregnant or become ill from smoking.

Two of the interviewed[6] considered their own smoking to be an abuse and two felt that sometimes it is an abuse, but usually it is not. While two others found they usually only uses cigarettes. The seventh in the group refrained from answering the question.

Table 2. The use and abuse of cigarettes.

What do you think is use/abuse of cigarettes?		Answers
Use	Dont excist	2
	1 pack/a week	2
	Smoke only when feeling like it	1
	Smoke only at parties	2
	Everything except smoking during pregnancy or if it makes you ill	1
	Everything except smoking used cigarettes is a use	1
	Not answered	1
Abuse	All smoking is abuse	1
	If one have to have a cigarette= abuse	1
	More than 1 pack/a week	1
	Pick up and smoke used cigarettes	1
	Chain smoking	2
	Smoking during pregnancy or despite that it makes you ill	1
	Smoke every day	1
	1 pack/day	1
	Not answered	1

Assume that the use and/or the ritual add something positive, such as a moment of peace and/or social community. In that case, the abuse could be the cigarettes smoker consumes without getting the benefits. Or when the immediate negative effects, such as to stand outside and freeze or smell bad, trumps the positive effects. Something that I think all smokers occasionally experience, as all of these participating smokers said yes to the question: *Has it happen that you lit a cigarette out of habit even though you did not really want it?*

[6]. The question was: *What do you think about your use?*

Cigarettes are not the only type of smokes, but are predominant in Sweden, why?

The participants think (table 3) that cigarettes are the best/tastes the best, depending on how they interpreted the question. With the exception of two former smokers who preferred water pipe. One of the two, who preferred water pipe, is smoking cigarettes anyway because he felt that it was too cumbersome to use pipes. The other one, however, had no explanation for why she still smoked cigarettes.

Thus, the results suggest that many believe that cigarettes are tastier/better and/or less cumbersome than other varieties.

Table 3. The smoker's opinion of different kinds of smoking means. All smokers in the study smoked or smoked cigarettes, but they had tried all the "usual" alternatives to cigarettes, that are standard pipe, water pipe, cigar and cigarillos, except one participant who had never tried water pipe.

What do yuo think about? (rank 5=highest)	Smoker (inclusive former smokers) number:							Average rank
	1	2	3	4	5	6	7	
Cigarettes	5	5	1	5	5	4	5	4.3
Cigarillos	4	4	2	4	4	3	3	3.4
Cigars	3	3	3	3	1	1	1	2.1
Water pipe	2	Don't know	5	1	2	5	4	3.2
Common pipe	1	2	4	2	3	2	2	2.3

For my own part, I thought, as a smoker, it was much larger difference between smoking a good and not so good cigarette, compared to other things I consume. I.e. I felt that many cigarette varieties were so disgusting that I did not like to smoke them to they were exhausted. Which much more rarely happened to me regarding any type of food, candy or drinks. Five of the smokers shared my opinion since they ment[7] that the brand has pretty big importance, greater than ditto for food & drinks. The remaining two smokers did, however, on the contrary, think that the brand of the cigarettes is less important than the brand of different foods.
The results of the survey also suggest that many smokers considered the morning cigarette to be the best (table 4). Even more of the participants preferred to smoke while consuming alcohol. Which probably is common because such ingestion, in my experience, for the moment, even can convert non-smokers to smokers.

Table 4. Best cigarette.

Which cigarett is/was the best. Rank the following alternatives (8= best):	Smoker (inclusive former smokers) number:							Average ranking
	1	2	3	4	5	6	7	
In the morning	8	8	1	8	4	8	6	6.1
Pre lunch coffe at work	Dont smoke then	3	7	3	2	2	2	3.2
After lunch	5	4	5	6	5	4	4	4.7
Post lunch coffe at work	Dont smoke then	2	6	2	3	3	3	3.2
After dinner	“	7	4	5	8	5	5	5.7
On a Sunday walk	“	1	3	1	1	1	1	1.3
Togehter with alcohol	6	6	8	7	6	7	8	6.9
When smething troublesome has happened	7	5	2	4	7	6	7	5.4

7. The answers to the question*: Compared to other things you consume, how important is the brand of cigarettes you smoke/smoked?*

The use of tobacco products generates income to the community, but also problems and costs. For some people, it also brings suffering and/or costs, even if they themselves aren't users. For still others, such as Sweden's tobacconists, it leads to large financial revenues. But for the public and common systems, the social costs could be divided into:

A. Pharmaceutical and healthcare costs for patients caused by the use, and ditto for those harmed by others' use (indirectly injured).
B. Cost of sick days (sick leave),early retirement, and death before retirement, directly or indirectly caused by the use and loss of tax revenue due to that the patient or indirectly harmed couldn't work.
C. Productivity reductions in the public sector that makes society forced to hire more people in order to achieve adequate production.
D. Tax losses since the drug is imported wholly or partly and thus generate tax revenues abroad, when alternative consumption instead had generated tax revenues in Sweden.
Since this money, if used for consumption of Swedish products in Sweden, would have generated tax revenue in several steps, it is difficult to guess how much of this money that would have ended up in the Swedish society funds. But, guess, that half of it had done it.
E. Repair and cleaning costs on public property because of damage caused by the use.

Societal income caused by the practice:

F. Sales taxes generated by the handling.
G. Costs that society will not have to spend since the user die an untimely death after he/she has retired.

However, what can not reasonably included the potential property damage and productivity reduction in the private sector, because it is not borne by society other than the need for more employees to reach the production demand, which is hardly detrimental to society if there is unemployment. But on the other hand, the salary taxes generated in the handling of the cigarettes can not be counted as income, because if the use did not exist, some of them that are currently employed with it, would do something else.

The above can be described by the following formula:

The total cost to society for a period = pharmaceutical and healthcare cost + sick days + early retirement days + productivity lost tax + revenue reductions in the public sector + ½ x tax loss due to imports + repair and cleaning costs on public property because of damage caused by the use - sales taxes - life shortening after retirement.

In short (formula 1):

Societal costs = A + B + C + ½ x D + E - F - G.

Folkhälsoinstitutet (Public Health Institute) has calculated certain social costs (Bolin K & Lindgren B, 2004:3) for 2001. If their data, combined with data from Statistics Sweden, is inserted into the above formula, together with guesswork, where data is missing, the result is:

A. According to Table 26 in the report, smoking costs about 2.2 billion per year in the form of health care and medicine, i.e.:

A_{users}= 2.2 billion.

Probably society's health care costs due to indirect damage as a result of smoking are quite small, so we assume in this rough estimate that:

$A_{indirectly\ affected}$= 0.

B. $B_{users} = B_{early\ retirement\ users} + B_{tax\ loss\ early\ deaths\ users} + B_{sick\ leave\ users}$.

$B_{early\ retirement\ users}$: The amount of lost working years attributable to 2001 were calculated in the report by all adding together all the early retirements due to smoking related diseases and recalculate all the part time jobs to full-time ones. The report authors then came to 2608 years (table 13 in the report). If an early retirement cost society, say, 11 000 SEK per month in the form of sick leave pay and housing compensation pat are:

$B_{tax\ loss\ early\ retirement\ users}$ = 2 608 x 11 000 x 12 = 0.34 billion.

$B_{early\ deaths\ users}$: the number of lost working years for those who died in 2001 is estimated to be 7290 years (table 13). If the smoker's average income in 2001 was, say, 203 000 SEK/year (average income in 2002, SCB 2005, Table 377) the lost tax revenue is (in general the Swedish salary taxes sums up to about 30%):

$B_{tax\ loss\ early\ deaths\ users}$= 7 290 x 203 000 x 0.3 = 0.4 billion.

$B_{sick\ leave\ users}$: No data presented in the National Public Health Institute report. But as sick leave (sickness benefits and rehabilitation benefits) cost about three times as much as the early retirement is assumed here that:

$B_{sick\ leave\ users}$ = 3 x $B_{early\ retirement\ users}$ = 1 billion. It all adds up to:

$B_{users} = B_{early\ retirement\ users} + B_{tax\ loss\ early\ deaths\ users} + B_{sick\ leave\ users}$ = 0.34 + 0.4 + 1 = 1.74 billion.

Probably there are only few people who are on sick leave, early retirement or dies as a result of indirect smoking, so we assume here that: $B_{indirect\ affected}$ = 0.

C. If the proportion of smokers who work in publicly funded activities is as high as in the rest of society. I.e. about 20% of the public employees smoke on daily bases (SCB, Living Conditions, Report 114, alcohol and tobacco use, figure 5). Since 2001, 1.3 million people worked in the public sector (SCB; 2005, table 339), it becomes 260 000 smokers. Suppose that they on average smoke 6 cigarettes during work hours and each time take five minutes to complete it. Then every smoker generates a direct production loss of half an hour per day. Since we work about 46 weeks per year, the total production loss C = 260 000 x 46 x 5 x 0.5 = 30 million hours. Then the total production lost would be 30 000 000/(46 x 5 x 8) = 16 000 work-years. If this production loss would be replaced with additional staff, it would cost society about 203 000 x 16 000 = 3.3 billion SEK in wages. But since it probably is not so that the entire production loss is compensated with additional employees, one can not expect the full amount, but, say half, thus:

C_{users}= 1.6 billion.

It is assumed that: $C_{indirect\ use}$ = 0.

D. In 2001 Sweden imported tobacco for about 1 billion SEK (SCB, 2003, Table 16.1), and we exported such goods for around 0.3 billion. Thus, the import gap for tobacco is 0.7 billion. Say half[8] of that was in the form of cigarettes, then: D = 0.35 billion.

E. Since there are almost no public buildings (excluding prisons) where smoking is allowed indoors, repair costs for public property because of damage caused by the use will virtually be zero. However, the handling of cigarette butts in public places causes some additional costs for cleaning, say, 0.2 billion a year, i.e.:

E = 0.2 billion.

F. The total trade in tobacco generated tobacco tax to the state that sums up to about 8 billion (SCB; 2005, Table 456). Say that half[8] of the tax came from cigarettes and the like. Additionally VAT, which was about 7 SEK/package (SCB; 2005, Table 406) = 0.4 per cigarette, and since there were about 7.3 billion cigarettes[8] consumed, it gave 7.3 billion x 0.4 = 2.9 billion. In that case:

F = 2.9 + 4 billion = 6.9 billion.

G. The number of lost years[9] after retirement due to smoking-related deaths in 2001 is in the report estimated to be 42 369 years (table 13). The strange thing is that the authors do not see this as an economic benefit for society. But everyone that does so will quickly realize that smoking provides an income to the community in the form of 42 369 years less in retirement pay. Say that an average retired in 2001 earned 10 000 SEK a month, including housing benefits. Then society "earned" 42 369 x 10 000 x 12 = 5.0 billion on this, thus:

G_{users} = 5.0 billion.

It is also assumed that the indirect use $G_{indirect\ affected}$ = 0.

Smoking societal cost = A_{users} + B_{users} + C_{users} + ½ x D + E - F - G_{users} = 2.2 + 1.74 + 1.6 + ½ x 0.35 + 0.2 - 6.9 - 5.0 = - 6.0 billion.

Thus society gained on that people smoked!

8. Since 2001, approximately 7.3 billion cigarettes were sold (SCB, 2005, table 249), and since a cigarette weighs about 1 gram will be 7.3 million kg of tobacco in the form of cigarettes. While it was sold 6.4 million kg of tobacco in the form of snuff.

9. It calculated with the formula: the average life - real life, for those who died of smoking-related illnesses in 2001, where the diseased were between 35-84 years. The amount specified in the report's table (table 13) is 49 659 years. But then include it both those who died before and after age 65, which of course both are "unprofitable" and "profitable" death. The profitable deaths are as calculated as total number of years of life lost - years of life lost for those who died before 65 years = 49 659 to 7 290 years = 42 369 years.

Snuff

In the case of snuff is probably more difficult to identify an abuse compared with smoking. Since snuff for most users is probably a fairly small cost[10], the identified negative heath effects[11] are few and not so serious and the use has probably little negative impact from a social point of view.

But even if snus consumption has little effect on the participants' economy, the price of snuff has increased a lot in the last 20 years.

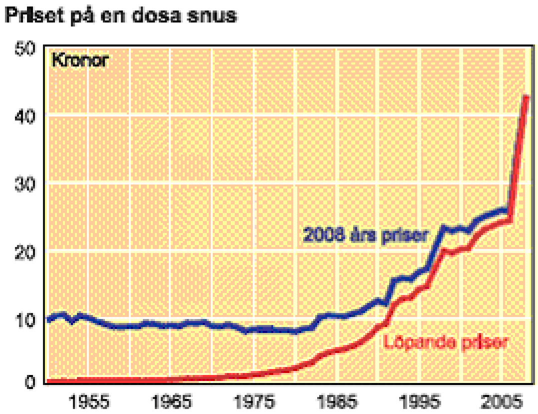


Chart from the Swedish statistical yearbook (SCB 2010) showing the price of snuff (blue) with the general inflation excluded.

10. Neither any of the five interviewed snuff users nor did former snuff users feel that snuff does/did have significantly negative impact on their economy. The question was: *The monthly cost and if it means that you have to skip some other consumption.*

11. It appears to be poor evidence for that there is serious health risks associated with snuff, Vårdförbundet (The union for nurses and similar), for example, says on their website:

"The health risks of snuff are not as researched as the health risks of smoking. With support from the Folkhälsoinstitutet (National Public Health Institute) has therefore Institutet för miljömedicin (Institute of Environmental Medicine), in collaboration with Institutionen för medicinsk epidemiologi och biostatistik at Karolinska institutet (the Department of Medical Epidemiology and Biostatistics, at Karolinska Institute) conducted a risk assessment of snuff use.
Snuff contains approximately 2000 substances, some of which are carcinogenic. According to a balanced assessment of experimental and epidemiological studies, the results indicate that Swedish snuff is carcinogenic. The form of cancer for which the epidemiological evidence mentioned is the strongest is cancer of the pancreas.

"Regarding cardiovascular disease continued research has given more knowledge. Snuff seems unlike smoking not to be an independent risk factor for the onset of myocardial infarction. In contrast, both epidemiological studies and animal experimental studies support the conclusion that the use of snuff increases the risk of dying from heart attacks due to increased risk of heart rhythm disturbances. Snuff is highly addictive. Nicotine prepares the brain for other drugs and increases the susceptibility of such alcohol. A high consumption of snuff also increased risk of obesity, high blood pressure and loss of teeth."

The cost, however, was the negative effect of snuff that most of the participating snuff users enumerated (3 of 6, see table 5). Moreover two of them mentioned that it might be detrimental to health, and two also answered that it is addictive. In addition, a number of minor concerns were raised, such as that it can be difficult to get rid of mountain of used snuff, or that it is bad when you are kissing. The latter, however, was contradicted by a non-snuff user who thought it tastes good to kiss snuff users. Two of the four non-snuff users answered that there is an advantage that snuff users can be drugging everywhere, even a snuff considered that, and two snuff users said that the practice is practical. The advantage, however, most snuff users lined up was that it tastes good (3 persons). This suggests that, overall, it is far from a unified view on advantages and disadvantages of snuff.

Though the strangest thing about the responses is that none of them deals with the drug effects. If they are negligible, so in that case why use it? The survey provides unfortunately no answer to that.

I started using snuff to keep my hunger feelings away, as I struggled to hold back on the food. In the fight snuff was a very effective tool that helped me to lose about 30 kg in weight.

Table 5. Pros and cons of using snuff?

What do you think is pros and cons with using snuff?		Users	Non user
		Number of yes	
Pros	Tastes good	3	
	One can use it everywhere	2	2
	Practical	2	
	It feels good, one whant to have something under the lip	1	
	Does not pollute the sorroundings compasred to cigarettes	2	
	Better than cigarettes from an health perspetive	1	1
	Tastes good to kiss a snuff user		1
	One have something to suck on		1
Cons	There are no cons	1	
	Unsocial	1	
	More yellow teeth	1	
	Tastes bad sometimes	1	
	Causes pain in the mouth	1	
	Bad for the teeth	1	2
	Unnecessary poisson	2	
	Bad when one wants to kiss	1	
	Some people are anoyed by the smell	1	
	Possible negative health effects	2	1
	Addicting	2	1
	Can be hard to get rid of mountains of used snuff	1	
	Must take it with me when travelling	1	
	Used snuff looks disguisting	1	

Just as for cigarettes, it seems that many consider the virgin dose for the day to be the tastiest (table 6). One explanation for this, that is also suitable for cigarettes, could be that it is the dose that has the most drug effect because the body before it has been "clean" for a longer period. The remaining doses were ranked more widespread and two of the consumers felt that they could not achieve any ranking at all, since they used the drug constantly throughout the day.

Table 6. Best snuff.

When snuff tastes the best (7=best)	Snuff user (with ex-users) number:						Average rank
	1	2	3	4	5	6	
In the morning	Dont know	7	Dont know	7	7	6	6.8
Pre lunch coffe at work		2		1	4	5	3.0
After lunch		6		3	6	7	5.5
Post lunch coffe at work		1		2	3	3	2.3
After dinner		5		6	5	4	5.0
On a Sunday walk		3		5	2	2	3.0
On a ski tour		4		4	1	1	2.5

For my own part, with experiences both as a smoker and a snuff user, I thought it was much less difference between a good and less good snuff brand compared with that of cigarettes, but larger than, for example, with beer. The majority of the participant snuff users, however, even think it is less important than that[12]. In relation to the case of cigarettes it is supported by the fact that most snuff users I know, who previously used "General portion", now have chosen low price copies such as "Granite portion." Something most smokers I know, or have known, would not do.

By contrast, the form of snuff appears to be a major issue because I rarely see snuff users switch between different types. All but one of the consumers who participated in this study believed that portion is best (table 7). And to a question about which is more important: brand, type (non-portion/portion) or occasion, most (5 of 6) rated the type the highest. Then it was on average almost a dead race between brand and occasion. The explanation could be that the brand is of little importance, and that many users of snuff, as I, use snuff almost all day long.

Table 7. What form of snuff is the best?

What form of snuff do you think is best (rank)?	Snuffer (inclusive former snuffers) number:						Average ranking
	1	2	3	4	5	6	
Non-portion	1	4	1	2	1	2	1.8
Chewning tobacco	2	2	2	1	2	1	1.7
Ordinary portion	4	3	4	4	3	4	3.7
Mini portion	3	1	3	3	4	3	2.8

12. Four of six snuff users answered something that means "less important" to the question: *Compared to other things you consume, how important is the brand of the snuff you use/used?*

Nevertheless, just as smoking products, snuff generates revenue to the community, but also problems and costs. As for the public and common systems can social income and expenses be broken down the same way as regarding smoking, see formula 1 in the previous chapter, but the variables becomes a guess:

A-C. Suppose health care costs, early retirement, sick leave, reduced productivity and costs for users and indirectly damaged by the use of snuff are negligible, i.e.:

A - C = 0.

D. Suppose that half of the import deficit of tobacco products derived from snuff (0.35 billion, see previous chapter), thus:

D = 0.35 billion.

E. Reasonably repair and cleaning costs on public property consists primarily of cleaning. Say it’s the same cost as for cigarettes, then 0.2 billion, i.e.:

E = 0.2 billion.

F. Say that half of the tobacco tax is generated in the trade of snuff (4 billion, see the previous chapter). In 2001, a package of snuff cost on average of 20 SEK (SCB, 2005, chart 405), therefore VAT on each package was 4 SEK. If a package on average contain 35 grams of snuff and it was totally sold 6.4 million kg of tobacco in the form of snuff (see footnote 8 in the previous chapter), the total VAT from snuff = 4 x 6 400 000 x 1 000/35 = 731 million. Overall, F becomes:

F = 4 + 0.7 = 4.7 billion.

G. I guess almost no one meets an untimely death directly or indirectly caused by the use of snuff, then:

G = 0.

Snuff’s social costs = A + B + C + ½ x D + E - F - G = 0 + 0 + 0 + ½ x 0.35 + 0.2 - 4.7 = - 4.3 billion.

Alcohol

Alcohol is, next to coffee, the most socially accepted drug in Sweden. It is so well spread[13] that it is rather they who do not use alcohol who must be held accountable and has to explain their position. Probably even more so than for those who do not drink coffee.

Unlike the other drugs discussed in this chapter, alcohol affects the brain so significantly that it becomes more difficult to work. Which may explain why, unlike coffee, cigarettes and snuff, the participants think it is best to drink alcohol in the evening and the least good to do it in the morning (table 8). The occasion is more important than the time (table 9) and both of these factors are more important than the type of alcoholic beverages offered or what temperature they then have. It could be interpreted as the right company, or with a good reason, any kind of alcohol would do even in the mornings.

Table 8. When does booze tastes the best, according to the nine participants who still uses alcohol.

When does alcohol taste the best? Rank the following (8=best)	Drinker number: 1	2	3	4	5	6	7	8	9	Average rank
In the morning	1	1	2	1	2	2	1	1	1	1.3
On a picknick	4	6	6	4	4	5	2	5	3	4.3
After lunch	2	2	3	2	5	1	4	2	4	2.8
With the dinner	8	7	5	7	3	3	7	4	5	5.4
After dinner	5	4	4	6	6	4	5	3	6	4.8
After work on a pub or similar	7	5	7	5	7	7	8	8	7	6.8
In the evening at a bar	6	8	8	8	8	6	6	7	8	7.2
When something bad has happened	3	3	1	3	1	8	3	6	2	3.3

Table 9. Is the right time more important than the right type?

What is most important: time, type, temperature on the beverage, Or the occasion? (Rank)	Drinker number: 1	2	3	4	5	6	7	8	9	Average rank
Time of the day	2	3	4	4	3	3	1	1	4	2.8
Sort	3	1	1	1	1	2	4	2	2	1.9
Temperature of the beverage	1	2	2	2	2	1	2	3	1	1.8
Occasion	4	4	3	3	4	4	3	4	3	3.6

13. Of all who live Sweden and are aged 20-84 years about 82% of the women and 90% of the men drink alcohol to some degree (SCB 2007). According to the same survey, the average consumption is around 2 to 2.5 bottles of wine per week for men and about 1-2 bottles of wine per week for women. Per day that is in average 20-25 grams of alcohol for Swedish men and 10-20 grams/day for women. Yet, the study pointed out that the figures are probably underestimates.

Compared with the previously discussed drugs is a hefty consumption expensive for many households. The nine participating alcohol drinkers spends, on average, about 1 400 SEK/month (median 700 SEK/month) on it. The majority of them (6 persons) considered themselves to be able to afford this without that their consumption was affected in general. Three of them, however, on the contrary, answered that it decreased their money for other consumption (The question was: *The cost of alcohol per month and if it forces you to forsake something else?).*

The cost suggests that the participants in median consume about the same as the average Swede[14], though some of them consume significantly more. Since the participants earn about as average, one can probably conclude that for some or many drinkers, the economic arguments against the consumption are of less importance.

Though the practice may have very negative effects on the health. Centralförbundet för alkohol- och Narkotikaupplysning (Central Association for information about Alcohol and Other Drugs (CAN)), claims on their website that alcohol causes risk of: brain damage, gastritis, liver damage, increased bone fragility, varicose veins in the oesophagus, heart failure, pancreatitis, diabetes, muscular and nervous system damage.

The participants were asked, without having faced the above information, about the health problems that can be caused by alcohol consumption. The responses indicate that the knowledge of the risks is pretty bad spread, besides the risk of liver damage. This is because seven out of 10 respondents specifically mentioned liver damage as one of the health risks associated with alcohol consumption, but besides that they only lined up a few risks, such as:

Cow legged (1 answer); depression/anxiety (2 answers), kidney problems (1 answer); visual impairment (1); gastritis (1); diabetes (1); blood clots (1); alcoholic dementia (1); brain damage (1).

So they would not have gained many points if CAN's information would be hindsight and my interview had been a test. The results thus indicate that even among educated drinkers (7 out of 10 participants have studied at the university), knowledge about the risks of alcohol consumption is limited to generally only include liver damage.

14. The average consumption for Swedish men the years 2004-05 (SCB, 2007), corresponds to about 8-10 bottles of wine per month, to the cost of 300 SEK/month and up. When the aggregate gross median income for Swedish men in 2005 was 21 250 SEK/month (SCB, 2009) it means that we in median invested at least 1% of our gross income on alcohol.

The perception of what constitutes a hazardous consumption also appears to be different among the interviewees since they on the question: *What is a hazardous consumption from a health perspective?* Answered:

To drink every day, drink every morning and throughout the day, 3 beer/day, 25 units per week or more, more than 4 cl of spirits/day, when the use is more detrimental than advantageous, more than 9 standard drinks/week for a woman , a bottle of spirits a day, do not know, more than 2 beer/day.

For their own part four of the nine who still drinks alcohol thought that their consumption poses health risks. The question was: *And what about for yourself?* Yet they choose to continue drinking beyond the limit for what they believe is a safe consumption, why?

That could be because, as briefly described below, there are several bids on what level of consumption that is harmful. It may in turn be due to different sources of information have different viewpoints on alcohol issues, from that all consumption is bad to that responsible drinking is positive.

CAN claims[15], based on a health perspective, that more than 1-2 cans of beer a day are a risky consumption. While it is not risky according to a test of alcohol habits published in the Swedish daily Svenska Dagbladet on 23 May 2010.

The latter test contains ten questions, that each can give 0-4 points. These scores are added together to a total. If the total exceeds seven points the drinking is risky. Of the ten questions three quantifies the average consumption and a daily consumption of two cans of beer gives six points (to get maximum points on these questions it requires a consumption of at least five cans of beer a day). The other seven questions are about attitudes to alcohol, and the social and psychological consequences, and these questions gives at a maximum 28 points. Thus the test designers think that these factors together are more important than the actual consumption in the assessment of someone's drinking habits.

Which seems reasonable since the consumption for the majority of us, probably do not destroy the economy. And most of the adverse health effects are likely to show up after such a long time of over consumption, that they do not seem relevant as a threat. But for those who, for example, become violent during the intoxication, the negative effects come directly and they are very real. The reasoning of what, for the moment, is a use or abuse of alcohol could thus be summarized in:

Abuse is a use that leads to significant drawbacks for the user.

Of the 10 interviewees four mentioned arguing and fighting in the response to the question: *What do you generally think are disadvantages, from a social point of view, in that people consume alcohol*? In addition, the responses were spread among different potential drawbacks. None of them considered themselves to cause any major social problems when being drunk. Something that I can basically confirm. So in that respect the practice is in the current situation relatively safe for the participants.

15. From CAN's website:

> *"How much you can drink without risk is impossible to say - there is no completely "safe" alcohol consumption. Some guidance is given, however, of the following risk limits: If we applied the same safety margins for alcohol as other substances in our environment - then you should not drink more than 7 grams of alcohol per day. This corresponds to about a bottle of light beer a day. This applies to healthy adults. At about 20 grams of alcohol per day (equivalent to about a can of strong beer), one can see clear liver damage in women. At 40 grams (two cans of beer) there is an emerging risk for men to get liver damage. If you drink more than 70 grams of alcohol per day - a bottle of wine or 20 cl spirits – you are definitely at risk for severe alcohol-related harm."*

Another reason that some of the participants continue with what they believe is a risky consumption of alcohol is possible that they have had a lot of fun and sex when they have been drunk (table 10). It is perhaps worth the increased risk of poor health in the future, because who does not choose a more enjoyable but possibly slightly shorter life than the other way around?

Table 10. Positive and negative experiences due to alcohol.

Positie and negative experiences due to alcohol?		Answers
Positive	Lots of fun	6
	Many occasions that have become nicer	1
	Met girls/boys, have had sex	5
	Problems have temporarily disappeared	1
	Got clooser to people	3
Negative	Memory latches	1
	Missed funny things since i've been sleeping	1
	Said stupid thing	3
	Done stupid thing	4
	Vomiting	3
	Fights	1
	Hangovers	2

Warning! People who totally leave out drugs suffer a great risk of getting a booring life.

We are affected differently by alcohol. Some become irritable, others joyful, still others appear to mostly get tired and taciturn. This is supported by that the participants described the symptoms quite differently, especially when they have been severely intoxicated (table 11).

At small intoxication, there was a degree of consensus that it makes you happy and excited. The effect seems, however, judging from the responses, to decline with increasing intoxication. And to reach the "goal" for an evening with heavy drinking appears according to the answers to be pretty negative, because all the effects enumerated appears to be rather negative. Yet people put a lot of effort into end up there, why?

Table 11. A summary of the participants' free responses to the question about which effects they feel that alcohol has on them, at different intoxication level.

Your expperienced normal effects of slight, average and heavy intoxication from alcohol?		Answers
Slight	Dizzy	1
	Happy	5
	Relaxed	2
	Feeling better	3
	Creative	1
	Less shy	3
	Cheered up	4
Average	Glad	4
	Fell like vomiting	1
	More opend	2
	Cheered up	2
	Increased wellbeing	3
	Less shy	2
Heavy	Tired	3
	Hungry	1
	Says/does crazy things	3
	Vomits	2
	Just troublesome	1
	Unstable	3
	Headache the day after	1
	Unclear speek	1
	Bad memory	1
	Bad patience	1

A reasonable guess is that it in our quest to have fun we sometimes accidentally take too much of a good thing. And it may be because we react differently powerful, from time to time, to the same amount of alcohol. This in turn may be due to variations in factors such as: hunger, fatigue, sorrows or joys. We hope that we just this time will feel better with more beer, we gamble and sometimes it goes well, other times not. Or maybe we simply do not think about how much we have consumed at the moment and therefore do not realize that it is time to end.

Stockholm University (Jarl J et al., 2006:37) has, for 2002, estimated the majority of the data required in formula 1. These data, combined with ditto from Statistics Sweden (SCB) and guesswork gives:

A. According to the report alcohol cost about 2.2 billion (chapter 3.1) in the form of medical care and medications. In addition the costs for social care were estimated to be 4.0 billion (paragraph 3.2).

A_{users} = 2.2 + 4,0 = 6.2 billion.

The social care for children with addicted parents costs 1.8 billion. In addition, the authors also estimated the health care costs for the proportion of crimes: drunk driving, murder, assault, rape, arson, vandalism, violence and threats against officers, that is considered to be alcohol-related, to 0.12 billion (table 5: health care costs), so :

$A_{indirect\ injured}$ = 1.8 + 0.12 = 1.9 billion.

B. $B_{sick\ leaves}$, = 4.3 billion (table 10).

$B_{early\ retired\ users}$ = 2.4 billion.The authors of the report have then subtracted the estimated fraction of early retirements that are avoided as a result of alcohol's beneficial health effects.
The total loss of earnings due to death was estimated to be 3.1 billion. If the average taxes they pay is 30%:

$B_{early\ death\ users}$ = 0.9 billion.

Which ultimately results in:

B_{users} = $B_{sick\ leave}$ + $B_{early\ retirement\ users}$ + $B_{early\ death\ users}$ = 4.3 + 2.4 + 0.9 = 7.6 billion.

Probably there are few who are taking early retirement, et cetera due to someone else’s use, so we assume in this rough estimate that:

$B_{indirect\ affected}$= 0.

C. It is difficult to make any reasonable estimate of the loss of production in the public sector because of intoxications and hangovers, partly because it is so personal, and depending on the tasks. Though in any event, there is certainly a certain cost. Say it cost society 0.5 billion, i.e.

C_{users} = 0.5 billion.

Say, for simplicity, that: $C_{indirect\ affected}$= 0.

D. We imported in 2002 alcoholic beverages for about as much money as we exported the same (SCB; 2003, table 16.1-16.2). Thus:

D = 0 SEK.

E. Society has to carry the costs of repairing public property due to alcohol-related damage, cleaning of public places/spaces and expenses for police and judiciary. The report authors summarized the latter to 2.5 billion (table 6: prison, police and judiciary, and breath samples). I have no idea what the first two costs may have been, but, say, presumably, that they cost 0.5 billion each. In addition, the researchers estimated the cost of research on alcohol and prevention of alcohol problems, to 0.5 billion (table 7), i.e.:

E = 0.5 + 0.5 + 2.5 + 0.5 billion = 4 billion.

F. The total trade of alcohol generated in 2002 alcohol tax to the state of about 11 billion (SCB, 2005, table 456). The same year it was sold alcoholic beverages, excluding low alcohol beer, for a total sales of 33.7 billion (SCB; 2005, table 246). Which means that VAT on alcohol sales brought in 6.7 billion to the governement[16]. In that case, F = 11 + 6.7 billion = 17.7 billion.

G. The number of life years lost for those who died in 2002 of alcohol-related causes was estimated to be 64 000 years (Chapter 3.5), but the figure booth includes productive life until "normal" retirement age and years as retired. The latter are not reported separately, but overall, it's probably far more pension years than productive years that are lost. So if 2/3 of the years are attributed to people who had reached retirement age, it is reasonably no overstatement. But according to the author of the report 36.000 years of life was saved due to moderate alcohol consumption. These effects will save the most lives of older women. Say that, presumably, 2/3 of those years that are saved are pension years, thus a cost to society and 1/3 are productive years saved (= revenue) that we for simplicity subtract from the cost. Overall, this means that the pension years that society will not have to pay is 64 000 x 2/3 - 36 000 x 1/3 = 30 600 years. Say that the average pension in 2002 was 10 000 SEK per month including housing cost compensations. The society gained 30 600 x 10 000 x 12 = 3.7 billion on alcohol drinking pensioners who died too soon. This means that:

G_{users} = 3.7 billion.

Say again, for simplicity, that no one dies after retirement because of someone else's drinking, that is:

$G_{indirect\ affected}$ = 0.

Alcohol societal costs = A_{users} + $A_{indirect\ affected}$ + B_{users} + C_{users} + E - F - G = 6.2 + 1.9 + 7.6 + 0.5 + 4 - 17.7-3.7 = -1.2 billion.

The suffering that the drug causes a third party is more difficult to quantify financially. The least bad way is to add all the compensations which the district courts decided that should be paid to those affected by alcohol-related crimes. But probably only a fraction of all the crimes done by drunken people is reported. The real figure is thus probably so large that it is pointless to even try to make an estimate.

16. In addition, the state trade in alcohol, in 2002, generated money to the state in the form of 0.08 billion from the governments chain of alcohol shops (Systembolaget, SCB, 2005, table 456) and probably much more from their company for making spirits (AB Vin & sprit). But the latter income is recognized only as a lump sum, together with the dividends from all other government owned companies. So for the sake of simplicity, these earnings are not included in the calculation.

Coffee

Coffee is probably the drug, of the drugs discussed here, which is the most socially accepted. And compared to the other, it is the drug that, among the interviewed users, is consumed to the most moderate extent. Since on average they only drink/drank three cups per day (median: 2 cups/day). Despite this, in relation to other drugs, low consumption, the interviewees mentioned a range of physical effects that they attribute to the use (table 12).
Though few or no long-term health risks are identified, and coffee isn't more expensive than that the consumption has a very small negative effect on anyone's economy. In addition, any adverse effects from a social point of view are probably very small. Though for some reason, they consume the drug in a much more moderate extent than other drugs, why?

Table 12. Coffee's effects according to eight coffee drinkers and two former coffee drinkers.

What effects does coffe have on you (consider for instance the stomach, awakeness, sleeping problems, wellbeing)?	Answers
Laxative[17]	5
More awake	2
Hard to fall asleep if I drink in the evening	7
Gives wellbeing	2
Abstinence if I don't drink	3
Feel like vomiting	1
Clearer in my mind	1
Can give stomach pain	2
Non	2

17. The laxative effect from the morning coffee that some people experience can in part be due to that the digestive cycle comes to the emptying position some time after waking up, no matter what you drink for breakfast (Klein S, 2008).

It could be because coffee does not create the same cravings as the others discussed drugs. Which in this case, probably is because coffee does not make the users happier and/or calmer. But some of the participants believe that coffee brings these feelings (table 13), so the explanation may lie in something else.

Table 13. Pros and cons of coffee.

What do you think are the biggest advantages and disadvantages from using coffee?		Answers
Pros	Makes me awake	2
	Gives wellbeing	3
	Laxative in the morning	2
	Tastes good	2
	Social	3
	Relaxing	2
Cons	Laxative	1
	Affects the stomach	2
	Creates addiction	4
	Hard to sleep at night	3
	Doesn't taste very good	2
	No cons	1

I know no one who regularly consumes coffee in the same amounts as those who, when possible, consume alcohol. Though I remember times when people have complained over various symptoms of coffee overdosing. Probably it didn't give more pleasure than that with time they learned to avoid doing so. If so, in general, it may be the answer, and it may also explain why we encounter so few obvious cases of coffee abusers.

Most participants thought that, like the case with alcohol, the moment is more important than the type of coffee (table 14), which in turn is slightly more important than the method of preparation. But the differences in average ranking between the alternatives were significantly less than for alcohol. Which presumably is due to that the use of coffee, among the participants, is more routine based. Something that the scattered ranking of which time the coffee tastes taste best, suggest (table 15). Most, however, rated the morning coffee the highest. One explanation for this may be that it is when they most need its drug effects, because it mainly consists of that it makes the user becoming more alert.

Table 14. What is most important?

What is the most important the coffee type, the preparation method or the occasion (rank)?	Coffe drinkers (inclusive former drinkers) number:										Average ranking
	1	2	3	4	5	6	7	8	9	10	
Coffe type	1	2	3	3	3	1	3	1	1	2	2.0
Preparation method	2	1	2	2	1	2	1	2	3	1	1.7
Occasion	3	3	1	1	2	3	2	3	2	3	2.3

Table 15. What time is best?

When coffee is the best (7=best)	Coffe drinkers (inclusive ex drinkers) number:										Average ranking
	1	2	3	4	5	6	7	8	9	10	
In the morning	7	7	7	7	3	7	3	7	1	7	5.6
Pre lunch coffe at work	3	4	6	3	6	6	7	2	6	4	4.7
After lunch	2	5	5	6	4	3	6	3	3	6	4.3
Post lunch coffe at work	1	1	2	2	7	2	1	4	5	3	2.8
After dinner	4	3	1	5	5	1	4	1	2	5	3.1
On a Sunday walk	5	2	4	1	1	4	5	6	4	2	3.4
On a ski tour	6	6	3	4	2	5	2	5	7	1	4.1

Societal revenues because of that coffee increases alertness are difficult to estimate and the costs of any gastritis or other coffee-related morbidity are to my knowledge not calculated. However, data are available for the handling of it, and if these are used in formula 1, the cost can be estimated to:

A-C. Suppose the costs for health care, early retirements, sick leave, reduced productivity and the costs for direct and indirect damage caused by coffee are negligible, i.e.:

A - C = 0.

D. In 2001, we imported coffee for 1.65 billion (SCB, 2003, table 16.2), and we exported for 0.36 billion. Thus, the import gap for coffee is 1.3 billion, i.e.:

D = 1.3 billion.

E. Reasonably, this cost consists of the costs for handling of the coffee and its accessories, i.e. cleaning the coffee maker, washing the cups and the like, in public administration. Say that the cost is 0.4 billion/year. In addition, the society has costs due to the purchase of coffee to the staff. Say that everyone who works in the public sector consumes the equivalent of 8 kg of coffee per year, and in the year 2001, there were 1.3 million people in the public sector (SCB, 2005, table 339), so, they consumed 10 million kilograms of coffee while working. A kilogram of coffee cost, in 2001, 46 SEK excluding VAT (SCB, 2005, table 406), then the cost was 0.4 billion.

Together, the E = 0.4 + 0.4 = 0.8 billion.

F. The net import of coffee was, in 2001, 83 000 000 kg (SCB, 2003, table 3.16) and the VAT was 25% and a kilogram of coffee in 2001 cost in average 58 SEK including VAT, the VAT on the same was 12 SEK/kilogram. Overall becomes:

F = 83 000 000 x 12 = 1 billion.

G. Reasonably, this social benefit is very small, type:

G = 0.

$\text{Coffee}_{\text{Social Cost}}$ = A + A + B + C + ½ x D + E - F - G = 0 + 0 + 0 + ½ x 1.3 + 0.8 - 1 - 0 = 0.45 billion.

Costs to society for the use of the drug coffee was thus quite small and it might be completely offset by that all publicly employed coffee drinkers got slightly more alert and thus it enabled a more efficient work performance.

The study design and the participants

The data presented here are, in addition to data that is accompanied by a reference, generated by structured interviews that I have done with ten people (7 men and 3 women). Their average age at the time of the interview was 45 years (median: 46.5 years, min-max: 37-49 years). They had varying levels of education, occupation, income, family and housing conditions. Four were cigarette smokers, and three had been, the other three have never been smokers. Five were snuff users and one had been. Nine were users of alcohol and the tenth had been. Eight of them drank coffee, while two had stopped doing that The questions in the interview are reported in their exact wording next to the respective accounts of the answers (besides that the they are translated to English).
The procedure used has both pros and cons regarding the degree of truth in the answers and how relevant the answers are for people in general, mainly (+ advantages, disadvantages -):

- The sample is small and not representative for the entire population.
+ Since it was interviews and I held the pen, I could to a greater extent assure that the respondents thought about the answer compared to if the respondents had written down the answers themselves. In addition, I was able to, to a higher degree, ensure myself that I understood their responses compared to if I had only been obliged to interpret what they had written.
- Although the respondents appeared to understand what was meant by each question, it does not mean that they actually did it. From that respect open interviews had been better since they are not stopping with a short answer.
- Everybody's opinion changes a little from day to day, so the responses only partially captured true positions.
- Questions about quantifying something reasonably give very different answers depending on the language and the frameworks the answering person uses. For example, the real difference may be less for a person who says that the difference is huge compared to someone who says that there is some difference. The effect is, however, neutralized to some extent when the respondents are asked to rank different phenomena's.

+/- The answers are partly based on open-ended questions, which have the advantage that the participants to a lesser extent are controlled by the optional answers and they had better opportunities to take up various aspects in their responses, compared to when using a questionnaire with suggested answers. The downside is that some of them may have forgotten to mention some experience that they, if it had been check questions, had responded that they shared.

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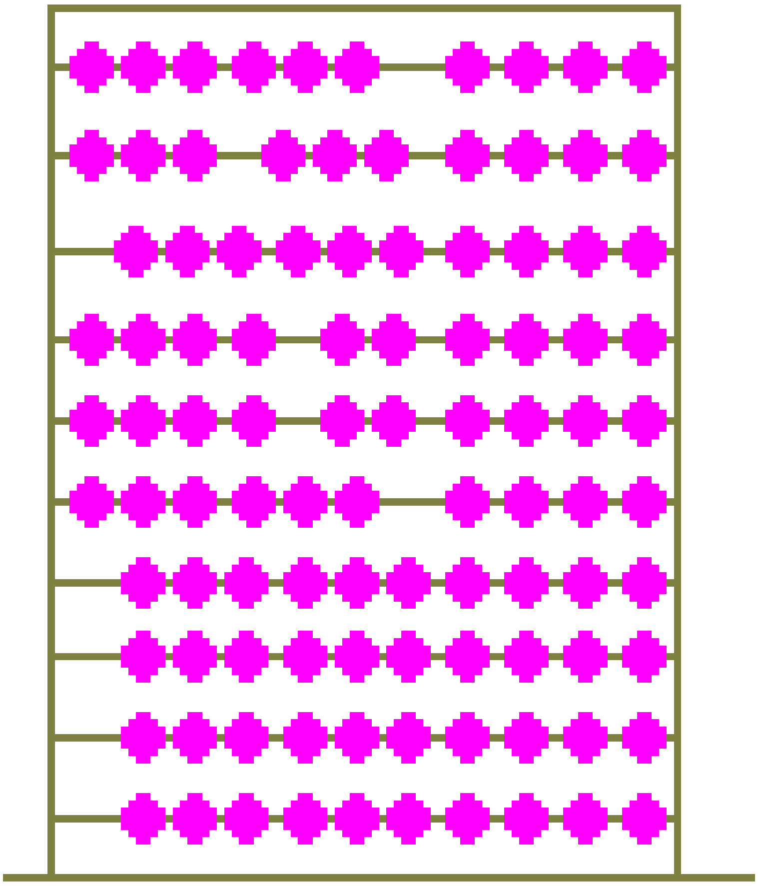
Math and natural science

Mathematics



To count one needs numerals. They do not necessarily need to look like the numerals we write: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. There are former, and sometimes still used systems, with only one character: I. Such systems were first used long before there were paper and pencils. People counted by carving lines on objects like a piece of wood. It worked fine when the only thing that needed to be counted was simple stuff like if every sheep was still in the heard. And such systems are still used today by many when listing points in card games, see for example the following three ways to record the score for four rounds of the Swedish card game “Chicago”:

Method 1. The usual counting with our standard numerals:

Jonas	Anton	Kalle	Johanna	Sara
2+2=4	0	5	0	3
+5= 9	+2+2= 4	+3= 8	+0= 0	+0= 3
+0= 9	+2= 6	+3= 11	+0= 0	+5= 8
+5= 14	+0= 6	+0= 11	+3+3+3= 9	+0= 8

Method 2. Counting by adding lines after each other in a row:

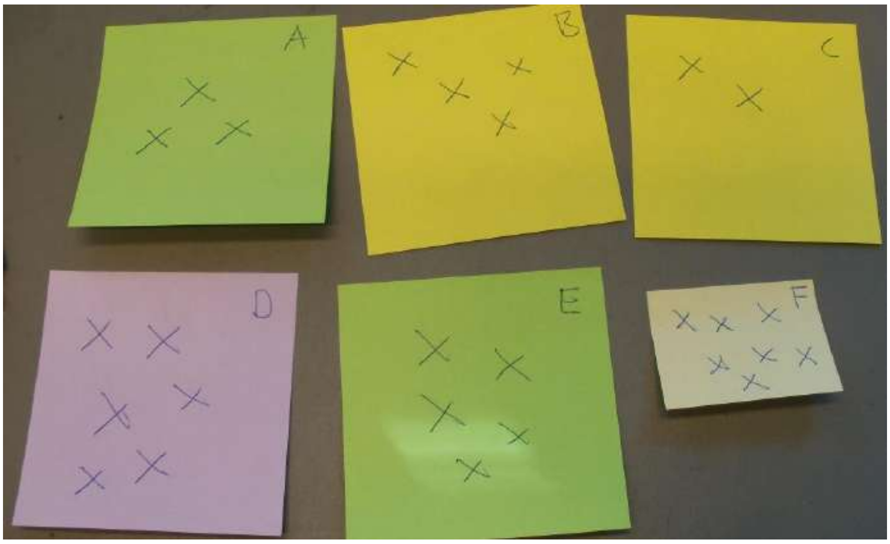
Jonas	Anton	Kalle	Johanna	Sara
IIIIIIIIIIIIII	IIIIII	IIIIIIIIIII	IIIIIIIII	IIIIIIII

Method 3. Counting by adding lines after another up to four, then an oblique line over the four and then another round with five lines, then a new row:

Jonas	Anton	Kalle	Johanna	Sara
~~IIII~~ ~~IIII~~	~~IIII~~ I	~~IIII~~ ~~IIII~~	~~IIII~~ IIII	~~IIII~~ III
IIII	I			

Which would you choose if you were the one who would keep the scoring?
At least I would have chosen method 3 for it is simpler than method 1 and more foreseeable than method 2. But why is it more foreseeable?

Look, one at a time, on the post-it notes below and judge how many crosses there are on each of them.



With a single glance you can probably see the amount of crosses on note A, B and C. But on the notes D, E and F, you probably have to count them. If you have to count you're like most people, who can only take in up to four characters without counting.

But method 3 would, however, be very difficult to use on, for example, price tags in a store. Probably in order to facilitate the use of larger the number, we created symbols given value greater than one. In these early systems each symbol always had the same value regardless of the how it was placed in relation to other symbols, in contrast to our system, where a numeral at the beginning of a row of numerals is more worth than one at the end. For example, 9 111 SEK is much more than 1 119 SEK.

One of these old systems is, to some extent, alive even today. It was invented by The Romans[1]. When the Roman system is used today it works like this:

Value	Symbol
1	I
5	V
10	X
50	L
100	C
500	D
1000	M

By combining these seven numerals in different ways we get different numbers, like for example:

Our numerals	Roman numerals	System with only one character
15	XV (= 10+5)	~~IIII~~ ~~IIII~~ ~~IIII~~
75	LXXV (= 50+10+10+5)	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~
		~~IIII~~ ~~IIII~~ ~~IIII~~
178	CLXXVIII	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~
	(= 100+50+10+10+5+1+1+1)	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~

As long as the numbers were so small that the actual counting operation could be done in the head, the system was probably working decently. But when the numbers are so large that we can not manage to keep them in our heads, it gets worse. The problems decreased sharply when the Indies[2] found out the numerals and the system that we use today.

1. The Romans were those who were citizens of a great and for the time very advanced empire called The Roman Empire that covered all the coasts of the Mediterranean around the year zero of our era.

2. Unfairly these numerals are called Arabic numerals.

Though today we often use numbers that are so large that they become intractable even with these nifty numerals. This problem we solved through introducing various special characters (table 1) in order to avoid having to count the less important figures following the first one.

Table 1. Numeral factor and prefix.

Numeral factor	As ten potens	Prefix	Symbol
1 000 000 000 000	10^{12}	Terra	T
1 000 000 000	10^{9}	Giga	G
1 000 000	10^{6}	Mega	M
1 000	10^{3}	kilo	k
100	10^{2}	hekto	h
10	10^{1}	deka	da
0.1	10^{-1}	deci	d
0.01	10^{-2}	centi	c
0.001	10^{-3}	milli	m
0.000001	10^{-6}	micro	µ
0.000000001	10^{-9}	nano	n
0.000000000001	10^{-12}	piko	p

Although the numbers are large, the vast majority of the mathematical calculations needed for the community and all the appliances to work, still simple. It is almost always enough to master addition, subtraction, multiplication and division.

The large numbers are all around us in our daily lives. And they are often readings from measurements of such things can be measured (called variables), as energy consumption, distance, storage capacity of computers, and the transmission frequencies (known as carrier frequencies) for radio stations.

Energy consumption in one year in a house = 26 321 000 watt-hours (abbreviated Wh) = 26 321 kWh.

Distance Stockholm-Uppsala = 71 000 meter (abbreviated m) = 71 km.

The storage capacity on a hard drive = 3 000 000 000 000 bytes (abbreviated b) = 3 Tb.

The transfer frequency for P1 in Stockholm = 92 500 000 hertz (abbreviated Hz) = 92.5 MHz.

Wh, m, b, Hz are units that we have agreed upon, since it is easier and more accurate to say 60 watt-hours than, for example: The electrical energy needed to power a 60 W's light bulb for one hour.

To describe how different variables affect each other we have decided to use technical formulas. A commonly used one is the one we use to calculate the travel time between two places (the sought greatness in this case, time): The time it takes to travel by car between two places = the distance between them divided with the average speed on the trip, i.e.:

$$\text{The time (in hours)} = \frac{\text{distance (in km)}}{\text{speed (in km/h)}}$$

It becomes clearer when it is written with abbreviations and acronyms commonly used in this case:

$$t = \frac{s}{v}$$

The formula shows that the longer the distance, or the lower the average speed is, the longer it will take to arrive.

And so it is with formulas in general. They describe how things relate to each other. In table 2 a few more or less useful formulas are shown.

Table 2. Some formulas with description of what it means, and examples of metrics.

Variable	Formula	Which means	Examples of measured values
Acceleration (a)	a=dv/dt, where dv= the speed increase, dt= the time for the speed increase	The shorter the time it takes to change the speed, the greater is the acceleration (or the opposite deceleration, thus braking).	5,5 m/s^2 (= 0 - 100 km/h on 5 s)
Density (ρ)	ρ=m/V, m= weight, V= volume	A little thing has grater density than a bigger thing weighing the same.	1 kg/dm^3
Fluid pressure (p)	p= ρ gh, ρ= fluid density, g= gravity (= 9,81 m/s^2, h= fluid height.	The higher the fluid is above something or the heavier the fluid is the higher is the pressure on it.	100 kPa (=100 000 N/m^2= 1 bar)
Mechanical pressure (p)	p=mg/A, m= weight of the load, g= gravity, A= the loaded area	The heavier the load or the smaller the area the higher pressure on the area.	100 kPa (=100 000 N/m^2= 1 bar)

In addition to numbers, parameters, units of measurement and formulas we also need materials to create something more than just thoughts. The most common building materials in our world are carbon, hydrogen and oxygen that are mixed in different ways. These three substances are called elements because they can not be separate into other substances.
But they are still mixtures of atomic particles. Hydrogen is the simplest element. In its basic form it has only two atomic particles: a proton and an electron. The proton and the electron are held together into a hydrogen atom by having different charge, as the poles of a magnet. If the proton is like a small ball in the middle of a giant football stadium, the electron is even smaller and it spins in the top row of the bleachers. Most of the atom is thus void.
The hydrogen atom and all other elements may also have an additional type of particles called neutrons. Hydrogen atoms with neutrons are called isotopes of hydrogen and there are those who have one neutron (deuterium) or two neutrons (tritium).
The next simplest element (helium) has two protons and electrons. The additional next is called lithium and in total there are about 100 elements, of which most are metals. To describe them, we invented the "periodic table". A simple version it looks like this:

1																	2
3	4											5	6	7	8	9	10
11	12											13	14	15	16	17	18
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
55	56	*	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
87	88	**															

* No. 57-71 called lanthanides and they are presented separately partly because they are very rare and partly because leaving them out is considered to make the system easier to grip.

** No. 89-103 called actinides are so rare metals that only four of them at all occur in nature (No. 89-93), the rest can only be produced by nuclear reactions.

The number in each box represents the number of protons found in the nucleus of each atom of the element and thus the number of electrons in its ground state (see below). Instead of the number of protons, one can present the periodic table with the elements names:

Hydro-gene																	He-lium
Litsium	Beryl-lium											Lives	Carbon	Nitro-gen	Oxy-gene	Fluo-rine	Neon
Sodium	Magnesi um											Alu-minium	Silicon	Phosp-horus	Sulfur	Chlo-rine	Argon
Potass-ium	Calcium	Skan-dium	Titan-ium	Vana-dium	Chro-mium	Mangan ese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germ-anium	Arsenic	Sele-nium	Bro-mine	Kryp-ton
Rubi-dium	Strontiu m	Yttrium	Zirco-nium	Niob-ium	Molybd enum	Tek-netium	Rute-nium	Rhodiu m	Palla-dium	Silver	Cad-mium	Indium	Tin	Anti-mony	Tell-urium	Iodine	Zenon
Cesi-um	Barium	*	Haf-nium	Tan-talum	Tung-sten	Rhe-nium	Os-mium	Irdium	Platinu m	Gold	Mer-cury	Tallium	Lead	Bis-muth	Polo-nium	Asta-tine	Radon
Franc-ium	Radium	**															

Some elements resemble each other more than others. For example, gold has more in common with silver than with aluminium. Therefore, they are divided into different ways, here an example of how it can be done:

Hydrogen																	Helium
Lithium	Beryllium											Lives	Carbon	Nitrogen	Oxygen	Fluorine	Neon
Sodium	Magnesium											Aluminium	Silicon	Phosphorus	Sulphur	Chlorine	Argon
Potassium	Calcium	Scandium	Titanium	Vanadium	Chromium	Manganese	Iron	Cobalt	Nickel	Copper	Zinc	Gallium	Germanium	Arsenic	Selenium	Bromine	Kryp-ton
Rubid-ium	Strontium	Yttrium	Zirco-nium	Niobium	Molybdenum	Technetium	Ruthenium	Rhodium	Palla-dium	Silver	Cad-mium	Indium	Tin	Antimony	Tellurium	Iodine	Xenon
Caesium	Barium	*	Haf-nium	Tantalum	Tungsten	Rhenium	Os-mium	Iridium	Platinum	Gold	Mercury	Thallium	Lead	Bismuth	Polo-nium	Astatine	Radon
Franci-um	Radium	**															

Non metallic materials

Noble gases (they resemble in that they normally occur in the form of gas and that they hardly react with other elements)

Noble metals (they hardly react with other elements and many of them have high density).

Light metals (they are lighter than other metals)

Other metals, of which the rare:

Those who mix different elements to mixtures like water, plastic, gasoline and so on, uses various methods and, of course, recipes for what to mix. These recipes are not:

Take two hydrogen atoms.
Take an oxygen atom.
Pour them into a bowl and stir to get a water molecule.

Since atoms are so small that even with the most advanced instruments we can't take only one atom. In addition, recipes in chemistry are not written that way, one reasons is the chemists use the elements abbreviation.

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	T	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	**															

So the recipe for a water molecule could look like this:

$H + H + O = H_2O$

Different elements react with each other because some want to let go of electrons while others like to get more. The electrons spin around at various, more or less fixed distances from the protons in the nucleus. Next to the core rotates, at a maximum, two electrons. On the next orbit distance spins up to 8 and on the further next up to 10 electrons. In the periodic table this is described so that each row in the system will be a new orbital distance (it has partially been thumbed on to make the system transparent). The element at the left of each row has only one electron in its outermost orbital distance, while the element along the right has the maximum number of electrons in it. The model fits well with the fact that the leftmost substances very easily reacts with other substances, while the ones to the far right does not react at all.

The elements at the left reacts by relinquish the lone electron in the outer orbital distance. The elements next to the right instead like to take up an electron so that their outer orbital distance becomes full. Atoms that have given up or received extra electrons are called ions.

The number of electrones per atom, of the element to the very right.

2	H																	He
10	Li	Be											B	C	N	O	F	Ne
18	Na	Mg											Al	Si	P	S	Cl	Ar
36	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
54	Rb	Sr	T	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
86	Cs	Ba	*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
118	Fr	Ra	**															

Emits electrons in the outermost orbit very easily
Emits electrons in the outermost orbit pretty easily
Receive electrons in the outermost orbit very easily
Receive electrons in the outermost orbit pretty easily
Neither emits or receives electrons

This phenomenon we use to create blends between different elements. We do this by attracting some elements to give up electrons that other elements are attracted to receive. Water, for example, is made in some fuel cells as a by-product in the generation of electricity. The fuel cell basically consists of a container filled with an electrically conductive liquid. In both ends of the container is an electrode which is connected in the same way as a conventional battery, to the plus and minus terminals of the thing to be driven. Adjacent to the electrode that is coupled to the positive terminal hydrogen gas is injected and adjacent to the other electrode oxygen gas or air is injected. Since hydrogen gladly relinquishes its electron the hydrogen splits into hydrogen ions and electrons. Since oxygen gladly takes up two extra electrons, the electrons move towards the oxygen through the pipe and the thing to be driven thereby forming an electrical current.

The hydrogen ions have the same charge as a lone proton, while the oxygen atom that received two electrons (oxygen ion) has the opposite charge. The oxygen ions and hydrogen ions then move towards each other in the conductive fluid and connect into water (H_2O).

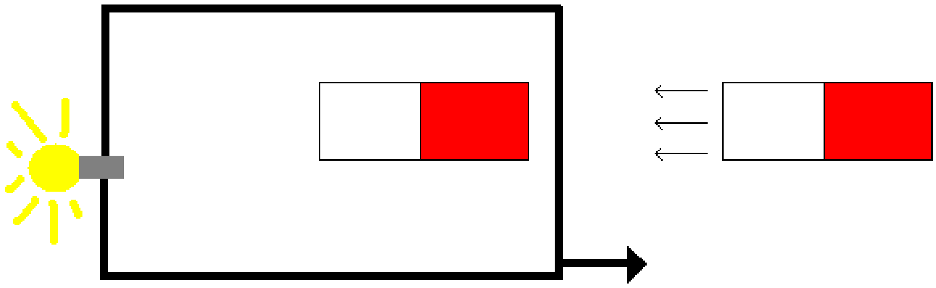
To make a certain amount of water, it takes exactly twice as many units of hydrogen as oxygen atoms. But it is not, as previously mentioned, possible to pick them atom by atom and put them together. We have therefore introduced the greatness amount of substance, which is measured in moles. 1 mole contains $6{,}022 \times 10^{23}$ units. How many atoms as a unit consisting of vary depending on how the atoms bind together.

Both hydrogen atoms and oxygen atoms prefer to bind together in pairs, since the pairs can share the electrons needed to fill the outermost orbit.

A unit hydrogen therefore looks like this: H_2 and oxygen: O_2. One mole of H_2 weighs 2 grams (g) while a mole O_2 is weighing 32 g, the recipe for the water thus becomes:

	$2H_2$	+	O_2	$\longrightarrow$	$2H_2O$
The number of atoms/ unit (pieces)	2		2		3
The number of atoms/mole	$12{,}044 \times 10^{23}$		$12{,}044 \times 10^{23}$		$18{,}066 \times 10^{23}$
Amount of substance (mole)	2 mole		1 mole		2 mole
Substance weight (g)	4 g		32 g		36 g

Electrons can also be brought to move using magnetic fields. Since they are negatively charged they will want to move to the positive side of the field. And it is this desire that allows us to create electricity in generators. The usable electricity is created through that “ring” made of an electrically conductive material is moved against the movement direction of the electrons in the magnetic field. Then start the electrons inside the cable to move through the ring, which have the effect that it is electrified. In the ring there is something that we want to electrify. At the same time a magnetic field is created around the conductor and this field becomes opposite to the first field and it makes it harder for them to move. The ring is called conductor and the things we want to electrify are called loads.



The stronger the magnetic field, the faster the electrons are moving in the conductor. It is describes by saying that the voltage increases. The greatness voltage is abbreviated V and is measured in volts (symbol V).

The more electrons moving in the conductor, the stronger is the current in it. The greatness current is abbreviated I and it is measured in amperes (symbol A). The current in its turn also depends on how strong the magnetic field is, but also how easily electrons can move in the conductor. Electrons in a conductor (wire) namely constantly meet obstacles (other atomic particles in conductor) and thus a kind of friction occurs. This friction creates heat. The friction is called resistance (abbreviated R) and the unit is Ohm. In insulators, the resistance is very big while it is small in good leaders, such as copper wire. The relationship between voltage, resistance and current can be described by the formula:

$$I=\frac{U}{R}$$

The formula, called Ohm's law after the man who came up with it, can, of course, also is written:

$$U = I \times R$$

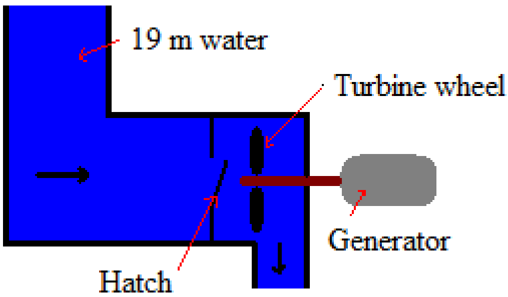
But the power that can be obtained in the conductor is, as mentioned, not only dependent on the voltage and the resistance in the conductor, but also the power of the magnetic field that the conductor moves in. The power is called effect (written P) and the unit is watts (Symbol W). The formula for the currents relation to the effect and voltage is:

$$I=\frac{P}{U}$$

Power generators are based on the fact that when an electrically conductive material (a conductor) is moving in a magnetic field it creates current in the conductive material. In small generators the magnetic field is created by permanent magnets, but for example in many hydro power plants, the magnetic fields created by electricity. The generators of these look like large electric motors, with a rotating part in the middle (the rotor). The rotor is provided with conductors through which a small current is led, and thus a magnetic field is created around the rotor. Around the rotor thick conductors are mounted. As the rotor rotates, the magnetic field around it will rotate to, which forces the electrons in the thick conductors around the rotor to move too, and there is current in them.

The effect is most the important factor in the electrical system, because one can not take out more power than what is created. The voltage and current, however can be changed with transformers.
The total resistance of the system constitute of the sum of resistances in the devices connected to the system and in the system itself. The resistance of the system should be as low as possible to avoid wasting power, while the connected devices, often should have as high resistance as possible to hold down the power through them.
When Sweden was electrified in the early 1900s villages around the country built their own electric networks, which was supplied from small hydroelectric power plants nearby.

The effect that could be taken out of the hydro power plant was due to the water pressure on the turbine wheel and the amount of water that flowed in the river, and how little energy that disappeared on its way from the turbine wheel to the power cables from the generator (which is expressed as the total efficiency). The water pressure depends in its turn on how much height difference there is between the water surface in the pond and the turbine wheel. And efficiency is depending on which components the facility is built with.



Effect = fall height (h) x water flow (Q) x acceleration of gravity (g) x power plant efficiency (n)

With the current symbol, the formula is as follows:

$P = H \times Q \times g\ (=9.81\ m/s^2) \times n\ [kW]$

If there were 19 meters of water above the location of the turbine wheel (fall height H = 19 m) and there in average was water enough to let seven hundred litres per second flow through the turbine (the flow rate Q = 0.7 m3/s) and the total efficiency of the equipment the village would purchase was approximately 85%, the effect that the could get would be:

$P_{average} = 19 \times 0.7 \times 9.81 \times 0.85 = 95\,000\ W = 95\ kW$

Let's say they built one just as large plant near the waterfall. And they used a three phase generator that gave the same power as a conventional three-phase motor was driven with at that time (220 V).
In a three phase generator, the same amount of effect is generated in all three phases and therefore just as much current. The current in each phase would then on average be (if we for the sake of simplicity assume that cos-phi = 1):

$$I_{phase} = \frac{P_{average}}{3 \times U_{phase}} = \frac{95\,000\ W}{3 \times 220\ V} = 144\ A$$

On the way to the village it would, however, disappear some effect due to its resistance in the conductors. The resistance of a conductor may be 0.00001 Ω/m (10 µΩ/m). If it was, say, 10 km to the village which uses the power, the total resistance in each of the three conductors would then be:

$R_{per\ conductor} = 10\,000\ m \times 0.00001\ Ohm/m = 1\ Ohm$

The power lost as heat in the conductors would then be:

$P_{\text{loss in the wires}} = 3 \times U \times I = 3 \times R \times I \times I$, since something x something is depreciated something^2 the formula becomes:

$= 3 \times R_{\text{per wire}} \times I^2_{\text{phase}} = 3 \times 1 \times 144^2 = 3 \times 20\ 736\ \text{W} = 62\ \text{kW}$

It's not so good, so the villagers raised voltage on the wires to the village with a transformer so that it was 10 000 V in each phase. For thus the current through the wires would be as much less as the voltage was higher. Which would be good because the losses in the line are proportional to I^2.

In transformers the transmitted power is the same on both sides (apart from minor losses in the transformer) but the voltage is changed and then current changes too, but in the opposite direction:

$P_{in} = U_{\text{phase1}} \times I_{\text{phase1}} = P_{out} = U_{\text{phase2}} \times I_{\text{phase2}}$

The current on the output side I_{phase2} gets per phase:

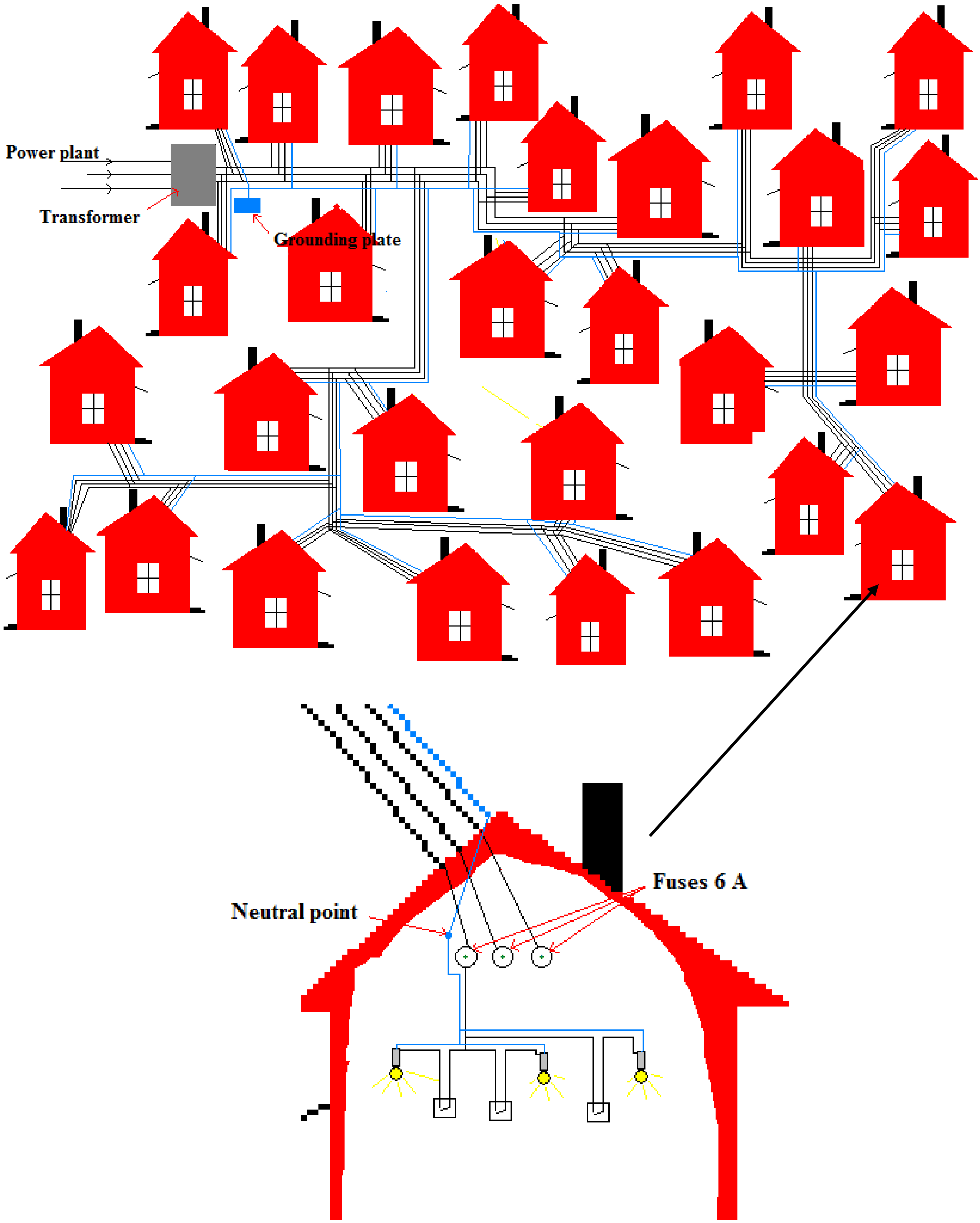
$$I_{\text{phase2}} = \frac{I_{\text{phase1}} \times U_{\text{phase1}}}{U_{\text{phase2}}} = \frac{144 \times 220}{10\ 000} = 3.2\ \text{A}$$

And so they got down losses in the lines to:

$P_{\text{loss in the wires}} = 3 \times R_{\text{per wire}} \times I_{\text{phase}}{}^2 = 3 \times 1 \times 3.2^2 = 31\ \text{W}$

When the energy is transported to the village it is transformed back to 220 V again, because it was what the villages electric devices were made for, and because it is less dangerous with 220 V than 10 000 V.

At the time when villages had their own power plants, the electric devises they had were mostly light bulbs.



Each house had a fuse of 6 A on each of the three phases. Then they could get:

$P_{total\ in\ each\ house} = 3 \times I_{fuse} \times U_{phase} = 3 \times 6 \times 220 = 3\ 920$ W= 3.9 kW.

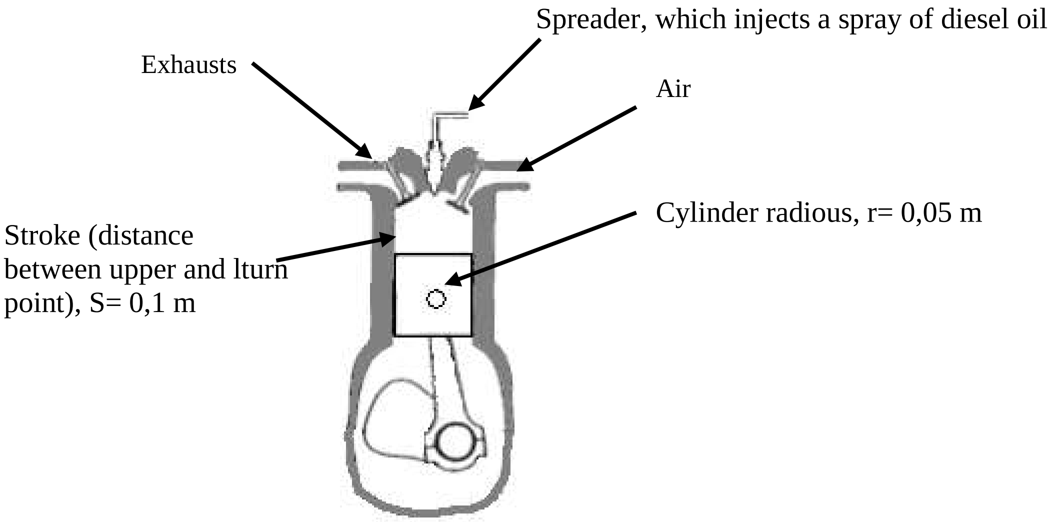
If only they only used the electricity for 60 W light bulbs, they could have over 60 bulbs active at the same time, since:

$$\text{The number of bulbs} = \frac{\text{total effect}}{\text{effect/light bulb}} = \frac{3\ 920\ \text{W}}{60\ \text{W/bulb}} = 66$$

Which at the time was a good margin, because they did not have more than a couple of lights bulbs in the ceilings and perhaps a floor lamp. If they had electric cookers, however, it would have been worse. Since they consume, like, 8 kW if all the heating elements are active at the same time.

The less power consumption (i.e. the fewer consumers connected) the higher the resistance (even if a bulb gives high resistance produces a light bulb turned off even higher resistance) and the less total current in the system. This in turn led to that the magnetic field around the thick conductors around the rotor was reduced. Since the field obstructed the field created by the rotor, the rotor then met less resistance and therefore it could spin faster. To counter this, there was always a person sitting in the power station prepared to reduce the flow of water until the rotating part again was spinning at the same speed as intended. So that the generated power was equal to what was consumed.

Other times, they needed instead to take out more power than what could be produced. Therefore, they bought a four-cylinder diesel engine, which they mounted in the power station together with an extra generator.



Say that the engine had a operating speed of 20 revolutions/second, n = 20 revolutions/second

A diesel engine works, as well known, so that the piston is pushed down by an explosion. When the piston goes up again, while the exhaust valve opens and the piston pushes the exhaust gases through it. The piston has so much momentum that it reverses again and continues down. On the way down opens a valve that is sucked in by the descending piston. As the piston rises again the air valve closes and the air is compressed. The more the air is compressed, the hotter it becomes and when the piston is almost up, a spray of diesel oil is injected into the chamber, which is ignited by the hot air. Which in its turn results in an explosion.

The pressure (abbreviated by p) in the cylinder after the explosion is calculated using the formula:

$$p = \frac{n \times R \times T}{V}$$

As a way to write what is called “the ideal gas law" p x V = n x R x T where
p = gas pressure (in N/m^2)
V = gas volume (in m^3)
n = amount of substance (in moles)
R = gas constant (= 8.3145 J/mole Kelvin)
T = absolute temperature (in Kelvin).

The force on the piston = pressure in cylinder x piston area = p x π x radius x radius = $p\pi r^2$.
The pressure is the largest just after the explosion, and then it decrease as the piston moves downwards. The easiest way, if you want to calculate the generated kinetic energy, is to use the average pressure in the cylinder ($p_{average}$). It is of course possible to compute the mean pressure, though it is much easier to measure the pressure for a few turns and let the measurement computer calculate the mean value.
Let's say that the mean, $p_{mean} = 10$ bar = 10×10^5 N/m^2.
The effect on the motor axle= the force on the piston x the peripheral speed of the motor axle, and the latter is the same as the stroke (S) x rotation speed (n). Overall, the formula for the effect is:

$P = p_{average} \times pi \times r^2 \times S \times n \times$ the number of cylinders

And this four-cylinder engine with:
The average pressure, $p_{average} = 10 \times 105$ N/m^2
the cylinder radius, r = 0.05 m;
stroke length S = 0.1 m;
n = speed of 20 revolutions/second.

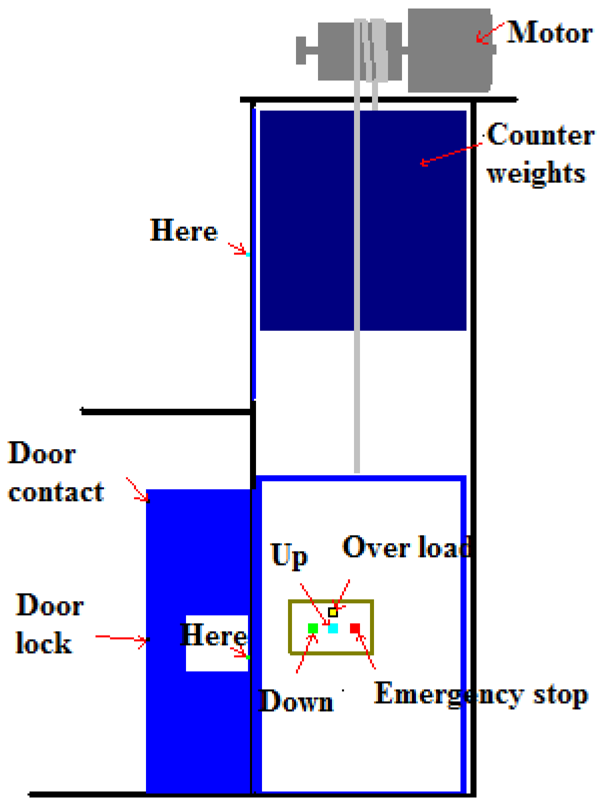
Thus gives:

$P = 10 \times 10^5 \times pi \times 0.05^2 \times 0.1 \times 20 \times 4$ W = 62 800W= 62 kW if the efficiency in the transmission of electrical energy was roughly the same as for the village's hydroelectric system they would get out:

$P_{elektric\ effect} = P_{mechanical\ effect} \times 0.85 = 52.7$ kW

Electronics such as computers and control systems are based largely on an even simpler type of maths that uses only two digits. Say that one of the villagers wanted to build an elevator between two floors and would like it to work like this:

1. The car should move if one of the buttons up or down is pressed.
2. It may only move if the doors are closed.
3. If the emergency stop button is pressed, it shall stop.
4. If there are too many people in the elevator, it shall not start.
5. If the car is heading in one direction, it should not respond if the button pressed for the other direction.
6. If the car is between floors, the doors shall not be possible to open.
7. If the car is on the wrong floor and the “here” button is pressed, the car shall move (if the doors are shut and there are not too many people in it and it is not already on the way).



Then he or she has to get:

An elevator motor.
A car.
Counterweights.
A roll of wire.
Elevator doors.
A contact on each door that is activated when the door is closed.
Electric door locks.
A wave that closes a switch if there are too many people in the car.
Two "here" buttons.
An "up" button in the lift.
A "down" button in the lift.
An "emergency stop" button.
A indicator lamp that is activated when the elevator is too heavily loaded.

For the control of the elevator, a control system is required. Next step on the road to forming such is to find out abbreviations for the various constituent phenomena:

Elevator motor up = MU.
Elevator motor down = MN.
Button up in the car = HU.
Button down in the car = HN.
Door switch up = DU.
Door switch down = DN.
Electric door lock up = EU.
Electric door lock down = EN.
Emergency = N.
Wave to detect overload = Ö.
Lamp that lights up when the car is overloaded = LÖ.
Location contact up = LU.
Location contact down = LN.
Here button up = VU.
Here button down = VN.

The majority of these phenomena generates inputs to the control system: HU, HN, VN, DU, DN, N, Ö, LU, LN, VU, VN.

The elevator builder wanted to make the control system as easy as possible, so he made all the buttons "hold buttons", which means that when they are released the activation stops. Since then he just need five outputs: MU, MN, EU, EN, LÖ.

Each input and output has only two states "On" and "Off" and this can be put into a table that describes what will happen (table 3).

Table 3. State of input and output signals of the different situations that can arise (- means that the input signal can change value without affecting the actual event).

Row		In-signals										Out-signals				
		HU	HN	DU	DN	N	Ö	LU	LN	VU	VN	MU	MN	EU	EN	LÖ
1	Here button pressed upper level	-	Off	On	On	Off	Off	Off	-	On	-	On	Off	On	On	-
2	The car is on the upper level	-	-	-	-	-	-	On	Off	-	-	-	-	Off	On	-
3	Someone wants to go down	-	On	On	On	Off	Off	-	Off	-	-	Off	On	Off	On	-
4	It is too heavy	-	-	-	-	-	On	-	-	-	-	Off	Off	-	-	On
5	Emergency stop is pushed	-	-	-	-	On	-	-	-	-	-	Off	Off	-	-	-
6	Here button is pressed lower level	Off	-	Off	On	Off	Off	-	Off	-	On	Off	På	On	On	-
7	The car is on the lower level	-	-	-	-	-	-	Off	On	-	-	-	-	On	Off	-
8	Someone wants to go up	On	-	On	On	Off	Off	Off	-	-	-	On	Off	On	On	-

Instead of "On," we can write "1" instead of "Off" we can write "0" (table 4).

Table 4. On replaced with 1 and Off replaced by 0.

Row	HU	HN	DU	DN	N	Ö	LU	LN	VU	VN	MU	MN	EU	EN	LÖ
	In-signals										Out-signals				
1 Here button pressed upper level	-	0	1	1	0	0	0	-	1	-	1	0	1	1	-
2 The car is on the upper level	-	-	-	-	-	-	1	0	-	-	-	-	0	1	-
3 Someone wants to go down	-	1	1	1	0	0	-	0	-	-	0	1	1	1	-
4 It is too heavy	-	-	-	-	-	1	-	-	-	-	0	0	-	-	1
5 Emergency stop is pushed	-	-	-	-	1	-	-	-	-	-	0	0	-	-	-
6 Here button is pressed lower level	0	-	1	1	0	0	-	0	-	1	0	1	1	1	-
7 The car is on the lower level	-	-	-	-	-	-	0	1	-	-	-	-	1	0	-
8 Someone wants to go up	1	-	1	1	0	0	0	-	-	-	1	0	1	1	-

There are two rows that describes the situations when the elevator motor must rotate so that the elevator goes up: row 1 and row 8. Line 1 describes what shall happen if the here button on the upper floor (VU) is pressed (VU = 1), and row 8 describes that to happen if the up button in the car (HU) is pushed (HU = 1). In both cases, the emergency stop (N), overload wave (Ö) and location contact up (LU) shall be = 0, door contacts (DU and DN) must, however, be = 1. Other inputs can change state without affecting the car ride.

Table 5. Situations in which the motor will rotate so that the elevator goes up.

Row	HU	HN	DU	DN	N	Ö	LU	LN	VU	VN	MU	MN	EU	EN	LÖ
	In-signals										Out-signals				
1 Button pressed upper level	-	0	1	1	0	0	0	-	1	-	1	0	1	1	-
8 Someone wants to go up	1	-	1	1	0	0	0	-	-	-	1	0	1	1	-

So in row 1, when HN = N = E = LU = 0 and DU = DN = VU = 1, the engine shall rotate so that the car goes up. But if any one of HN, N, E or LU is 1, it shall not happen. In the mathematical method that we are approaching one say then that the HN, N, E and LU must be "none" 1. And it is marked with a dash over the variable, like this:

$\overline{HN}$, $\overline{N}$, $\overline{Ö}$, $\overline{LU}$

The continuing path to the control system goes via math with a few simple rules (called Boolean algebra after George Boole, who invented this type of mathematics):

1. 1 x 1= 1, the same is true no matter how many ones that are involved, so 1 x 1 x 1 x 1 x 1 x 1 x 1 x 1= 1.

2. $\overline{0}$= 1, $\overline{1}$= 0.
3. 1 x 0= 0, even if there are a hundred ones and only one zero.
4. However, if there is a plus between two input signals, it is enough that one of them is 1, for the output to be 1, but it is never more than one (the elevator motor can not spin faster). I.e.1 + 0= 1 and 1+1+1= 1.

"The formula" that describes MU function in row 1 is:

$MU= \overline{HN} \times DU \times DN \times \overline{N} \times \overline{Ö} \times \overline{LU} \times VU$

"The formula" for MU function in row 8:

$MU= HU \times DU \times DN \times \overline{N} \times \overline{Ö} \times \overline{LU}$

We wants the motor to spin in both cases, and therefore we can merge the two "formulas" so that it starts if any of these conditions occurs:

$$MU = \overline{HN} \times DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LU} \times VU + HU \times DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LU}$$

The formula can be written shorter by lifting all those parameters that are the same before and after the plus sign:

$$MU = DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LU} \times (\overline{HN} \times VU + HU)$$

The formula for the MN function in row 3:

$$MN = HN \times DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LN}$$

And for the MN function in row 6:

$$MN = \overline{HU} \times DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LN} \times VN$$

Merged together it becomes:

$$MN = HN \times DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LN} + \overline{HU} \times DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LN} \times VN$$

Shortened:

$$MN = DU \times DN \times \overline{N} \times \overline{\ddot{O}} \times \overline{LN} \times (HN + \overline{HU} \times VN)$$

Row 4 and 5 in table 4 describes that when there is an overload or if the emergency stop is pressed, the motor shall not spin, but we have already included that above, since as a prerequisite for MU or MN = 1 is that N and Ö are "not" 1.

Row 2 describes that the upper electric door lock (EU) should be deactivated only when the upper location contact (LU) is activated. It is described by:

$$EU = \overline{LU}$$

And corresponding for the lower door lock (row 7):

$$EN = \overline{LN}$$

The final output signal, i.e. the indicator lamp for overload (LÖ), shall be activated only if the wave (Ö) is activated:

$$L\ddot{O} = \ddot{O}$$

In summary:

$MU = DU \times DN \times \overline{N} \times \overline{Ö} \times \overline{LU} \times (\overline{HN} \times VU + HU)$

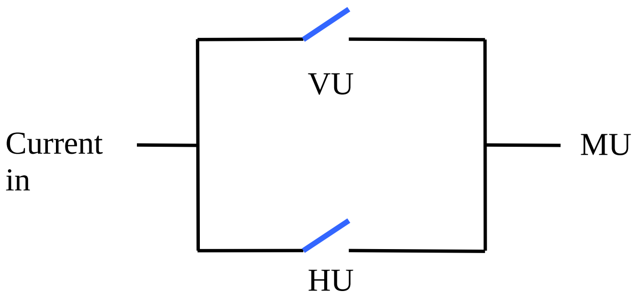
$MN = DU \times DN \times \overline{N} \times \overline{Ö} \times \overline{LN} \times (HN + \overline{HU} \times VN)$

$EU = \overline{LU}$

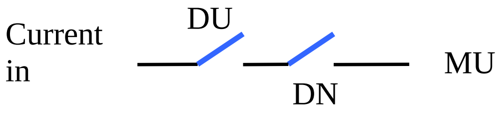
$EN = \overline{LN}$

$LÖ = Ö$

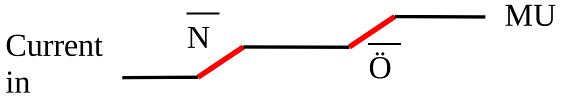
This may seem pretty silly, but the good thing is that the function can then be built with simple contacts[3] linked in a combination corresponding to the previously described mathematical rules.



With these two contacts the function: the elevator motor gets power if either one or both of the contacts HU and VU are closed (MU = HU + VU).



If the contacts connected like this: the motor gets power only if both of the contacts DU and DN are closed
(MU= DU x DN).

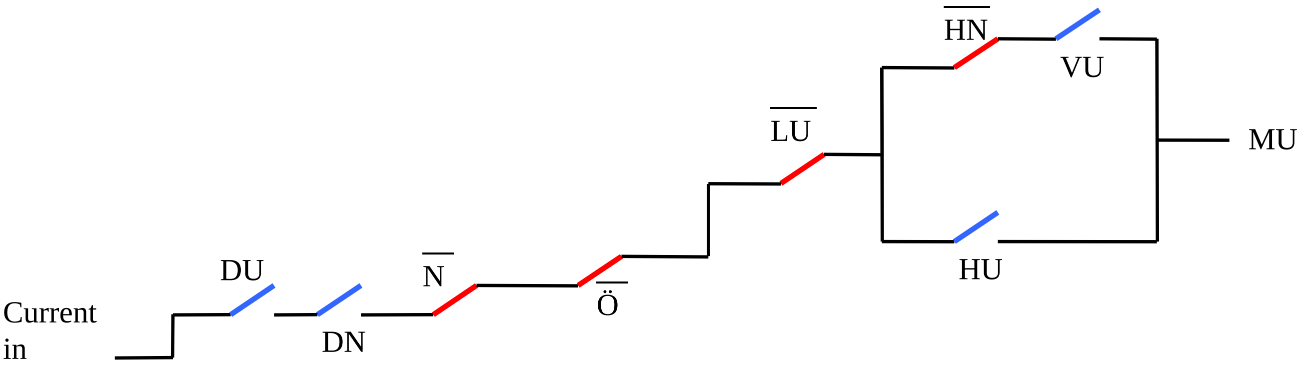


This coupling powers the motor only when both contacts are open

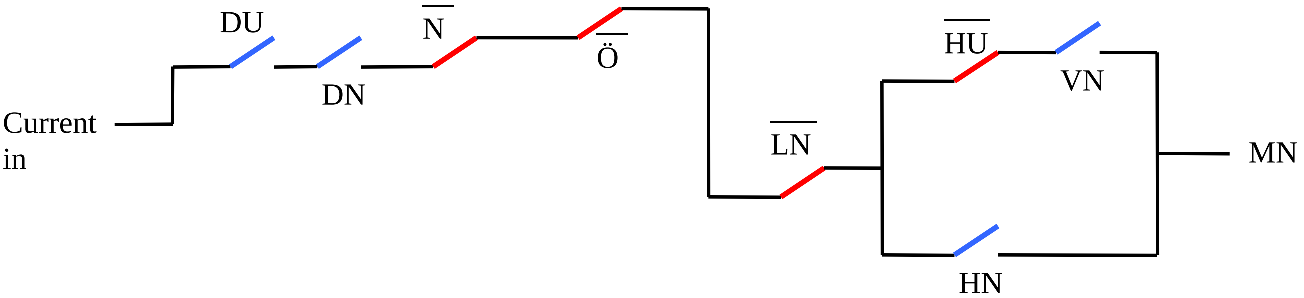
$(MU = \overline{N} \times \overline{Ö})$.

3. In real elevators the power to the engine does not pass through door contacts or other actuators because, among other things it would take so thick cables since the engine requires a lot of power. Moreover, the elevator is less dangerous if there is less voltage in the contacts (usually 24 V). Normally one build a 24 V network in the elevator, which in turn drives relays that break and release the power to the elevator motor.

$\mathrm{MU} = \mathrm{DU} \times \mathrm{DN} \times \overline{\mathrm{N}} \times \overline{\ddot{\mathrm{O}}} \times \overline{\mathrm{LU}} \times (\overline{\mathrm{HN}} \times \mathrm{VU} + \mathrm{HU})$:



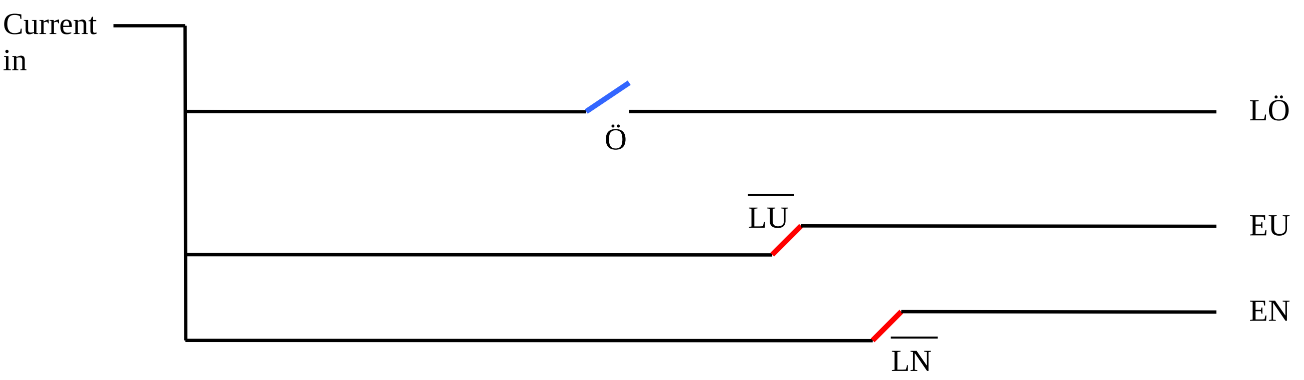
$\mathrm{MN} = \mathrm{DU} \times \mathrm{DN} \times \overline{\mathrm{N}} \times \overline{\ddot{\mathrm{O}}} \times \overline{\mathrm{LN}} \times (\mathrm{HN} + \overline{\mathrm{HU}} \times \mathrm{VN})$:



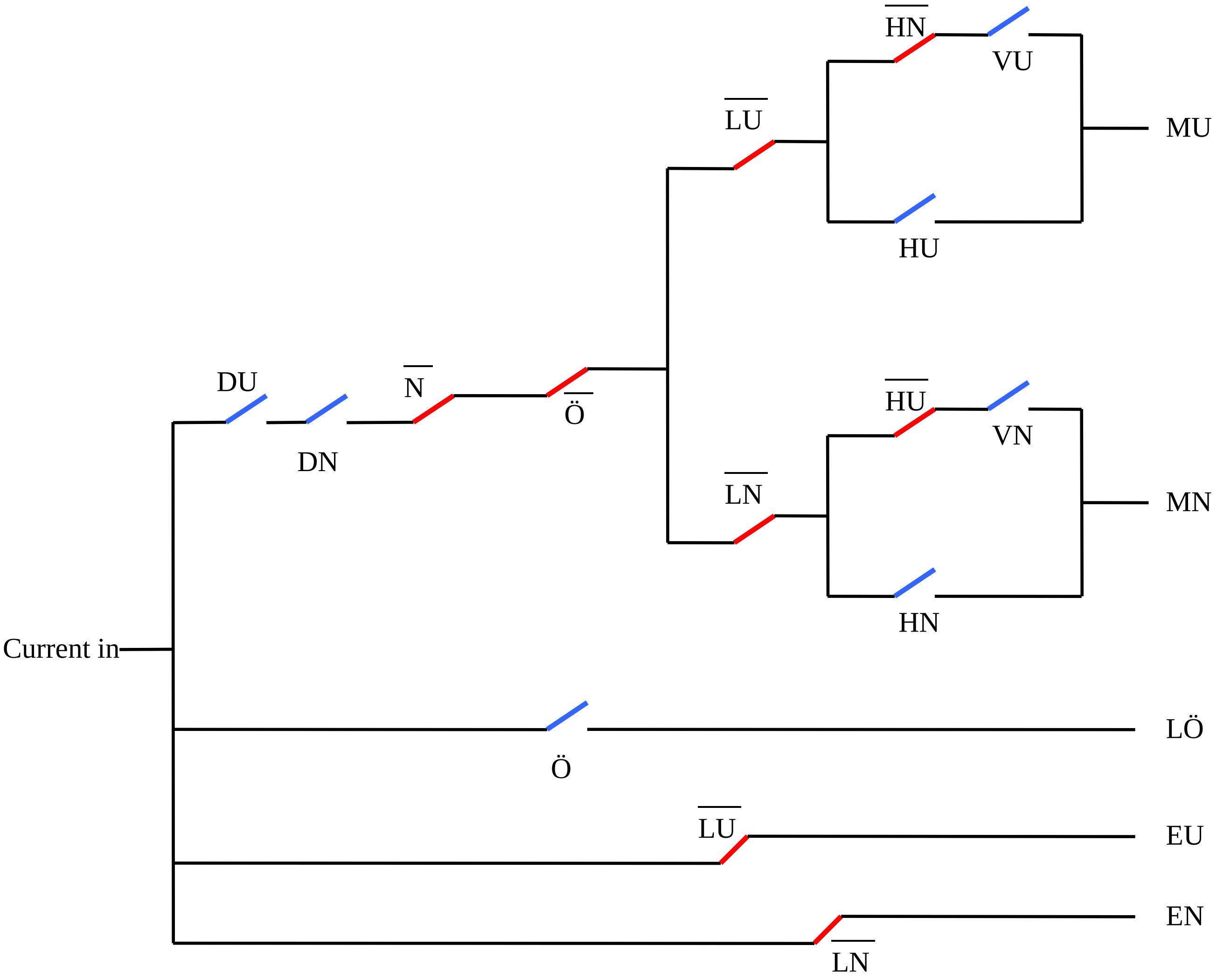
$\mathrm{EU} = \overline{\mathrm{LU}}$

$\mathrm{EN} = \overline{\mathrm{LN}}$

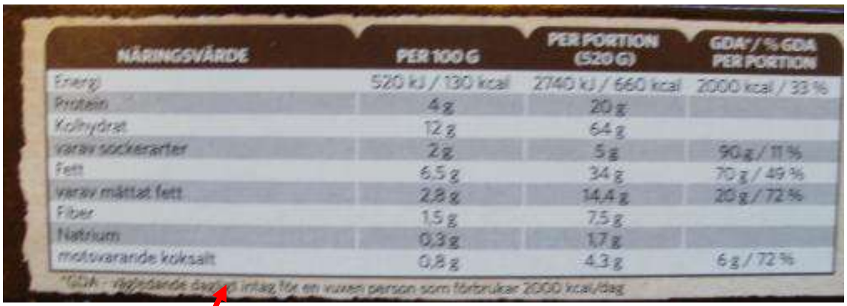
$\mathrm{L\ddot{O}} = \ddot{\mathrm{O}}$



And the whole control system:



We also consume energy, provided to us through the food, in the same way that gasoline contains the energy for a spark ignition engine. But we measure our energy in kilojoules (kJ) instead of kWh.



NÄRINGSVÄRDE	PER 100 G	PER PORTION (520 G)	GDA*/% GDA PER PORTION
Energi	520 kJ / 130 kcal	2740 kJ / 660 kcal	2000 kcal / 33 %
Protein	4 g	20 g	
Kolhydrat	12 g	64 g	
varav sockerarter	2 g	5 g	90 g / 11 %
Fett	6,5 g	34 g	70 g / 49 %
varav mättat fett	2,8 g	14,4 g	20 g / 72 %
Fiber	1,5 g	7,5 g	
Natrium	0,3 g	1,7 g	
motsvarande koksalt	0,8 g	4,3 g	6 g / 72 %

*GDA - vägledande dagligt intag för en vuxen person som förbrukar 2000 kcal/dag

One serving of taco gratin contains 2740 kJ of energy, which is a little more than half a kWh.

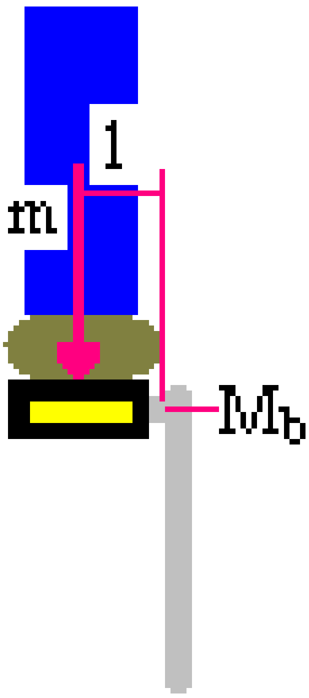
4 000 kJ is about 1 kWh

A man who lies still and weighs 70 kg burns about 5 kJ/min, which primarily is converted to heat the body. For him, it then takes about:

$t = \frac{2.740 \text{ kJ}}{5 \text{ kJ/min}}$ = 548 minutes, which is 548 min/60 min/h= about 9 h to consume the energy (except that the digestion itself increases the consumption)

If he instead walked with a speed of 5 km/h, his consumption would rise to 17 kJ/min and the gratin would then be burned in 161 minutes. He would get rid of the energy even faster if he ran at a speed of 10 km/h, since it would give a burning of perhaps 45 kJ/min.

Some are forced to sometimes make strength calculations, though it is usually nothing to get nervous about. Anyone who, for example, constructs a bicycle pedal should check that its weakest point stand up to even a heavy rider.
The weakest point is somewhere in the cycle where the load (called the bending torque, abbreviated Mb) is high, while the design is weak. Which is probably where the pedal is attached to the crankshaft. Therefore, the designer calculates the bending torque at that point when, for example, a person with a weight of 100 kg stands with all his weight on the pedal:



M_b= m x g x l

M_b= bending torque
m= the persons weight= 100 kg
g= weight acceleration= 9.81 m/s^2
l= the distance from the mid point of the load= 5 cm= 0.05 m

M_b= 100 x 9.81 x 0.05= 49 Nm= 49 000 Nmm

The bending torque creates a tension in the pedal attachment, called bending stress (abbreviated o_b) and must not exceed the tension that the material can withstand. How large the bending stress becomes depends on how the attachment is designed, i.e. how big is the designs bending resistance.

$o_b = \frac{M_b}{W}$ where:
o_b= bending stress, given in N/mm^2

W= bending resistance, which for a cylindrical component is:

$$W = \frac{\pi \text{ x } d^3}{32}$$

Say that the pin has a diameter of 10 mm at the narrowest point:

$W = \frac{\pi \text{ x } 10^3}{32}$ = 98 mm^3, thus the bending stress becomes:

$$o_b = \frac{49\ 000}{98} = 500 \text{ N/mm}^2$$

Which is quite a lot, so the manufacturer of the bike has to select a strong material, since if looking in a table with strength data for steel, one would find that some types of steel can not withstand that kind of bending stress. And then we have not even considered that there are people who weigh well over 100 kg.

Anyone who deals with accounting a lot would, beyond addition, subtraction, multiplication and division, also need to know some about percentages. Because VAT it includes in most purchases made, and that cost shall be deducted from the tax that most business owners add to the price of whatever they sell. When its time to pay the access VAT to the government, they add together all the VAT they have paid on their purchases and reports the total (called ingoing VAT). Additionally they sums up all the VAT that they in their turn has received from their customers (called outgoing VAT). Finally, do the following calculation:

VAT to be paid to the government = outgoing VAT - ingoing VAT

For most companies, the sum is greater than zero because they sell more than they buy, and thus there will be money for the treasury. But if the contrary occur they will instead get money back from the government.

As if to complicate things a little different goods and services are subject to different VAT. On bank services, insurances, healthcare and some rents there is no VAT at all. On food there is 12% VAT, while on most of the rest it is 25% VAT.
On most receipts of today it booth the VAT and the price without VAT (called moms in Swedish) is written and thus it’s no problem.


Systembolaget
Folkungagatan 56
S-116 22 STOCKHOLM
08/640 20 90
OrgNr: 556059-9473
Förs : 0165anhj But: 0165 Nr: 8154
Datum : 2012-01-20 14:40 Ka: 1

High Commissioner 40% 700 ml
20444-01 203,00
Lazy Lizard Merlot Cab papp 1 L
2256-01 63,00
Rosie Rosé papp 1l
6661-01 59,00

TOTAL 325,00
Totalt antal artiklar: 3

Moms%	Moms	Netto	Brutto
25,00	65,00	260,00	325,00
Summa	65,00	260,00	325,00

Mottaget Kontant 500,00
Åter Kontant 175,00

Två veckors öppet köp mot
uppvisande av kvitto.

But in cases where there is only a grand total including VAT it is a little "tricky". But the trick is simple:

Paid VAT (25%) = grand total x 0.2, which on my purchase at the liquor store is:

Paid VAT (25%) = 325 x 0.2 = 65 SEK.

The price without VAT is then, of course = grand total x 0.8 = 325 x 0.8 = 260 SEK.

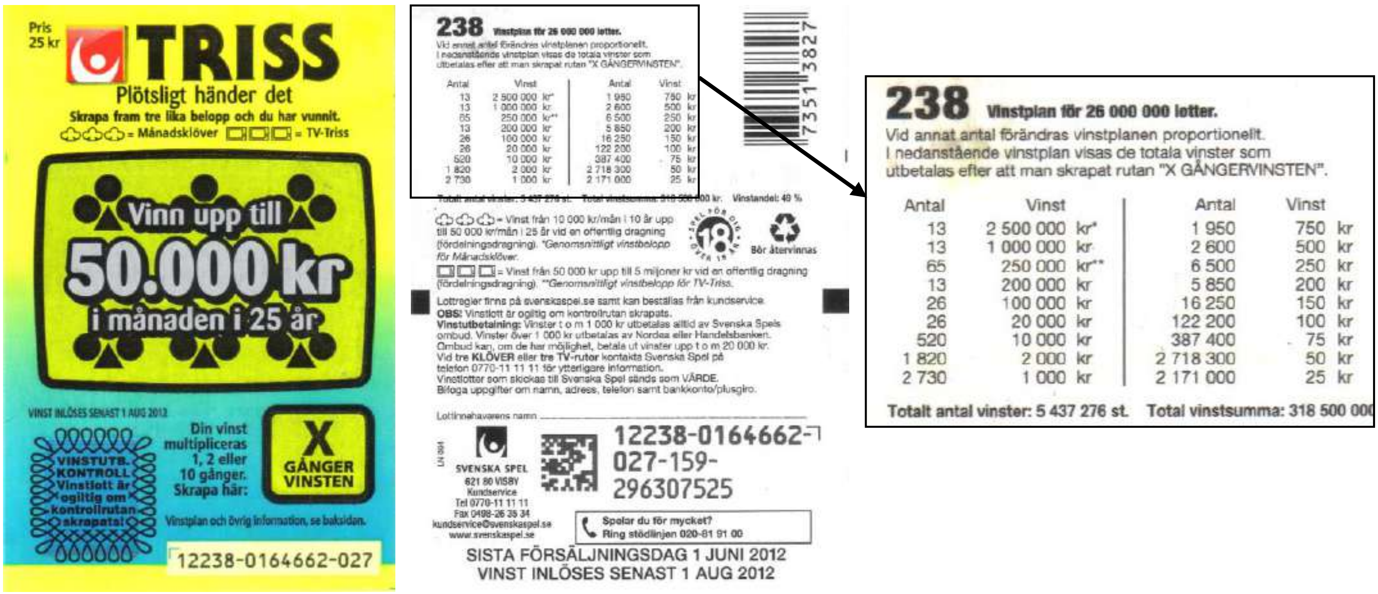
Another common case of percentage calculation, which those who are dealing with accounts may come in contact with is that they have to calculate interest on late paid invoices. The problem is that if, as in the example below, is the interest is 10% it does not mean that the customer has to pay 10% extra just because he is a few days late, instead it usually means that if the customer slips on the bill for a year it costs 10%. If he "only" pay a month late, he or she shall pay one-twelfth of 10%. There are of course usually not as much money, so it has been "solved" by adding an extra flat fee (a so-called reminder fee).

The most complicated mathematics one may meet is, in my experience, probability calculations and statistical calculations. There are an awful lot of calculation methods for things that no one other than those who chose to get involved with this comes in contact with. Though to some extent, we all do some probability calculation every now and then. Since probably everybody has drawn lots to decide about thing like, who has to take out the garbage, and then realized that the risk to be the one that has to do it, decreases with the more people that are involved in the lottery.

The same simple math applies to regular lotteries (provided that they are not rigged).

$$\text{Chances of winning} = \frac{\text{number of wins}}{\text{number of tickets}}$$

A simple division that is! Though the results can be difficult to understand if there are many lottery tickets.



According to the winning plan on the back of this lottery ticket there are 5 437 276 winning tickets and 26 million tickets. Which means that:

Chance to win = 5 437 276/26 000 000 = 0.21, which is about 1/5.

The chance to win on this lottery ticket is thus rather high for those who purchase a ticket. Though unfortunately 4 839 300 of the winnings are on only 50 SEK or less.

But someone who asks a few class mates about which British football team like the most, and then wants to draw a conclusion about which team that is the most popular in the class, may all of a sudden have passed the border into very advanced mathematical calculations. If he or she asks the whole class and all everybody answer, the questioner does not need make any statistical calculations at all. But if only, say, half the class responds, it forces him/her to make a guess about to which teams the rest might prefer.

Let's say there are 20 students in the class, and 10 responded. Of these three prefer Arsenal, four Manchester United, two Chelsea and one do not care at all. A simple guess is that Manchester United is the most popular tem, and it is true among the 10 respondents. Though it maybe was because all the Manchester United fans happened to be there when the question was asked, the rest of the class is perhaps Tottenham fans are or why not Nottingham Forest. If the author can not ask those present about what the absent ones prefer, or wait until they comes back, he can use statistical methods to calculate how big the chance is that Manchester United really is the most popular team, but then it suddenly becomes quite tricky.

Chefs also need to be able to count. First and foremost, they must keep count of how much of something that they have poured into the pot, which is easy for anyone who can add. In addition, they must be able to convert amounts in the recipe to suit the number of guests. The latter requires multiplication or division, depending on the number of guests. It is not that hard as long as it is all about, for example, three teaspoon cardamom instead of one.

<u>Lamb Balls with coriander for 4 people</u>

400 grams of minced meat preferably lamb
½ -1 teaspoon of salt
1 teaspoon cumin (preferably fresh grounded)
1 teaspoon coriander (preferably fresh grounded)
½ dl of chopped parsley
3 tablespoons plain yogurt

For the sauce
3 tablespoons oil
1 cinnamon stick
1 teaspoon cardamom
1 large yellow onion
1 teaspoon ginger (or rather a piece of fresh ditto)
1 teaspoon coriander (preferably fresh grounded)
1 teaspoon cayenne
1 teaspoon cumin (preferably fresh grounded)
3 tablespoons tomato paste
4-6 cloves of garlic
3 tablespoons plain yogurt
2 dl water
½ teaspoon of salt

Rice according to taste and quantity according to the guest’s appetite.

Though chefs will also be forced to deal with more advanced mathematics that involves rather complicated estimates.

400 grams of minced meat
½ -1 teaspoon salt *How many teaspoons are there in a decilitre?*
1 teaspoon of cumin
1 teaspoon coriander
½ dl of chopped parsley
3 tablespoons plain yogurt
For the sauce
3 tablespoons of oil *How many grams of solid margarine is equivalent to 3 tablespoons of oil?*
1 cinnamon stick *How many teaspoons grounded cinnamon corresponds to a cinnamon stick?*
1 teaspoon cardamom
1 large yellow onion *How many small yellow onions corresponds to a big one?*
1 teaspoon ginger
1 teaspoon coriander
1 teaspoon cayenne
1 teaspoon of cumin
3 tablespoons tomato paste
4-6 cloves of garlic
3 tablespoons plain yogurt *How much ordinary cooking spoons is that?*
2 dl water
½ teaspoon of salt

Rice at will and quantity *How many decilitre rice will each guest eat?*

Technology

The history of technology

Inventors

Many historical books contain names of people who are considered to be the inventor of various innovations and this is no exception. These names are not always accurate since sometimes it is someone else who got the same idea before. For example Edward Jennings, was not the first to make smallpox vaccine[1] and several people made light bulbs[2] before Thomas Alva Edison came up with his version in 1880. This is partly due to the different sources list different inventors and partly because many inventors never managed to spread their innovations outside their own circle. The latter can be caused by many things beyond their own inability, such that the invention was made at a time when the world was not ready for it. What benefit did light bulb give us before we could generate electricity? Further many other inventions were surely invented earlier and by other people than are normally associated with each innovation, but these people did not have the ability and/or the means to realize, or spread their idea. However, it is usually a far greater achievement to realize an idea and also monetize it compared to just get it, so perhaps it is fair that those who succeed in this sometimes get the undeserved honour of being the inventor of the phenomenon. In addition, it is sometimes, in the literature, different bids on when something was invented. However, it is not surprising as there are several important dates in the inventive process, such as the day when the idea crossed the inventors mind, the day when the idea was realized in a working prototype, the day when the patent application was filed or the date when the product hit the market. So I ask you to have in mind that what is stated in this chapter regarding inventor and the dates of the inventions are not always consistent with other sources and/or with reality.

1. The method of inducing immunity against smallpox by smearing the secretions from a mildly diseased person in a wound was used in the early 1700s in particular in what is now called Turkey. Jenner's method, to instead

smear cowpox was, however, considerably less dangerous.

2. One of them was the British man Joseph Wilson Swan, who in 1860 presented a working electric light bulb.

Technology development during 0-1700

There is a saying that goes: "Necessity is the mother of invention" and it is, in my experience, used when someone lacks a certain component and another component is used as a surrogate. In this context, the saying is true. Though if was true, in general, we would have seen a tremendous amount of innovations when need was greatest, before the 1700s, and then the amount of innovations would have declined. However, as seen in table 2-5 there were pretty little technical development between 0-approximately 1700. Excavations of an etruscan[3] upper class home, which burned down about 79 BC, has for example shown that, they had about the same things that could be found in a home in the same area a thousand years later. The home consisted of a detached villa with a basement that occupied a ground area of 150 sqm. It was built of brick and probably also the roof was covered with bricks. It had wooden details assembled with nails. There were doorknobs and other fittings of metal (bronze). Archaeologists also found plates, an olive press and wheat. From Etruscan tomb paintings we know that they produced and drank wine and that they hunted and fished. Tomb paintings also show that they used tables, chairs and carpets, and they entertained each other with singing, dancing, juggling and funny games. From other graves we know that they had art objects, axes, spears, large knives and helmets of bronze. Still other findings show that the cultivated wheat extracted and processed iron and used agricultural equipment in metal.

3. The Etruscans roughly lived in the area now called Tuscany (in present Italy). They had their heyday from 800-600 BC. From about the year 280 BC it became a part of the Roman Empire.

The Roman Empire is otherwise the most famous example of a culture that flourished around the year 0, and whose technology over trumped later cultures ditto (see table 1).

Table 1. Examples of technology in some for us very important areas, in addition to the previously described, we known existed in the Roman Empire.

Technic type	What
Transport	Big ships driven by rowing slawes, nation wide collective[4] transport system.
Comunication	Optical telegraphs, mail pidgeons, a nation wide system of mail riders.
Food	Water mills were used and different farming tools, spices, preservation methods such as salting, they baked bread, made wine and they used cutlery[5].
Energy	Wind (sail ships), falling water, animals and slaves.
Medicine	They operated, for instance, boone fractures and produced herbal medicines.
Buiding & construction	Multi floor housings, cupoles, cranes, elevators[6], water pipes[7], suer pipes[7], bath tubs, showers, swimming pools[8], saunas[8], doors, locks, central heating[9], valve bridges in stone, amfi theaters[5], reservoirs, nation wide road net[10], concrete, toos like axes, hammers, scissors, drills and pliers.
Materials	They made products[5] in, for instance, stone, iron, lead, silver, gold, glass, clay, leather and wool.

4. The Romans created about 250 BC a system of timetable controlled public transport traffic along the roads. The horse-drawn carriages became more advanced and resembled in the end those that appear in the Wild West movies, with two axes of which the front one could rotate and was attached to the towing horses.
5. In a Roman building complex, located in present Germany (Saalburg, see www.saalburgmuseum.de), it have been found various well-preserved objects made of wood, skin, glass, pottery, bronze and iron from the period 100-260, such as: advanced locks, swords, crossbows, shoes, helmets, trinkets, tools, cutlery, buckles, hardware, nails, horseshoes and chains.
6. Elevators were already part of Rome’s tall buildings before the year 0. In the Emperor's Palace (rebuilt after the fire in Rome year 64) there where such an elevator that could lift the traveller 40 m. The car hung in a rope, and was operated by three slaves who cranked a winch. Marks on the rope showed when the car arrived at a floor. At the bottom of the elevator shaft, there was a thick leather cushion that would capture the car softly, if the rope broke.
7. From archaeological findings in Pompeii we know that in Roman cities there where water pipes into different rooms in the house. In the ends of the pipes there were taps. And in a book written in 79 by the head of Rome’s waterworks it shows that the city had over 400 kilometres water mains in the form of tunnels and aqueducts.
8. During the Roman Empire, there were about five hundred public baths in Rome alone. These came from 312 BC, when the first aqueduct was finished. One of these, which was built in the early 200's, had two pools totalling 4 000 sqm. In one, the water was cold and the other it was lukewarm, in addition, there was a hot tub, two saunas, guarded locker rooms, sports and relaxation areas.
9. The central heating was designed so that hot smoke from a fireplace was led through channels in the floors and walls.
10. The Roman road network was covering the whole country. It was straight and 4-5 meter wide roads with paved ditches on each side. Earth excavation was removed and the roadbed was founded with boulders then the bed was filled with finer and finer gravel that was stamped into a smooth road surface. Along the road there were stops where passengers could get on/off and the horses could be replaced. Distances were marked at regular intervals (every thousand double-steps) trough milestones (mille = thousand in Latin), in which the distance to the nearest wagon stop was given.

Most other than the Romans lived, however, under simpler conditions. The History Museum in Stockholm has, based on excavations, made a model of the houses that they believe were in the town of Birka during its heydays in the 800s. Compared to Rome several hundred years before the proud city of Birka, however, looks like a collection of mediocre huts.

A house under construction.

Finished houses in the same model. All were small, one store high, without window openings and with holes for smoke evacuation under the ridge.

The areas where the technology evolved significantly, from 0 to 1700, was in the military and related areas with both civil and military benefits, such as transport, on land and at sea. This is probably because there was the first clear needs (defence of the country or the conquests of other countries), as well as someone who could not pay (the state). To some extent also luxury products were developed targeted to a rich minority of the population.
Of the major innovations that I know of, and that could be attributed to the 0-700 year period was paper probably the most important and it was an essential tool in the Chinese central government communication with the local representatives of the countryside.

Table 2. Timing, location, and (in some cases) the inventor of important and enduring innovations made between 0-700 years.

Technic type	0-100	101-200	201-	301-	401-500	501-	601-700
Transport					400s, Asia, The stirrup[12]		
Comunication		105, China, paper[11]					
Food							600s, Europe, the heavy plow[13]
Energy							
Medicine							
Build. & constr.							
Materials							
Science important for the technical development							657, India, the zero[14] is introduced, Brahmagupta

11. Paper conceded far more convenient texts than those that were written on clay tablets, stone, on wood or hide, for those who had not papyrus plants available.
12. The stirrup made it easier to stay on the horse and moreover he could also stand, and it in turn made it possible to ride faster. In addition, it was very beneficial in battles because the rider could hit to the side with more power without having to worry about falling off.
13. With heavy plows the farmers could turn the soil so their seeds could be placed in more energetic soil under the previously used and thus crop growth increased.
14. The Indies did not just invent zero but also the other nine digits we use, which was a huge advance over other systems:

Our numerals | Roman numerals | System with only one character

Though the numbers 1-9 excited before year 0. With zero we had, however, a complete system for describing all the numbers in a clear manner:

175	CLXXV (= 100+50+10+10+5)	~~IIII~~ ~~IIII~~

Also the innovations attributed to the period 700-1200 were often due to military demands (such as horseshoes, the compass, gunpowder and gunpowder rockets). Moreover some happened in communications through that the printing technology was improved (table 3) for the benefit of the Chinese state.

Table 3. Timing, location, and (in some cases) the inventor of important and enduring innovations made the years 701-1200.

Technic type	701-800	801-900	901-1000	1001-1100	1101-1200
Transport		800s, Europe, horse shoes[17], approx. 900 improved harness[17], 863, Eastern Europe , the Cyrillic alphabet[15]			Early 1100s, China, the compass[18]
Comunication				Ca 1045, china, Printing with movable types[16]	1102, Italy, Europes oldest paper document
Food					
Energy					
Medicin					
Buid.- & constr.					
Materials			Approx. 1000, South Asia, the spinning wheel[19]		
Science imp. for the technical development	820, Iran, algebraic[20] system, Ṃusa al-Chwarazmi				

15. The Cyrillic alphabet is used in for example Russia.
16. Printing with movable types (small pieces with a sign on each piece that was put together to a whole text) was not a major revolution for the Chinese, because they have thousands of different characters. But when the technology in the mid-1400s was "invented" in Europe, it was a greater success. Since we only have about thirty characters and also use quite a lot of signs for each word.
17. Horseshoes made that the horses' hooves were not torn as much and they also got better grip in the soil and thus could pull heavier loads. Harnesses of course existed before the 900's, but they were improved, which further increased the horses' ability to pull heavy loads.
18. Until the 1300s, a large part of the intercontinental transports were made on land, partly because those that where out on the open sea basically had no idea about in what direction they were going, especially when the sun had gone down and if it was not a starry night. But with the compass, the establishment of naval routes, faster and roomier merchant ships the marine transportations increased radically, see the chapter on transport.
19. The spinning wheel made it easier to turn the balls of, for example, sheep wool into threads, which in turn were braided together (woven) to fabrics.
20. Algebraic systems are used to solve equations.

Many of the innovations the subsequent 500 years, appears to have been to military benefits (such as watches, navigational aids, signal flags, better ships, various guns, rifles and hand grenades). Moreover, to the delight of the few who could afford to pay for luxury items, watches, glasses, and dental fillings were invented (table 4).

Table 4. Significant and lasting innovations 1201-1700. ? = Do not know.

Technic type	1201-1300	1301-1400	1401-1500	1501-1600	1601-1700
Transport			1440, Europe, the quadrant (navigational instrument). 1484, Portugal, the first European navigation manual and nautical calender.	About 1550, Germany, railroads[22], ?.	1700, England, useable steam engines, Newcomen. ?, the diving bell, ?.
Communication	The end of the 1200s, Europe, the mechanical tower clocks. 1290, Italy glasses.	1340, Italy, Europes first paper mill.	Early 1400s, signal flaggs.	1502, Germany, the pocket watch[21], Henlein.	1657, Holland, pendullum clock, Christian Huygens. 1663, 1692, France, woord book, French akademy.
Food					1672, ?, treshing machine, ?.
Energy					
Medicine			1450, dental fillings of gold.		
Build. & construct.		1328, sawmills.			1653, Germany?, piston pump, Otto van Guericke.
Materials				1586, Germany, mechanical loom.	
Science important for the technology dev.					"1614, Scotland, logarithmic tables[23], John Napier. 1637, France, the Cartesian coordinate system, René Descartes. 1683, Holland, precision microscope[24], Anton van Leeuwenhoek. 1662,?, General gas law, Boyle and Mariotte. 1678,?, The speed of light is calculated, Ole Römer. 1685?, Meteorological chart (wind map), Halley. 1687, England, "principa matematica" [25] published, Isaac Newton.

21. The early portable watches had only hour index. Much later they were supplemented with a minute index and even later with an index for seconds.
22. The first railway line was made of wood and used in a mine with horse-drawn carriages.
23. Logarithmic tables were important, before the calculators with a logarithm function, for those who wanted to understand the relationship between certain physical quantities, such as how long it takes to wear out a cutting tool in a lathe at different processing speeds.
24. There had been simple microscopes before Antony van Leewenhoek began to develop his better varieties. He constructed hundreds of microscopes and he was the first who saw germs (in 1675).
25. "Principa Matemathica" was a scientific book in which three of the fundamental laws of physics were described:
1. Every body remains in its state of rest or uniform and rectilinear motion unless it by interacting forces is forced to change that state.
2. The change of motion change is proportional to the force applied and it is directed along the straight line in which the force acts.
3. Each force corresponds to an equal and opposite force, so that the mutually between two bodies acting forces always are equal and opposite.
These mechanical laws were important to know for those who later designed for instance steam engines.

The reason that so little happened after the Roman Empire until the year 1700 may be that:

Economic constraints. They who possibly saw the need for technological development in the most important economic sector (agriculture) had probably seldom the skills, materials and tools needed to develop the technology. Still less did they afford to let someone more suitable person to do the development work. And those who could do it, as blacksmiths and other craftsmen, could not reasonably engage in things[1] they did not get paid to do.

The limitations of bartering. The trade was limited and the majority (often over 90%) lived by their own family's work in nature. Most of what was consumed came directly from their own production. For this majority the payment for goods sold was usually other goods. Barter would include the disadvantage that the system was very cumbersome for those who were specialized in manufacturing of a particular product, since they had to devote much time to succeed in exchange to what they needed to survive. Which resulted in that most did everything, and the overall productivity was low.

The transport limitations. Transport was time consuming and thus costly, therefore restricting the movement of goods to either cover the immediate area or very expensive goods destined for a small elite that could pay for long distance journeys. That limited the village's opportunities, and output from, specializes in an area.

Communication systems constraints. For new technologies to be born it requires that someone sees that innovation is technically possible. But most were tied to the family's work in nature (or another family's ditto) and they did not have the means to do some travelling. This meant that they were stuck in the local area and therefore could not see, much less embrace technological advances made elsewhere. In addition, they could not learn about achievements through reading about them or study them on TV.

Education system limitations. Today, we must all submit to training in a whole variety of subjects such as math, language, history, and more, before the actual work related training begins. But before public schooling was introduced, however, the children at an early age had to learn to do a job. This meant that they were forced from childhood to obey and submit to the existing methods. When they themselves had the opportunity to influence their production, they were probably so solid in earlier approaches that they did not reflected on the efficiency in their work.
Further, the contemporary higher education organized by the society aimed to make students carrier of the current civilization's cultural heritage and norms. The studies were concentrated on poetry and some important religious scriptures like, the Bible, the Quran, Avesta, Vedas, Tripikata, or Confucius writings. The research that, after all, was conducted by the wise researchers at the universities was primarily in the areas of science and math. This probably because it was considered to be cultivated and that such area requires only an analytical person, and since he was paid, he did not need any other reward than the glory and perhaps a better position. Which was an important reward system then and now.

Social constraints. Those who had the means to develop new technologies (the state and the upper class), were rather uninterested in doing that. It may be because they:
- Wanted to keep the distance to the working part of the population, such as farmers.
- Felt solidarity only with themselves, their family and the immediate circle, and as long as they had a good time, they saw no reason to do anything.
- Were only interested to seize as much as possible of the common cake, instead of increasing it. Then probably no one had even heard of a society where the cake was enough for everyone.

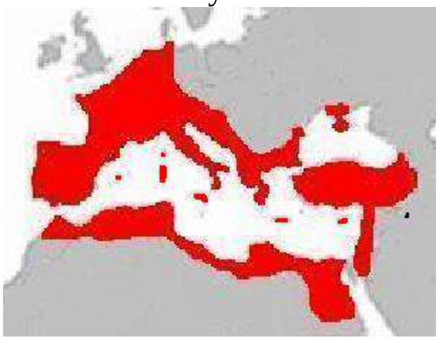
How is it then that the Romans successfully developed such advanced systems?

Economic constraints. Romans took home great wealth, which probably to some extent gained all citizens, which reasonably resulted in that ordinary people had more funds for development compared with other communities.

The limitations of bartering. The Romans lived largely in cities and they could not live directly from what the land gave. The Roman economy was to a far greater extent than most other previous and subsequent kingdoms depending on trade paid with coins. Coins made of brass, bronze, copper, silver and gold, were minted and distributed according to strict rules of weights, sizes, value and metal composition. They were so popular and valuable that they were used (or at least, they have been found) as far away as India.

A copper coin from the German part of the Roman Empire under Emperor Constantine II's reign (317-340 years). This coin did not cost more than 195 SEK in one of Stockholm coin shops in 2011, suggesting that the Roman coins still today are quite common.

The transport limitations. A major part of the more densely populated areas of the Roman Empire was reachable by boat than most other empires that have ever existed.



The Roman Empire during the year 0.

Communication systems constraints. The Romans had public transportation throughout the country, which provided opportunities for citizens to look around.

Education system limitations. Roman Empire also had no public education, but it was common that children's of less affluent parents were trained in a primary school, which was called the Ludus litterarius. They could be anywhere, in private residences or on the street. They typically focused on the demands of everyday life: reading and writing. In addition, there were higher levels of education for those who had rich parents. Thus, the Romans probably were better educated than the citizens of most other kingdoms before compulsory schooling began to be introduced in the 1800s. In addition, it was reasonable to believe that their abundant supply of cheap labour (slaves) to the heavy chores that otherwise bound population at simple tasks, freed workers who had a managerial position in relation to the slaves who did the hard work. It probably meant that they both had time to think about more efficient methods and also to some extent had the power to implement changes.

Social constraints. No idea how it was regarding this point.

Technology developments during 1701 – 2000

Since the technology that we daily face differ very much from what someone faced in 1700, very much must have been invented afterwards. Some of the most significant innovations are listed in table 5.

Table 5. Significant and lasting innovations 1700 - 2000. ? = Do not know.

Technic type	1701-1800	1801-1900	1901-2000
Transport	1707,?, suspension, 1759, Great Brit., chronometer (portable precision clockwork), John Harrison. 1769, France?, steam wagon for city, Cognot. 1779, France, the velocipede (bicycle predecessor). 1781,?, the first successful experiments with steamers, Jouffroy. 1783, France, hot air balloon, Mongolfier. 1790, sextant (navigational instrument), Adams.	1803, Brit., locomotive, Richard Trevithick. 1803,?, paddle steamer, Robert Fulton. 1805,?, leaf springs, Obadiah Elliot. 1839, Brit., bicycle, Kirkpatrick Macmillan. 1839, USA, vulcanizing rubber (gave the rubber tire), Charles Goodyear. 1876, Germany, four-stroke petrol engine, Nikolaus Otto. 1877, USA, pneumatic brakes (used on trains and trucks). 1881, Germany, electric locomotives, ?. 1885, Germany, the car, Daimler and Benz. 1892, Germany, the diesel engine, Rudolf Diesel.	1903, the United States, aircraft, Wright brothers. 1907, France, helicopter, Paul Cornu (the first viable helicopter was German and came first in 1936). 1930, Brit., Jet engine, Frank Whittle. ?, Germany, rocket engine, Verner von Braun and others. 1957, Soviet, satellites, ?. 1970, USA, GPS, various persons.
Communication	1765,?, paper based on wood instead of rags, ?. 1780,?, reservoir pen, Scheller.	1812, Germany, cylinder printing press, F König. 1826, France, photography, Louis Daguerre. 1833, Germany, telegraph, Carl Gauss. 1837, the United States, better telegraph, Samuel Morse. 1839, Switzerland, electric bell, Carl August Steinheil. 1876, USA, telephone, Alexander Bell. 1858, United States-Brit., Transatlantic submarine cable, ?. 1867, the United States, the first useful typewriter, Christopher Latham Sholes. 1877, USA, phonograph (the first type of gramophone), Thomas Edison. 1895, Italy, radio, Gugliemo Marconi. 1895, France, moving images, the Lumière brothers.	1904, United States?, Electron tube, Ambrose Flemming. 1910, the United States, moving images with sound, Thomas Edison. 1915, the United States, traffic lights, ?. 1923, the United States, the portable radio, ?. 1936, Great Brit., Television broadcasts. 1947, the United States, the transistor, William Shockley. 1949, Great Brit?, Computer. 1958, USA, micro chip. 1960, USA, laser, Theodore Maiman. 1969, the United States, the forerunner of the Internet, various persons.
Food	The 1700s, Brit., horse-drawn seed drill and harrow, Jethro Tull.	1805, USA, chiller, Oliver Evans. 1811, France, food preservation, Nicolas Appert. 1834, USA, reaper, Cyrus Hall McCormick. 1864, France, pasteurization, Louis Pasteur.	1911, the United States, electric refrigerator for household use. 1994, the United States, genetically modified vegetables, various people.
Energy	1703, Germany, street lighting with oil lamps, ?. 1712, Brit., steam engine, Thomas Newcomen. 1800, Italy, battery, Alessandro Volta. 1745, Germany, capacitor, Edward von Kleist. 1778-88, Brit., improved steam engine, James Watt. 1792, Brit., gas lights, William Murdoch. 1800, Italy, battery, Alessandro Volta.	1813, Brit., the first real gasworks. 1831, Brit., Transformer, Michael Faraday. 1831, the United States, electric motor, Joseph Henry. 1848, Germany, gutta-percha isolation around electrical cables, Siemens. 1860, France?, lead battery, Gaston Plate. 1859, the United States, the first oil drilling ?. 1880, the United States, the first lasting light bulb, Thomas Edison. 1879, the United States, the first working hydroelectric plant, Thomas Edison.	1942, U.S. atomic reactor. 1960, the Soviet Union, the solar cell, ?.

Table 5. Continued.

Technic type	1701-1800	1801-1900	1901-2000
Medicine	1770's, Brit. , medicine for heart failure, William Wintering. 1796, Brit., smallpox vaccine, Edward Jenner.	1816,?, stethoscope, Rene Laennec. 1831, chloroform, Samuel Guthrie / Justus van Liebig. 1842, USA, ether anaesthesia, Crawford Long. 1842, Austria, disinfection before surgery, Semmelweis. 1865, cleaning of wounds with carbolic acid, Joseph Lister. 1874, Germany, aspirin, Herman Kolbe. 1895, Germany, the X-ray machine, Wilhelm Röntgen. 1896, Italy, blood pressure cuff, Scipio Riva-Rocci.	1928, Brit., penicillin, Alexander Fleming. 1929, Germany, electro-encephalography, Hans Berger. 1953, USA, outpatient vaccine. 1957, Brit., ultrasound, ?. 1967, South Africa, heart transplant, ?. 2000, USA, draft map of the human genome, various persons.
Building- & construction	1750, USA, lightning conductor, Benjamin Franklin. 1771,?, twist drill, Cooke. 1774, Brit., water closet, ?. 1776,?, planer, Hatton. 1777, France, central heating with hot water, Terrebonne Main.	1805, Brit., Band saw, Newbury. 1822,?, the road roller Patterson. 1866, Sweden, dynamite, Alfred Nobel.	
Materials	1709, Brit., iron with coke, Abraham Darby. 1733, Brit., quick shuttle for looms, John Kay. 1740-50, Brit., crucible steel process, B Huntsman. 1746, Brit. method for producing sulphuric acid, John Roebuck. 1765, Brit., spinning machine, James Hargreaves. 1785, Brit., bleach, Berthollet. 1786, the first workable mechanical loom, E Cartwright. 1789, Brit., rails of steel. 1793, USA, cotton ginning machine, Eli Whitney.	1823, Brit., waterproof fabric, Charles Macintosh. 1826, Germany, aluminium, Wöhler. 1856, Brit., steel fabrication, Henry Bessemer. 1846, USA, sewing machine, Elias Howe. 1879, Brit, Thomas method (steel from iron ore with phosphorus), ?. 1884,?, art silk, Count de Chardonnet. 1890, Russia, electric arc welding, Nikolai Slavianov.	Mainly USA, all plastics, various inventors.
Science important for the development	1714, Germany, temperature scale, Gabriel Fahrenheit. 1768, Switzerland, integral calculus, Leonhard Euler. 1727,?, The discovery that silver oxides are photosensitive (important for photography's emergence), Schulze. 1785,?, coulomb's law, Charles Coulomb. 1795, France, the metric system, ?.	1820, Denmark, electromagnetism, C H Oersted. 1827, Germany, ohms law, Georg Ohm. 1831, Brit., principles of electric motors, transformers and generators, Michael Faraday. 1834, Brit., mechanical computer, Charles Babbage.	1938, Germany, the fission of uranium atoms, Otto Hahn and Fritz Strassmann.

Even at the end of the period discussed here, there were people who came up with inventions that someone thought ware so fundamentally different from previous technology that it would be possible to get a patent on them (chart 1).

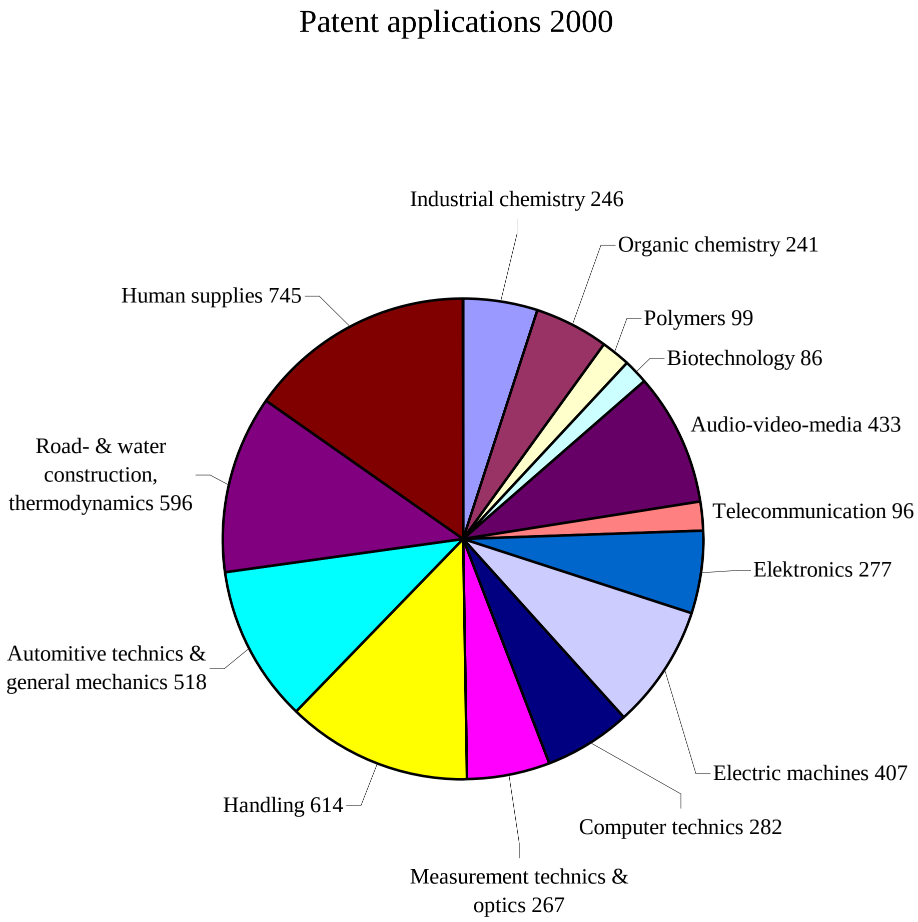


Chart 1. How the 4920 Swedish patent applications, lodged at the Patent Office in 2000, were distributed among different areas, according to the International patent classification (data from the Patent and Registration Offices website). The figure after the names of each category indicates the number of patent applications.

Why was so much invented in the North-western and Central Europe?

Though the civilizations of China, India and the Muslim world were superior to Europe long before. Maybe because:

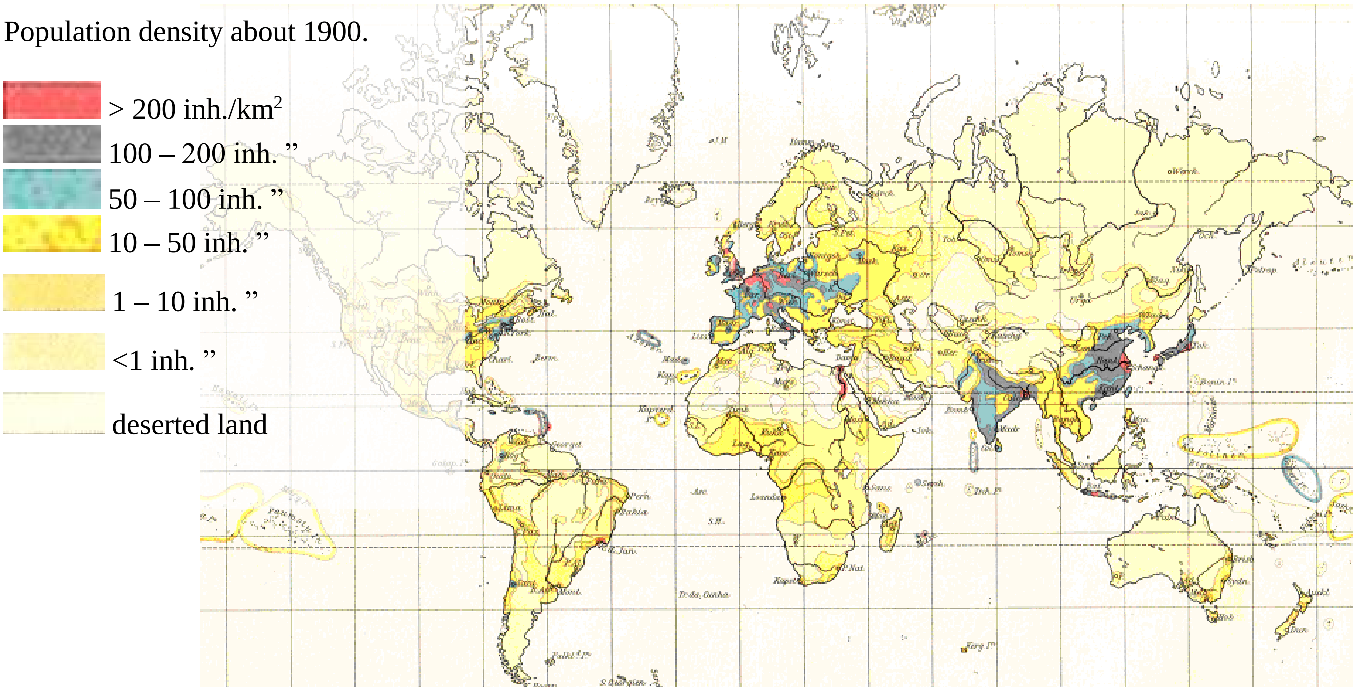
Economic constraints.
- The wealth in Britain, in particular, shipped home from the colonies generated revenue to the country. Which in turn resulted in that there were money to invest in industrial production and there were people with money to consume the products manufactured.
- Natural resources in the area were varied and include fairly large supplies of hydropower and important elements such as iron, copper, clay, limestone, wood and coal.
- Europeans had fewer children than in other civilizations. This is mainly due to the relationships formed later and thus they had less time in which to conceive children. The effect of this was that the population increase was not greater than that it usually was a food reserve for natural disasters and crop failures. This in turn meant that these disasters had less devastating effects than in other parts of the world.
- The area has a regular and abundant supply of water in the form of rain. Unlike from the competing civilizations which were mainly located in the drier areas watered by large rivers, with related future demands for irrigation of fields and a greater risk of dehydration.
- Efficiency measures in agriculture conducted in north-western Europe, beginning in the 1700s (see food), freed labour ready for other tasks.
- The potatoes that came to Europe with the Spanish sailors, were spread over the region from the late 1700s and since a couple of potatoes can produce enough potatoes to a whole meal for one person, it led to that the amount of food increased and thus the farms could feed more people who were not farmers.
- Jennings method of smallpox vaccine were used on a large scale in the UK in the early 1800s, which led to more people survived (see Medicine) and it further increased the supply of labour.

The limitations of bartering.
- Due to the above, there was a widespread urbanization of the region. For example, 1801 - 1851 the population in London increased from 959 000 to 2 362 000[26] persons. Since the urban population could not live on what the nature had to offer, they were forced to find other ways to support themselves, primarily some form of manufacturing, which undermined the self-sustenance and thus the barter.

The transport limitations.
- The relatively densely populated area in northern Europe meant that producers had close to a large amount of potential customers.
- Europe has a very long coastline which has the effect that a larger portion of the population could be reached by sea transports than in competing areas.
- The large number of rivers made it easy to transport goods to cities in the interior.
- During the period a large number of canals and later railroads where built which further improved transportation.

26. English Industrial Cities of the Nineteenth Century: A Social Geography by Richard Dennis, Cambridge University press, 1984).

Communication systems constraints.
- The region was, unlike competing regions, not surrounded by desert, tropical rainforest and mountains (the latter with a few exceptions). This meant, first, that there was a large land mass and population that to some extent could take part in the advanced civilization building, and secondly that there were no nomadic people who constituted a threat against this.
- Northwest Central Europe was densely populated, which further increased the possibilities for exchange of information.
- During the period the ability to travel and communicate in the region increased (see the chapters on transportation and communication).



Education system limitations.
- During the Industrial Revolution public schooling was introduced in the region.
- From 1794 and onwards public technical universities and other technical schools started throughout Europe.
- The climate in Central Europe is more variable and in the northern part the winters are so cold that agriculture and the like are impossible during a large part of the year. This in turn meant that there was a need for more technical solutions compared to if the climate had been more constant. These generally present needs, probably gave rise to more interest in technology among the general public.

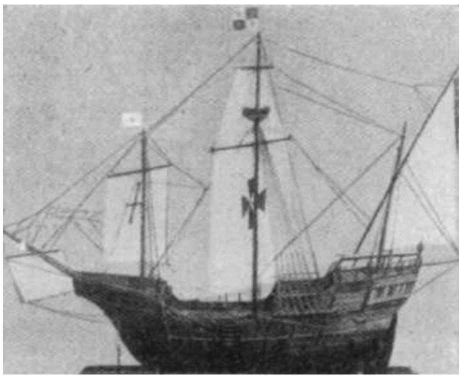
Social constraints.
- It was not as unseemly in the European elite to indulge themselves to technology or agriculture as it was for the elite in other parts of the world. This since Europe earlier was so poor and undeveloped that they had to be confronted with such banalities.
- The large amount of relatively equal states close to each other, called for competition.
- The Christian view of work that appears in bible verses like: "Six days you shall work, but on the seventh day you shall cease to work, so that your ox and your donkey may rest and the slave woman's son and the stranger may be refreshed." (2 Exodus 23:12), "The lazy desire becomes his death, because his hands refuse to work." (Proverbs 21:25) and "Let him work – that’s what he is made for, and if he do not obey, then put him in fetters.”(Sir 33:30).

The majority of the reasons proposed above may explain why the industrial revolution took place in Europe, but not when it happened. The triggering factors are among the events and processes that preceded the Revolution, the introduction of the smallpox vaccines, or the shipments of wealth from the colonies, or the improvements in agriculture, or ...

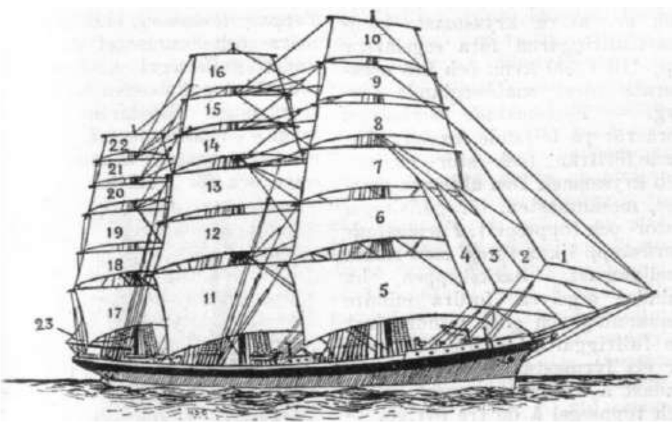
Transportation

Boats existed long before the year 0 in our era. And they were in several respects superior to all land-based transport. It probably began with rafts of interconnected tree trunks, via canoes made of hollowed tree trunks to real ships. These early boats had some significant drawbacks such as that: they probably were heavy relative to their size, they were unstable since the size of the keel probably was limited, they required pretty much manual labour and the load capacity was very limited. Longer distances and/or larger shipments required other boats. The problem with that they required pretty much manual labour was solved in two ways, one was to provide the boats with sails. There are images that show that the Egyptians were sailing about 3200 BC. The second method was to provide the boats with a great number of rowers. Since the early yachts could not sail besides in tailwind the first sailing ships was usually a combination of these two techniques. The development continued with sailing vessels like:

Long boats, which was a type of ships that has evolved over several centuries and perfected by its most famous users, the Vikings, in the 900's. Typical size 22 x 5 m, speed ≤ 10 knots, 30 rowers.



The caravel, which was developed by the Portuguese in the 1300s (size about 20-50 x 9 m). This type of vessels were used by both them and the Spaniards when they conquered the New World. The ship to the left is a model of Columbus caravel 'Santa Maria'.



Full rigs, which were developed in the 1700s, when the professional sailing ships peaked regarding performance. They are characterized by having at least three masts with square sails on each one. In ideal wind, they could get up to a speed of, like, 16 knots.
There were more than full-rigged ship and the largest (Prussia) weighed 11 150 tons (full load), had five masts, 6 806 m^2 sails area and was 147 m long including bowsprit.

Navigation at sea:
The sun's position was for a long time central for navigation at sea. In addition to that it with it's motion across the sky indicates the east and west, the angle between the ship and the sun's arc of motion gives the latitude vessel.
Astrolabe was until the advent of the compass the main instrument for navigation at sea. It was invented in ancient Greece. The instrument is similar to a sextant and was used to measure the angle between two stars or one star and the horizon. With this information, in combination with a star map one could, to some extent, calculate the longitude.
In the 1100s the Chinese began to produce reliable and convenient compasses and thus the sailors had a tool to know that they were on the right course. But the knowledge that a floating magnetic needle always pointss in the same direction, however, the Chinese (and perhaps others) have had since long ago.
The Earth is round, but maps are flat. It can for example be solve by stretching out the world at the poles (cylindrical projection), or by making a circular map (conical projection). The former, called the Mercator projection, after a famous 1500's cartographer, has the disadvantage that same distance looks longer nearer the poles than near the equator, but the advantage is that the latitudes and longitudes appear as straight and perpendicular lines. And a straight course will be straight on the map.
The sextant, was developed in the 1700s and it was used to determine the sun's height above the horizon. With that information in combination with the knowledge of the time (in for instance Greenwich) it was easy to fairly accurately calculate the longitude. The problem was that it was not possible until the Briton Harrison in 1765 invented the portable clocks that kept time with even on rocking boats and during the long period of time that an Atlantic crossing takes.
The Global Positioning System (GPS) was developed for the U.S. military and was introduced in the latter part of the 1900s. It is based on a number of satellites hanging in space around Earth. Each satellite transmits its position with a radio signal that also contains data about when the signal was transmitted. The GPS receiver measures when the signal arrives and calculates the time taken for the signal to reach the receiver and with that information it then calculates the distance to the satellite. By taking in the signal from a number of satellites, it can determine it's position.

But even great and fast sailing vessel has the disadvantages that:
- It was difficult and sometimes impossible to take them through confined spaces such as rivers. This disadvantage was particularly evident when the Suez Canal was opened and steamships got a huge shortcut to Asia.
- If it is not blowing, the journey could take a long time and it was always difficult to plan the travel time.
- Pure sailing ships were difficult to park beside the quay, which meant that they often had to anchor outside them. This in turn meant that loading and unloading was time consuming as it was done with rowboats.
- They needed lots of people to tear down the sails quickly in the event of sudden storms.

Experiments with steam-powered vessels began in the 1770s, which basically solved these problems.

The boat in the foreground is a modern ship with a diesel engine, which still have to compete with the ship behind, which is powered with a steam engine.

Initially there where only paddle steamers and they were used for river and coastal transports and as tug boats, but the propeller and energy-efficient machines about 1815 allowed ocean cruises. A disadvantage of steamboats on the longer routes, however, was that they had to bunker coal along the route. That problem was solved with larger vessels, more efficient steam engines and the Suez and Panama canals.

Steamships, in turn, began to be replaced by diesel-powered ships in the second half of the 1920s. The main drawbacks with steamships were probably:

- To create the steam that was necessary, it required that someone fired in the pan a long time before it was time to start the engine.
- Shovelling coal was a hard and unpleasant work because the coal dusted and it was moved by hand from the coal boxes to the boiler.
- The smoke from the boilers was sooty and smelly.
- Coal is bulkier than diesel oil.

With the advent of diesel engines shipbuilding technology had more or less reached its perfection, and even today, many vessels have a similar design as those built in the 1920s.

No matter how effective a ship is, it has the disadvantage that it can only travel in the water. To reach human habitations however one has, apart from in Venice, always have to use land transports.
People have ridden horses in battle and used to them pull wagons, in several places in China and the Orient, for at least 8 000 years. In China, the horse cart already well developed in the 1300s BC, and then it has not changed that much further. The biggest step stones after the year 0 regarding the use of horses are probably:

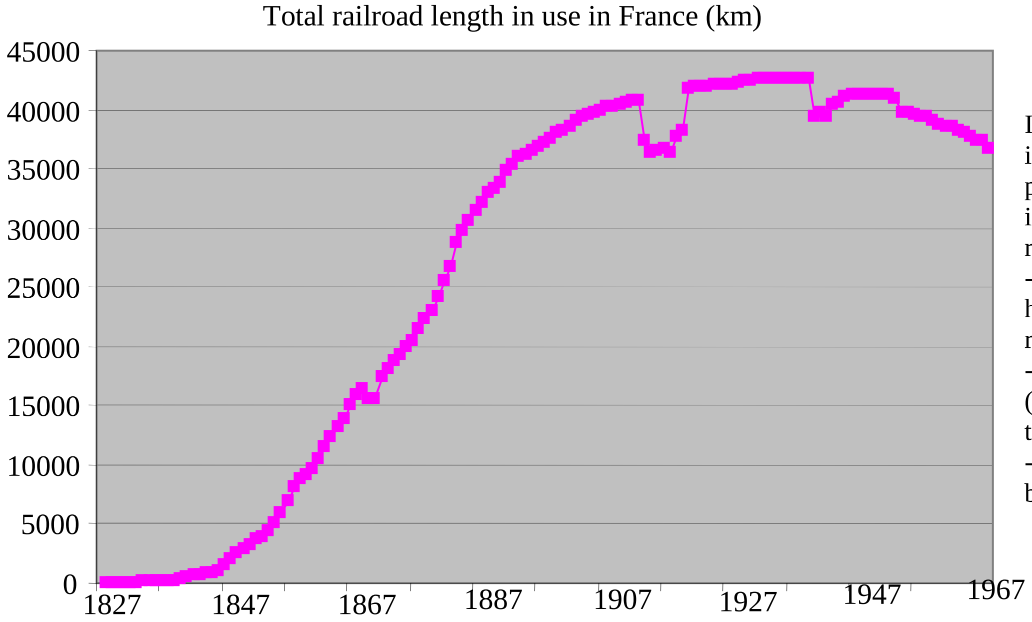
- When the Mongols introduced the stirrup on the 300's, which meant that the riders had easier to stay in the saddle.
- In the 800s the horseshoes were invented and with these the horse's hooves were less torn and they could pull heavier loads.
- Someone in the 900s made a major modification of the harness that allowed the horses to pull heavier loads.
- Strong working horses were developed with time, however, these were used at first mainly in warfare (in agriculture, it was common to use oxen until the 1700s, because they were stronger and probably cheaper).

Horse-drawn vehicles, however, had a number of severe limitations, of which the most important were:

- Horses can’t pull heavy loads, especially uphill.
- They had a hard time slowing down heavy load in a downhill slope. It was solved in some cars, like horse-drawn trams, through brakes on the wheels.
- Horses need to sleep long before the coachman.
- They can’t run fast more than a short distance.

The three of these disadvantages is more or less eliminated if the horse instead pulls a barge on a stream, since streams have no up hills and barges required relatively little force to be pulled. The downside is that the water is not always where you want it, or it is too shallow. This has long been solved by digging channels. An early example of a large channel for transport was the 2 500 km long Grand Canal in China built in the 400's, BC.
In addition to that the channels require a lot of work to be built there is also the problem that they are best suited for flat ground. Those who intend to make a channel in ascending terrain are forced to dig shafts or tunnels, which are extremely labour intensive, especially before the dynamite existed. A similar problem faced those who wished to make rivers and lakes navigable past waterfalls. The problem with altitude was solved by building locks. In Sweden, we began to build locks in the 1500s.
But the European channel construction golden age lasted from the 1700s until the construction of railways began on a large scale. For example, the construction of the Suez Canal began in 1859 and it opened to traffic ten years later.

Railway construction busted channel construction since the former was much easier and in addition tracks could be laid almost anywhere. The first railways were built in German mines during the 1500s. There they used rails of wood and had horses pulled the carts along the mine shafts. The first real railroad also had wooden rails and the train was pulled by horses. It was built in 1758 in the UK. The Briton Richard Trevithick built a high pressure steam engine with significantly higher power than his countryman Thomas Newcomen engine and he built in 1804 the world's first steam locomotive. The maiden voyage it pulled ten tons of iron and 70 passengers. In 1825 the first real steam-powered passenger train was presented. At first people probably were a little afraid of the railroad and its possibilities, as the British Parliament in 1836 decided on a law that limited the trains speed to 8 km/h, but the railroad was a success and already in 1850 about 2 920 km of railways was built in France alone (figure 2). In Germany there was at the same time, 5 860 km, 850 km in Belgium, Italy 620 km, and Denmark there were 30 km rails.



In the 1870s, several important innovations that probably fueled the interest in building railways:
- Steel rails (withstands heavier trains than iron rails).
- Electrical signaling (admitted several trains on the same track).
- Air brakes (better braking).

Chart 2. The total length of used railway lines in France regardless of track width, between the years 1827-1967 according to Brian R. Mitchell (International historical statistics, first edition, The Macmillan Press Ltd, UK). The decrease in 1871 was due to that the French lost Alsace to the Germans. There were also small drops around 1915 and 1940 due to the wars. The downward trend after World War 2 is due to that the needs of railway decreased with the increase of mass motoring.

In the early days of railroads, they were built largely by private initiatives between the larger towns, but over time it became a state responsibility and they saw it as a means to populate the wilderness and increase prosperity in poor parts of the country. Examples of the latter were the U.S. transcontinental railways were built in 1864 and 1890 to transport goods and people to the west of the country, and the Siberian railway, which began to be built in 1891.
In the 1920s, European Rail reached its peak concerning the total track length and 1926 there were over 960 000 km rails in the free part of the world (table 6).

Table 6. Data from the Tidens Calendar 1927 (Tidens förlag, Stockholm, 1926). Only the countries that, according to various sources, were wholly independent states are included in the table.

Name at the time	Size (km^2)	Inhabitants (millions)	Railway length/inh. (m/pers.)	Railway length 1926 (in 10 km)
Abyssinia (Ethiopia)	900 000	9.5	0.73	693
Afghanistan	650 000	11	no data	no data
Albania	30 000	0.85	3.53	300
Andorra	450	0.005	no data	no data
Arabia	no data	no data	no data	One railroad
Argentina	2 790 000	10	3.73	3727
Belgium	30 440	7.8	1.29	1005
Bolivia	1 590 000	3	0.81	242
Brazil	8 511 000	30.6	0.98	3010
Bulgaria	103 100	5.1	0.52	265
Chile	751 500	3.9	2.12	825
Colombia	1 283 000	6.6	0.25	164
Costa Rica	50 000	0.5	2.14	107
Denmark	44 300	3.5	1.42	497
Dominican rep.	50 000	0.9	1.1	99
Ecuador	307 000	2	0.53	105
Egypt	935 300	14	0.31	440
Estonia	47 550	1.2	0.89	107
Finland	388 500	3.5	1.3	454
France	551 000	40.4	1.04	4191
Guatemala	127 000	6.2	0.2	124
Greece	113 000	2	1.23	246
Honduras	100 250	0.773	1.29	100
Italy	309 700	40	0.52	2091
Japan	677 400	85	0.25	2112
Yugoslavia	249 000	12.5	0.73	917
China	11 100 000	440	0.03	1154
Cuba	114 500	3.4	3.03	1029
Latvia	65 800	1.9	1.48	282
Liberia	95 400	1.75	no data	no data
Liechtenstein	139	0.012	no data	no data
Lithuania	56 100	2.2	0.73	160
Luxembourg	2 600	0.275	1.96	54
Mexico	1 969 000	14.2	1.61	2289
Monaco	21	0.022	no data	At least one railroad
Netherlands	40 800	7.4	0.49	366
Nepal	140 000	5.6	no data	no data
Nicaragua	127 000	0.64	0.53	34
Norway	323 800	2.8	1.24	346
Paraguay	253 100	0.8	0.63	50
Peru	1 355 000	5.5	0.61	334
Persia (Iran)	1 650 000	5.6	0.1	56
Poland	388 300	29	0.7	2019
Portugal	92 000	5.6	0.61	343
Romania	294 200	17.5	0.67	1178
Russia	21 200 000	140	0.53	7362
Salvador	34 000	1.6	0.26	41
Switzerland	41 300	4	1.32	527
Siam (Thailand)	500 000	9.7	0.26	248
Spain	505 000	21.9	0.71	1559
United Kingdom	244 800	45.2	0.85	3829
Sweden	448 460	6.1	2.52	1540
Czechoslovakia	140 400	14.2	0.96	1362

Turkey	887 200	12	0.25	296
Reich	470 700	62.5	0.92	5725
Hungary	92 900	8.4	1.02	858
Uruguay	186 000	1.6	1.66	266
USA	8 000 000	114	3.55	40451
Venezuela	1 020 400	3	0.35	106
Austria	83 800	6.6	1.06	702

Steam locomotives were used for a long time, but steam cars never became a success. It is probably due to that steam engines were pretty well suited for use in locomotives, because the drawback that it takes so long to heat the boiler had little significance when trains runs almost constant. Furthermore, it did not take so much extra energy to lug all the coal needed and train stability made it pretty comfortable to shovel coal even when rolling. Moreover steam train could do pretty high speed (the current speed record is 202.7 km/h and was set in 1938 by the British locomotive Mallard). The disadvantages that steam locomotives after all had, made that electrified railways began to be built, the first one was built 1881 in Germany. But in many places they did not electrify the railways, instead diesel locomotives are used. Whatever type of locomotive used, however, railways have a number of disadvantages, of which the principal are:

- The trains are bound to the track and they can not make any detour from this and just a few transports can go from door to door by train.
- It is quite energy-and labour-intensive to drive a train, so it requires large transport volumes to be profitable.
- The trains can not run past each other on a track, so it is necessary that they follow a strict timetable.

The first deficiency was dissolved in part by the cycle. Around 1600 man started to experiment with that kind of transport means. Most, however, had 3-5 wheels, making them quite difficult to control and expensive to produce, and they didn’t gain any popularity.

In 1779 a bicycle-like thing was constructed in France. It was almost entirely made of wood and it was kicked with the feet. There was no steering, one had to lean sideways to change direction. Approximately in 1816 the German Baron Carl von Drais developed the idea by providing the device with a device on which one could turn the front wheel. In 1839 the British Kirkpatrick MacMillan introduced rods on the rear wheel driven by levers. McMillan’s bike was difficult to ride. One from this angle better solution came from the Frenchman Michaux when he put cranks and pedals directly to the front wheel hub. A disadvantage of this was that every revolution of the pedals the spinning wheel just rotated one lap, which forced the drive wheel to be big, otherwise the cycle would have been a very slow vehicle. This meant that the front wheels were huge, up to 1.5 m in diameter (high wheelers).

The large front wheel and small back wheel made the bike easy to tip forward, with the risk of serious injury. To avoid that many variations of high wheelers were introduced during this period. However, they still ran the bike on the steering front wheel. Brakes were introduced in the 1860s, chain drive was first used in 1869 and rigid metal spokes came in the 1870s. In 1885, John Kemp Starley designed a bike with the same size wheels, saddle and pedals in the middle that was perched on a large sprocket that drove a chain to a smaller sprocket on the rear wheel. Thus the modern bike was born! With the exceptions that the air-filled tires were not introduced until 1888 (they were invented in 1845 by William Thomson) and the first gear mechanism was patented in 1896. So in the second half of the 1890s, one can say that the bike was fully developed.

All the drawbacks of trains, however, were solved with the invention of cars, trucks and buses. The first real car was developed by the German Carl Benz and it was first run in 1885. But it looked more like a rickshaw than a car.

Benz had many followers, and even before the year 1900 a number of technical solutions that today characterizes a car were introduced, such as the steering wheel and air-filled rubber tires. The following decade a number of innovations came, such as battery, drum brakes and the ability to control the speed using a throttle.

In 1908 the T-ford was launched. It was based on a framework of steel beams with bodywork partly made of wood. The engine had four-cylinders with a maximum output of about 20 hp and the gearbox had two gears, which could push up the car to about 65 km/h.

Before the year 1930 a great deal of today's automotive technology was introduced, such as: covered body, alternator, starter motor, electric lighting, brakes on all four wheels, front wheel drive, compressor, self carrying body structure, hydraulic telescopic dampers, hydraulic brakes, wipers and automatic transmission.

Citroen B11 went on sale in 1934 and the company continued to sell it until 1957. From the outset, it had self-supporting all-welded body, front-wheel drive, independent suspension and hydraulic brakes.

Then did not happen so much with the car technology until the 50's, when many convenience-enhancing solutions were launched. For example: power-assisted braking and steering systems, electric windows, electrically adjustable seats, air conditioning, fuel injection and seatbelts. Then it happened not so much again until the electronics made its foray into the automotive world with innovations such as airbags and anti-lock brakes (80s) and computer-based networks (90s).
Throughout the time automobiles has existed, the number has increased steadily all over the world (for example, in the UK, chart 3), apart from periods of war like during World War II.

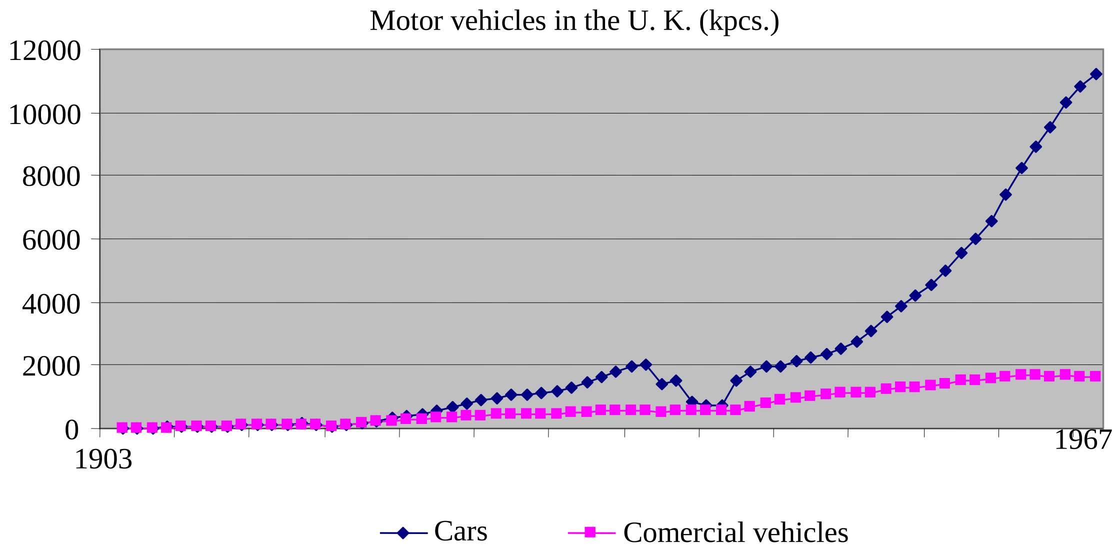


Chart 3. The number of motor vehicles in use in Great Brittan between 1903-1969 according to B. R. Mitchell.

We also travel a lot more (in 1900 an average Swede travelled about 230 km/year, today we travel an average of 12 810 km/year and 78% of the trips are made by car). With increased car use, the infrastructure around the cars has also increased, in the form of more and better roads (between 1900 and 1990 the total length of public roads increased from 54 800 km to 98 600 km), more traffic laws and traffic police (see chart 4), more traffic lights, higher oil imports (chart 5), et cetera.

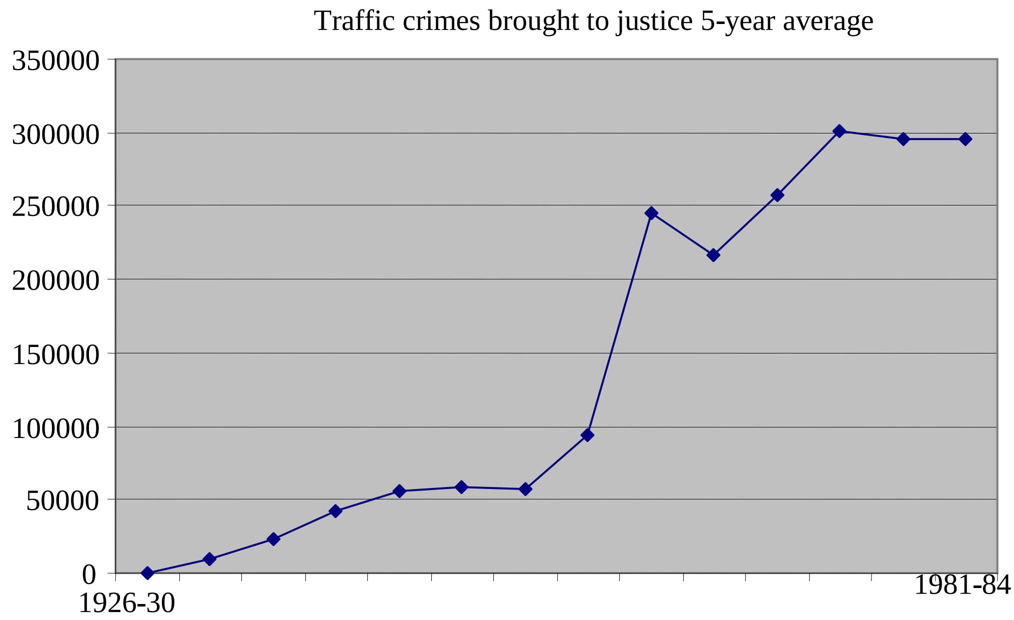


Chart 4. The number of traffic offences that were subject to legal actions according to Hans v Hofer (Brott och straff i Sverige Historisk kriminalstatistik 1750-1984 Diagram, tabeller och kommentarer, Statistiska Centralbyrån 1998= Crime and Punishment in Sweden Historical crime statistics 1750-1984 Graphs, tables and comments, SCB 1998).

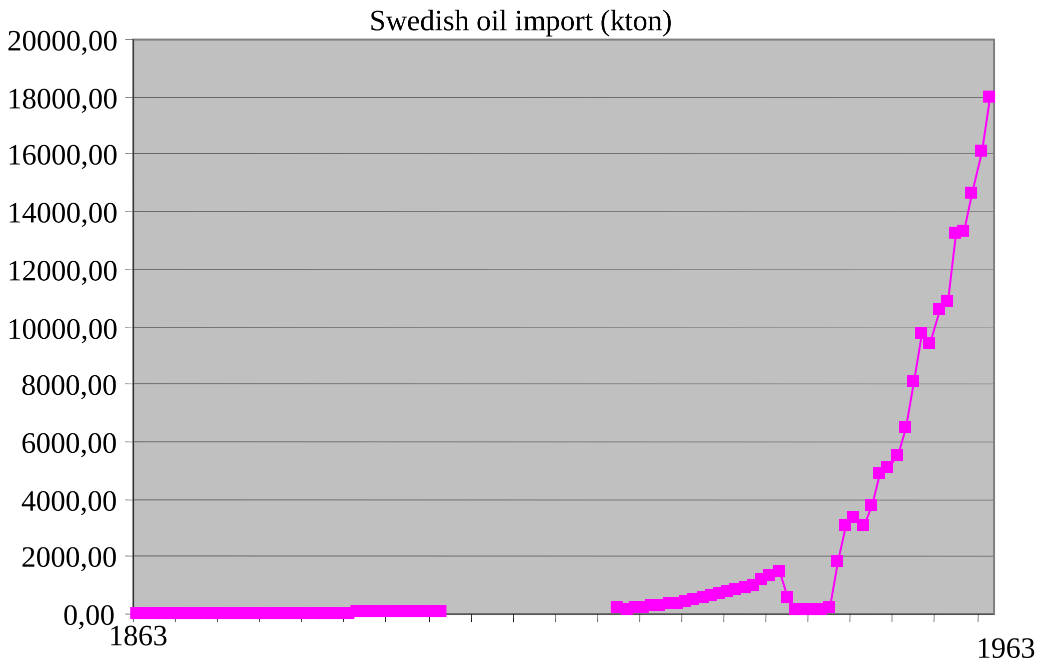


Chart 5. Oil imports to Sweden according to BR Mitchell (fourth edition). The empty field 1909-1919 is due to lack of data. Note that the import also included oil used for heating, which was a major application during the late 50's and the 60's).

Motor vehicles have a major drawback in that they move on the ground. The disadvantages of this are that:

- The vehicle speed is limited by the road's curves and bumps.
- There may be obstacles that stop up and/or causes accidents.
- The roads follow the terrain, not the shortest route between the departure and arrival.
- They can normally not cross lakes and rivers other than on bridges or if they are transported by boat.

These drawbacks are eliminated, more or less, with vehicles travelling in the air. Aside from some early experiments with wings, gliding from the cliffs, balloons and failed flying machines, aviation history is considered to begin in the U.S. with the Wright brothers, though there are, however, some debate about whether they really were the first or not.

The brothers built and tested in the early 1900 century a number of variations of gliders. When they did not succeed, they built their own wind tunnel and tested a number of different wing and rudder designs and their own combustion engine. They made the first controlled flight journey with a powered craft that was heavier than air (as distinct from balloons and gliders) in December 1903 and it was 8 km long. The aircraft, however, had a number of shortcomings, such as that it was very unstable. Later prototypes they built were more stable, but they still lacked essential things like landing gear.
With the launch of the first generation of American civilian jet aircraft, the Boeing 707-120, the civil aviation was more or less fully developed. It took only six years after the very first civil jet aircraft, DeHaviland Comet, came until Boeing 707-120 was introduced. It is still used today and its main performance, from a traveller’s point of view, i.e. cruising speed, is quite close to modern followers (table 7).

Table 7. Typical performance for the first civil jets and an early follower compared to more modern ones. Data like cruising speed, range and number of passengers vary for the same aircraft depending on the choices that the airlines do.

	DeHaviland Comet 1	Boeing 707-120	Boeing 747-400	Airbus 380-800
Crew:	4	3-4	2	2
In active service:	1952-54	1958-	1989-	2007-
Manufactured:	1949-1954	1954-1978	1988-2007	2005-
Ving area:	197.0 m²	226.3 m²	524.9 m²	845 m²
Empty weight:	34 200 kg	55 589 kg	180 755 kg	277 000 kg
Max. start weight:	73 470 kg	116 575 kg	362 875 kg	560 000 kg
Nominal speed:	790 km/h	897 km/h	920 km/h	955 km/h
Distance with max. fuel:	5 190 km	8 485 km	12 900 km	14 815 km
Capacity (no. of passanger):	56-109	110-179	-624	840

Around the same time that the first jet aircraft became operational air traffic increased dramatically (chart 6 a + b).

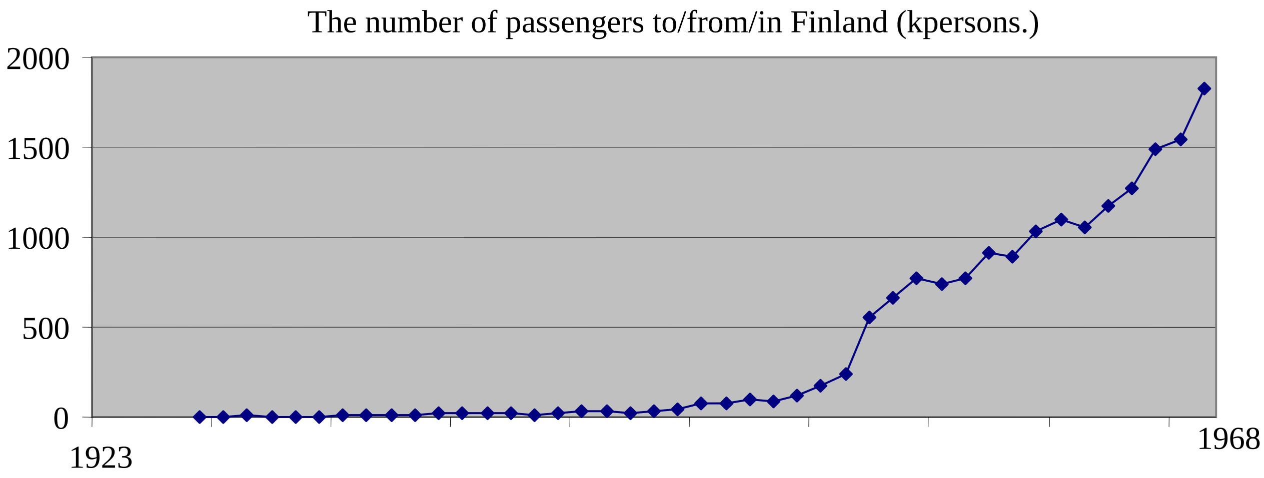


Chart 6a. Air plane passenger's to/from/in Finland according B. R. Mitchell.

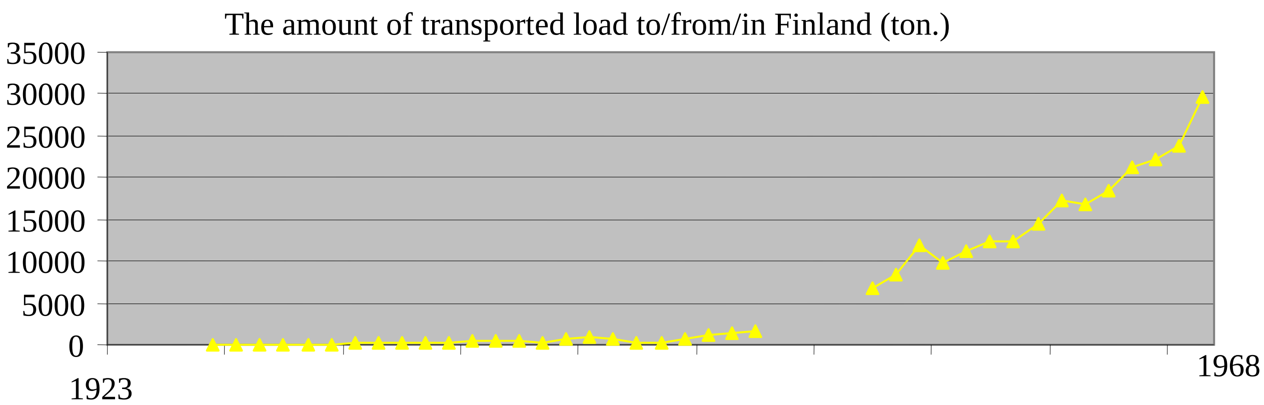


Chart 6b. Air freight load to/from/in Finland according B. R. Mitchell. Data is missing from the period 1951-1954.

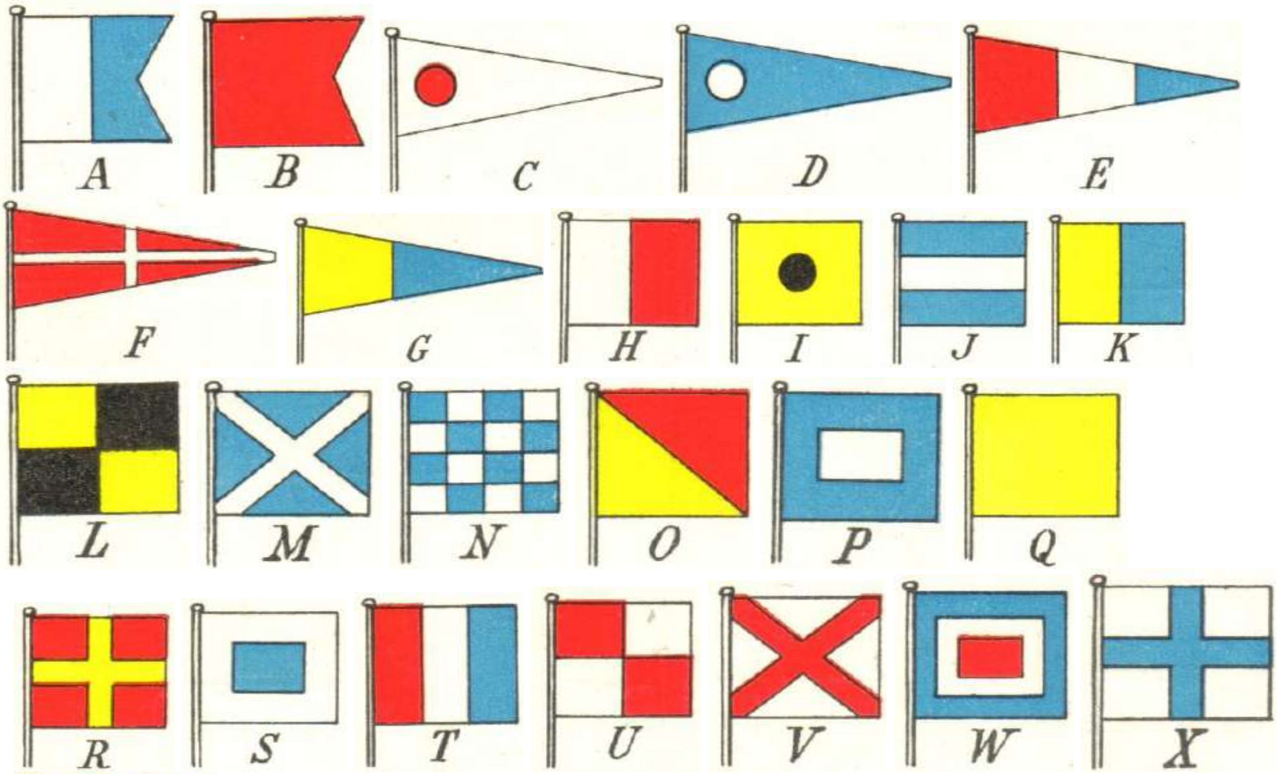
Today we can travel relatively fast and comfortably on or through all the earth media, except solid materials such as rock and soil. And modern engineers does not focus on new transportation methods, but rather to refine existing systems and devices to make them more energy efficient, comfortable and above all, cheaper to manufacture.

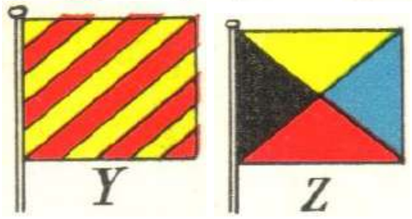
Communications

For most of human history, we have been forced to transfer all messages from mouth to mouth. The distance between the senders to the receiver could only be extended by couriers who went from the one to the other. A fundamentally important development step, the courier took, that instead of verbally convey the message, delivered in the form of objects with symbolic value, as a severed horse head, a bouquet of flowers, or a stone with signs. Even today we use that form of communication where we write down signs on a piece of paper, put it in an envelope, franking and posting it. We thus let the mail service do the courier work from us to the recipients.

We have also for tong time used a whole host of different methods to avoid travel from one place to another in order to communicate messages, such as light, fire, smoke, or drum signals. Among other things, networks of semaphores were in the late 1700's built in several countries, such as France, Sweden and the USA. These networks were used to the middle of the following century. Semaphore communication was faster than sending couriers and less sensitive to disturbances compared to other systems like light signals, and it required no fuel. But they were dependent on good weather and it took a fairly dense network of semaphore stations because one had to see between them with binoculars. Therefore, they were significantly more expensive than the system (the telegraph) that would compete with semaphores in the latter part of the 1800s. However, there are still live versions of other visual systems in the form of light houses, traffic signals and signage.

In the foreground a replica of a semaphore station, in the background the TV-tower in Stockholm.





The standard international signal flags for messages between ships. The practice of sending messages to each other with flags began in the early 1400s and evolved into an advanced system with different default messages that was used until the 1900's.

In all other types of communication outside sight and hearing distance, it is something other than a human being or human minds that carry the message between the parties. The oldest of these transmission media is the letter doves. They were apparently used in several of the ancient civilizations before our era, such as in China, Paranoiac Egypt, Ancient Greece and the Roman Empire. Until that radiotelegraphy was invented, we used pigeons especially for sending messages from ships at sea and from military in the field. The principle of the communication was that pigeons always want to fly home and that they are very good in finding their way back, no matter where they start. The disadvantages were that they can orient wrong, being eaten by other birds or die in some other way, and above all that the system only works in one direction. At the German siege of Paris 1870-1871, this later problem was solved in part by that the besieged sent the pigeons with balloons. Of the 381 pigeons that were sent from Paris, 302 were found by French forces and sent back with messages, 59 of them reached their destination in Paris with a military message.

One of the earliest systems for transmission of messages with the help of electrical wires was constructed by the Germans Carl Friedrich Gauss and Wilhelm Weber in 1833. The system consisted of a generator, a switch that could change the direction of the electric flow, a two pole cable (1 km) with a galvanometer at the other end. The galvanometer pointer was veering in different directions depending which mode the switch was set on. And the inventors designed an alphabet consisting of combinations of the three modes: the galvanometer pointer in the right, middle or left.

The system that was accepted by the market and got commercially spread was, however, developed by the American Samuel Morse and was patented in 1837. The principal differences between his system and the former were:

- The alphabet consisted of combinations of long and short signals.
- The long and short signals were created by a "switch" that was pushed down to the leading position different lengths of time.
- The receiver heard the short and long signals through a loudspeaker.
- Both transmitter and receiver have the same equipment, so the communication could go both ways.

Morse's telegraph system quickly captured the U.S., and in 1861 messages were sent across the country. Five years later, there was a working telegraph line between the UK and U.S. When the telegraph line across the Pacific was completed in 1902, there was a telegraph system around the globe.
But this system also had some significant drawbacks:

- Only one message at a time send could be sent in each pair of wires.
- It required telegraph wires.
- It was difficult to parse/send Morse signals, so it required specially trained personnel.

Despite that the number of telegrams increased, even after the phone system was introduced (chart 7 and 9).

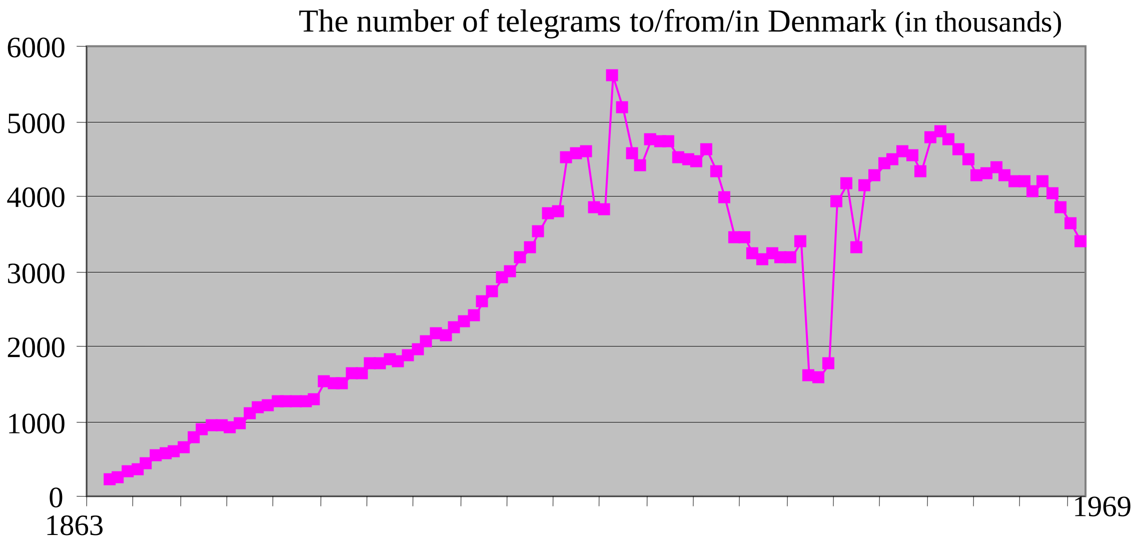


Chart 7. The number of telegrams to/from/in Denmark between 1863-1969, according to BR Mitchell.

To solve the first problem one either had to build a system with much more pairs of wires, just as they later did with telephones, or encode the messages so that each recipient knew what was meant for them or was not. They chose the latter and developed coding devices (telex machines). These machines also solved the third problem with the need for telegraphers, because the operators of telex machines wrote down the message on a standard keyboard. The Telex machines then in turn translated the text to a punched tape, which in turn was fed into a reader/sender device. The receiving telex machine then wrote out the text on a paper. The telex network was expanded to a large number of users and was used on a large scale until the end of the 1980s. Nowadays, however, it is more or less closed all over the world. Mainly because of the competition from the much simpler fax devices that can send a copy of any paper over a normal telephone line.

A solution to the second problem would be to send messages wirelessly. The first wireless message is considered to be sent in 1896 by the Italian Guglielmo Marconi and it was received by his colleagues around 6 km away.

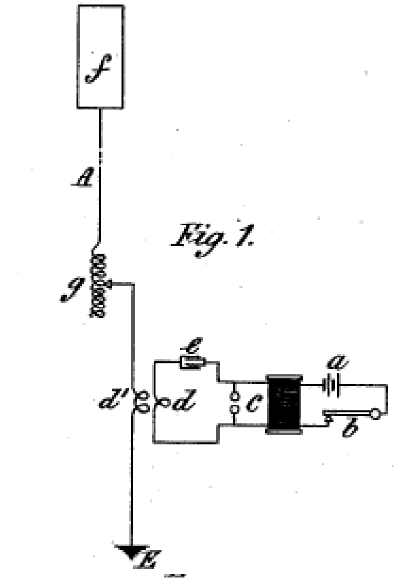


Figure 1. The description of the transmitter in Marconi’s patent application, wherein:

a = source,
b = breaker,
c = coil with two windings,
e = capacitor,
d = a coil with two windings, in the winding of the capacitor circuit there is a gap,
g = coil with a variable number of windings,
A / f = antenna,
E = ground.
When b closes e is charged, then discharged creates a spark in d, which in turn creates a brief electric pulse in the secondary winding, i.e. a high-frequency alternating current. This current pulse is spread in the air through the antenna.

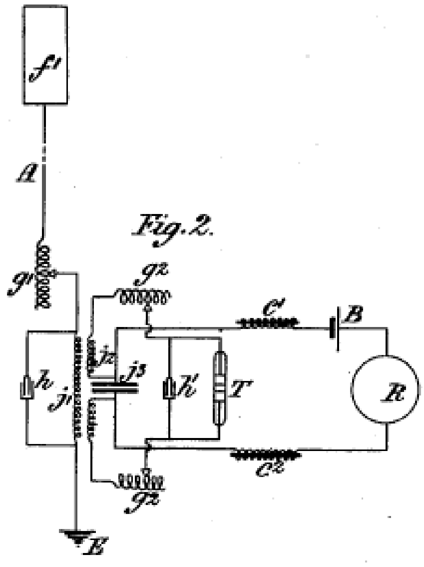
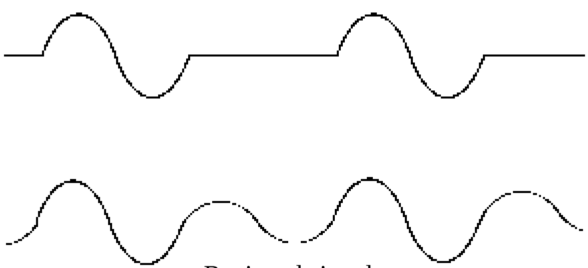


Figure 2. Receiver, wherein:

A / f = antenna,
g1 = a coil,
h = capacitor,
j^1 and j^2 = a coil with two windings, of which the other is split in two parts,
j3 = capacitor,
B = battery,
R = relay, which controls, for example a pointer instrument.
T = a tube with metal powder between two poles, when affected by electric waves the resistance of the metal powder decreases.
g^2 and C = coils.
E = ground.
The purpose of this set-up is to create a circuit that oscilates, whith an oscillation frequency that could be adjusted to fit the transmitter. When the signal comes it decharges j^3, and thus activates the relay.

Transmitted signal



Recieved signal

Transfer principle:
The transmitter was either silent or transmitting a signal. The receiver, however, was set to constantly swing with the same frequency as the transmitter signal. Once it got a signal the height of the swing got higher, i.e. the amplitude increased. This increase was sent, through the relay, to the instrument.

Marconi's system had a number of deficiencies, of which the principal was, in addition to that the messages consisted of Morse code, that it was based on an amplitude modulated carrier wave (AM band). This means that the sound (e.g., the Morse code) transferred by the amplitude of the carrier frequency, was varied at the same rate as the Morse code. This meant that the transfer was very sensitive to disturbances if not the broadcasts were made with extremely high power. The system improved considerably when the American Lee De Forest in 1906 invented the radio tube which was beneficial both to enhance the signals and partly to create the carrying wave.

One of the first commercial uses of his radio system was radio beacons for air traffic. The system was used until the beginning of the 1960s. Another early use was to send messages between ships and shore. The most famous example of this was the messages that were sent from the Titanic during its sinking in 1912.
Radio broadcasts began in California 1909th. 1925 the Americans Kellog and Rice invented the type of loudspeakers that dominates still today. Frequency Modulation (FM) was invented in 1933. With this technology, the carrier wave frequency changed a little all the time and the actual sound was in the frequency difference. It made the broadcasts much less sensible to interferences and thus they got better quality and the transmitter power could be reduced. Furthermore during the 30's, the number of radio stations increased. Overall, this probably had a big impact on that the amount of radio receivers increased rapidly (chart 8).

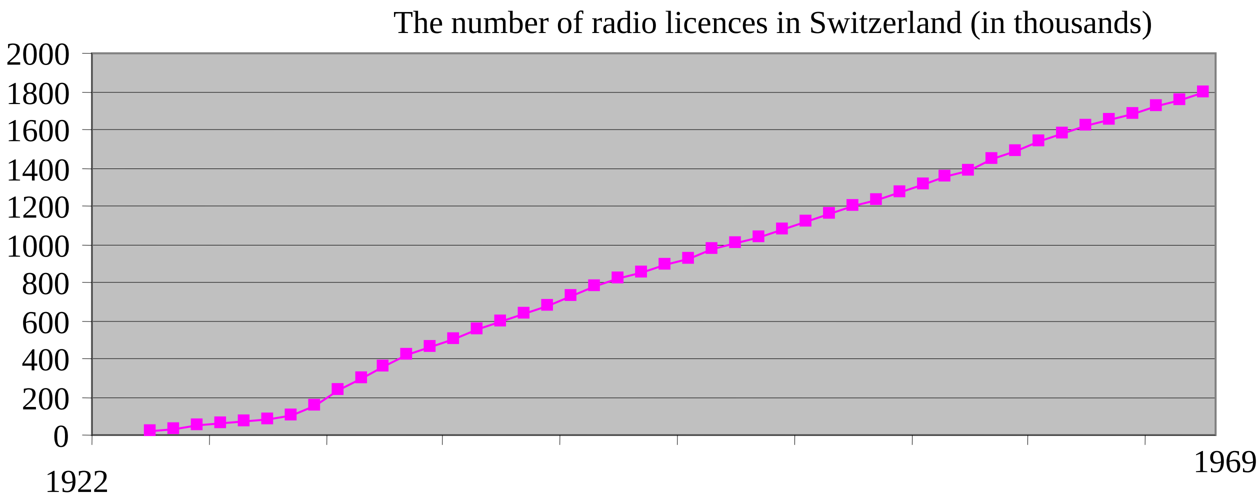


Chart 8. The number of licenses for possession of radio receivers in Switzerland 1922-1969, according to BR Mitchell.

Subsequently, it has not happened so much with radio technology besides that transmitters and receivers could be made considerably smaller when the semi-conductors[27] replaced the radio tubes.

27. Semiconductor devices consist of a base material that conducts electricity "semi well". In semiconductors childhood germanium was used as the basic material, but today silicon is most widely used. In the most basic semiconductor device (the diode), there are two thin layers of other material on the base material. The purpose of it is to make the component leading when one particular side is connected to the positive terminal and the other to the negative, but not leading when contacted in the opposite way. The component is useful for those who, for example, want to transform an alternating current into a direct current. With multiple layers and/or several diodes one can achieve almost all the other components that modern electronics constitute of, such as LEDs and transistors. The latter variety is composed basically of two diodes and it has the features that you can control how conductive the component should be from + to - by changing the voltage "across" the current direction. With millions of interconnected transistors we have advanced components such as computer processors.

The telegraph in 1876 got a competitor, when the American Alexander Graham Bell received a patent for a phone system. The system was based on a microphone, which basically looked like a small speaker. Sound waves made the speaker diaphragm oscillate which produced a current in the coil around the magnet, which in turn passed through a cable to the speaker on the receiver. Either the two phones were directly connected or there was at least one telephone station in between them. These consisted of panels with a power outlet for each subscriber. When a subscriber wanted to call he/she rotated a crank that sat on a generator, generated a current that made it ring in the telephone station. The operator answered and asked where the subscriber desired to be connected. If the recipient was served by the same telephone station, the operator called him and told that he had a call and the connected a cable between the power outlets of the caller and the receiver. If the receiver was connected to another telephone station the operator had to instead transfer the call to that station. When the call was finished the talkers again rotated the crank so that the operator heard that the call had ended and he removed the cord between the outlets. Apparently the system had a lot of deficiencies, in addition to the obvious cumbersome arrangement, the power generated by the microphone was very small, resulting in poor sound quality. In addition, the devices were large and they were equipped with a fixed microphone, which made it quite uncomfortable to use it. In particular, as the microphone on the first phones also served as speaker. The major milestones on the way to today's phone system were as follows:

- A year after the first phones Bells company released phones with a loose speaker that was connected to the unit via a cable.
- The Swede Lars Magnus Eriksson in 1880 designed a better microphone, then an even better one and then in 1903 the type of microphone that became standard for a long time. It worked so that the sound vibrations made carbon grains in the microphone move and this in turn varied the resistance of the microphone. The DC voltage sent into the microphone came out as a varying voltage that could drive the speaker at the other end of the wire. Resulting in better sound since the energy was no longer generated by the speakers.
- 1892 a design with speaker and microphone in one unit was invented by Eriksson.
- Approximately in 1915 the automatic telephone station came, which allowed the subscribers to connect themselves through rotating a disc on the telephone set. The disc had a hole for each digit 0-9. The longer the disc was spinning the higher figure and the more pulses in the telephone station. Most major cities were automated by 1930, but calls between the cities still needed to be connected by operators.
- In the 1950s, came fully automated telephone systems.

Then the phone from the user's point of view was more or less fully developed. And almost every year that passed, the number of calls has increased (chart 9). The main remaining deficiency was then that the phones were physically attached to the phone jack or its vicinity. This problem was solved with the advent of mobile phones.

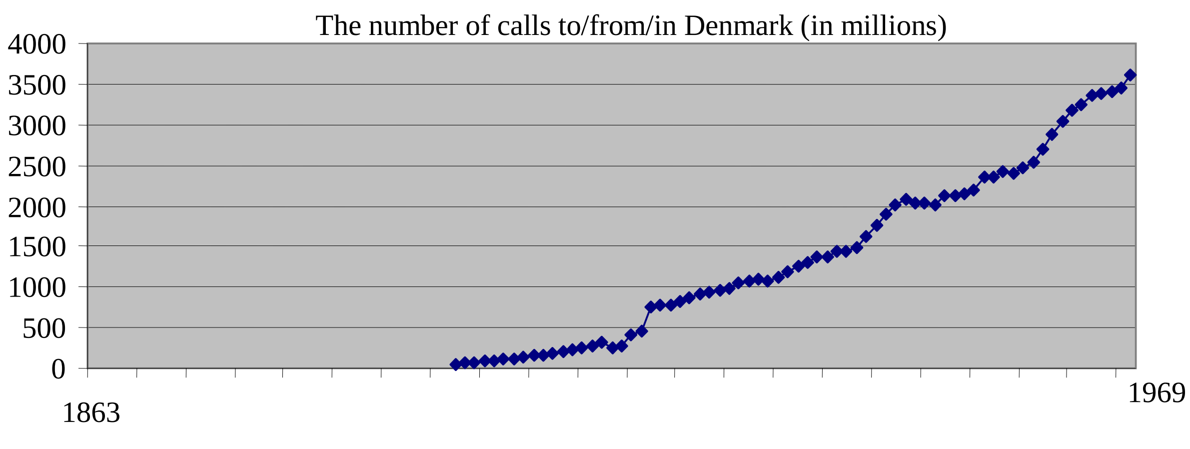


Chart 9. The number of phone calls to/from/in Denmark between 1863-1969, according to B. R. Mitchell.

The world's first mobile phone system with automatic connection to the public telephone network (System Laurén) was founded by the Swedish National Telecom (Televerket) in 1956 and it covered Stockholm and Gothenburg. The system was based on that each subscriber had a transmitter with power enough to reach the telephone station, even if the distance was quite far. The system was in upgraded versions still in use until 1987, and when it peaked it had 20 000 subscribers.
1981 opened the Nordic National Telephone companies the world's first modern, fully automated and nationwide cellular network (NMT 450). It was based on a network of radio transmitters, each covering a smaller area, which enabled handsets with lower transmission power, which thus could be smaller and with longer talking time without draining the batteries.
NMT was an analogue system, making transmissions sensitive to disturbances, since all signals real signal as well as noise was transferred to the receiver. Unlike digital systems which convert the real signal to a code. In 1992 started the Swedish National Telecom the first digital system (GSM) and it became a standard agreed in several European countries. This standard was also rapidly taken up by countries outside Europe, making it a world standard.

To hear is nice but to see and hear is, by many, considered to be even more entertaining.
Already in 1908 the British gentleman Alan Archibald Campbell-Swinton published a letter in the journal Nature in which he described how the images could be transmitted by using a cathode ray tube as both sender and recipient. Then there was some experimentation, but the first actual transmission of moving images through a cable was carried out 1925 by another British man, John Logie Baird. Since the system contained a number of rotating discs to scan the image and converting it to electrical impulses, the images were updated slowly. With the result that all the movements looked very jerky. Moreover, the clarity of the details was lousy. Four years later, the American Philo Farnsworth created a system that could scan the subject in the same way as a modern television camera. In the 1940s, the technology was so advanced that TV shows was regularly sent out in the USA. Television broadcasting in colour began in the early 50's. In the 50s it was many countries that embraced the technology and built up the TV system and people bought TV receivers (chart 10).

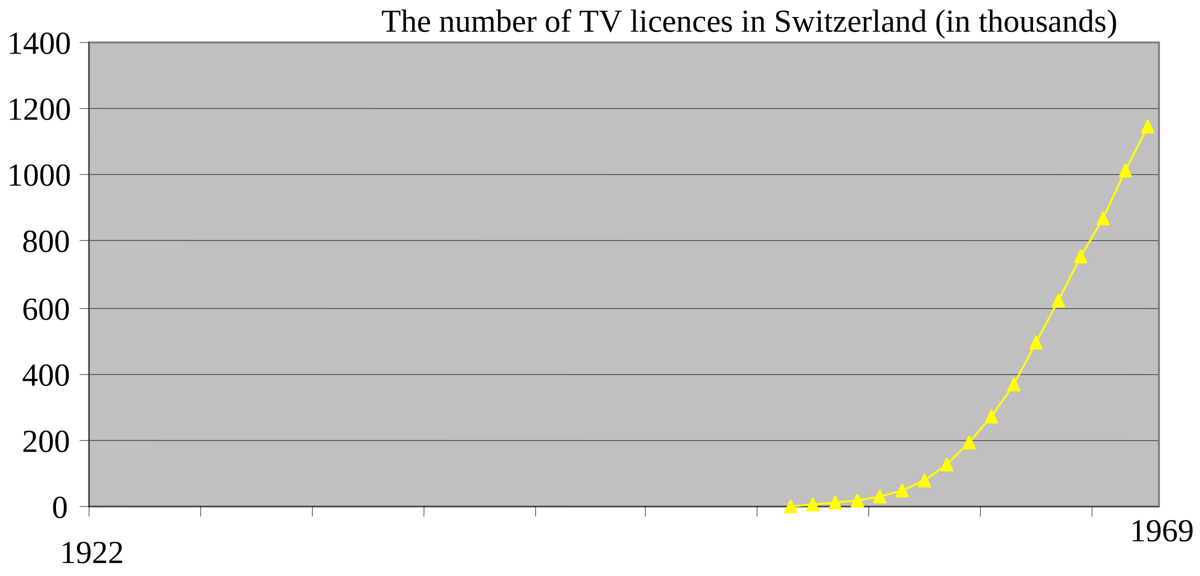


Chart 10.   The number of licenses for possession of TV sets in Switzerland1922-1969, according to BR Mitchell.

The last major event in the communications sector was the emergence of the Internet and it was born soon after the "modern" computer technology in the 50's. There were a few computers even before then, but they were huge, slow, expensive, and energy-and maintenance-intensive because they were based on relays and/or radio tubes. But after John Bardeen, Walter Brattain and William Shockley at Bell Labs in the U.S. in 1948 invented the transistor, emerged the ability to make smaller, faster, cheaper, more reliable and more energy-efficient computers. Even better, they were after Robert Noyce in 1958 invented the integrated circuit. This was during the Cold War and the United States invested, through a governmental source of funding for military research: Advanced Research Projects Agency (ARPA), big money on building computers that could be used to develop better weapons. Soon they coupled more of these computers together and they started to communicate, i.e. give and receive data via a cable. A scientist (Paul Baran) suggested in 1962 that the data to be transferred should be divided into small packets with individual addresses, which could take any route through a network of interconnected computers, to the recipient. Where the pieces were reassembled. This way the communication could proceed even if parts of the network had been knocked out by Soviet bombs. The idea was developed at some institutions, ARPA liked the idea and financed in 1969 a network of four nodes, dubbed ARPANET.

ARPA had started extensive research across the United States and now wanted to investigate whether it was possible to save resources by allowing different contractors to share the computing power over a network (computer time was in late 1960 - 's still a scarce and precious resource). But one major problem was how to get universities previously incompatible mainframe computers to talk to each other. The solution was Interface Message Processor (IMP), a kind of standard interface or "router", which allowed a large amount of hardware and software to work together over the ARPANET. As early as January 1971, the network had 13 nodes, and in April 1972 the number had risen to 23. Scientists soon discovered that the network was also an excellent tool for sending messages to each other, resulting in the E-mail feature. In the same year scientists from different countries began to work on one addressing and transmission format that would work even in much larger scale and in 1974 the first version of the Transmission Control Protocol (TCP) and Internet Protocol (lP) were finished. But not until the late 80’s all network owners, authorities and companies finally agreed that it was these formats that should apply to all networks.

Now we can more or less everywhere receive and send moving colour images accompanied with sound. Moreover, we can to some extent interact in some video games and systems for transferring three-dimensional images has started. Thus, there is probably not much more that we could wish to communicate with these senses, in addition to if it was possible to create and transmit three-dimensional environments that we could walk around in. Other minds however are less satisfied, except for a few examples of vibrating handles to video games and the like.

Food

Two thousand years ago many of the farmer's tools, such as fish net, fish hook, mill, harrow and plow were already invented. The technique was similar to those 1700 years later, it was even so that a Roman handbook in gardening, horticulture, animal husbandry, beekeeping and food handling was used until the 1800's. It was written by Lucius Junius Moderatus Columella, in the first century. And they used the land (i.e., practiced agriculture and/or had livestock) in the same parts of the world as today. Apart from that a few areas have been added:

- On the African savannah, Brazil, eastern U.S., central parts of Scandinavia, parts of Russia and Ukraine farming began after year 0.
- Western United States, Argentina, parts of South Africa, New Zealand and Australia wasn't cultivated on a large scale until after they had been colonized by Europeans.

The origin of a selection of useful plants, where this to some degree of certainty, been possible to determine:

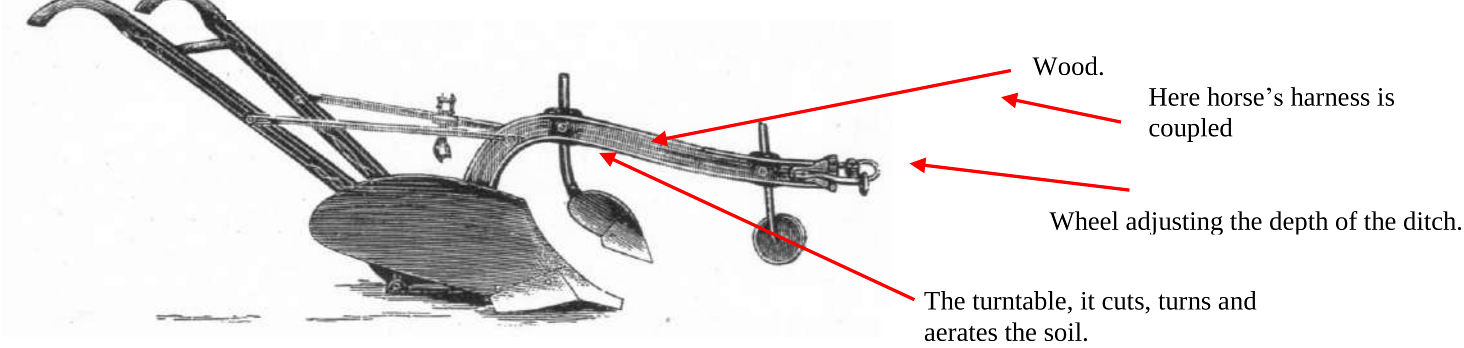
In the agricultural field of technology, it seems to more bids than the origin of various innovations than in other areas. It may be because innovations by the peasants in many places were very poorly documented. Several authors argue that many advances are coming from the UK, but also the British enhancers of agriculture appear to have got much inspiration from trips to farms on the continent. In order not to trample any nationality on the toes is, in broad terms, only the technical development in Sweden is described below. Sweden began officially to become interested in the development of agriculture in the 1700s, when the Vetenskapsakademin (Academy of Sciences) was established and given responsibility of such matters among other things. In 1813 then King Karl XIV wanted to invest more heavily in agricultural technology and he helped himself with money to the founding of the Kungliga Skogs- och lantbruksakademien (Royal Institute for Agriculture and Forestry). It was tasked to study what happened in the field, primarily in the UK, and disseminate this knowledge on to farmers through agricultural shows and local household societies. In 1840 Ulna Agricultural Institute, Sweden's first university in the agricultural area, was founded.

These efforts by the state appear to have had an effect, since the most important agricultural tools and cultivation practices in Swedish agriculture were refined:

- From the mid 1600s and onwards farmers in Sweden gradually went from harvesting with a large knife to harvesting with a scythe. With the effect of the work went faster (given that the field was not so rocky that the scythe was broken).

- In the early 1700s came plows[28] with the cutting part (the turntable) made of iron instead of wood. Its major advantage over plows with the turntable made of wood was that they slipped more easily through the soil. Which had the effect that fewer animals were needed to pull them which in turn led to a smaller need for feed, which in turn increased the acreage that could be used for cereals. The disadvantage of iron was that it was expensive, but in the 1700s iron became cheaper due to better production methods.

[28.] Plow from the early 1900's, with a turntable made of iron. My uncle use such until the end of the 1900s to dig up his potato field, but then he pulled it using the tractor. Today plows do not have v-shaped turntables and also have more turntables (since a tractor can pull a lot more than a horse).
The most important thing the plow does is that it exposes unused nutrient-rich soil for the seeds.

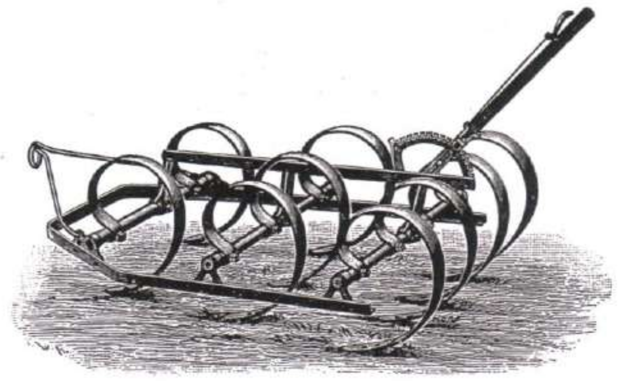


- It was realized that instead of always growing the same crop on the same field, and every two years to let the field’s rest[29] (fallow) one could change between different crops, which meant that the land needed to rest more seldom.

[29.] One of the biggest problems with growing crops is that it requires a lot of nutrients from the soil to give good return, the soil is drained on precisely what the crop needs. This problem can be solved through:

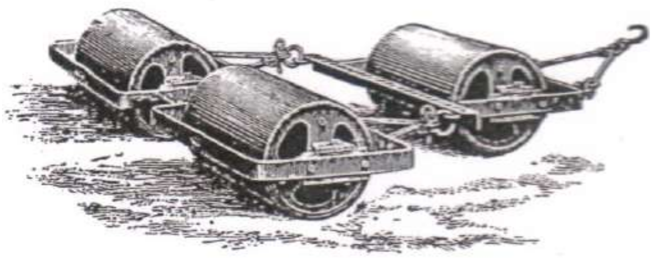
- Constantly growing on previously uncultivated land (slash and burn). The problem with it is that the land in many places isn’t sufficient for such a luxury.
- Stirring the soil so that "healthy" soil is in contact with the seeds. For this purpose we use plows.
- Supplying nutrition. This can be done by plowing down plant parts in the soil, or to fertilize. Normally farmers do both, but the problem with the latter was to get together enough and sufficiently nutritious fertilizer. This was solved more or less permanently in the early 1900s with the invention of artificial fertilizes.
- Switch between crops that take up some different things and/or require less nutrition than what the plowed down plant parts gives when composting.
- Only grow plants that require little nutrients, such as potatoes. The problem with it was that at first it was an unknown plant and later that all soils are not suitable for potatoes, and the failure to store potatoes as good as we then managed to store grain.

- After the earth is plowed it should, if it is cereals that shall be planted, be mashed further and in addition it should be smoothed and small ditches has to be made to put the seeds in. When the seed is in the soil a tool is needed to cover them with soil. For these purposes we have for long time been using cultivators. In its simplest form a harrows consists of split pine logs with stumps of branches left. At the end of the 1700s cultivators with curved sticks of iron had its breakthrough. It made the cultivation process go faster.

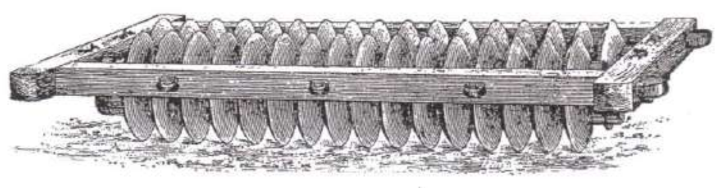


Cultivator from the beginning of the 1900s, completely made of iron with adjustable pegs. Basically modern cultivators looks similar. Sometimes they farmers puts rocks on them to make them go deeper.

- It is advantageous to flatten the soil more than the cultivator does and after that the seed is in the earth it is also advantageous that the surface is flattened further. To do that farmers use compactors. This tool consists, in its simplest form, of a block of wood that is rolled across the field. They became common in the 1700s and their ability to crush hard clods increased when the log surface was patterned, for example by nailing triangular ribs on it.



Flat compactor from the beginning of the 1900s.



Ring compactor from the same time. This one is very much like the compactor my uncle used at the end of the last century. It is better because it breaks up clods efficiently, and keeps the soil surface more aired.

- The state decided that the peasants should exchange of land with each other so that the estates became more consistent and therefore more efficient to use. The cause of the shattered estates was that, in all fairness, for a long time, the distribution of estates and/or the village community, had shared both the good and the bad parts fraternal so that everyone got the same amount of each. With the effect that each had small stripes of fields, meadows and forests here and there.
  "Storskiftesstadgan" ((the law about big shifts) from 1757 limited each farms fragmentation to a maximum of four strips (=shifts) per farm. This attempt did not give as much as the authorities had hoped, therefore another attempt was done 1803 and additionally other one in1827. But even today the shifting is not fully implemented, for example, I myself partly own five small pieces of forest land with weird dimensions like 970 x 30 m.

Even in the 1900s, several important steps in the development of Swedish agriculture were taken:

- The first tractor with a combustion engine came to Sweden in 1905. But it took longer for the tractor to be established on the market compared to trucks, buses and cars. Since the farmers preferred the horses as they:
- Had access to cheap feed.
- Knew how to deal with animals.
- Had the space to house a horse.
- As a rule, were not in need of high transport speeds (tractors do not do more than 30 km/h).
- Had the benefit of the horse's off-road capabilities in their forestry work.
- Had use of the manure.

So many farmers, like my uncle did not buy a tractor until the 50's. The main advantages of tractors in agriculture were probably those they:
- Could pull more than horses.
- Don’t get tired.
- Could lift the processing unit during transport to and from the field.
- Had a power take out (PTO) that could power for instance a manure spreader.

- Artificial fertilizers, i.e. nitrogen powder which is extracted from the air through using electricity. The method was invented by the Norwegians Birkeland and Eydes and its advantages over natural fertilizer were probably that it:
  - Is less unhygienic.
  - Doesn’t smell bad.
  - Guaranteed not contain dangerous contaminants.
  - Was easier to spread.
  - Could be spread more evenly.
  - Was stored in "handy" 50-kg bags.
  - Had a long shelf life.
  - Where weight efficient.
  - Kept consistent quality.
  - Was available in abundance for all farmers (who could afford to buy it).

- Sowing machines are devices that mechanically release the seeds relatively smooth and in straight lines with a sufficient distance over the field, in contrast to when spreading by hand. This meant that the seed is used efficiently.

- Manure spreaders, spreads the manure in a much more even layer over the field, compared to what can be achieved with a shovel. The first working automatic spreaders were constructed by the Canadian Joseph Kemp in 1875. But it took to the 1900s before the machines reached Sweden.

- The first combine harvester, i.e. a machine that both cuts off the bristles and separates the seeds from the plant, came to Sweden from the U.S. (International Harvester) in 1928. But they did not become common in Swedish agriculture until much later. The early combined harvesters were pulled across the field with a tractor, but the harvesting and threshing mechanism was driven by its own engine.

The combined harvester replaced both the tools previously used to cut the bristles (scythes or sickles) and the tools used to separate the seeds from the rest of the plant. For the latter they earlier used a shovel, flail and a coarse and a fine filter.

- Silage balls. As well known cows and horses eat grass, but in the winters there were no grass, so they were forced to eat the dry and boring hay. This to someone realized that the grass can be preserved (stored oxygen-free). This conservation technology is relatively old (see below), but the boom in the area, however, came in the end of the 1900s, when it came tractor-drawn machines that gathered grass directly on the field, made balls out of it and wrapped them airtight in plastic film. This way, the farmers had "portions" of food that was easy to transport without that the preservation was broken and also it did not require a storage silo, but instead could be stored anywhere.

This resulted in combination with lowering of lakes, draining of swamps conversion of pastures to fields and other measures that increased the acreage to that the agricultural production increased (chart 11).

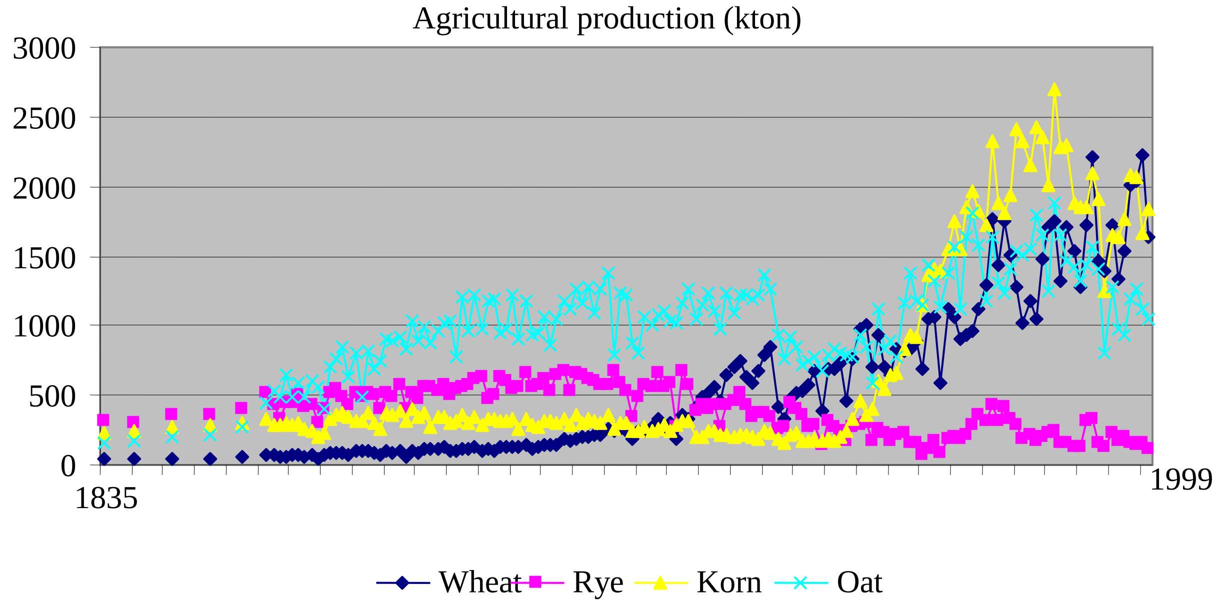


Chart 11. The Swedish production of some major crops 1835-1900 according to BR Mitchell, 1900-1999 according to SCB (Statistics Sweden).

When the crops are fully grown and harvested, it shall be stored for as long as possible, preferably until it is possible to harvest again. Most of the preservation methods we use today are far older than 2000 years. Even before the year zero, we added grain/fish/meat and vegetables in the sun for it to dry, we rubbed fish and meat with salt and/or smoked them, took advantage of the cold cellars/caves and laid fruit/vegetables in vinegar or honey. The methods then added are preservation[30], pasteurization[31], fridges[32], freezing in frezers[33], freeze drying[34], vacuuming and radioactive irradiation. Regardless of the method used, the aim is to keep the bacteria's down so they do not become so numerous that the food is inedible (see table 8).

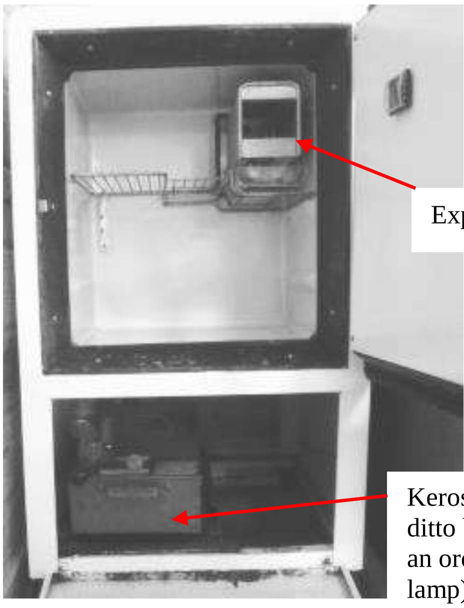
Although we have come a long way towards the perfect food systems, they have yet a lot to be desired. Apart from problems with that the ecological sustainability and the problems with that food is destroyed, I believe that the knowledge about how to optimize the taste for everyone's personal taste buds and appetite for the moment, are poorly developed. Furthermore, there are still few good surrogates for costly food and flavouring agents. Finally, to my knowledge, the cultivation of the marine supply of vegetarian food is limited to very few species.

30. In 1810 presented the Frenchman Nicolas Appert the preservation technique. Another Frenchman Peter Durant developed the technology and made so that the first metal canning jar was produced a year later.

31. The French chemist Luis Pasteur was very prominent in his days, and he was hired by various French food companies to save beer and wine from being destroyed by micro organisms. Pasteur solved the problem in 1860 when he developed an efficient method (pasteurization), which consisted of that the liquid was heated to 70° C, which killed the organisms. The technology has been of great benefit also for the conservation of other liquids such as milk.

32. The first refrigeration machine was built back in 1805, but the technology has since been developed by a number of inventors before General Electric in 1911 launched the household refrigerator.

My kerosene refrigerator from, like, 1940 that I still use. The refrigerator type was developed as a thesis atKTH (The Royal Institute of Technology) by Baltzar von Platen and Carl Munter in 1925. In general, the refrigerator operates so that when the gas in the cooling circuit is compressed into a liquid it gives off the heat and when liquid then expands again and becomes a gas it picks up heat. In the kerosene refrigerator the increase in pressure in the gas is done using the temperature increase caused by a kerosene lamp. The heated gas rises and then ends up in the cooler that is mounted on the back of the cabinet. In the cooler, the heat, and this, combined with the increased pressure causes the gas to liquefy. The liquefied gas is then pressed further in the system so that it reaches an expansion valve, and then an expansion chamber within the refrigeration compartment. When liquid flows through the expansion valve into the larger space it becomes gas again. In this transition, it sucks up heat from the surrounding area and thus it becomes cold in the refrigerator.



Expansion chamber.

Kerosene tank and ditto burner (looks like an ordinary kerosene lamp).

33. The American Clarence Birdseye invented and commercialized in 1929, the freezing of foods, after finding that the people of the Arctic kept fresh fish and meat in barrels of sea water quickly frozen by the arctic temperatures.

34. In the 1930s, the process freeze drying was developed by the Swiss company Nestlé and they launched instant coffee in 1938. But Indians in Peru's mountains are said to have freeze dried food long through just letting it be in the thin, cold air.

Table 8. A comparison between different preservation methods for food.

	principle	How do you	Durability	Advantages	Disadvantages
Drying	When drying the water disappear, and thus the bacteria's can not multiply.	The food, for example, can dry in the sun.	Long if the food remains dry.	It is easy and the food can be stored at room temperature.	It alters the taste and texture, which can also be a benefit as in the case of dried ham.
Smoking	Smoking also makes the water disappear.	The food, e.g. fish, is placed in a smoke filled container.	Fairly short.	Some foods are considered to get tastier.	Smoke may perhaps provide unhealthy substances.
Mixed with salt	The salt kills the bacteria's.	Meat/fish is stored in salty water and/or salty water is injected into it.	Fairly short.	The salt may enhance the flavour of some foods.	Foods that are salted so that they do not need to be kept cold are very salty.
Mixed with acid	Acid (e.g. acetic acid) also kills bacteria's.	The vegetables are laid in a mixture of water and vinegar.	Long, if the acidity is high enough.	It requires no special equipment.	The food tastes like vinegar.
Mixed with sugar	Likewise sugar.	The fruit is boiled with sugar.	Long if there is enough sugar.	”	The calorie content is high.
Preservation	Bacteria die of heat and there is so little air in the packaging that the surviving bacteria reproduce slowly.	The cans are heated, the air in them expands and flows out, and then the lid is closed.	Long.	Unopened cans can be stored at room temperature.	Requires special equipment and canned food does often not taste as fresh ones.
Pasteurization	Bacteria's are killed by heat.	The liquid is heated to 70° C.	Short, but often combined with cooling (as for milk).	The alternative for milk is to preserve it, which alters the flavour even more, and such products are more expensive.	The pasteurisation can alter the flavour slightly. In particular, the high-temperature pasteurized milk.
Cooling	The cold makes the bacteria multiply slowly.	The food is put in the refrigerator.	Short for most foods.	Affect the taste very little.	Requires a refrigerator.
Freezing	The bacteria multiply even slower.	The food is placed in the freezer.	Very long if it is sufficiently cold (colder than normal freezers).	Easy for anyone who has a freezer and the method often affects the taste only slightly.	Requires freezer. Some foods taste worse after freezing.
Vacuum packaging	There is so little air in the packaging that the bacteria reproduce slowly.	The air is sucked out, and then the lid is closed.	Short.	Extends shelf life compared to non-vacuum-packed products.	Requires special equipment and vacuum packed food often need to be stored cold anyway.
Lyophilization	The water disappears without the shape of the foodstuff changes.	The food is frozen then the air is sucked out of the freezer.	Long.	The weight decreases and the food can be stored in room temperature.	Requires special machines, freeze-dried food is expensive and taste changes.
Radioactive radiation	The rays kill bacteria.	Do not know.	Do not know.	It causes less vitamin loss than other methods.	Do not know.

Energy

Energy is what makes all processes continue. The main and oldest source of energy we have is the sun, but in addition man has long been used wood to create heat/light. With the matches, invented by Briton John Walker in 1827, the handling developed significantly.
A major disadvantage of wood as fuel, however, is that in some parts of the world there were a limited amount of it in relation to needs and also the fact that it wear out pretty quickly, which in turn led to that the volumes that must be dealt with was big. Coal made it somewhat easier because it contains twice as much energy as wood and in some countries it could be found in large quantities. Therefore, coal was used in some countries for a long time. Excavations of the ruins of a Roman baths in Britain showed that the Romans warmed them with coal. But after the Romans left Britain in 410 the technique seems to have been forgotten until the 1200s.

During the 1700s, a number of advances happened in coal mining, for example, people began to test drill in order to find suitable locations for mines instead of just digging "randomly" and, so far as we know, in 1712 the world's first viable steam engine was constructed by Thomas Newcomen to pump up water from a coal mine. With this, albeit unwieldy machine, we had for the first time mechanical power where you need it, not where it was available (like a waterfall). These advances, combined with that in the middle of the 1800s the steam engines were introduced on a broad front in the industry, on ships and to operate railway trains, resulted in that coal mining increased hugely (chart 12).

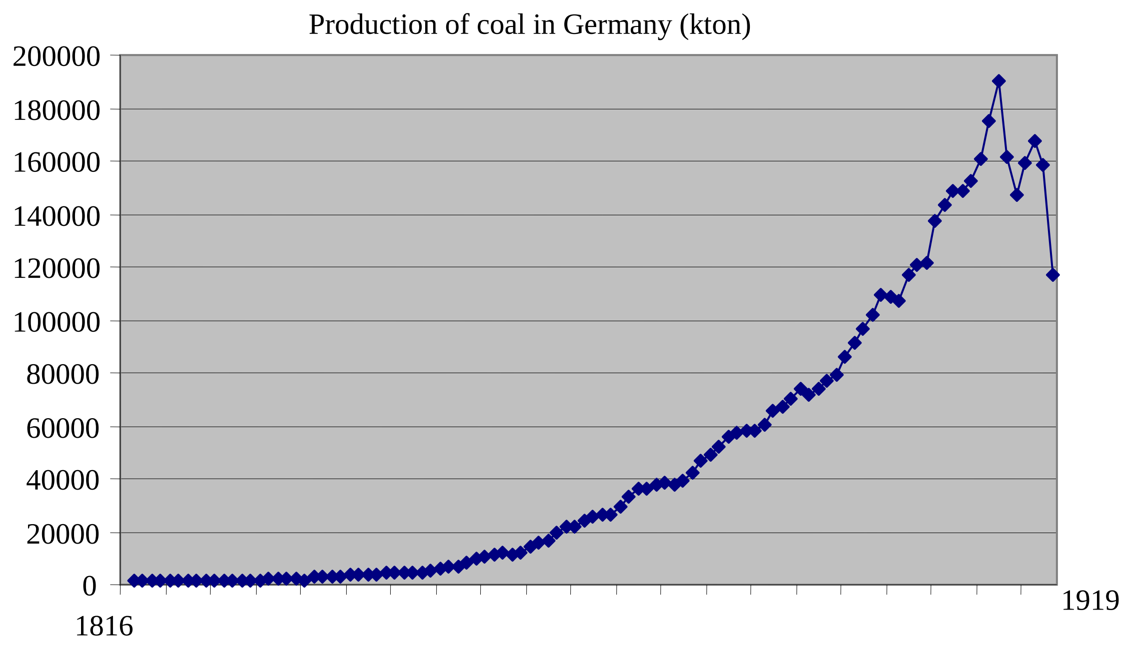


Chart 12. The German production of coal 1816-1919 according BR Mitchell. The decrease at the end of the period is likely due to that the World War I was going on then, so the Germans had other things to do than to mine coal. Because of the loss of the war, Germany's lost some parts of the country, which may explain that the production did not subsequently recover.

With the steam engine, we took a few fundamentally important steps in the use of energy, since it was a process that converted one form of energy into another form, which in turn drove something that performed a useful work.
Newcomens steam engine worked so that a counterweight made a piston rise. When the piston was at top of the cylinder, the cylinder was filled with steam. Then it was cooled with water vapour. This meant that the air shrank, which in turn is "sucked" down the piston.

Before steam: Coal/logs	→	heat + light				
Before steam: running water			→			movement
With steam: coal	→	heat	→	steam	→	movement
Over pressure steam: coal	→	heat	→	pressurized steam	→	more movement
With Otto engine: gas	→	gas-spray	→	explosion	→	movement
With Diesel engine: diesel	→	diesel-spray	→	explosion	→	movement

The steam engine was improved a lot by Newcomen’s compatriot James Watt, what he did was:
- 1778 to design the crank movement that turned the linear piston motion into a rotating one.
- 1778 to build the first expansion steam engine (like the one below but without the shuttle valve).
- 1788 to create the shuttle valve.

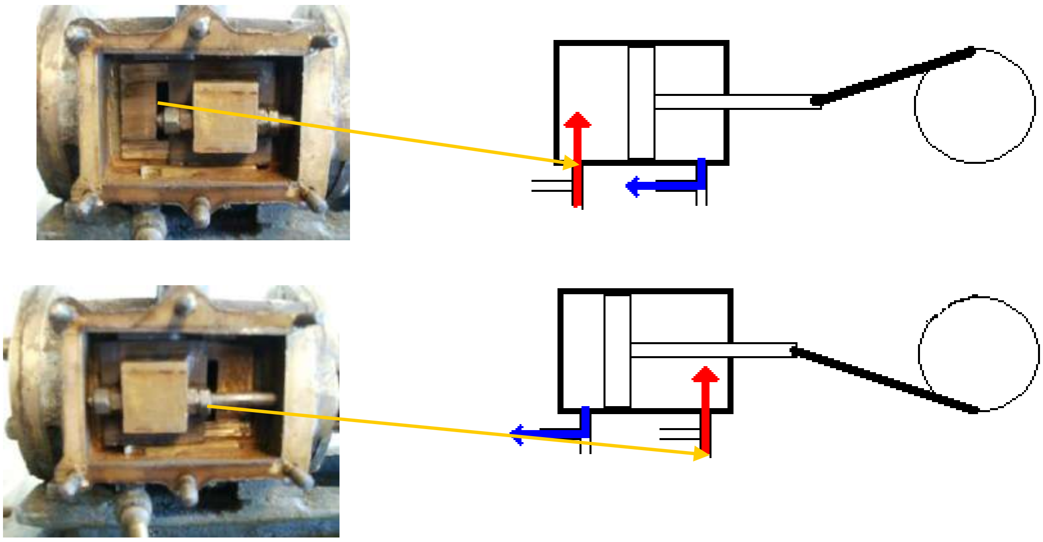
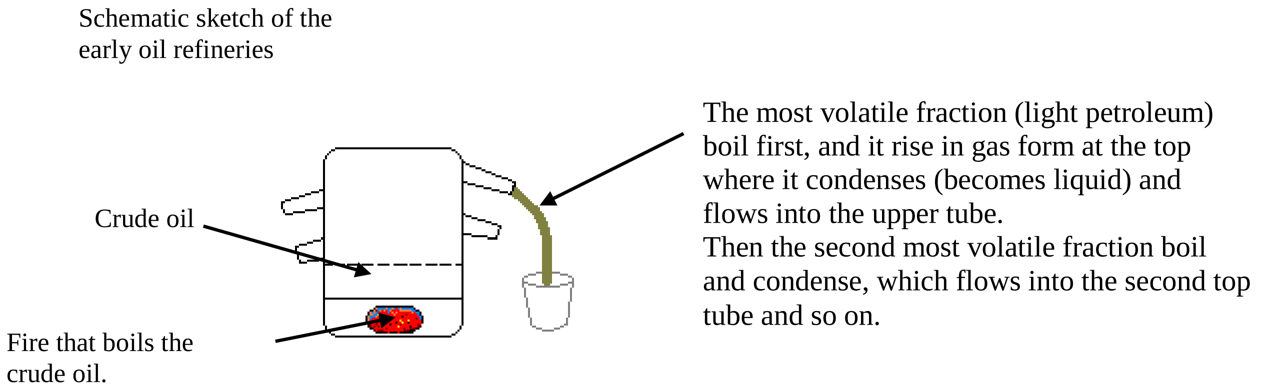


Photo of the shuttle valve and installation diagrams for Watt's improved steam engine. The shuttle valve increased the steam engine power very much because it turned the return stroke to a working movement.

Coal also had some drawbacks such as the lack of systems to automatically dispense it into the combustion, i.e. someone had to shovel it into the fireplace. But that was not what made us start extracting oil. It was instead to get components such as kerosene (for kerosene lamps), paraffin's (for preserving food), and various oils (lubricants).



Oil contains about 1.7 times as much energy as an equivalent quantity of coal. As seen in chart 13 the oil production was started much later than the production of coal. This despite the fact that oil production started quite early in Russia. It was partly due to Alfred Nobel (who later founded the Nobel Prize) and his big brothers Ludvig and Robert Nobel, because they1875 invested money in the nascent Russian oil industry in Baku. The supply of oil was huge, the difficulty was foremost to transport it. When the Nobel brothers arrived the oil was taken up by hand and it was transported in barrels that were shipped with donkeys. The brothers spent a lot of effort into improving the transports and they built Russia's first pipeline and commissioned the world's first oil tanker. Robert, Alfred and Louis also started an oil company after a few years, Russia's largest company and one of the world's largest oil producers, but it disappeared with the Russian Revolution.

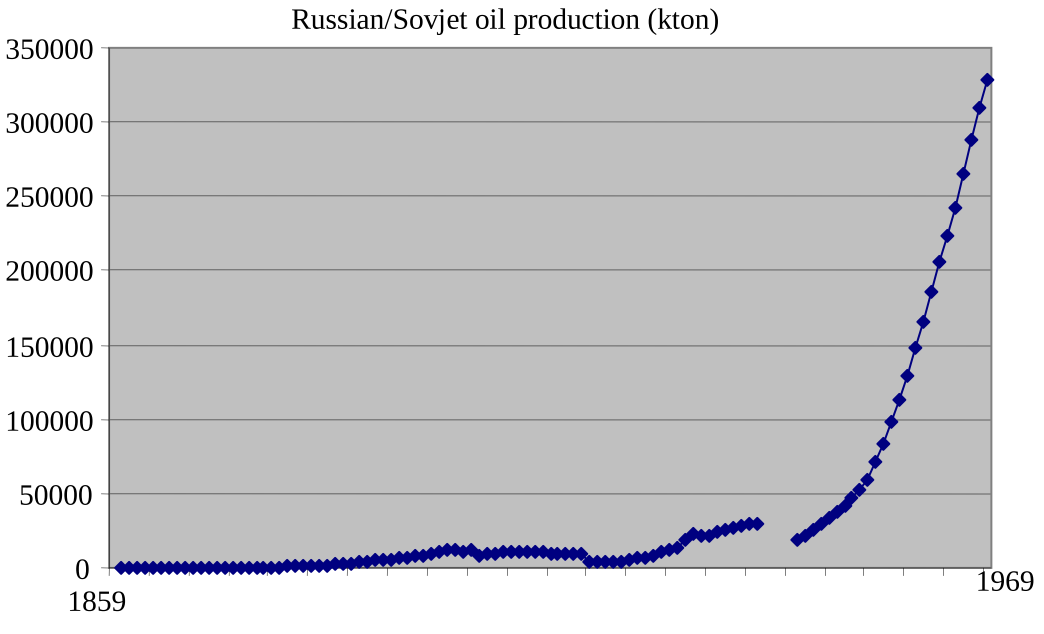


Chart 13. The Russian oil production 1859-1969 according BR Mitchell. As we know, the country's borders has changed some during the period due to the wars that they were involved in, but it should not have affected the production of oil significantly, since the new areas were not known for any major oil production. However, a slight decline can be noted during and after the Russian Revolution. Moreover data is missing during World War II.

In addition to coal and oil, there is also a lot of natural gas in the ground. The natural gas production (chart 14) started even later than the oil production. The earliest notes about natural gas production, in the land which today is the world's largest natural gas producer (Russia), are from 1913. Natural gas was used, and still is used in many countries for home heating and as fuel for stoves and water boilers. In addition, it was earlier even used in lamps.

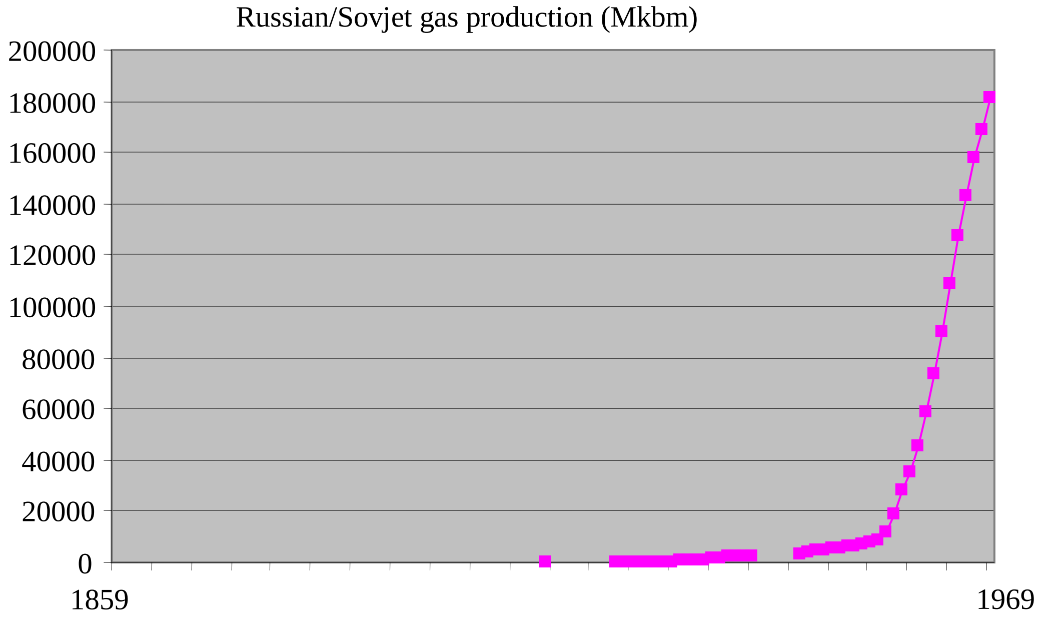


Chart 14. The Russian natural gas production 1859-1969 according BR Mitchell.

In addition the sun and combustion of various materials, the main sources of energy are the wind (which sailing ships and windmills have used for a long time) and running water.

In Southern Europe and China waterwheels have been in use since before the year 0. They were used to drive the hammer forges, mills and sawmills.

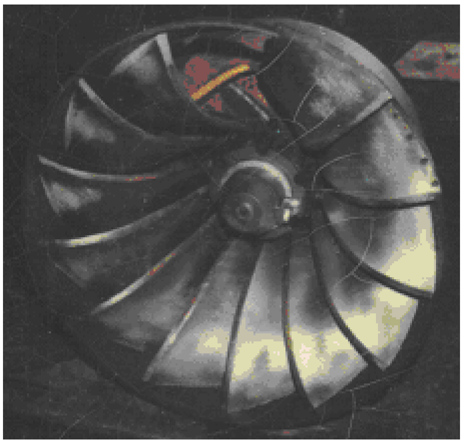
This waterwheel in Gustavsberg was built in 1895 to generate power for a mill that was grinding raw materials for the adjacent porcelain factory.

With the industrial development waterwheel came to power large industries like textile mills, rolling mills and mechanical workshops. When water turbines were introduced in the 1870s, it became possible to get more energy out of the waterfalls and in addition higher fall heights could be used, but the industry was still forced to be close to the waterfall.

There was a great need to transport the power to other places. The first variants of transmissions were purely mechanical. The Swede Christopher Polhem did in the early 1700s a transmission of linked wooden rods transporting energy from a waterwheel to a mine some kilometre away. It did, however, break quite often, so the steam engines out-competed this solution fairly quickly.
But with the development of knowledge about electricity that emerged in the 1800s[35] hydropower got a major boost.

35. There was even before the 1700s people who had noted various electrical phenomena, but when the Dutchman Pieter van Musschenbroek 1745 invented the so-called leiden bottle (a glass bottle lined with metal foil attached to an electrode), the researchers were able to store electricity, which led to the development really began.
1796 the Frenchman André-Marie Ampère clarified the principles of electrical voltage and current.
1800 the Italian Alessandro Volta created a method to generate electricity by putting a pile of alternating layers of silver and zinc plates in salt water (i.e. the electric battery was born).
1820 the Dane Hans Christian Öhrsted, by chance, discovered the electromagnetism as the needle on a compass that he happened to have on his table moved, when he was experimenting with electricity.
1827 the German Georg Ohm described the relationship between voltage, current and resistance, i.e. $U = I \times R$.
1831 the Briton Michael Faraday found that if a power cable was wound as a coil and taken through a magnetic field current was formed in the cable. The discovery, he developed to the first generators, electric motors and transformers.

The very first, very simple, hydroelectric power plant was built in 1879 at Niagara Falls, USA. The plant consisted of a waterwheel with a DC generator and the generated enough power to run a few light bulbs. The next important step in the development of hydropower plants was taken in 1895 by George Westinghouse, who built plants with an AC-generator[36] in the same place. After that, development has continued, but despite that, most hydropower plants in the world were built in the 1950s and 1960s.



Damaged Francis turbine from 1963.

Samuel B Howd patented the first practical turbine in 1838. But with Francis turbines, the big breakthrough came for water turbines, because they had much better performance than its predecessors. The turbine type was constructed in the United States by the Briton James B. Francis, from about 1840-55. Even today, Francis turbines are the most common turbine type in hydropower stations throughout the world.

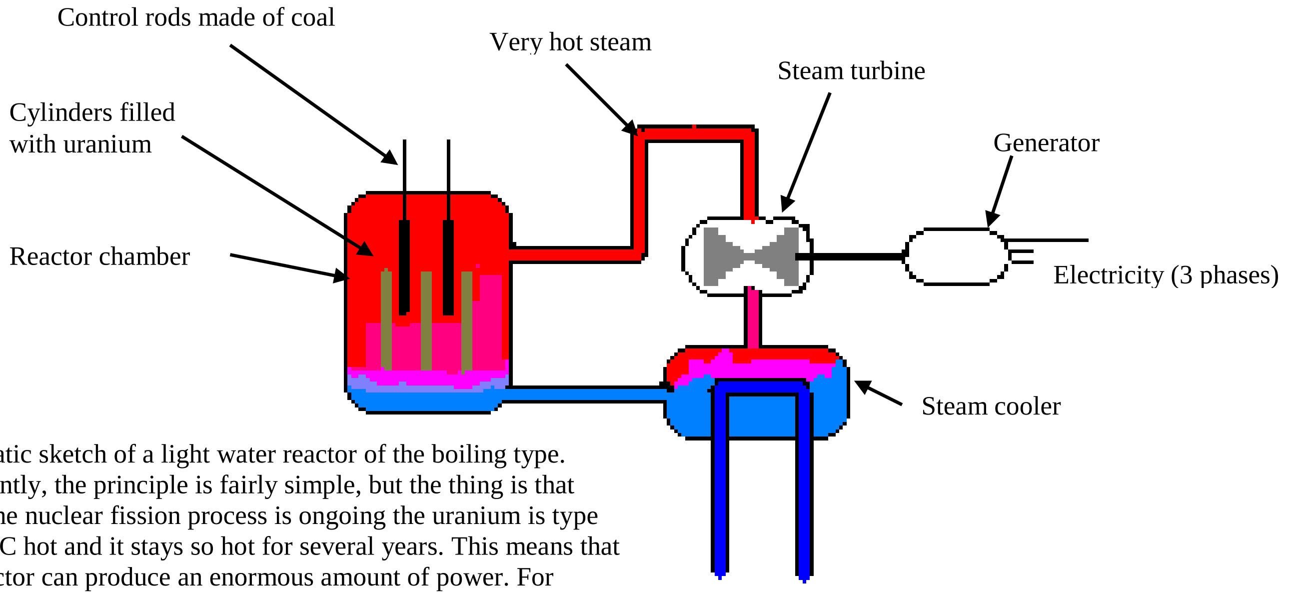
The vanes to the turbine above.

The vanes are like a garland around the turbine wheel. First, they direct the water flow against the wheel and also regulates the amount of water flowing. But early Francis turbines had fixed vanes. The variable vanes were later developed by the Briton James Thomson.

On the whole hydroelectric equipment of today lokks much like they did 100 years ago, the difference lies mainly in that the control system has become more sophisticated with the help of electronic sensors and control computers. My generator, for example, was built in 1932 and is still in commercial operation with equivalent performance as newer ones.

36. The advantage of AC is that it can be transformed to high voltage and the higher the voltage, the less current and hence the less losses in the cables. This is because the power loss $P_{loss} = U \times I = R \times I \times I = R \times I^2$, where I is the current through the cable and R is its total resistance.

In 1942, a team in the United States succeeds in making the first self-sustaining nuclear reaction and nine years later produces a research plant in the United States produced electricity for the first time. But it didn't give more energy than to power four light bulbs. The world's first large-scale nuclear power plants started in the U.S. 1957. The plant supplied the Pittsburgh area with electricity. Most of the early nuclear reactors boiled heavy water and therefore they were called heavy water reactors. In heavy water, the hydrogen atoms have a neutron in the nucleus in addition to the usual proton. The advantage of heavy water is that the slowing down of the neutrons is much reduced compared to in plain water, allowing the nuclear reaction to be maintained even if one not use enriched uranium (enriched uranium = the atoms are supplied with more neutrons through neutron bombardment, with the effect that they decompose more easily). Heavy water reactors are now scrapped. The majority of the nuclear reactors that are in operation today are called light water reactors because they boil normal water. They were built in the 1970's and 80's and they are both more fuel efficient and produce far more power than the old heavy-water reactors.



Schematic sketch of a light water reactor of the boiling type. Apparently, the principle is fairly simple, but the thing is that when the nuclear fission process is ongoing the uranium is type 2 700° C hot and it stays so hot for several years. This means that the reactor can produce an enormous amount of power. For example, the largest Swedish reactor, Forsmark 3, makes about 15% of all the electricity produced in Sweden. And in other countries, mainly France, nuclear power accounts for the bulk of electricity production.

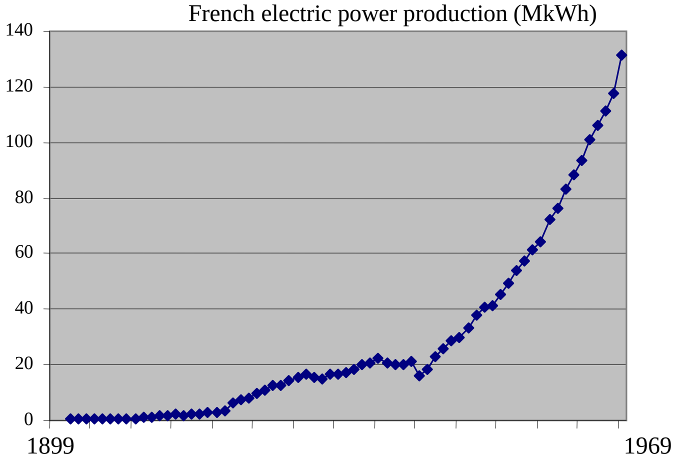


Chart 15. The French electricity generation 1900-1969 according to BR Mitchell. Thus, during the period when water power was built the most. Although France now has many hydropower plants over 70% of French electricity is generated in nuclear power plants.

There is still a lot of development in the nuclear field, the efficiency is increased and they become safer, including such as making them independent of pumps to get the cooling water into the reactor.
In addition, intensive development of energy systems in general is ongoing, for example, we are waiting for thin film batteries, more efficient solar cells and nuclear fission.

Medicine

The medical development concerns actually most of us living today mainly in the event that we or a loved one is in the need of care. In addition, it may be reassuring to know that if that is the case, there is qualified help available. But those who lived in Sweden until the 1900s risked more or less constantly suffering from horrible diseases that quickly could end their lives (chart 16).

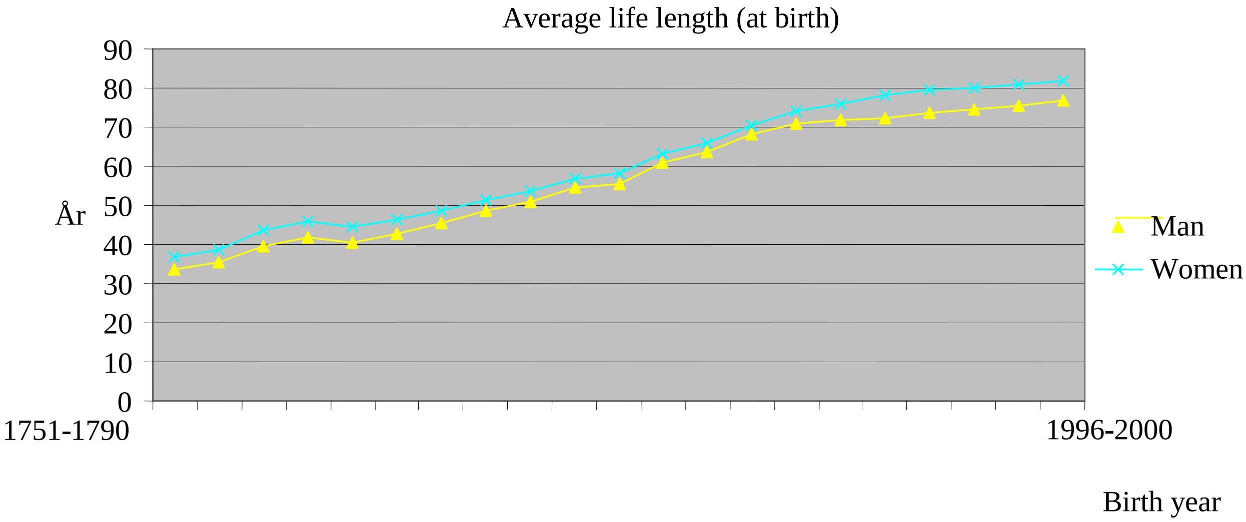


Chart 16. The average life length expectancy in Sweden from the year when the population statistics began 1751 to 2000. Data from Statistics Sweden's website.

The first important step to the medical security we have today was taken in the 1770s when the Briton William Wintering showed that the herb digitalis (foxglove) contained a substance which is active against heart failure (formerly called dropsy), which without treatment, often led to death.
The second important step was taken by his countryman Edward Jenner when he introduced a good method of vaccination against smallpox. Smallpox was a painful illness with blisters that often cover most of the body and usually led to death. During the severe epidemics of 1779 and 1784 it killed 15 000 and 12 000 people in Sweden alone. But after the vaccination was introduced this disease disappeared almost completely. For example, in 1861, only 193 persons in Sweden died of smallpox.
As in so many other disciplines a number of very important things happened in the 1800s. And this science went during the century from that most treatments consisted of taking out blood from the patients, regardless of the kind disease, to a variety of effective treatments for many of the then common and serious diseases. People realized that there are tiny little creatures, such as bacteria, and that these are the cause of a whole host of diseases and treatment complications. The Austrian Semmelweis investigated why so many women died in childbirth in a section and not on another, and realized that it was because the doctors on the first section went between births and autopsies without washing in between. After he had found this out, he advocated disinfection before surgery. Joseph Lister went down in history because he realized that what Luis Pasteur pointed out, namely that there are micro organisms floating around in the air, and it can explain the many infections in open wounds. He prescribed therefore airtight packaging of wounds and disinfection with carbolic acid. When he introduced the treatment after amputations the mortality decreased from 43% to 15%.

Besides this, it can be mentioned that:

- 1806 the German chemist Serturner produced morphine, which still is an effective and common mean for pain relief.
- In 1820 quinine was produced. Quinine was and still is an important tool in the fight against malaria.
- 1853 the syringe was invented by C Pravaz, it meant that medications, vaccines, and more could be added to the body in a faster and many times better way.
- 1863 the Frenchman Casimir Davaine discovered the anthrax bacterium.
- The leprosy bacteria were demonstrated later by the Norwegian doctor Armeur Hansen.
- 1867 the German Julius Conheim showed that the response formed in ulcers consists of white blood cells.
- 1879 the Russians Ilya Metjnikov showed that the white blood cells fights the bacteria's.
- 1877 the French chemist Luis Pasteur succeeded to manufacture vaccines against anthrax.
- 1891 the German physician Robert Koch showed the TB bacterium.
- Another German physician Emil von Behring showed, the year before, that when bacteria's are injected into the bloodstream, the body creates antibodies that fights the bacteria's and so he created a method of combating diphtheria (i.e., a vaccine).
- 1896 The first synthetic medicine was introduced: aspirin by the pharmaceutical company Bayer.

Even in the 1900s a lot of pioneering work has been done in surgery, pharmacology (drugs), oncology (cancer treatments), et cetera. The most important of these was probably done in 1928 by the Briton Alexander Fleming, when he realized that a kind of mold could kill bacteria, which was the first and most important step to the advent of penicillin.

These and other innovations and actions have led to that illness and deaths in a lot of nasty diseases have declined dramatically from the late 1800s (chart 17). In addition to purely medical reasons for the increasing life expectancy it is also due to engineering step stones such as the introduction of water supply systems and sanitation in urban areas from the mid-1800s (chart 18). The improved hygiene decreased the incidence of diseases caused by bacteria, especially in drinking water, such as cholera. For example, in 1834, 4.5% of Stockholm's population died in cholera (the water pipe system opened in 1861). In addition, some could be explained with that as our economy got better, people could afford more and better food.

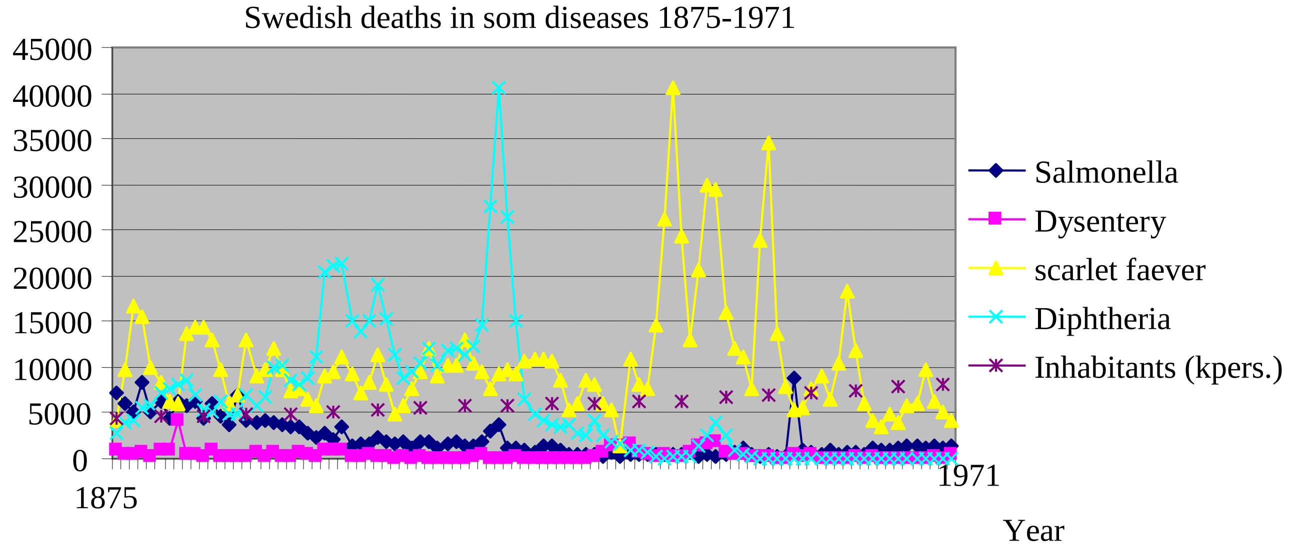
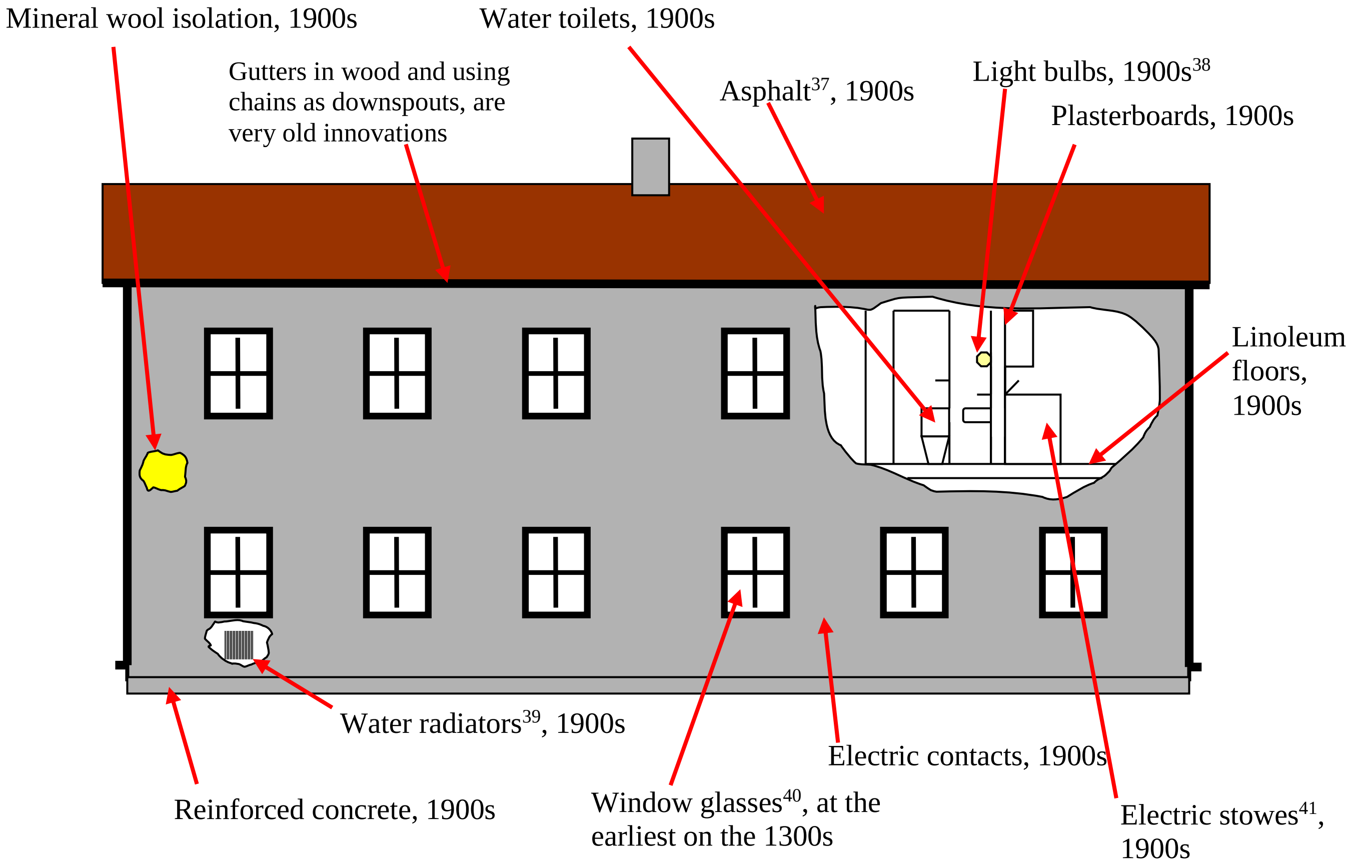


Chart 17. The yearly number deaths in some illnesses in Sweden 1875-1971.

Building & construction

Even before the year 0 a large part of the building construction techniques still used, were already invented (table 1). The main differences between the current Swedish houses and the ones the Romans perhaps lived in are (the time indicates when the technology began to be used by Swedish builders):



37. Asphalt began to be put on roads in the United States from 1872 and onwards, but it is unclear when we began to manufacture asphalt cardboards. The material asphalt is the last remaining in the refining of crude oil, i.e. the thickest fraction at the bottom of the pan after all other fractions have been evaporated.
38. Bulbs were made from the 1880s. The early bulbs, however, had a filament of carbon, and this made the glass partly blackened with time and only about 5% of the electrical energy became light, which was a big disadvantage because the power was expensive. So the manufacturers invested heavily in the development of better filaments. In Germany alone about 7 000 patents were applied for in the subject of light bulbs, between 1900 and 1912. In 1914 the American company General Electric launched the 'final' solution with filament of tungsten. Before that, people had used kerosene lamps and before that oil lamps, candles and resin-rich pine needles.
39. Before water elements, houses were heated with fireplaces, kerosene stoves, iron stoves and tiled stoves. The latter led to a big change in Swedish homes in the 1800s. Since they made it much easier and cheaper to heat multiple rooms. This in turn had the effect that everybody did not have to sleep in the kitchen.
40. Window glass came from France. It was made from molten glass that was blown out into a bubble which was rotated until it became flat. Then a rectangular glass was cut out.

41. Before the gas stoves and electric stoves the main source of energy for cooking in Sweden was wood. Until the 1860s, we burned the clogs in the fireplace. But then the iron stoves gradually took over as they:
- Where more fuel efficient.
- Gave heat longer and the heat was more stable.
- Created less smoke.
- Had a built-in oven.

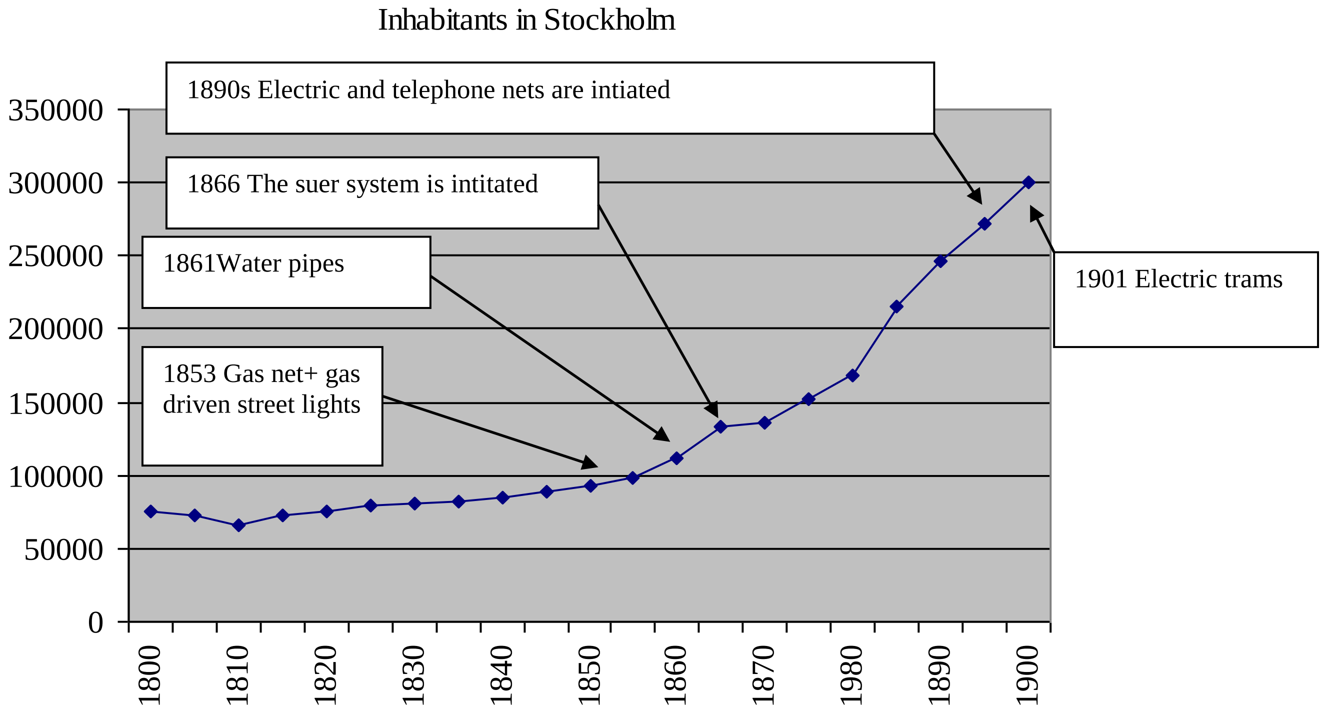


Chart 18. The population in Stockholm during the 1800s (Lars Nilsson, Historisk tätortsstatistik, Stads- och kommunhistoriska institutet, Stockholm 1992= Historical urban statistics, Urban and Municipal Historical Institute), with the data about when a number of important technical systems began to be built or put into service.

Oddly enough, we have along the way from the time when we lived in very humble abodes to today's modern homes, probably arguably liking, had a setback regarding buildings embellishments. What is ugly/beautiful is a matter of taste, but there seems to be less detail in today's buildings that are only there for the sake of beauty, compared with the buildings that are, say, 100 years old. Although it’s never been easier to make ornaments. Why is that so?

Materials

Until the advent of industrialism most made their clothes within their household or by someone in the neighbourhood, of what was to available, such as hides, furs, wool, linen or cotton. Regardless of if the thread was made of linen, cotton or wool the fibres must first be harvested and assembled into threads. Next, the threads have to be woven together into a piece of cloth, which is then cut and stitched to the garment.

Traditional tools for harvesting (cutting), carding, spinning and weaving sheep's wool.

In 1733 the speed weaving was suddenly dramatically up-speeded with the invention of a shuttle (John Kay, UK) that could be pulled through the transverse threads much faster. The weaving went so fast that there was a shortage of threads, which speeded up the construction of improved spinning machines. Which in turn made the weaving a bottleneck, until the American Edmund Carthwright 1787 built the first steam-powered weaving machine. This together made fabrics cheaper to manufacture and this increased the demand for cleaned cotton. This was solved when the cleaning machine was invented in 1792 in the United States by Eli Whitney. 1805 the Frenchman Joseph Marie Jaquard designed a weaving machine that was controlled by punch cards, which meant that one could change pattern just by simply replacing the punch card. With these inventions the production of cloth was about the same as today, and the production in the UK cotton industry increased (chart 19). Though still the manufacture of clothing was completely manual until the sewing machine was invented in 1846 and then developed further by Isaac Singer, 1851, when he unveiled a machine that was quite similar to today's sewing machines. Somewhat later (like 1870) the population in the Swedish countryside, to some extent, could buy ready-made formalwear from local tailors (Nordiska Museet list of questions from 1941 about when industrial products began to spread over the countryside) and factory-made shoes.

Chart 19. The British consumption of raw cotton, 1750-1899 according BR Mitchell.

The metals that could be produced at the time of Christ's birth were silver & gold (in jewellery and coins), copper (in tools, etc.), brass and bronze (alloys used in jewellery, ornaments and utensils), iron (tools) and lead (pipelines). Then not so much happened in metallurgy until the 1700s (see table 9), except that some elements such as arsenic, bismuth and platinum were isolated, and that the processes for iron making were improved. The most important development step in that respect was probably when the Briton Henry Bessemer in 1855 patented the idea to blow air on the molten iron after it arrived from the blast furnace. The point of it was that the naturally occurring carbon was reduced to below 2.1% and thus he had steel.

Used the year 0
Between 0 - 1699
1700s
1800s
1900s
Not yet isolated

Hydrogene 1 1766																		Helium 2 1895
Litsium 3 1817	Beryllium 4 1797												Lives 5 1808	Carbon 6	Nitrogen 7 1772	Oxygene 8 1774	Fluorine 9 1886	Neon 10 1898
Sodium 11 1807	Magnesium 12 1755												Aluminium 13 1825	Silicon 14 1824	Phosphorus 15	Sulfur 16	Chlorine 17 1774	Argon 18 1894
Potassium 19 1807	Calcium 20 1808		Skandium 21 1879	Titanium 22	Vanadium 23 1801	Chromium 24 1797	Manganese 25 1774	Iron 26	Cobalt 27 1735	Nickel 28 1751	Copper 29	Zinc 30	Gallium 31 1875	Germanium 32 1886	Arsenic 33	Selenium 34 1817	Bromine 35 1826	Krypton 36 1898
Rubidium 37 1861	Strontium 38 1790		Yttrium 39 1794	Zirkonium 40 1789	Niob 41 1801	Molybdenum 42 1778	Teknetium 43 1937	Rutenium 44 1844	Rhodium 45 1803	Palladium 46 1803	Silver 47	Cadmium 48 1817	Indium 49 1863	Tin 50	Antimony 51	Tellurium 52 1782	Iodine 53 1811	Xenon 54 1898
Cesium 55 1860	Barium 56 1808		Lutetium 71 1907	Hafnium 72 1923	Tantal 73 1802	Tungsten 74 1783	Rhenium 75 1925	Osmium 76 1803	Iridium 77 1803	Platinum 78	Gold 79	Mercury 80	Tallium 81 1861	Lead 82	Bismuth 83	Polonium 84 1898	Astatine 85 1940	Radon 86 1900
Francium 87 1939	Radium 88 1898		Lawrencium 103 1961	Rutherfordium 104 1964/69	Dubnium 105 1967/70	Seaborgium 106 1974	Bohrium 107 1976	Hassium 108 1984	Meitnerium 109 1982	Darmstadtium 110 1994	Röntgenium 111 1994	Copernicium 112 1996	113	114	115	116	117	118
Lantan 57 1839	Cerium 58 1803	Praseodym 59 1895	Neodym 60 1895	Prometium 61 1945	Samarium 62 1879	Europium 63 1901	Gadolinium 64 1880	Terbium 65 1843	Dysprosium 66 1886	Holmium 67 1878	Erbium 68 1842	Tulium 69 1879	Ytterbium 70 1878					
Aktinium 89 1899	Torium 90 1829	Protaktinium 91 1917	Uran 92 1789	Neptunium 93 1940	Plutonium 94 1940	Americium 95 1944	Curium 96 1944	Berkelium 97 1949	Californium 98 1950	Einsteinium 99 1952	Fermium 100 1952	Mendelevium 101 1955	Nobelium 102 1958					

Periodic table, with data about when each element was isolated and its atomic number = number of protons in each nucleus.

Rubber got its breakthrough when the American Goodyear in 1839 received a patent on a way to process natural rubber so that it was not so sticky and difficult to work with and the process also made the products more sustainable. The process was called vulcanization and it is still used today.

Vulcanization = natural rubber + sulphur + high pressure + heat.

The first plastic-like material produced in large scale was celluloid. It was based on plant fibres that were dissolve into a homogeneous batter by adding camphor. Celluloid was produced for the first time by the American John Hyatt in 1869. It was used, among other things, to make billiard balls as a substitute for ivory (ivory was expensive and ivory balls were never perfectly round). Unfortunately, the material is very flammable.
The first real/synthetic plastic material (i.e. with only chemically manufactured ingredients, apart from reinforcement) was patented in 1907 by the Belgian Leo Baekeland. It was called Bakelite and it’s actually still manufactured.

Bakelite = acid phenol formaldehyde + gas + pressure + wood flour (as "reinforcement").

The first synthetic rubbers, Buna S and Buna-N was produced by German chemists during the World War I, because they had a shortage of natural rubber (the British blocked the supply of natural rubber, which meant that the Germans could not produce automobile tires, etc.).

Table 9. Examples of common materials and how long they have been utilized by man.

Material	Year 0	1800	1900	2000	Used today example
Cotton	X	X	X	X	Clothes
Lin	X	X	X	X	Clothes
Silk	X	X	X	X	Clothes
Wool	X	X	X	X	Clothes
Paper		X	X	X	Books, magazines
Aluminium			X	X	Vehicle components, beer cans
Lead	X	X	X	X	Automotive batteries
Bronze (type 90% copper +10% tin)	X	X	X	X	Bearings, bushings
Cast iron (iron +> 2.1% carbon (often about 4% carbon + approximately 2% silicon)	X	X	X	X	Machine components
Gold	X	X	X	X	Jewellery, coating connectors
Silicon			X	X	Electronic circuits
Steel (iron + ≤ 2.1% carbon + possible. Alloying elements such as manganese)			1855	X	Vehicles, buildings
Copper	X	X	X	X	Electric cables
Magnesium			X	X	Vehicle components
Nickel		X	X	X	In stainless steel
Stainless steel (iron + 12-30% chromium + nickel, often 7-30%)				1912	Building components
Silver	X	X	X	X	Jewellery
Tin	X	X	X	X	Soldering of electronics
Zinc	X	X	X	X	Moulded components
Graphite / carbon	X	X	X	X	Pencils
Vinyl chloride plastic (PVC)				1900s	Tubes, profiles
Polystyrene (PS)				"	Disposables
Methyl methacrylate plastic (PMMA)				"	Signs
Polycarbonate (PC)				"	window boxes
Phenyleneoxy plastic (PPO)				"	Cases of such appliances
Low density polyethylene (LDPE)				"	Automotive components
High density polyethylene (HDPE)				"	Pouches
Polyoxymethylene (POM)				"	Household goods
Polypropylene (PP)				"	Cogwheels
Polyamide (PA, Nylon)				"	Car parts
Polyphenylene sulfide (PPS)				"	Cogwheels
Polytetrafluoroethylene (PTFE, Teflon)				"	Covers
Phenol-formaldehyde plastic (PF)				"	Gaskets
Urea Formaldehyde plastic (UF)				"	Covers
Epoxy (EP)				"	Electric components
Polyurethane (PUR)				"	Castings
Natural rubber (NR)	X	X	X	X	Car tires
Styrene rubber (SBR)				1900s	Car tires, etc.
Butyl rubber (IIR)				"	Inner tubes of tires
Ethylene-propylene rubber (EPDM)				"	Sealings for buildings
Nitrile (NBR)				"	Oil hoses
Chloroprene rubber (CR)				"	Bellows
Styrene-butadiene thermoplastic elastomer (SBS)				"	Shoe soles
Olefin thermoplastic elastomer (TOE)				"	Fins
Urethane thermoplastic elastomer (TPU)				"	Hot melt
Ester-ether thermoplastic elastomer (TPAE)				"	Track for snowmobiles
Soft PVC				"	Floor mats

A quick lesson for future inventors

Creativity for financial gain

The restaurant industry is probably the most creative of all industries in Sweden. It constantly pops up new products (food). But it has not always been like that. Even in the 60's, it was mostly the same dishes that figured in the menus all the time. A situation that well-travelled readers probably recognize from the situation in some other countries even today.

MÅNDAG

Stekt salt sill med löksås	7:50
Skånsk kalops med rödbetor	8:—
Kalmarlåda	8:25
Stekt falukorv, skånsk potatis	5:25
Gräddstuvad lever med lingon	7:—

TORSDAG

Ärter och fläsktärningar	5:50
Stekta kroppkakor med lingon	5:25
Halstrad makrill med spenat	6:—
Svensk biffstek med lök	8:75
Kokt kalv med dillsås	8:—

TISDAG

Tunna fläskpannkakor	7:—
Stekt rödspätta med citron	8:—
Svensk panna	8:50
Oxhjärpe med gräddsås och lingon	7:—
Isterband med stuvad potatis	5:75

FREDAG

Gratinerad slätvarfilet med champignoner	8:50
Sillbullar med korintsås	5:50
Köttgryta	8:—
Raggmunk med fläsk	7:50
Fläskkotlett med curryris	9:—

ONSDAG

Köttbullar (eller fläsk) och bruna bönor	7:25
Kroppkakor med skirat smör	5:25
Pepparrotskött	8:50
Strömmingflundra, potatispuré	6:—
Oxragu med brytbönor	8:—

LÖRDAG

Sotare med puré och dillsmör	5:25
Skomakarlåda	8:25
Pannbiff med lök	7:—
Laxpudding med skirat smör	8:50
Panerad fläsksnitzel med ärter	9:—

Varje dag iskällarsaltad lax med stuvad potatis . . 12:—

1965-year standing menu at a famous restaurant in Stockholm, with five dishes every day that were the same throughout the year.

What happened in Sweden in the late 60th century was that some creative people, such as Tore Wretman, began to bring inspiration from abroad.

Tore Wretman was restaurateur at the restaurant Riche in Stockholm in the 60:ies. He made several pioneering efforts in the Swedish cuisine, such as composing the popular appetizer ”skagenröra”.

The contemporary chef's in Stockholm continuously presents new concepts and every tavern with a little more ambition creates their own dishes. For example it is common to bring inspiration from foreign kitchens and transform the recipes from those into Swedish conditions with Swedish ingredients. However, few of these ideas form the basis for large scale concepts.

In 1968, opened Max's founder, the then 19-year-old Curt Bergfors,his first fast food grill in Gällivare. Then he continued in Skellefteå, Luleå, Piteå, Umeå, Boden and further south. Now the company is more or less nationwide and a serious competitor to McDonalds. Which other competitors as Big Burger and the state owned and subsequently listed hamburger chain Clock failed to do. And this without a lot of capital in the back, also at a time when there were far more other competitors than when Clock and Big Burger existed.

In the industrial part of the food sector it is also bigger creativity today than in 50/60:ies. For example offered Arla's predecessor in the early fifties only a few different varieties of milk (Gottliebsson, S. 1984), while the company currently lists 17 varieties on their website. The effect of this is not only beneficial for the industry. For example, each new milk product requires a shelf place in the milk disks, forcing the shop owners to continual rebuild their shops. Although regular standard-, medium-and low-fat milk still accounts for over 90% of the milk sales (Karlsson, S. & Moback, J. 2001).

Another industry that is characterized by great creativity is the cultural one. Though despite this, it is rarely any ideas in the cultural sector that leads to a sustained commercial success. Among imaging artists, it is particularly unusual. The most famous exception is perhaps Andy Warhol, who in the early 60:ies, made artworks that looked like stylized comic panels. These artworks he then mass-produced with different printing techniques. He further developed the concept by making stylized depictions of celebrities like Marilyn Monroe and commercial products such as Campbell's soup cans. Then he developed the concept even further through hiring a staff who continued in the same style.

Besides Warhol also the artist couple Christo and Jeanne-Claude, have lifted their concept to a higher level. The business idea is to, for a short period, convert various public places, such as sweeping the Reichstag building in Berlin with fabric. After photographing the creation, they mass copied the photographs and sold them through established channels for such products.

A Swedish example of an artist that has his own concept is the painter Bengt Elde. He definitely has his own artistic style, but he is not alone in having that. Instead his exclusive thing is that he mass copy his paintings on all sorts of everyday objects, that he sells in his own shop. You can say that he has done the contrary to other manufacturers of everyday objects. I. e. he began with the artwork.

Other artists, like writers and musicians, usually mass produce their work, but there are few examples of someone who managed to expand the business based on the same basic idea. For example, it is probably no musician who created a disc that then has sold very well and then with continued commercial success released it again several times with only slight changes in the songs each time. Perhaps because of this, the protection of artistic works is designed in a different way than for technological inventions. Artistic works, such as songs and novels may not be copied for commercial use or imitated during a period ranging from 50 to 70 years after the author's death. Unless the author, or the person who bought the rights from him, agrees to it.

Many commercial successes are, however, based on technical ideas. And according to researchers in the field (Mellgren, E. 2006) a disproportionately large proportion (20%) of all newly established technology companies in Sweden are built on ideas hatched in university research. But it need not be because the people involved in this are more creative than others, it may also be that the research institutions:

- Has specialized knowledge in one or more areas, which means that they keep track of what has already been done in these areas. This means in turn that they more than others have the opportunity to realize if what they come up with is new or not.
- Striving to bring something new to the former common knowledge. This means that they are forced to look where others have not and thereby increases the chance of finding something hitherto unknown.
- Has the equipment necessary to do the experiments needed.
- Have contacts that facilitate the efforts to move forward with commercialization of a good idea.
- Provides legitimacy to the inventor and credibility to the idea, which increases the chances of getting funding.

Additionally many new ideas that become commercial successes come from existing companies. It has about the same reasons. The biggest difference from public research is that it usually is the companies themselves who commercialize ideas and these, thus, forms no basis for new companies.

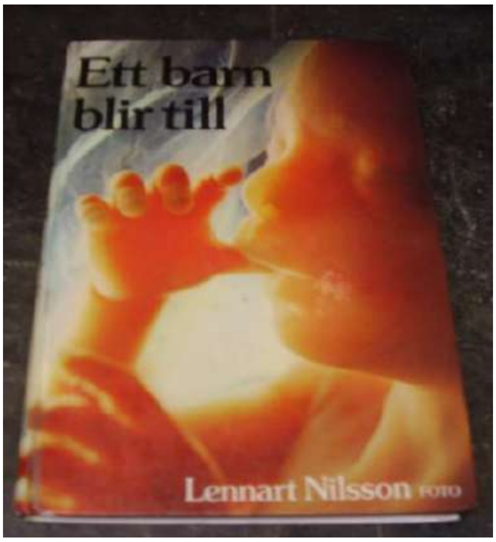
However, what might be missing in these environments is, in my experience, often the tradition of using knowledge and techniques from different areas and combines them into something that solves a problem in another area. There even a single creative person can have a chance, despite a lack of deep expertise and expensive equipment. The reason is that if no one yet has thought about to combine the techniques in this way, it is still no large organization that laid claim on the new territory.

The inventor of the telphone, Alexander Graham Bell, had the idea to take the technological advances in the electrical engineering field into the field of communication. But he was not a technician, instead he was a professor in voice physiology. To realize the idea he hired a mechanic (Thomas Watson). Watson managed it and the invention was a success.

The Swedish designer Lars-Anders Edström took the shovel from the garden to the kitchen when he came upon a plastic scraper to remove food waste from the sink. Edströms protected the design of the scraper and named it "Renzi". Renzis advantage was that it saved paper towels and that it could be stored in the immediate vicinity of the sink without being destroyed by water splashes.
But the design protection was not comprehensive enough, because just a few months after the design protection for "Renzi" had got public another Swedish company got design protection for a very similar product. The main difference was that the holes were oblong instead of round.

Another example of technology transfer from one industry to another is the explosive establishment of mail order on the Internet a few years after the World Wide Web became popular in the mid-1990s. Many of these early web entrepreneurs probably lacked both money and connections, but several of them did quite a lot of money before the IT-crash just after the turn of the millennium.

One can also find examples of how major companies have adopted ideas from other areas, thereby creating new and successful products. Like when Wasabröd came on the idear to add different cheese mixtures between slices of their crisp bread and pack the products in attractive individual packages. To then market these as an alternative to chocolate bars.



And ditto in the cultural field. For example, when Lennart Nilsson took advantage of technological advances in optics and adapted them so that it was possible to take pictures of the process in which a child grows in the mother's body. The images became a best-selling book and was also sold to a number of newspapers around the world.

There are surely even today a lot more or less untapped opportunities to transfer established techniques or methods from one industry to another, for example:

- Transfer the principle of managers from the music industry to that for artists who create physical works like paintings. He could have a group of artists that he sells to businesses to decorate their premises with various forms of artistic expressions and interpretations of their products.
- Mobile operators could do as the commercial radio stations and broadcast radio programs in their networks.
- Restaurants could compete with the manufacturers of ready made deep frozen food by selling leftover lunch food, frozen in individual portions.

The fact that some municipalities now allow private operators to take over much of the activities they previously operated, also opens new opportunities for creative entrepreneurs. Whoever gets the assignment to take over a business is reasonably the one that has offered to provide service at the lowest cost to the municipality. For it to be possible to do this with a profit for the contractor, it is required that he probably lowers the operating costs compared to when it was operated by the municipality. For this, in turn, to be possible, it can be fruitful to absorb creative solutions from other industries which have long been churning out profits from highly competitive businesses. It could be:

1. Running kindergartens or retirement homes in the same way as low-cost airlines and charge for everything beyond a certain minimum service.
2. Inserting cafe businesses in the public transport system trough forcing latch guards or bus drivers to also sell coffee and sandwiches.
3. Combining school activities with outdoor cleaning for the municipality. Letting the students do the cleaning on the pretext of giving them work experience training.
4. Running an elementary school in the same way as an outdoor kindergarten, i.e. have all lessons outdoors and thus save the costs for school facilities.

Sometimes there are also an economic potential in transferring ideas within the same industry, but from one country to another.

Januari 2010			
Namn	**Lösen-pris (kr)**	**Köp (kr)**	**Sälj (kr)**
ERICB0M25X	25	0,5	-
ERICB0M30X	30	2,75	4,25
ERICB0M34	34	3,6	5,5
ERICB0M40X	40	6,25	7,5
ERICB0M42	42	6,25	8,25
ERICB0M46	46	8	10
ERICB0M50X	50	10	11,75
ERICB0M60X	60	15	17,75
ERICB0M70X	70	20,25	24,25
ERICB0M80X	80	27,25	31,25
ERICB0M90X	90	35	39,25

Olof Stenhammar in 1985 introduced the financial instrument call and sell options* in Sweden and he created a market where they could be traded, i. e. "Optionsmarknaden." The products became popular and the company he founded grew. A few years later it was listed on the Stockholm Stock Exchange and 13 years later the company bought the Stockholm Stock Exchange.

* A call option is a document that gives the holder the right to buy a certain share a certain date at a certain price. And a sell option implies a corresponding right to sell a stock at a given price. The point of these instruments is that it is much cheaper to buy a call option than the corresponding shares. Thus, the investor may be able to afford to buy 1 000 call options when he otherwise had only afforded 50 shares. If the shares increase in value, the option's value increases accordingly.

The further back in history, the greater the difficulty of transferring goods or ideas from one country to another. Thus there were probably also a larger potential for an individual entrepreneur to make money on this.

But some things can’t be taken over country borders so easily because of import restrictions or because it is about things like habits or attitudes. Drugs are examples of the foregoing. And it is, as familiar, an area where there are still opportunities for small entrepreneurs to make money. The latter, there are many examples of in the area of nutrition, like the consumption of fast food.

How to make inventions

An often successful way to come up with ideas that may have commercial potential is to look for gaps in existing technology. The results of these efforts can then be a new technical solution, that is, an invention. In order to find such deficiencies it can be good to have for example the following questions in mind:

A. What deficiencies are created by changes in our society? There are a variety of relatively obvious such things that could be fertile ground for profitable innovations, such as:

- Energy prices are rising.
- Concerns increases about various environmental threats.
- Urbanization increases, i.e. migration to urban areas.
- Increasing proportion of single-person households.
- Longer life expectancy and an increasing amount of healthy, alert and well-off pensioners.
- The interest in interior design is increasing.

B. What is, or will shortly become, a lack of resources? The resource that is most in the news right now is oil. But there are also other phenomena that decrease, for example:

- The presence of quiet environments.
- Various metals.
- Our physical activity.
- The population of many fish species.

C. What takes time, is tedious, or difficult to get a good result when doing?
Here it may be worthwhile to look at your environment and consider what feels annoying in any way. It could for example be:

- It is time consuming to wipe oneself dry after a bath or a shower.
- It is difficult and time consuming to get the lid off on previously unopened jars.
- It is heavy to carry home glass packaging from the store and they are pretty easily smashed and they require special handling when they are empty.
- The flavour of a cheese quickly degenerate after the vacuum package is opened.
- Potatoes have a short shelf life in the refrigerator.
- Bicycle tires often get punctures.
- Smoke alarms howl when they should not.
- Candles often drip down on the table.
- Bread is rarely even close to perfectly toasted in the toaster.
- Many homes are too hot at night but cold in the morning.
- It is difficult to cook stuff just perfect.
- It is difficult to maintain the correct temperature in the pan.
- It's hard to keep track of all digital codes.
- It is awkward to have the quilt in place in the duvet cover.
- It gets embarrassing tracks in the toilet when the shit falls down.

Solutions eliminating shortcomings are often generated through:

a. Formulate a problem, i.e. describe the functions required and the framework conditions for the solution.
b. Examine how similar problems have been solved in other areas.
c. Consider whether these solutions are transferable to the area without exceeding the framework conditions.

Last spring, I talked to a ventilation expert who described that the air flow in a ventilation system based on natural ventilation, unfortunately, is inversely proportional to the outside temperature. This means that the colder it is outside, the more indoor air escapes through the chimney. Which is a drawback in the system that causes unnecessary energy losses and reduced comfort indoors when it is cold outside.

It would therefore be desirable to have some form of automatic valve that reduces the flow area with decreasing outdoor temperature. The framework conditions seemed, at first, to be that the valve should be cheap and it should not require any electric drive.

During our conversation, it struck me that, for instance electric thermostats utilize the fact that some metal alloys (so-called memory alloys) changes shape with temperature and thus closes or cuts the power to the radiator. With such metal, it would be easy to make a valve, whose flow area decreases with decreasing temperature. If the valve is mounted on top of each canal on the chimney, the flow area would be controlled by the outside temperature automatically and without that any electrical energy would have to be added. We discussed this and concluded that it would be worthwhile to investigate.

The results from the investigation are described under "How you test your ideas."

Instead of searching for deficiencies, one can also search for options. This is done by looking for techniques that are so new (virgin), that it probably still is a lot that is undone. When such an area is identified, it is appropriate to proceed by looking for shortcomings in the technology and/or possible transfers from other areas.

Mature market
Only a few companies are still standing

Mature technique
Production and products are similar

Homogenization and consolidation
Some variants and companies wins other dies

Competition between different solutions
A number of variants are fighting of becoming the “world standard”

The technique is established
Many companies starts and the technique develops rapidly

Virgin technique
An invention opends up a new field of technology

At the advent of a new type of technology it is in a virgin state. This means that the technical solutions and production processes are far from optimal. If so there is often a chance for a farsighted entrepreneur to create a company that gets a decent share of the market, and if he succeeds, the company may eventually become large.

Jens Nylander launched in 2003 a Korean MP3 player under the brand name "Jens of Sweden". His players had a significantly more delicious design than what the competitors had, on the then virgin market for such devices in Sweden. The company was in the onset of the trend with such devices, market leader. He managed to sell 80 000 MP3 players during the first 18 months (Alexander, A. & Osterman, M. 2006). Eventually, however, the competitors caught up, partly because Jens of Sweden had problems with their suppliers, and in 2005 the company went bankrupt.

Virgin technique

The first real car was developed by the German Carl Benz and the sample was first run in 1885. But it looked more like a rickshaw than a car. Benz had many followers, and before the year 1900 came a number of the technical solutions that today characterizes a car, such as steering wheel and air-filled rubber tires. The following decade a lot of important features were introduced, like: battery, drum brakes and the ability to control the speed using a throttle.

The technique is established

In 1908 the T-ford was launched. It contributed greatly to establish the technology. This is primarily due to that it was mass produced in an efficient manner and thus could be sold cheaper than the competitors cars and thus the technology became available to a wider group of customers. The T-ford was built on a frame of steel beams with a bodywork partly made of wood. It had a four-cylinder engine with a maximum output of about 20 hp and the gearbox had two gears, which could push up the car to about 65 km/h.

Competition between different solutions

In the 20s there were a lot more manufacturers than today. For example the most common brands in Sweden 1926 were (Tidens Förlag, 1926): Scania-Vabis, T V (Thulinverken), Minerva, Rolls-Royce, Berliet, Citroën, Peugeot, Renault, Voisin, Fiat, Diatto, Lancia, Benz, Daimler-Mercedes, Horch, Presto, Ajax, Buick, Cadillac, Chevrolet, Chrysler, Cleveland, Dodge, Durant, Essex, Flint, Ford, Gray, Huson, Hupmobile, Jewett, Nash, Oakland, Oldsmobile, Overland, Packard, Rickenbakker, Studenbaker and Willis Knight.

Homogenization and consolidation

Even before the year 1930 some of these car manufacturers had disappeared and a large part of today's automotive technology had been introduced (though it was far from being on all cars). For example, there were: alternator, starter motor, electric lighting, brakes on all four wheels, front wheel drive, compressor, self supporting body structure, hydraulic telescope dampers, hydraulic brakes, wipers and automatic transmission.

Citroen B11 went on sale in 1934 and the company continued to sell it until 1957. From the outset, it had a self-supporting all-welded body, front-wheel drive, independent suspension and hydraulic brakes.

Mature technique

Then is not so much happened with car technology until the 50's, when many convenience-enhancing solutions were launched. For example: power-assisted brakes and steering systems, electric windows, electrically adjustable seats, air conditioning, fuel injection and seatbelts. And in the mid 50s the car technology can probably be regarded as mature. Afterwards not so much happened again, until the electronics made its foray into the automotive world with innovations such as airbags and anti-lock brakes (80s) and computer-based networks (90s).

Mature market

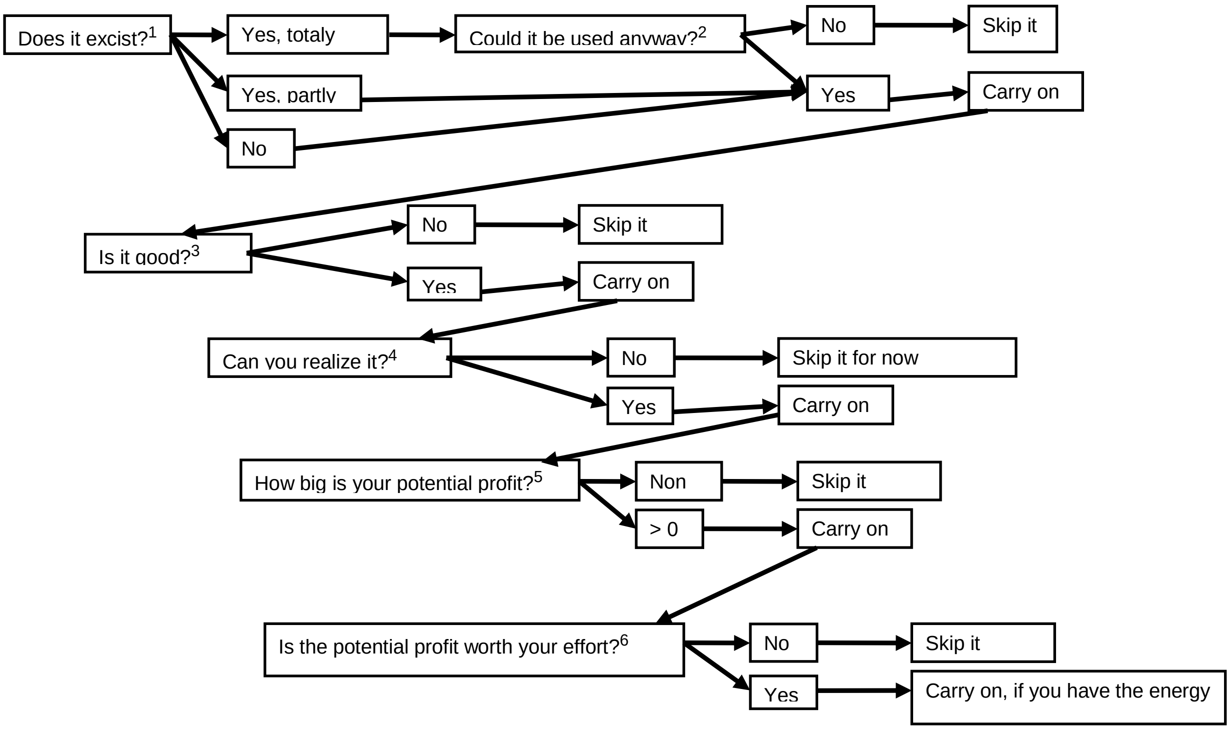
Today (in 2009) there are only a few automakers left. The largest of these is the Toyota (about 9.5 million vehicles / year), GM (8.8 million pcs.), Ford (6.4 million pcs.) And Volkswagen (6.2 million pcs.). Whatever the brand of the car is, the technical content is relatively similar and the prices are, relative to the average wage, lower than ever.

There are, still today, techniques that are virgin, with respect to the potential for improvement without new technological break through, even if the technique in fact is old. The smaller the market is for the type of products, the more likely the chance that it is the case.

There are probably greater opportunities to further improve the design of mobile stone and asphalt crushers as this one, compared to, for example, articulated haulers.

How do you test your ideas?

If you can not an idea out of your head, and wants to something with it, you should start by asking yourself the following questions (see also the numbered explanations after the figure):



1. It might be good to take the issue about if the idea is new before the question whether it is good or not, because the former is often easier to answer. Moreover, it is very common that ideas already exist, even if you yourself have never seen them realized. Start by critically examine if your and maybe also someone else can recollect that it exists. Continue to look on the internet using a search engine and clever keywords.

   If the idea is an invention go to your Patent Office's website and search, especially in the European patent database espacenet. With the right keywords, you will get information about related patents, decided in recent years in any country which patent office is included in the database. The database also covers patents that were originally developed in other countries, where the patentee has chosen to also apply for a patent in one/some European countries. What, however, you do not a get answers to, no matter how appropriate keywords you use, are:

   - If there's an old patents.
   - If there are a patents only in countries outside the database.
   - If the idea is realized or otherwise published without being patented.

2. If the idea is an invention, and the idea is to apply for a patent on it, you can skip the project as soon as you realize that the whole of your idea is already in the data base. But if the existing solutions, on at least one important point, differ from yours, it can still be worth going on. If your idea consists of for instance a business concept, it may have potential even if it is already available in its entirety anywhere in the world. It might even be an advantage, because someone has already done some of your research work and perhaps aroused people's interest.

3. The question whether the idea is good can be difficult to answer on your own, because it is easy to be blinded by its advantages. It may therefore be helpful to discuss it with appropriate persons. But it can be difficult to find such people, as many probably just will say that it sounds good, since they do not want to offend you or because they haven't really analyzed the problems truly enough.

   If your idea is an invention, it may also be good to make a simple prototype. Since the development of the prototype breeds thoughts about it and it helps you to critically examine the idea, and with a prototype it is easier to present the idea to the people you want to discuss with.

4. There are many ideas that certainly are both new and good but the inventor's lacks possibilities to realize them, because they don't have sufficient knowledge, time, energy and/or capital. But the realization does not need to imply any great effort from the inventor, it can also be that he tells it to someone who in turn can make something out of it. If he then do it and succeed, the inventor then got something to be proud of.

5. The profit doesn't necessarily need to be financial, it may come in the form of, for example, a more comfortable life.

6. If you answer yes to this question it may be difficult to skip the project, with good conscience.

Regarding the idea of using a memory alloy in a ventilation valve, described earlier, a simple search and examination on the Patent Office's web sight gave no hit. I then believed, quite uncritically, that the idea was good and I imagined that it probably would be possible to patent it and then sell licenses to suitable companies, with a small reward for me. Glad at heart, I began to sketch the technical design. After a while it occurred to me, however, that all possible solutions would reduce the flow area so much, that the ventilation system would not meet the ventilation requirements during hot periods of the year. Which in turn ruined the whole idea. So I had done some design work for nothing, because I did not, in a sufficiently critical manner, examine if the idea was good or not. Besides, I had been careless when I formulated the framework for the technical solution, since I did not take into account the very purpose of the ventilation, i.e., to always carry out an adequate amount of air out of the building.

Patents

The point of patenting something is that no one else has the right to manufacture and market the same thing in the countries where the patent is valid, during a certain period*, and that the patent can be sold.

* In Europe, at a maximum, 20 years if the holder pays the annual fees to the respective patent offices, but in reality the time is usually shorter, because the competitors finds out ways to circumvent the patent.

Requirement for an invention to be patentable

Technical
Patents can only be given to ideas related to technical artifacts such as machinery, chemical / medical mixtures, electrical components and materials.

Innovative height
It is not enough that it is something that only is in line with standard product development. The idea must have at least one untested approach to be patentable.

Technical effect
The invention has to work technically and solve a problem in a technical way.

Reproducible effect
This means that the intended effect shall allways occure when the invetion is properly used.

New
The invention must not be known before the patent application.

It's really not that hard to come up with something that might meet the Patent Office's requirements. But you should generally wait as long as possible to file a patent application, in part because:

1. A patent has a limited life and the sooner the patent is approved the sooner it dies.
2. To write a good patent application is considered to be difficult, and thus the risk is high that the patent does not provide adequate protection around the idea, for those without experience in the field who tries anyway. The longer the idea develops and the more potential business partners that are involved in the process, the larger are the chances to get financial support for professional help with the application.
3. It can be very important that you include many, if not all possible solutions based on the invention. If you are in a hurry, you may end up in that the solution that finally is realized is not listed in the original patent application. One can then apply for additional patents, but you can also have such bad luck that the final solution in some way is indicated in the original patent applications descriptive section, without being included in any of the claims, and thus your own patent application constitutes and obstacle for the new application.

Despite the above, it may sometimes be necessary, in a fairly early stage, to submit a patent application to be safe and/or to have something to show in negotiations with potential license buyers. Moreover, it is quite inexpensive to apply for patents (in 2008 it cost only 3 000 SEK to apply for a patent in Sweden).

Innovations at work

Few of the inventors I've met, have managed to live off their inventions. Although several of them had invested a lot of efforts into to commercializing them. The inventors who are employed in enterprises have a much more relaxed life. Since the job can supply the creative mind with ideas for inventions and also can take care of all the work after the bright idea was emerged. There is even a law in Sweden that protects the employee's right to compensation if he does an invention that can be beneficial to the employer. For the law to apply it requires that the invention is patentable, and that it falls within its scope of the company, and that the inventor was working at the company when the idea was born. The law came in 1949 under pressure from unions who thought that it was unfair that the employers only got the benefits of the employees' ideas. However, it is reasonable to believe that many brilliant ideas, for various reasons, are killed by smug managements. If so, the inventor has the legal right to commercialize the idea himself.

On a large industrial company (car manufacturers) where I worked, the system worked so that whoever came up with an invention downloaded a form from the intranet, filled it with a description of the invention and emailed it to the patent department. The patent department investigated whether it would be possible to patent the idea and if so, they sent the proposal to appropriate technical experts within the company, which assessed whether the idea was useful or not. If the experts considered that it was the case, a patent agency was contacted, and they wrote a patent application. During this process, the inventor got compensation in three instalments. First (in 2004) about 6 000 SEK if the invention was considered to be good enough and new, then an additional approximately 6 000 SEK if the company tried to patent the idea and finally from 6 000 to 12 000 SEK, if the company went ahead and applied for patents in several countries (depending on how many additional countries they applied for patent in).

It can also be fruitful to be innovative at work without having ideas that are real inventions. Since many employers rewards new ideas. Large employers even have special systems for rewarding innovative employees’. System, which in my experience, are based on that the inventor fills out a form and sends it to a joint draft committee, which analyzes whether the proposal will be implemented and rewarded. In order to receive compensation for a proposal it shall provide the workplace with something new, have some "innovation height", provide demonstrable benefits, be an achievement beyond the inventors normal work and in addition the employer shall adopt the proposal. The compensation consists of a predetermined portion of the savings the employer makes in a year, if it can be calculated or estimated. Which can be much more money than what an outright invention gives.

My experience of these systems, at various workplaces, is that the attitudes to the proposals and the generosity vary from committee to committee. Some committees have refused further handling of proposals, merely because they have too little "inventive height". While others even have rewarded proposals that have been about introducing well known, but in that workplace, untested products or procedures. To minimize the amount of unnecessary work, it is therefore probably wise to consider the Committee's previous decisions before trying to figure out any own proposals.

Risks with inventing

There are risks with inventing. A major risk is that the great idea you believe you have, in reality, is quite poor. Anyone who does not realize this, risks losing money, energy, respect and time.

One example of this is the Cash Card, which a number of major Swedish banks introduced in the mid-1990s. The difference between Cash Card and Credit/debit cards was that the money was not linked to an account, instead they were only in a chip on the card. The customer charged the chip with cash at a bank branch or in a Cash Card charger in town. When the card was used the store did not have to connect to a bank and the customer did not need to sign anything, or enter any code, or showing any identification card. The customer paid the goods through inserting the card into a payment terminal. The amount was then stored in the payment terminal and at the end of the day, the store personnel connected the terminal to the bank's computer and the total sum was transferred from the bank to the merchant's account.
The banks aim was to reduce the costly cash management. The advantages for the consumers, the banks argued, were that the Cash Card was faster than other debit cards, and the customers would not have to bother with small change. The advantage for the shops was that they would have less cash and thus the risk for robbery would be reduced.

But in fact the system had a lot of serious drawbacks from the customers' point of view:

1. Far from all transactions could be carried out with the card, so the customers still had to walk around with cash.
2. It was not possible to see on the card if there was any money left, instead it required a special Cash Card reader, i.e. one more thing to carry around.
3. If the card was broken or if someone stole it, they where the rightful owners of the money (in contrary to regular credit card).
4. The extra hassle of both charging the card and go to the ATM, compared to just going to the ATM.
1. The card cost 50 SEK per year.

The system flopped and was terminated in 2004.

Another risk is that the idea is indeed good, but someone steals it and the inventor then sacrifices a lot of time, energy and money to obtain redress. An example of this is the Swedish inventor Håkan Lans with a series of brilliant inventions behind, such as colour graphics for computers. Most computer companies in the world pay him to use his colour graphics. But a number of U.S. computer companies have refused to do so. In autumn 1997 he began to sue the companies. The process was long, costly and mentally painful for Lans. It looked like he would win but he did not, because the computer companies found a loophole that was that the patent was owned by a company that he owned and not by him personally.

A third risk is that the idea is good and the inventor manages to successfully launch it, without someone stealing it, but he/she meets such great resistance in the community that it becomes over-powerful. Take the Englishman Hargreaves as an example, he invented the first mechanical spinning machine "Spinning Jenny" (named after the inventor's daughter). Hargreaves founded several spinning factories and everything was going well. But the plants were stormed by spinning workers who were worried about losing their livelihood, and the machines were destroyed. The inventor hence had financial problems and ended his days as a poor man.

A fourth risk is that the technology is launched before the necessary ambient technology is mature. Which could be the case if someone launched entirely new types of car engines based on new and environmentally friendly fuel, before it was possible for the customers to get the fuel.

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The ergonomics of tools

Ergonomic improvements

For it to be meaningful to try to improve a tool, it should an improvement potential. The greater the potential for improvements, the more reason to try to improve it. The ergonomic improvement potential could be divided into a number of levels (figure 1).

Cosmetics May to some extent further increase acceptance among users.

Increased comfort
Increases the acceptance among users.

Indirect productivity gains
Less fatigue among users.

Direct productivity gains
Makes the job go faster, cheaper and/or better.

Decreases disorders
The makers are obliged to make healthy products.

Technically and economically good solutions
A requirement for further development is that the concept is OK.

Figure 1. Ergonomic improvements.

Many of our facilities have, during a shorter or longer period, evolved from ergonomically unsound, but working solutions to ergonomic and visually appealing tools. Though there are still those that have, or recently had, great ergonomic improvement potential. Mobile phones, for example, have since the mid 1980ies evolved from ergonomically unsound to ergonomic aids (figure 2).

Very tiny telephones	No advantages? Besides cool design.
GSM, much later generations	Even smaller and lighter phones maybe led to increased comfort
GSM, later generations	Smaller and lighter= easier to carry them. Handsfree kits made the users less tired in their shoulders/arms/hands.
GSM, first generation	Better transmission made the ”production” i.e. the talking better.
NMT 900	They were so small that the users could talk a longer time without getting pain in their shoulders/arms/hands.
NMT 450	Expensive and bad transmission quality. Moreover the users risked to get musculoskeletal problems when using them, since they were so heavy and big.

Figure 2. The development of mobile phones from ergonomically unsound but working solutions, to ergonomic and visually appealing solutions.

Musculoskeletal disorders

We still have a rather vague idea about how a vast part of the usual musculoskeletal diseases arise. What we are the least uncertain of are (see also figure 3):

Musculoskeletal disorders in the shoulder/neck

Highly repetitive arm movements, static contractions of neck and shoulder muscles and perhaps prolonged forward bending of the neck, can cause musculoskeletal disorders in the neck-/shoulder muscles (Hagberg M and others 1995). According to the same source frequent work with the arms raised (if it is not supported with an armrest) induces a risk for inflammation in the shoulder muscle tendons. And frequent extreme forward bending of the head may cause neck pain.

Musculoskeletal disorders in the arm, wrist and hand

Repetitive extreme twisting of the wrist (like when you flick off a ball) has traditionally (Putz-Anderson V 1988) been considered to be the primary causative factor for disorders in the tendons at the elbow, known as "tennis elbow". But recent studies (Hägg GM 1997; Hägg GM and Milerad E 1997; Hägg GM, Öster J and Byström S 1996) have shown that prolonged gripping work without passive stabilization of the wrist, also can cause such problems.

Repetitive hand movements, particularly in combination with applying force (as for instance when using a manual staple gun (figure 4)), carries the risk of inflammation in the tendons and/or tendon sheaths in the wrist (Hagberg M and others 1995; Viikari-Juntura E 1997) and Carpal Tunnel Syndrome (CTS) (Hagberg M and others 1995; Viikari-Juntura E 1997). Prolonged severe twisting of the wrist (De Krom MCTFM and others 1990) and vibration increases the risk (Hagberg M and others 1995; Viikari-Juntura E 1997).
If a finger is bent while high pressure is applied on the outermost part, it can cause a problem called "trigger finger" (Tichauer ER and Gage H 1977).
Prolonged use of vibrating hand tools increases the risk of white finger (fingers go numb and turn white in the cold), the problem is called "vibration-induced white Finger" (VWF) (Griffin MJ 1990). High gripping force increases the risk of VWF (Färkkilä M 1978; Gurram R, Gouw GJ and Rakheja S 1993, Hartung E, Dupuis H and M Scheffer 1993). Vibrating hand tools can also cause other problems (Griffin MJ 1990), commonly known as Hand-Arm Vibration Syndrome (HAVS).

Musculoskeletal disorders of the back

Manual material handling, vibrations, frequent forward bending and/or twisting of the spine can cause back pain (Burdorf A and G Sorock 1997; Viikari-Juntura E 1997).

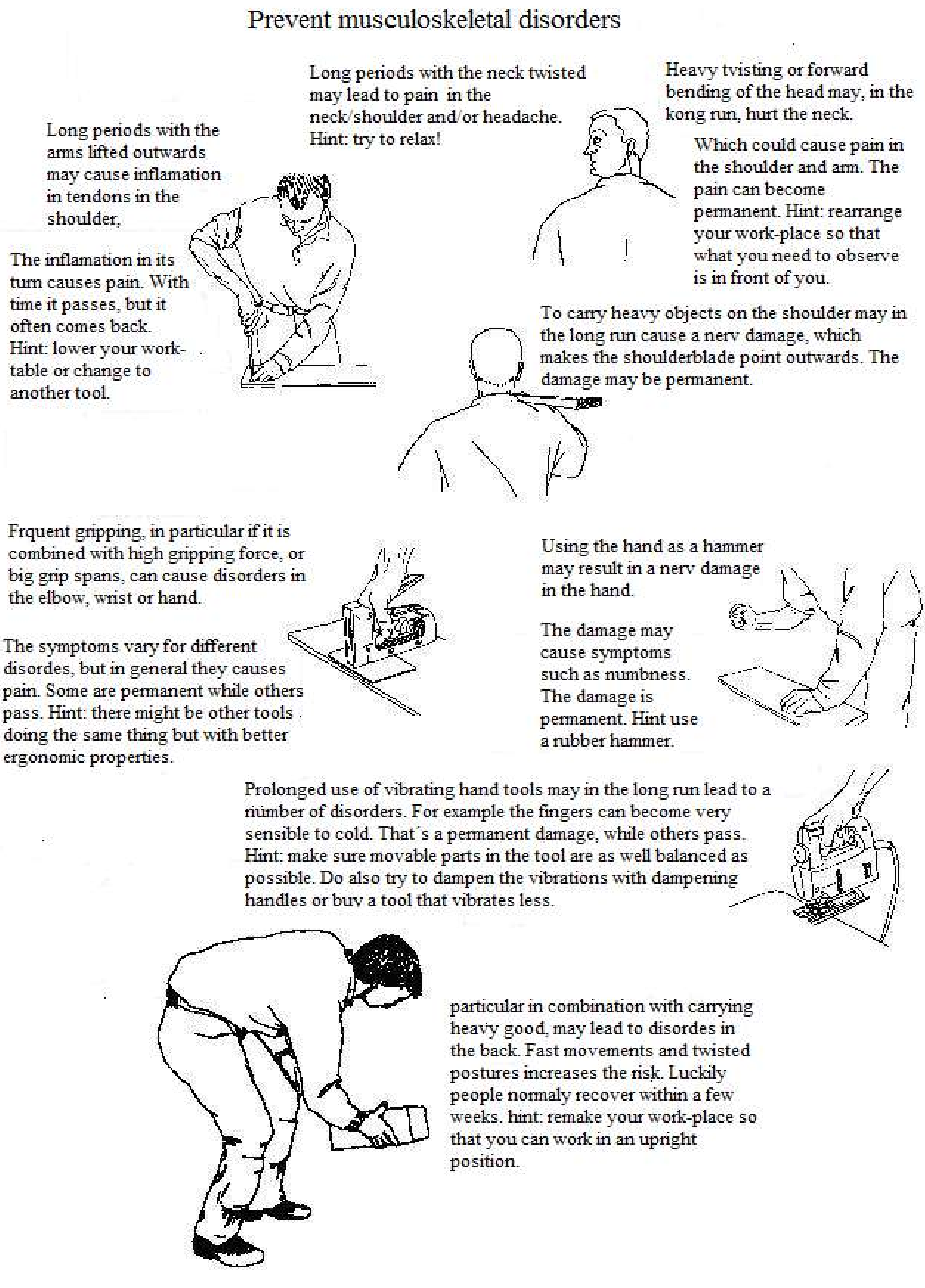


Figure 3. Some risk factors for musculoskeletal disorders which are related to manual work.

Ergonomic factors important to consider in the design/use of hand tools

This chapter describes some important factors for the prevention of musculoskeletal disorders when choosing or designing tools.

Gripping movements

Repetitive gripping movements, especially if the movement requires high gripping force, are a risk factor for a number of musculoskeletal disorders in the forearm, wrist and hand. It is reasonable to believe that the risk increases with increasing demands on gripping force.
It is recommended (Mital A and Kilbom On 1992 Part 1 & 2) that the trigger force for an index finger-operated trigger should not exceed 10 N. Some hand tools have a trigger that is operated with both the index and middle finger. In that case the trigger force should not exceed 20 N (C Fransson and Winkel J 1991; Hazleton FT and others 1975) and if the tool is equipped with a four finger maneuvered trigger, the trigger force may be up to 30 N.
What gripping force that the user must develop when using pliers and the like, is largely dependent on the character work piece and it is therefore impossible to determine any limits. For these tools, it is important to design the tool so that the work requires a minimum gripping force (i.e. long torque arm, sharp edges).
The hand can develop different maximum gripping force at different grip spans. According to many researchers the optimal grip span for hand tools, held in a power grip is between 50 and 60 mm, for the majority of both men and women.
The larger gripping motion the more the tendons move the wrist and the greater the total friction load. It is reasonable to believe that the greater the friction load, the greater the risk of inflammation of the wrist tendons. Thus, it is, from a preventive point of view, better the shorter the gripping movement is. There are, still today, tools that have a too large grip range and/or requires to high gripping force, such as manual staple guns (figure 4).

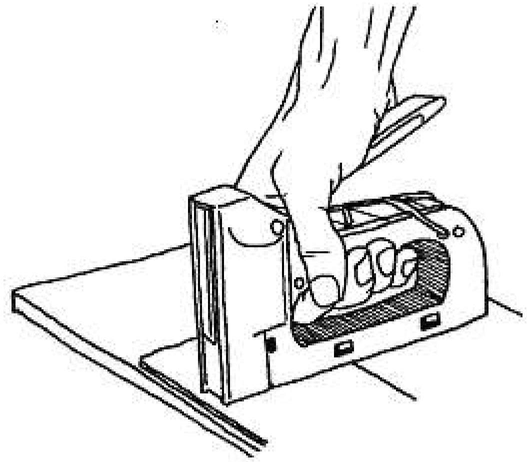


Figure 4. An example of a tool with poor ergonomics.

Tool weight and the weight torque

The heavier hand + tool is and/or the longer the distance between the hand and the point of gravity of hand + tool and/or the stiffer any cable/hose to the tool is, the higher the biomechanical load on the back/shoulder/arm/wrist/hand. And the higher the biomechanical load the greater the risk of getting musculoskeletal disorders (Hagberg M with several 1995).

Vibrations

Vibrating hand tools can cause a number of musculoskeletal disorders (see also the sub-chapter related musculoskeletal disorders in the arm, wrist and hand).
The vibrations transmitted from the tool to the hand can either be absorbed by the hand or returned to the tool. The more vibrations that are absorbed, the greater the risk for HAVS (Lidstrom IM 1974). Some relationships between the vibrations, the vibration exposure and the human response are described in figure 5.

To reduce the risk for HAVS, the problematic hand tools used in the industry (as sanders) should be fairly new (since a worn tool may have higher levels of vibration than a new ditto). The external moving parts on tools (such as grinding wheel on a grinder) should be properly secured and well balanced. The amount of vibration transmitted from the tool to the hand can be reduced by providing the tool with vibration-absorbing handles (Andersson S 1990). When switching to such a handle, it is important to select a handle with vibration-damping characteristics suitable for the type of vibrations. Vibration dampening gloves may also be a mean to dampen the transmission of vibrations. But many of these gloves, does not dampen the vibrations sufficiently (Koton J, Kowalski P and Szopa J 1998; Xiao J and Zheng Q 1998). Furthermore, there are in some cases "new" technologies such as electro-pneumatic drills that vibrate far less than traditional machines.

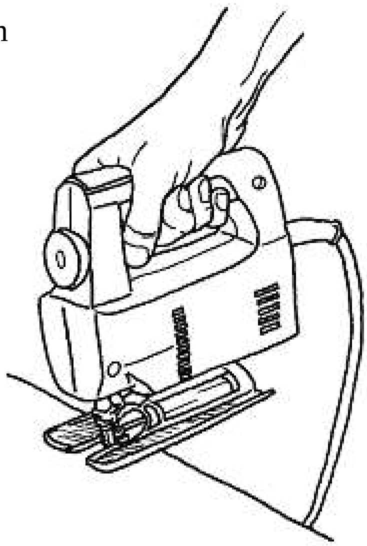


Figure 5. Correlation between vibrations from power tools and vibration exposure in the user’s hand-arm.

Handles

Since users generally hold the handle, it's the part of the tools that have the greatest impact on the ergonomic conditions. Therefore handles are devoted a separate chapter.

Handle profile

The optimal profile of the handle for a tool depends on the tool type. A circular profile on the handle is often preferred for tools that the user may wish to rotate in the hand, such as screwdrivers. An ellipsoidal (oval) profile is, however, preferred for hand tools that should not be rotated in the hand and when the direction of the tool is critical, as for axes. An ellipsoidal profile is also preferred for tools, like wrenches, for which the user may need information about the angle of the jaws in relation to the work-piece. Rectangular/triangular profiles should be avoided, because the edges can cut into the user's hand. If rectangular/triangular profile for any reason is used, the edges should be well rounded.

Handle material

What is the best material on the handle of the tool depends on the type and conditions of use. But generally, the material:

- Have low electrical and thermal conductivity, for safety and comfort reasons (Mital A and Kilbom Å 1992 Part 1 & 2).
- Provide high friction, since increasing friction reduces the gripping force needed to hold the handle. This is particularly important for tools, such as screwdrivers, with which torque is to be transferred.
- Have low density, to minimize the weight of the tool.
- Not contain nickel, since prolonged contact with nickel-or nickel-plated hand tools can cause nickel allergies and even hand eczema.
- Be able to withstand rough handling without deformation.
- Prevent sharp metal pieces and the like gets embedded in the handle, since that may harm the user and/or make the handle uncomfortable.

For certain tools the handle the material should be slightly compressible, because it distributes the pressure better in the hand (GL Fellows and Freivalds A 1991; Mital A and Kilbom Å 1992 Part 1 & 2). This reduces the risk of developing disorders caused by high pressure against spots in the hand (se below). A compressible material also absorbs shock better and it can also to some extent dampen vibrations (Björing G, Johansson L and GM Hägg 1999). But a very compressible material has the following disadvantages from an ergonomic point of view (Mital A and Kilbom On 1992 Part 1 & 2):

2. The user may need to use more gripping force, to hold the tool.
3. Some very compressible materials (like foam rubber) absorb fluids, like for instance solvents, which can be annoying and increase the risk for allergies.
4. Sharp particles, such as metal pieces, can easily be embedded in the handle.
5. The durability is often low.

Handle surface

The optimal surface texture on the handle depends on the circumstances under which it is used. But generally, a uniform or finely patterned surface is more comfortable than a coarsely patterned surface with for instance grooves. Deep grooves can cause high pressure on point in the hand, which in turn can cause problems (se below).

Moreover high friction between the hand and the handle is often desirable, because the higher the friction is, the lower gripping force is needed to keep the tool in a steady grip. Regardless of if the hand is dry or sweaty, a fine patterned surface provides higher friction than a completely smooth surface, or a surface with ribs. But if the handle was soaked in contaminants, such as oil, ribs would improve the friction.

High pressure against the palm and/or fingers can cause pain (Tichauer ER and Gage H 1977) and blisters (if shear forces are involved) (Sulzberger MB 1966). The pressure level is due to the gripping and/or feeding forces the user applies and the profile/length/size and surface conditions of the handle/trigger/shanks. The highest pressures arise, of course, when the tool is gripped with high force. Sometimes it’s hard to do anything about because the job requires high gripping forces, such as when cutting sheet metal with manual shearers. But some tools (like small pliers) have such small shanks that even if they are not gripped with particularly high force, the pressure will be high on some spots of the hand.

Finger shaped handles should be avoided on standard tools. This is because the notches are designed to fit the "average hand" and it can make the handle unnecessarily uncomfortable for a those user whose hands are not suitable for the grip (figure 6). It also reduces the user's ability to vary the grip.

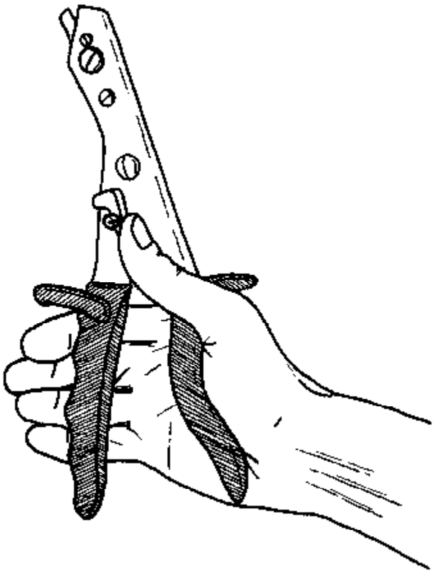


Figure 6. Shanks with notches for the fingers, which do not suit the user.

Handle length

If the handle is too short, the end of it will cut into the user's hand, thereby making the tool uncomfortable. In the preliminary European standard for tool design it says that tools which the user must keep a firm grip, the handle must have a minimum length of 125 mm. In some cases (such as regarding large knives), the user may want to push the thumb against the handle to press it down on the work-piece and in that case, the handle should be long enough to make it possible.

Placement and orientation of the handle

The placement and orientation of the handle affects the posture and it also has a major impact on the transmission of vibrations from the tool to the user. Furthermore extreme wrist postures reduce the maximal gripping force (Grant AW and Hallbeck MS 1997, Terrell R and Purswell JL 1976). The optimal placement of the handle is dependent on the tool type, and the working height of the item in question.

When large feeding-/press forces shall be transmitted, such as when drilling in steel, a pistol grip is preferable. But it is important to note that the tools that are designed to fit for work in one direction at a working height can be far from optimal when working in a different direction or on another working height. On tools with pistol grip handle, the angle between the handle and the rest of the tool usually is between 100-110°. The angle is optimal if the tool is used primarily on vertical surfaces and if the work performed at elbow height or below (figures 7 and 8). But if the tool is usually held above the elbow and/or if the tool is often directed towards horizontal surfaces, a 90°angle is better. If the work is only performed on horizontal surfaces at elbow height straight tools is, however, usually better. Finally, the handle of tools, such as circular saws, which are most frequently used under elbow height, should have an angle that is larger than 110°.

On most pistol grip tools, the handle is positioned in the back, but some have the handle in the middle. The advantages of the latter are that the balance is better and that some of the tool's weight burden is carried by the arm instead of the hand.
For straight tools, such as screwdrivers, the distance between the handle and the cutting edge is important for the position of the upper arm (figure 9).
In the case of strong rotating tools, like nut runners, the distance (torque arm) between the centre of rotation and the hand important for the ability to counteract the torque.

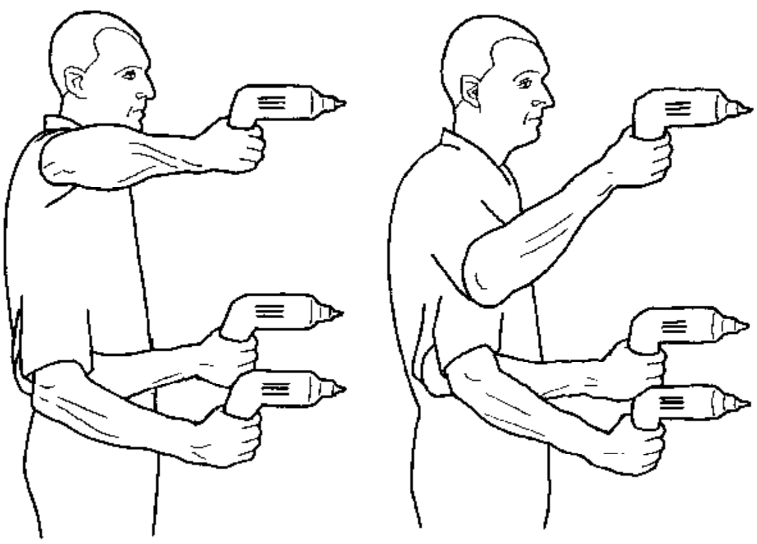


Figure 7. Pistol handles with an angle between the handle and the rest of the tool of 110º and 90º used when machining a work-piece at waist height, elbow and shoulder height. As seen in the figure the 90º angled handle gives a better posture when working above elbow height.

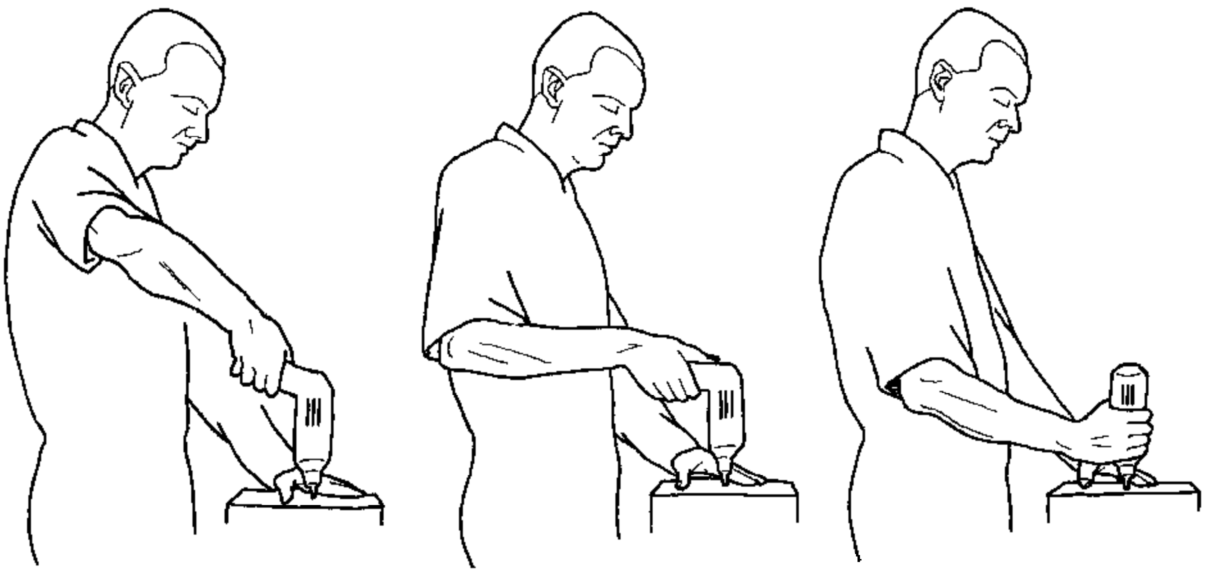


Figure 8. Pistol handle with an angle between the handle and the rest of the tool of 110º and 90º and a straight tool used when processing of a horizontal surface of a work-piece lying on a workbench. The straight tool provides the best working position and 110º gives the worst.

Figure 9. A screwdriver which is not suitable for the task, since it forces the user to lift the upper arm outwards.

Right-/left hand handles and gender differences

Often the users wants to hold the tools with the hand that they have the most control over, which for about 90% of us are the right one. But to allow the user to switch between right and left hands, and also to improve for those who are left-handed, tools should be designed so that they can be used with both.

There are differences in hand length between males and females, but the average difference is less than 10%, and it does not justify making tools with different handle sizes. However, the average difference in grip strength is 30% and this can affect the design of the handles. Furthermore, the difference in length between men with long hands and women with short ditto may be bigger than 30%.

So if it was possible from an economic standpoint, it would be beneficial if some tools were available with different left-and right-hand grips and/or handles in various sizes.

Specific requirements for the handle on some types of tools

Electric and pneumatic tools, the main handle

A majority of all hand-held electric or pneumatic tools with pistol grip (as drilling machines and circular saws) has a more or less ellipsoid handle. A common size of the profile is 50 x 35 mm. But for tools with great weight imbalance, such as large hammer drills, it may be appropriate to have a smaller size of the profile, in order to increase the possibility of holding the tool in a power grip.
The trigger should not have any sharp edges because it can cut into the user's hand. The trigger should also not be so short that one of the fingers is pressed against the bottom of the trigger. Finally, the distance between the fingers that actuates the trigger and the rest of the fingers shall not be longer than what is absolutely necessary, because it makes the handle uncomfortable.

Generally the trigger force should be as low as possible. However, if the trigger force must be high, two or four finger triggers are preferred. The appropriate length of the trigger depends on the width of the user's fingers and it is not possible to give any general recommendations.
When a tool is pressed with high force against a work-piece it can create high pressure on the skin between the thumb and forefingers, which can lead to redness and even blisters. It is therefore important that the part of the handle which is in contact with this part of the hand is appropriately designed.

The most common handle material is plastics. But there are also tools that have aluminium handles. A minority of all tools have handles that are more or less covered with rubber. Rubber handles probably has some advantages, as it reshapes after the users hand and thus distributes the pressure better. Also it to some extent dampens the vibrations. Finally, the rubber and plastic tool isolates thermally and electrically, so that they feel less cold and the risk of electric shock is reduced.

Some tools (like angled nut runners) have a circular profile on the handle. This is because these are kept different depending on whether the user is tightening a horizontal or a vertical screw. Straight tools often have a circular profile on the handle. The optimal diameter of such handles is for most people 30-40 mm.
On straight tools it is advisable to have a bolster at the beginning of the handle, as it reduces the gripping force that the user needs to develop in order to achieve the correct feeding force. The bolster will also prevent the user from sliding on the handle.

Electric and pneumatic tools, support handle

The handle should be designed so that it can be used with either the left or right hand. On electric or pneumatic tools, such as an angled grinders, that handle often vibrates with higher amplitude than the main handle. Therefore, it is important that the support handle dampens vibration.

Screwdrivers

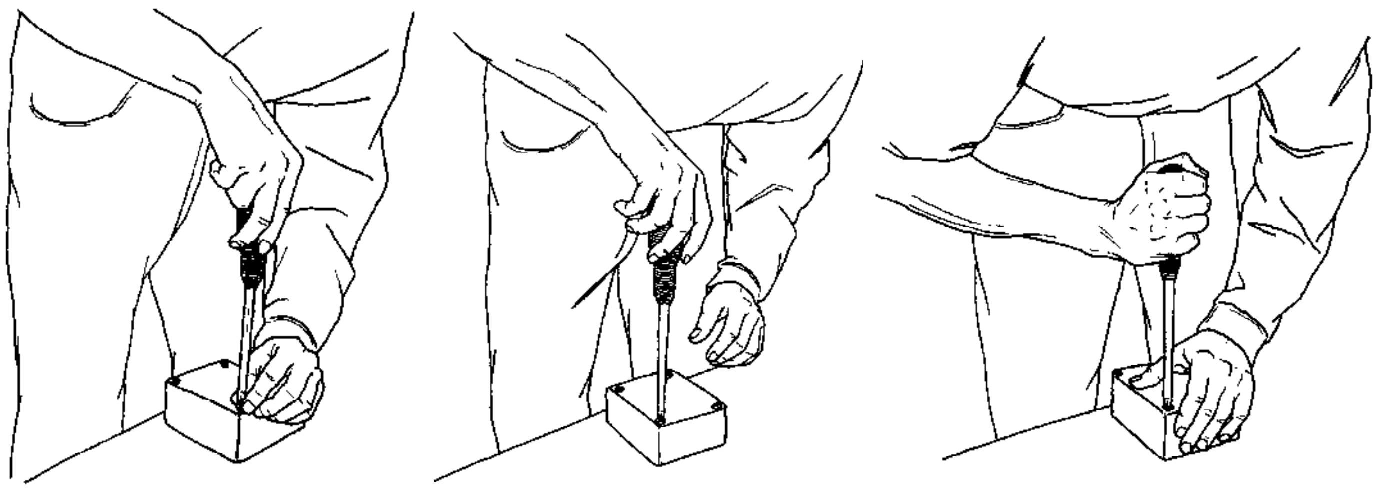
There are many different types of handles for screwdrivers. The profile varies from squared to circular. Generally circular profile is preferable because the user may want to rotate the screwdriver in his hand. But also because a square profile with edges can cut into the user's hand.

In the initial phase of the screwing the user fits the edge of the screwdriver into the recess of the screw head. It is a precision task. When the precision task is performed most users likes to hold the handle in a precision grip (figure 10). Afterwards many users changes from precision grip to "quick screwing grip". In the end many user changes grip again, to hold the screwdriver in a firm in order to tighten the screw.

The ability to rapidly rotate the screwdriver reduces with the diameter of the handle. While the ability to produce high torque increases with the diameter of the handle up to a maximum of about 50 mm, hereafter it decreases.

Regarding screwdrivers made for small screws, the precision and quick screwing phases are more important than the high torque one. Therefore, the diameter of the handle should be small. But not smaller than 6 mm, as smaller handles often cut into the user's hand, and it also makes it more difficult to control the screwdriver.

When screwing larger screws, it is important to be able to produce high torque. Therefore, a diameter of 32-38 mm is preferred. Some screwdrivers have a bolster or a "finger stop" at the beginning of the handle, which can reduce the need to grip the handle when the screwdriver pressed against the screw. Many large screwdrivers also have a "waist" at the beginning of the handle. This is to increases the efficiency in the precision and fast driving phases.
The rear end of the handle must be rounded, large and uniform. This is because the user may want to push one of his hands against it or hit it with the palm.
The friction between the hand and the handle is important, partly to reduce the force that is used to hold the screwdriver and partly to increase the possibilities to produce high torque. Finally, the handle should be long enough for the entire hand to fit around it. A minimum length of 114 mm is recommended. For extremely large screwdrivers, it is advisable that the handle is so long that the user can grip it with two hands.



A B C

Figure 10. Using a screwdriver, A. precision phase, B. "fast-screwing", C. tightening.

Tool that is reciprocated, as files

Round files should have more or less circular profile on the handle. While flat files should have a more squared profile, because it will make it easy to maintain the alignment of the file's surface. Files should have a waist or a bolster at the beginning of the handle. This because it will reduce the gripping force which the user must develop to provide the desired feeding force. Waist or bolster will also prevent the user from slipping over the handle. Large files should have a long handle so that it is possible for the user to press the thumb against the handle to push the file against the work-piece.

Knives

The most important feature for knife handles is that they prevent the user from sliding from the handle over the blade. This is accomplished through a bolster between the handle and the blade or by designing a part of the handle like a bolster. The bolster should protrude at least 16 mm. For knives that are designed to transfer high feeding forces, the handle should be so long that the user can push with the thumb against the back of the handle. Generally, the handles of knives should have ellipsoidal shape. But there are a large number of knives for different purposes and general recommendations for the size of the handle can not be given.

Striking tools, such as hammers and clubs

Most striking tools are intended to be used in one direction and they should have an ellipsoidal profile on the handle. If large impact forces is to be produced the handle should be designed to minimize the risk that the tool slipping out of the user's hand. It is therefore important that the user's fingers can completely encircle the handle. Generally, the handle of a hammer, should have a width of 25-40 mm. The handle should be shock absorbing, to prevent a certain circulatory problem in the hand, which can be caused by mechanical shocks against the hand.

"Cutting" tools, such as pliers, wire cutters and scissors

The shanks should have a half ellipsoidal profile, as it reduces the risk that there will be high pressure on points in the hand. The larger forces the tool is designed to transmit, the wider the shanks should be. Many small pliers and the like have pretty thin shanks, which can cut into the user's hand. If the shanks are too short (usual on for instance small pliers), the outer end cuts into the user's hand, making the handle uncomfortable. The preliminary version of the European standard for tool design states that the shanks should be 50-80 mm. For tools (such as scissors), where a finger is inserted into the handle, the handle should be designed so that there is enough room for the finger. The handle of these tools are often specially designed for right-handed people, because it greatly improve the situation for the majority of users. But it makes the tool inconvenient for left-handers (approximately 10% of us).

"Push and pull tools", such as hand-powered lawn mowers

When using "push tools" large shear forces are transmitted between hand and handle. These shear forces can cause blisters in the hand. To reduce the risk of blisters the handle should be very compressible.

Tools with a high trigger force, such as manual staplers and spray guns

These tools are often characterized by that large gripping forces has to be used, which may result in that there is high pressure on spots in the user’s hand. Therefore, the handle (and trigger) should have well a rounded half ellipsoidal shape. Furthermore, the handle profile and trigger profile should harmonize with each other. On some tools, like spray guns, there is often a heel on the front of the handle placed so that it is to be between the middle finger and ring finger. The advantage of this heel is that a part of the weight of the tool can be carried with the ring finger. The downside is that if the heel is too thick and/or the distance between the bottom of the trigger and the bottom of the heel is big, the distance between the middle finger and ring finger will be so big that the handle becomes uncomfortable to hold.

Wrenches and similar

For handles on wrenches and the like, it is important that the user can obtain the desired torque with as little grip force as possible. Furthermore, the handle must distribute the surface pressure as evenly as possible in the hand, and it shall prevent the tool from slipping out of the hand. A square or ellipsoidal handle shape is preferable to a round ditto, because they can give the user information about the position of the shanks. An important feature in the event that the tool is used as a counter part at the back of, for instance, an engine block.

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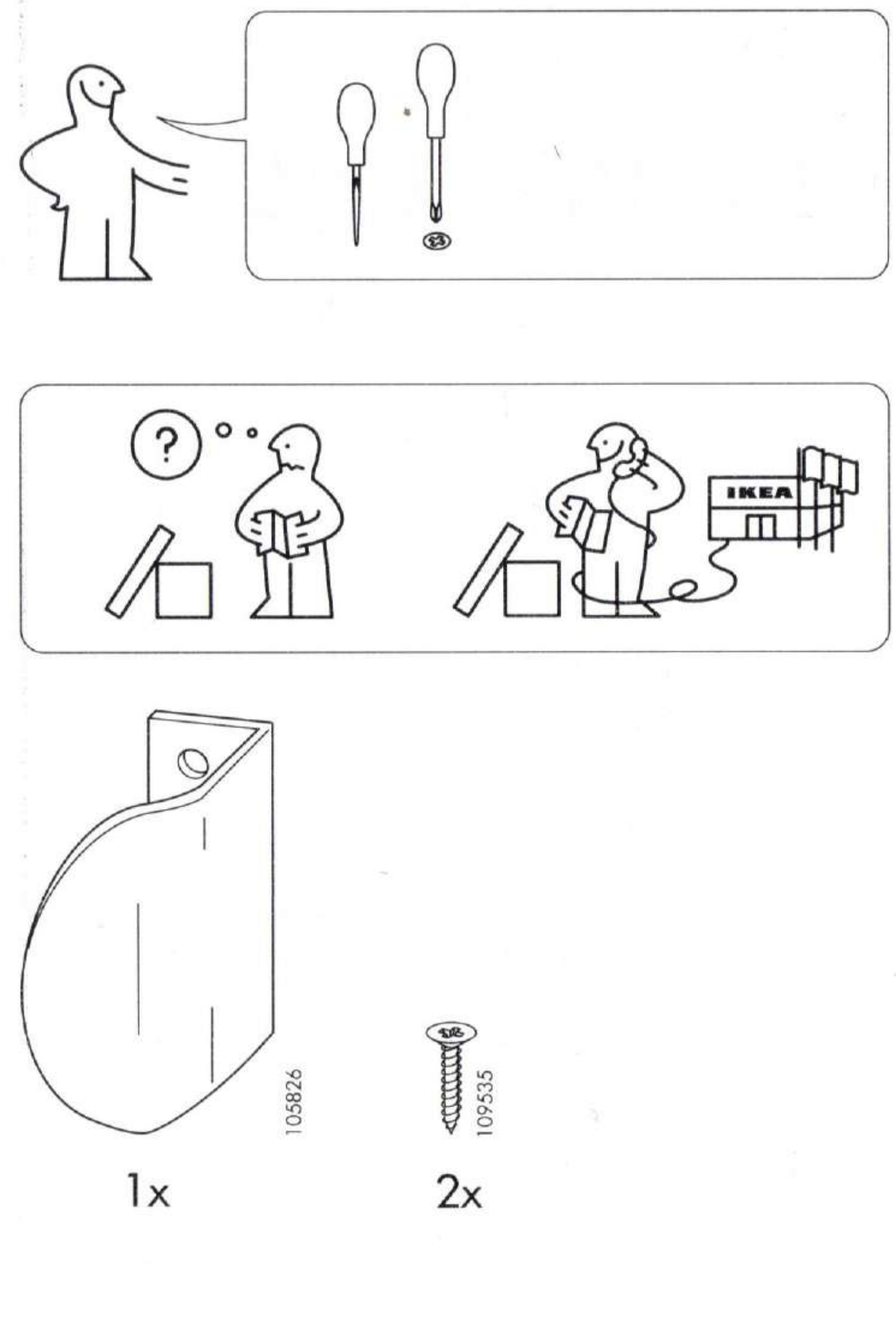
About manuals



What are manuals and why do they exist?

Manual = installation + safety + operation + handling + reparation + destruction instructions.

These various chapters that manuals usually consist of can also have other names such as installation instructions, maintenance manual or the like. In addition, each chapter is often divided into further sub-chapter. The first chapter, for example, could be divided into: assembly, installation and connection instructions.
The size ratio between the different chapters varies depending on the nature of the object of the manual. For example, a construction detail may primarily be accompanied by installation instructions, while a computer program mostly requires user instructions and a disposable battery mostly need disposal instructions.

There are various reasons why a particular product should, or must be, accompanied by instructions:
1. For users to use the products correctly, so that they, for instance, doesn’t break.
2. In order to better sell the product among potential customers.
3. For that there are regulations that require them to be accompanied by instructions. Notably with regard to products falling under the scope of the Machine directive[1] and/or Low voltage directive[2].

1. The Machine Directive (DIRECTIVE 2006/42/EC) applies to machines in which there is some kind of movement that is not driven by hand and their accessories, as well as various lifting equipment and safety components. But there are exceptions. The most common exceptions are:

   - Motor vehicles.
   - Household appliances intended for domestic use[2].
   - AV equipment[2].
   - Information technology equipment[2].
   - Ordinary business machines[2].
   - Switching equipment low voltage[2].
   - Electrical motors[2].

2. Such devices are instead mainly regulated by the low voltage directive. The Low Voltage Directive regulates the design from the electrical point of view of virtually all products to be used with a voltage between 50 to 1 000 V. However, with some exceptions, such as electrical parts for elevators and medical devices.

   The Machine Directive and The Low Voltage Directive enshrines the CE marking procedure will be implemented for the products. The purpose of the rules is that the products sell in Europe are as harmless as possible for users.

   For products that fall under the Machine Directive, the manufacturer shall ensure that they are safe by carefully analyzing them and, if possible, eliminate the hazards the analysis reveals. If it is not possible to eliminate the hazards, he shall warn for them on the products.

The products shall also be accompanied by instructions, whose design to some extent is defined by the Directive. See the excerpt from the directive below. With the most vital text for authors of manuals in green.

"*1.7.4.2* ***Contents of the instructions***
Each instruction manual must contain, where applicable, at least the following information:
*(**a**) the business name and full address of the manufacturer and of his authorised representative;*
*(**b**) the designation of the machinery as marked on the machinery itself, except for the serial number (see section 1.7.3);*
*(**c**) the EC declaration of conformity, or a document setting out the contents of the EC declaration of conformity,*
showing the particulars of the machinery, not necessarily including the serial number and the signature;
*(**d**) a general description of the machinery;*
*(**e**) the drawings, diagrams, descriptions and explanations necessary for the use, maintenance and repair of the machinery and for checking its correct functioning;*
*(**f**) a description of the workstation(s) likely to be occupied by operators;*
*(**g**) a description of the intended use of the machinery;*
*(**h**) warnings concerning ways in which the machinery must not be used that experience has shown might occur;*
*(**i**) assembly, installation and connection instructions, including drawings, diagrams and the means of attachment*
and the designation of the chassis or installation on which the machinery is to be mounted;
*(**j**) instructions relating to installation and assembly for reducing noise or vibration;*
*(**k**) instructions for the putting into service and use of the machinery and, if necessary, instructions for the training of operators;*
*(**l**) information about the residual risks that remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted;*
*(**m**) instructions on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided;*
*(**n**) the essential characteristics of tools which may be fitted to the machinery;*
*(**o**) the conditions in which the machinery meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns;*
*(**p**) instructions with a view to ensuring that transport, handling and storage operations can be made safely, giving the mass of the machinery and of its various parts where these are regularly to be transported separately;*
*(**q**) the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;*
9.6.2006 L 157/48 Official Journal of the European Union EN
*(**r**) the description of the adjustment and maintenance operations that should be carried out by the user and the preventive maintenance measures that should be observed;*
(s) instructions designed to enable adjustment and maintenance to be carried out safely, including the protective measures that should be taken during these operations;
*(**t**) the specifications of the spare parts to be used, when these affect the health and safety of operators"*

In addition to the above points there is point "**u**" that is about data about the noise level. It concludes that either the device does not produce noise, which the author indicates through writing that the noise level does not exceed 70 dB (A), on the distances from the machine where people normally are. Or he/she has to write down data from actual measurements of the noise levels at these distances. The last point "**v**" is about objects that emit ionizing radiation and it s therefore rarely relevant.

To meet the requirements of many of the items such as: "**e**", "**h**" and "**l -t**", it requires the author, beyond necessary knowledge about the machine, also has a risk analysis as a basis for the writing.

For products that fall under the Low Voltage Directive, the manufacturer must ensure that they are safe from primarily an electrical perspective. By ensuring that the design is good and that the product is not misused and that it is managed properly. See the following excerpt from the Directive which has the, in this context, most relevant text is crossed out in green.

"ANNEX I

The most important safety requirements for electrical equipment designed for use within certain voltage limits

First Terms and conditions
a) To ensure that electrical equipment is used safely and in applications for which it is intended, should main data be marked on the equipment or, if this is not possible, on an accompanying notice.
b) The brand name or trade mark should be clearly printed on the electrical equipment or, where that is not possible, on the packaging.
c) The electrical equipment, together with its component parts shall be made in such a way that it is guaranteed that it can be assembled and connected in a safe and proper manner.
d) The electrical equipment is designed and manufactured to protect against the hazards set out in paragraphs 2 and 3 of this Annex is assured providing that the equipment used for the purpose it is intended for and maintained in a satisfactory manner."

Various forms of manuals

Manuals are mostly text-based. Though there are also manuals made in the form of drawings, symbols, instructional videos, and pop-up windows.
Instructional videos have many advantages, but it probably requires that the object is complex and/or expensive otherwise the user's wont waste time looking at them. Also pop-up windows have many benefits when they are applicable, which is the case if the object is a devices with a display. But neither instructional videos nor pop-up windows will be further affected in this text.

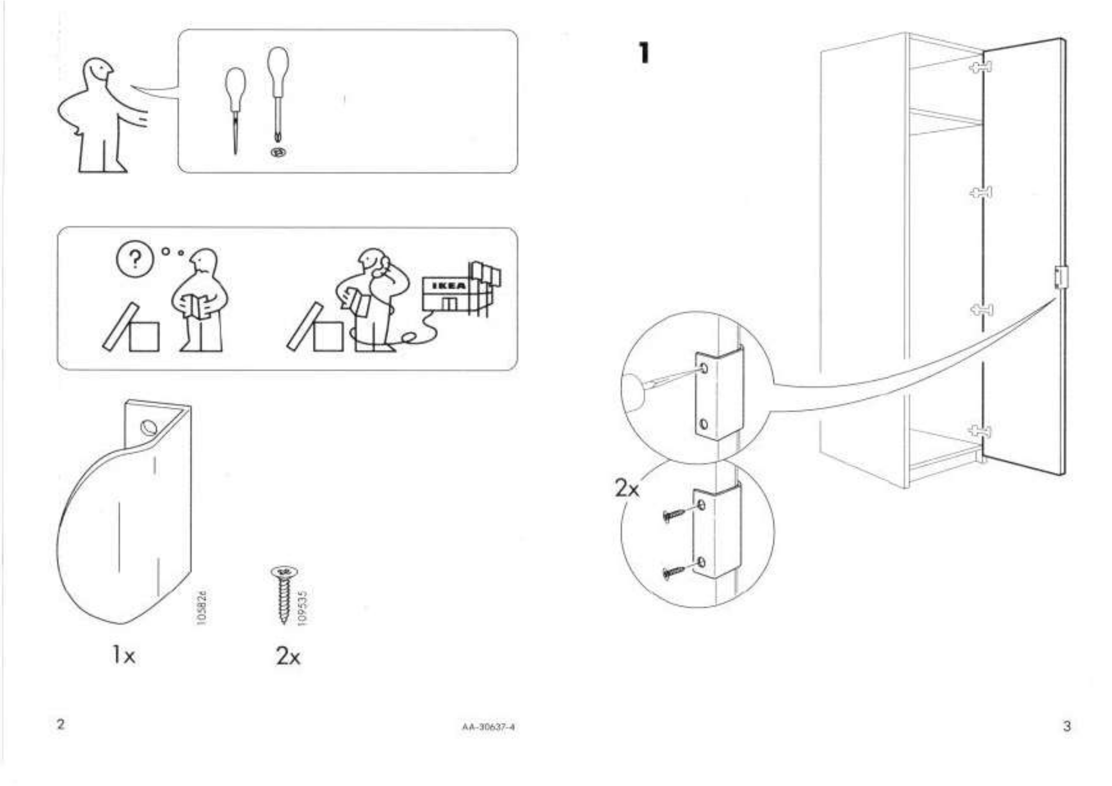
Text or image-based instructions

An advantage for text-based instructions is that they do not require any artist to make them. Moreover, it is easier for authors to edit the text afterwards compared to edit sketches.

Some important advantages of animated instructions compared to text-based ditto is that it requires much less translation if the products are marketed in several countries and that in some cases it is easier to understand.

One advantage with sketches compared to photos is that the latter often contains a lot of information that is not relevant in the context, which can confuse the viewer. Photos, on the other hand, are often more attractive than drawings in, for instance, cookbooks.

Example of an instruction which is probably easier to assimilate with pictures:



Compared to if it was written with text only:

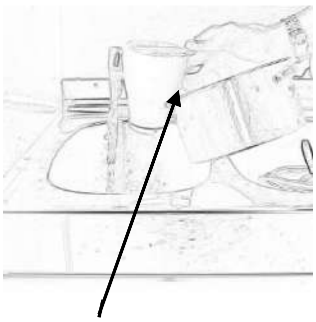
Instructions for mounting handles, Number 105 826, on a wardrobe door.

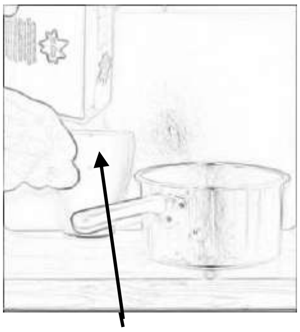
Note If you do not understand these instructions, do not hesitate to call IKEA!

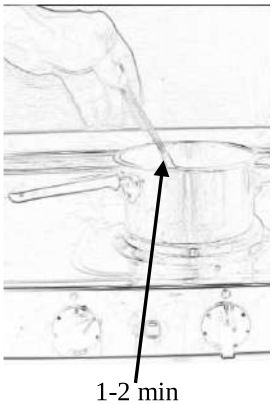
1. Obtain an awl.
2. Obtain a screwdriver for screws with philips head.
3. Take the handle and the two screws.
4. Open the wardrobe door.
5. Place the handle so that the screw holes are on the backside of the door and the rest of the handle is sticking out on the front.
6. Pull the handle up and down along the edge of the door until you find a height that seems to be appropriate.
7. Press the handle firmly against the door at the height you desire.
8. Make a small hole in the middle of one of the holes on the handle using the awl.
9. Hold the handle so that the hole is visible through the corresponding the hole in the handle.
10. Insert one of the screws in the hole and tighten it.
11. Repeat 8-10 for the second hole of the handle.

An example of instructions that probably works better in text:

The same instructions with pictures would require a number of pictures:


1.5 dl

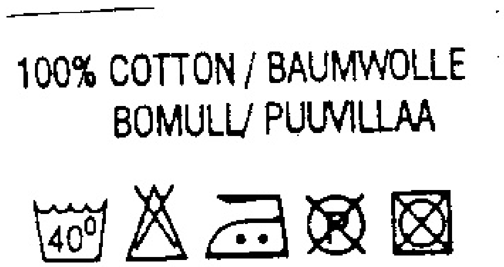

1 dl


1-2 min

Yet it would say less.

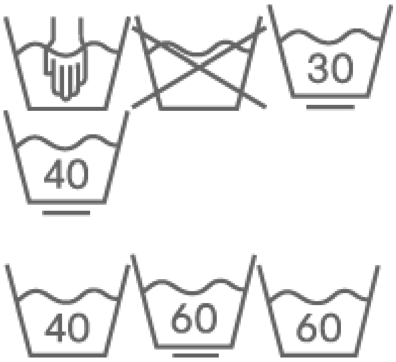
Symbol-based instructions

The probably most common instructions are the washing instructions that are available on most clothes. These instructions are extremely brief and almost entirely based on symbols. Which to some extent are quite cryptic. But because they are so well established and standardized, we still understand how each item should be handled.



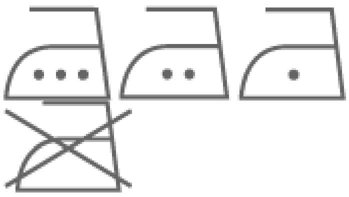
The laundry pictograms describes which washing, and drying methods that are recommended. And if the garment can be chlorine bleached and / or ironed and what temperature the iron in that case should have.

Water wash



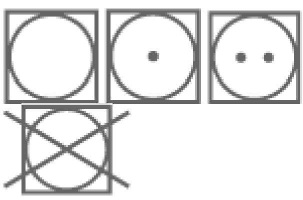
Chlorine bleaching

Ironing



Chemical wash

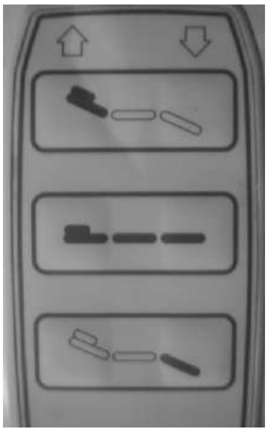
Drying



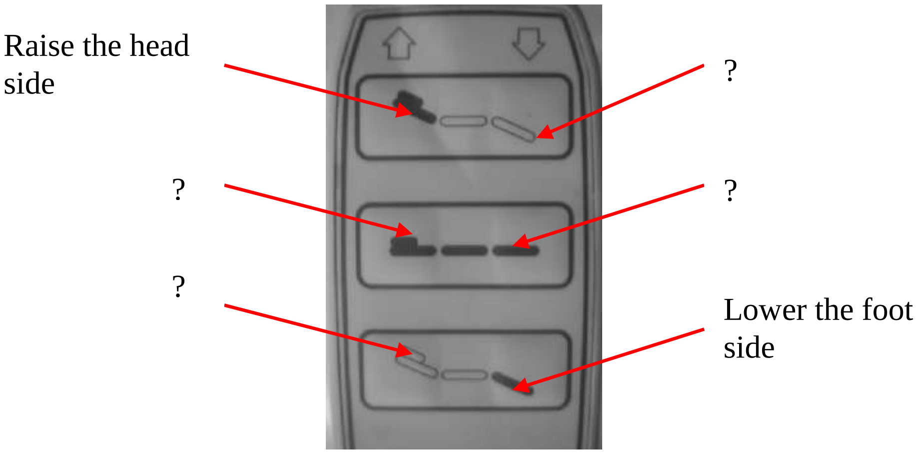
The biggest advantage for garment manufacturers is that they can use the same label (instructions) in all its markets. Strangely, there are not many other areas where instruction symbols are the main way to convey information. Although many products are marketed in the same package in markets with many different languages, as in the European Union.

We could, for example, have standardized symbols for durability, cooking time and the parameters reported in the nutrition declaration on food packages. A reason that this is not the case may can be that it is difficult to design symbols that are easy to interpret.

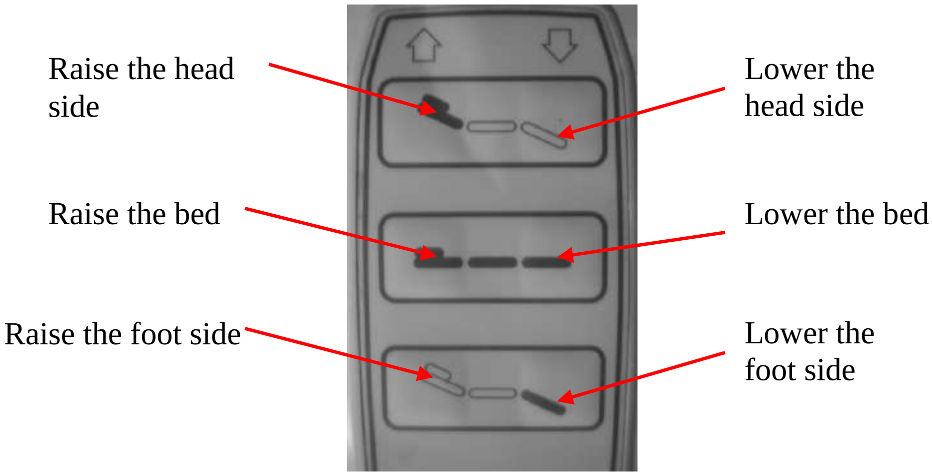
Control unit for a bed with adjustable height and alignable head and foot side.



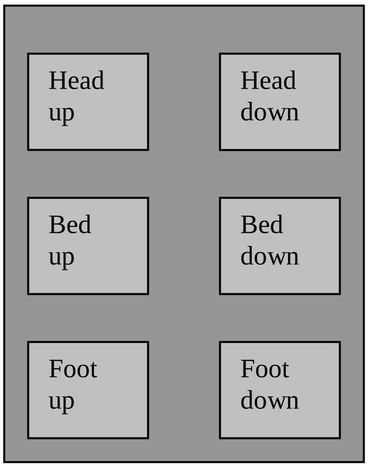
A reasonable interpretation would be:



A correct interpretation is:



A text would had, in this case, been easier to understand:



Not even good instructions helps an user-unfriendly product

Aside from games, sports, and other things that are designed to contain elements that give them a moderately high degree of difficulty, most of what we encounter is made with the intention to be as easy to use as possible.

Much of the annoying problems that may arise, when handling objects are probably due to that they are unforgiving, illogical or un-consequent. And if so, not even the best of instructions will help.

The object is unforgiving

Many, who have ever had exclusive wine glass with thin walls, probably know that they are extremely unforgiving for mal handling in the sink (often they are not dishwasher safe). In particular, as the one who cleans the glasses often have been involved in consuming the wine and thus may not be in the best shape. Instructions on how to clean the glasses would probably not help the users because none of them would even think of learning them by heart, or to read them before an upcoming dishwashing. But even if someone did that and also took the instructions into account, the risk would probably still be high that the cleaner made a careless, but normally harmless manoeuvre, which brakes one of the glasses.

The operation is illogical

The features are more logical and easier to understand, the more they follow the basic principles that we are familiar with, such as:

If a control lever is pushed upwards, it means an increase and down means the opposite.

For horizontal levers, this is not as obvious. It may seem natural to push it ahead if you want to go forward and more forward the faster you want it to go. This is true for example, pull the boats and horses. In the latter case the controller's own body is the control. While it is the opposite for motorcycles. When the throttle is turned backwards the speed of the motorcycle increases. Because the throttles for motorcycles are an example of another well-established basic principle:

A clockwise turn gives an increase and counter clockwise one gives the opposite.

This relationship also applies of for instance screws (harder tightened) and the volume controls on music equipment. But it does not apply on water taps.

A complication regarding this principle is that what is clockwise and counter clockwise depends on how you stand in relation to that which is rotated.

As a rule, we lock right hanged door by turning the key counter clockwise, i.e. towards the door frame. But there are exceptions, such as the door lock above, which can be operated from both the inside and the outside. On the outside, the door is instead locked by turning the key in the direction of the arrows.

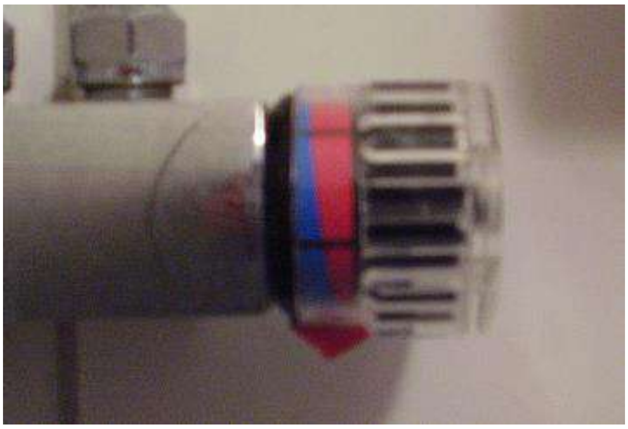
Someone, perhaps to reduce confusion, has mounted an instruction there about how the lock is operated.

Which unfortunatelly increases the confusion since it is open to two equally reasonable interpretations (Öppet= opend, Låst= locked):

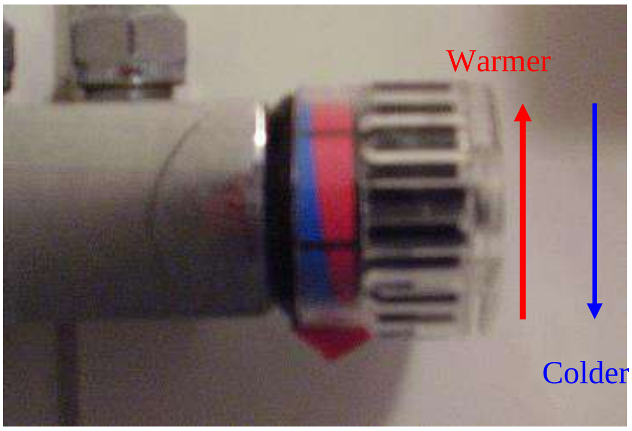
- If the lock is locked, turn it counterclockwise to make it unlocked, or

- Do you want the lock to be locked, turn it counterclockwise.

A symbol on a knob that appears to symbolize an increase shall also result in an increase when the knob is operated that way.

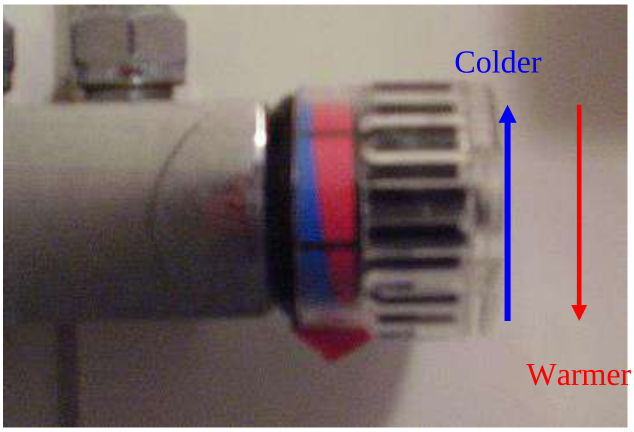


Temperature control on a shower faucet.

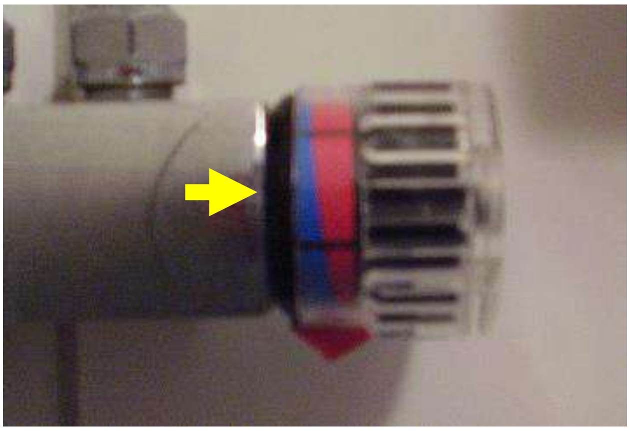


Reasonable interpretation.

Because the symbol gets more red, the higher up in the picture you look.



Correct interpretation.



This way the symbol had been less ambiguous.

Something that seems to be for a specific manoeuvre in the handling should not be for another manoeuvre

Traffic signal control at crossing.

This is a device containing a lamp an audio signal and an activation button. The idea is that it's a green light for vehicles as long as no one have pressed the button. If someone press it, the cars will have red light after a while and the pedestrians will have a green one, while this device emits a beep.

On the top of the box there is a white circular field. It is the activation button. But it does not look like a button because it neither stand out or can be pushed in.

The lamp that lights when someone phas ressed the button, however, sticks out, and it has an eye-catching design. Which at a first glance resembles a button.

For people to understand what to do, the designer has added a symbol (a hand that is pointing).

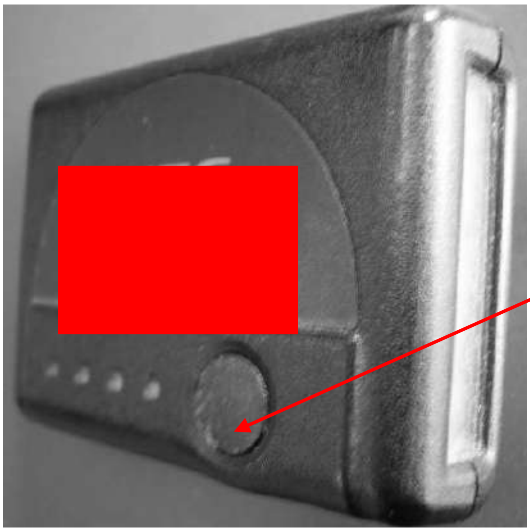
In addition, he added a symbol, that is hard to interpret, depicting a standing man.

The operation is in-consequent

The more something all the time can be performed in the same way, the easier it is to master it.

Those who have learned to ride a bike under certain circumstances don’t need take additional lessons to master the art under other circumstances. The pedal movements can be performed in the same way all the time, regardless of the circumstances for the moment. Cycling is thus a fairly consistent thing to do. Unlike, for example, downhill skiing. The movements required are about as simple as them needed to ride a bike: Bend your knees, keep the entire weight on the downhill ski and switch point of gravity after each turn. How this should be done, however, varies considerably depending on the nature of the snow, the steepness of the slope and its flatness, making it much more difficult to master downhill skiing than cycling.

It should always be the same events that happen as a result of the same grip regardless of what is happening at the moment.



The object on the left is a pager. If someone calls it, the signals and the telephone number are displayed on the display. In addition to the phone number, the time when the search reached the pager is indicated.

The pager’s functions are operated by a single button. To change various settings, such as selecting alarm tone or set the time, it is required that the user to presses the button in different sequences for different lengths of time. The sequences are so complicated that whoever lost the manual will have a lot of difficult to ever, for example, change to daylight saving time.

The less the user needs instructions the better

This is partly because many probably never even open the manuals that come with some of the products they buy. Moreover probably even the most avid reader's pretty soon forgets most of the instructions. Fortunately many objects are so simple that we can use them anyway. Take for example this ball pen.

To be able to use it as intended, one need to get the ball out. Anyone reading this probably knows how to do, so for you a description about how to do it would probably be completely unnecessary. But even those who have never seen such a thing, would surely soon try to press the button on the far left. Even if the person had no idea what he would use the ink-covered ball to, he or she would soon become aware of it. Another push on the button would clarify the whole function.
However, there are many examples of objects that are so complicated that they require manuals. What's worse is that there are objects that should be simple, but the manufacturer has chosen to make them complicated, as the microwave oven below.

To make the relatively common manoeuvre to change the heating time while the heating is in progress, the operator needs to know and do the following:

1. Press the Start/ Reset button.

2. Set a new timethrough a number of times press some of the buttons labeled "10 Min", "1 Min" or "10 Sec".

3. Press the Start/Reset button again.

Compared to:

1. Turn the combined starting and timing knob clockwise or counterclockwise depending on whether you want to increase or decrease the heat treatment time.

General viewpoint concerning the design of manuals

- Clarify the client's objectives with the manual and plan it accordingly (see the chapter about user instructions).

- Distinguish between “shall” and “ought to” requirements. I.e. keep apart what must be done and what is good to do. Explain, if possible, why it is so, see the chapter: handling-/reparation-/destruction instructions.

- Consistently use the same term for the same phenomenon and avoid using the same term for different things.

- Do not soak the important information in unimportant details. To avoid this, the text is preferably divided into main instructions and footnotes.

- Check if the text meets the requirements in applicable European Union directives.

- Try, if possible, the text using some suitable persons, who may try to interpret and perform.

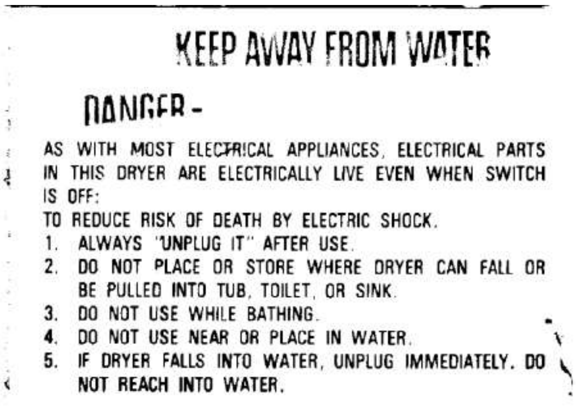
Safety instructions

The Machinery Directive and Low Voltage Directive require that the instructions should warn of risks associated with the use. See the following excerpt from the Machinery Directive, with the most important, for a writer of instruction manuals, crossed out in green:

"1.1.2 Principles of safety integration
a) Machinery must be designed and constructed so that they can function as intended and operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse.
The aim of the measures taken must be to eliminate any risk throughout the machine's life expectancy, which includes transportation, assembly, dismantling, to disabling and scrapping.
b) In selecting the most appropriate methods, the manufacturer or his representative shall apply the following principles in the following order:
- Risks to the extent possible eliminated or reduced (inherently safe design and construction).
- Necessary precautions should be taken such risks can not be eliminated.
- Information to be provided to the users of the residual risks due to any shortcomings of the protection measures adopted, indicate whether any particular training is required and the personal protective equipment needs to be provided.
c) When designing and constructing machinery and when drafting the instructions, the manufacturer or his representative not only the intended use of the machinery but also any reasonably foreseeable misuse. The machine must be designed and constructed so as to prevent abnormal use if such use would engender a risk. Where appropriate, the user manual be made aware of such inappropriate use as experience has shown might occur.
d) A machine shall be designed and constructed to take account of the constraints to which the operator is subject as a result of the necessary or foreseeable use of personal protective equipment.
e) Machinery must be supplied with all the special equipment and all the accessories essential to enable the setup, maintenance and use in a safe manner."

Note! Safety instructions shall be highlighted compared to the rest of the text.

Risks with safety instructions



In the U.S., companies are very afraid that their products will harm someone. Because it can cause that they have to pay significant amounts of money to the harmed persons. A common way to avoid liability is to warn against all sorts of strange ways that customers could injure themselves. See for example this label who sat glued to the cord to a hair dryer.
In Europe, fortunatelly, we don't yet have have that system. Which means that we can avoid a lot of the very dafter warnings and instead only highlight relevant risks.

Note that when a hair dryer falls into water it is likely that the electrical circuit short-circuit, before any fatal damage has been done.

Machinery Directive and Low Voltage requirements are essentially good as long as they do not lead to an inflation of unnecessary safety regulations, which in turn leads to reduced respect for even the essential requirements. Or if, despite all the rules, there are serious risks that the manufacturer has not warned for.

Assembly instructions

Assembly instructions are preferably written as step by step instructions.

Moreover, it is easy to write such instructions, because the author just needs to document what an experienced installer do from when he takes the item out of its packaging.

All key elements of the step by step instructions should be described.

Unfortunately, it is quite common that the instructions lack descriptions of key elements that are crucial for the success, which is the case in these instructions on how to mount a solar panel.

Bruksanvisning för 6 W solcellspanel

(Artikelnummer 604-103)

Läs noga igenom bruksanvisningen innan produkten används.

FUNKTION

- Denna solcellspanel omvandlar ljusenergi från solen till 12-volts likström (DC) som sedan kan överföras till upp-laddningsbara batterier via medföljande kablar och batteriklämmor.
- Den tunnfilmsteknik som panelen använder möjliggör för panelen att absorbera ett större spektrum av det naturliga ljuset och den fungerar därför även under molniga vinterförhållanden. Panelen kan också bättre hantera hög som-marvärme med mindre effektförluster jämfört med andra solpaneler.
- Panelens dubbla glasstruktur ökar dess hållbarhet och den tål hagel med en diameter på 25 mm som träffar pane-len med en hastighet på 23 meter per sekund.

HANDHAVANDE

- Rikta panelens svarta framsida mot solen och placera solpanelen så att den inte hamnar i skugga under dagen. Den bästa positionen är med långsidan placerad i sydlig-nordlig riktning.
- Justera solpanelen till en lämplig vinkel. Den optimala vinkeln är densamma som din lokala latitud där du bor.
- Anslut batteriklämmorna till batteriet. Var noga med att ansluta den svarta kabeln/klämman till batteriets negativa (–) pol och den röda till batteriets positiva (+) pol.
- Panelen har en uteffekt på 6 W / 17,5 V, vilket är lämpligt för uppladdningsbara 12 V-batterier.

FÖRSIKTIGHET

- Håll solpanelens yta ren för att erhålla maximal effekt. Använd en mjuk trasa för att rengöra panelen.
- Hantera panelens glasyta med försiktighet.
- Undvik kontakt med sura eller alkaliska ämnen.

Värna om miljön! Får ej slängas bland hushållssopor!
Denna produkt innehåller elektriska eller elektroniska komponenter som skall återvinnas.
Lämna in produkten för återvinning på anvisad plats, t.ex. kommunens återvinningsstation.

Med reservation för konstruktionsändringar och tryckfel som vi ej kan råda över. Vid eventuella problem, kontakta vår serviceavdelning måndag till fredag på telefon: [redacted]

Trycksaksnummer: 999-701

The description is quite detailed on some points, such as, that about which of the clips that shall be mounted where on the battery. But several very important elements are missing (they are underlined in the comments on the next page):

HANDHAVANDE

1 Rikta panelens svarta framsida mot solen och placera solpanelen så att den inte hamnar i skugga under dagen. Den bästa positionen är med långsidan placerad i sydlig-nordlig riktning.

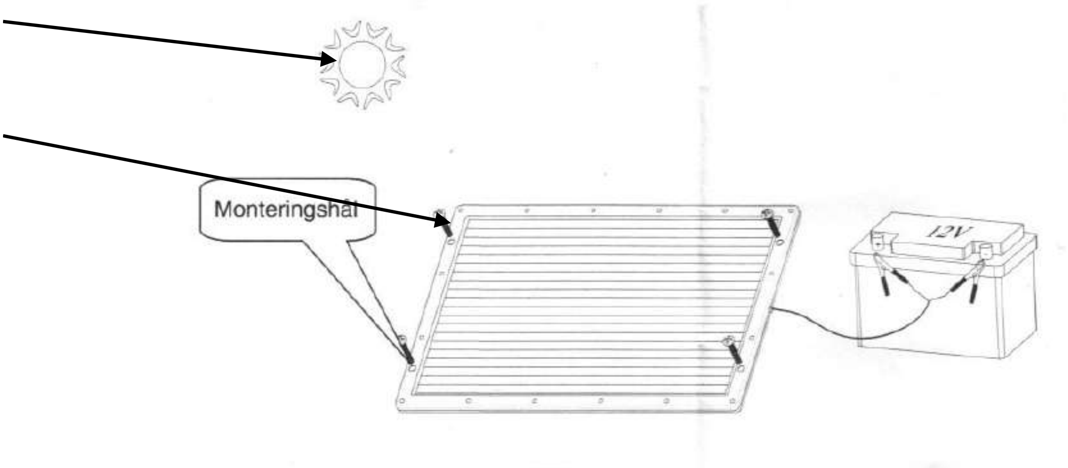
2 • Justera solpanelen till en lämplig vinkel. Den optimala vinkeln är densamma som din lokala latitud där du bor.

3 • Anslut batteriklämmorna till batteriet. Var noga med att ansluta den svarta kabeln/klämman till batteriets negativa (–) pol och den röda till batteriets positiva (+) pol.

4 • Panelen har en uteffekt på 6 W / 17,5 V, vilket är lämpligt för uppladdningsbara 12 V-batterier.

5

6



1. What is the "south-north" direction do they mean facing south?
2. The important instructions about the panel’s angle versus the vertical are very cryptic. They would ideally be accompanied by a figure and since the instruction is directed specifically to us in Sweden, they could well have written what angle that is appropriate instead referring to something that is far from all aware.
3. <u>All information is lacking about what to do if the about one meter long connecting cable is not sufficient for the distance between the panel and the battery. In particular, the important information that it must be a fuse on the cable mounted near the battery. In other cases, the cable may start to burn in the event of a short circuit. Furthermore, it is not mentioned the battery terminals, in a permanent assembly, should be replaced by cable shoes for car batteries. Among other things, in order to make losses in the transmission as small as possible.</u>
4. This information does not belong in this part of the instructions.
5. The panel on the picture seems to have a very strange position relative to the sun, the confusion would have been less if they had not depicted the sun in the picture.
6. It looks like the panel is to be mounted in the air, why didn’t they add a wall to the sketch.

Each step should contain as many or as complex operations.

Since:
1. The flow in the completion of the instruction will be better.
2. The installer can easily check off each completed step.
3. It reduces the risk that an operation is missed.
4. It makes it easier to calculate how long time the whole work will take.

It is advantageous to write explanations that are not required for the actual execution of the operations, in footnotes.

The instructions for installing the solar panel could, in the light of the above, be designed as follows:

Obtain:
- A screwdriver with PZ2 head.
- Any spacers, brackets etc. that is needed to attach the panel in the manner that is the most appropriate in your case.
- Possibly a splicing cable (2-conductor cable for outdoor use with core diameters of at least 0.5 mm^2).
- Splicing devices, such as cable shoes.
- Tools for splicing, such as a wire stripper or pliers.
- Cable clamps with appropriate size.
- A hammer for the cable clamps.
- A fuse holder for a hang fuse.
- Fuse, preferably 2-4 A.
- Cable shoes for the + and – terminals on the battery.
- A 12 V lead-acid battery.

To do this:
1. Select a suitable[3] spot.
2. Position the panel so that the black surface is facing the sun.
3. Fasten the panel with the four screws provided.
4. Secure the cable with cable clamps so that it ends at a suitable site for splicing.
5. Cut out the two battery terminals.
6. Splice the cable.
Note It is important to note which wire is + and which is - in the new cable.
7. Secure the rest of the cable length required to reach the battery.
8. Assemble the fuse holder on the + wire.
9. Fit the + pole piece after the fuse holder.
10. Fit - pole piece on the negative wire.
11. Connect the pole pieces.
12. Insert the hanger fuse.

[3] The location should be such that:
- The active surface is directed to the south.
- The panel is shaded as short part of the day as possible.
- The panel, if possible, is inclined about 30-45° upwards against the sun.
- The panel is reasonably protected from falling objects such as fruits, pine cones and branches.
- The panel can be easily assembled and disassembled.
- The cable from the panel to the battery can be mounted in a good way.

Operation instructions

The design and scope of the operating instructions varies greatly depending on the object of the instructions, mainly due to:

- The newer or more alien a technology is, the greater is the need for detailed instructions, see the example on the next page on how to make a phone call, and the sub-chapter about beginner instructions.

- The reader's purpose[4] with the reading probably vary more than they do regarding other parts of the manuals. It may therefore be wise to investigate what is likely to be the most common purpose, and then customize the instructions accordingly.

- The manufacturer purpose[5] with the instructions also vary more than they do on other parts of the manuals. It may therefore be wise to investigate this too and act accordingly.

4. The purpose for some readers may, for example regarding instructions on advanced fishing paraphernalia, be to be entertained through reading about something that interest them, even if they have no real needed for the information. While regarding other things, like cell phones, they may have to read the manual just to be able to use the products.

5. The purpose for example, could be to raise the status of the product, reducing the number of questions from users or to meet the requirements in the Machinery Directive at the lowest possible cost.

All techniques have at some point in history been new and people have been unaccustomed to dealing with them. Below are the instructions from 1927 years telephone directory for Stockholm on how to make phone calls.

Allmänna anvisningar vid telefonering från automatisk apparat.

Rörande tillvägagångssättet vid uppringning från automatisk telefonapparat se anvisningarna å kartongbladet i katalogens mitt.

Tillse att mikrotelefonen alltid, då samtal ej pågår, vilar på sin plats; i annat fall **förstöres mikrofonen.**

Svara snarast möjligt, då signal höres. Rikssamtal markeras från stationen medelst två strax på varandra följande korta ringningar, **dubbelsignal.** Sådan signal får icke användas för annat samtal, även om påringande abonnent så begär.

Svara med **namnet eller numret å egen apparat, icke med »hallå».** Härigenom vinnes tid. Avhöres ej andra abonnenten, upprepa då svaret flera gånger, innan Ni lägger ned mikrotelefonen.

Tala tätt intill mikrofonen; avpassa röstens styrka efter ledningens längd.

Håll hörtelefonen **fast tryckt** intill örat under samtalet.

Ljudförstärkning vid **mottagande** av samtal erhålles genom att nedtrycka den å apparaten anbragta tryckknappen. Denna knapp måste vara uppe då man talar **från** apparaten.

Begär **numret**, icke namnet, å önskad abonnent. För samtal inom och till de stationer, vid vilkas namn i stationsförteckningen »nummeranrop» finnes angivet, **begäres alltid numret,** med undantag för sådan abonnent, som enligt abonnentförteckningen har »namnanrop». Understruket telefonnummer angiver att abonnenten har flera ledningar och sådan anordning, att ledig ledning automatiskt utväljes, då detta understrukna nummer begäres.

Uppgiv vid telefonistens fråga: »varifrån», den egna apparatens nummer.

Uttala telefonnumret siffra för siffra, således t. ex. **»två, fyra, ett, noll»,** istället för »tvåtusenfyrahundratio» eller »tjugofyra tio». **Femsiffriga nummer uttalas dock lämpligast** i två grupper med två siffror i sista gruppen, t. ex. 128—30, **»etthundratjugoåtta trettio». Hör efter att telefonisten upprepar numret riktigt och rätta, om så behöves.**

All uppringning av huvudapparat sker av stationen. Anknuten apparat uppringes från huvudapparaten, **icke** av stationen.

Följ de anvisningar, som under samtalsutväxlingen givas av vederbörande telefonist, och uppehåll ej telefonisten genom andra meddelanden än sådana, som oundgängligen fordras för samtalsexpeditionen.

Använd ej apparaten under åskväder.

Anmäl ofördröjligen **fel** å ledningar eller apparater till »Felbyrån» samt befogade **klagomål** över expeditionen till vederbörande vaktföreståndare eller kontrollör.*)

Vid begäran om samtal till station i annat centralstationsområde (nr 9 på nummerskivan) bör, sedan telefonisten svarat, först angivas **namnet på centralstationen** för detta område, även i det fall att den önskade abonnentens ledning ingår till växelstation. (Förteckning över central- och växelstationer se sid. XXVII—XCII.) Lyder stationens svar: »Var god dröj», invänta då, utan att lägga ned mikrotelefonen, vidare meddelande och lämna sedan de uppgifter, som av stationen begäras.

*) Angående sättet för uppringning se sid. III

Vid beställning av samtal till viss person vid viss apparat skall tydligt angivas, att det gäller honom personligen.

Lands- och rikssamtal få ej pågå längre tid än 2 perioder (= 6 minuter), om annat samtal väntar. (Blixtsamtal må dock pågå 3 perioder.) Å hårt belastade ledningar äger stationen att under de brådaste timmarna av dagen begränsa avgiftsfritt landssamtal till 1 period. Likaså kunna vid ledningsfel och liknande tillfällen, avgiftsbelagda lands- och rikssamtal begränsas till 1 period. Vid avgivande av beställning å avgiftsbelagt lands- eller rikssamtal kan korrespondent begära dess begränsning till 1 eller 2 perioder, och åligger det då telefonisten att vid bestämd tid avbryta samtalet.

Pågående avgiftsfritt samtal avbrytes, om rikssamtal begärts till någondera av de samtalande. Likaså kan avgiftsbelagt samtal å kortare ledning brytas för långväga samtal. Meddelar telefonist, att pågående samtal måste brytas, lägg då genast ned mikrotelefonen.

Vid samtal från allmän samtalsapparat utgår för såväl eljest avgiftsfria som avgiftsbelagda samtal en extra avgift av 20 öre per samtal (apparatavgift).

Önskar abonnent att under tid, då den egna stationen hålles stängd, hava förbindelse med abonnent vid annan stängd station, dit samtalen äro avgiftsfria, eller med närmaste station, som hålles öppen, kan detta efter hänvändelse till föreståndaren för vederbörande centralstation medgivas i den mån ledning finnes disponibel för ändamålet. För sådan **extra förbindning** erlägges för dygn eller del därav förbindningsavgift med 50 öre, för månad 10 kronor. Vid extra förbindning till station inom annat taxeområde utgår samtalsavgift enligt taxan för den station, avgångsapparaten tillhör.

Beställning av **rikssamtal** kan vid *inländsk* korrespondens avse följande slag av samtal:

Vanligt samtal (samtal utan företrädesrätt) för vilket utgår enkel periodavgift enligt rikssamtalstaxan.

Ilsamtal expedieras med företrädesrätt före vanliga samtal och betinga dubbel periodavgift. För ilsamtal å ledningar, där vanliga samtal äro avgiftsfria, utgår en avgift av 20 öre per period.

Blixtsamtal expedieras omedelbart. Avgift 100 kr. per samtal jämte ilsamtalsavgift.

Seriesamtal (abonnemangssamtal) expedieras på regelbundna tider bestämda dagar. För seriesamtal utgår samma avgift som för ilsamtal.

Presseriesamtal (pressabonnemangssamtal) expedieras å bestämda tider mellan tidningar eller telegrambyråer och deras korrespondenter. För dessa samtal utgår samma avgift som för vanliga samtal.

Morgonsamtal och **kvällsamtal** expedieras kl. 7—9 resp. 18—23 mot nedsatt avgift. (Se sid. XXII—XXV).

Avgifterna för samtal beräknas per påbörjad period om 3 minuter. Den första perioden av ett samtal beräknas — med nedanstående undantag — från det ögonblick, då avgångsapparat satts i samtalsförbindelse med adressapparat oavsett vem som svarar.

Skall till viss apparat i förväg framföras underrättelse om förestående samtal eller viss person tillkallas för samtal, utgår härför särskild **förutbeställningsavgift.** Erfordras för tillkallande av personen särskilt bud, utgår även **budsändningsavgift.**

För periodberäkningen anses personligt samtal i inländsk trafik påbörjat det ögonblick, då avgångsapparat satts i förbindelse med begärd person.

Avgifterna för samtal från Stockholm till olika orter framgå beträffande inländsk trafik av taxetabellen å sid. XXII—XXIII, där även stationernas signaturer äro angivna, samt beträffande utländsk trafik av tabellerna å sid. XXIV—XXV. Vidare upplysningar kunna erhållas från vederbörande vaktföreståndare å riksavdelningen, telefon nr 10 08 89.

»Taxa för rikssamtal inom Sverige» tillhandahålles avgiftsfritt å Rikstelefonbyrån. Beträffande telefonkorrespondensen med utlandet se anvisningar å sid. XXIV—XXV.

Beginner instruction is often preferably designed as step by step instructions.

Many who read the instructions just wart's to know how to get started, without first being forced to read and interpret long passages of unimportant text. But often it is very sparse with beginner instructions. This is especially true for more complex devices, such as this printer/scanner.

In the nearly 90-page long manuals, as far as I have seen, there are only the following instructions on how to scan a document. Moreover the instructions are difficult to find since they are not found in the "Getting started" section.

Scanning

1 Turn on your computer and printer, and make sure they are connected.

2 Place the document face down on the scanner glass and make sure the upper left corner of the front of the document aligns with the arrow on the printer. For more information, see "Placing Your Document on the Scanner Glass" on page 21.

3 Press **Scan** on the operator panel.

[redacted]

4 In the **Send scanned image to:** drop-down menu, select a program as your scan destination.

5 Customize your scan settings.

6 Click **Scan Now** to complete your scan.

Scanning Photos

1 Turn on your computer and printer, and make sure they are connected.

2 Place the photo face down on the scanner glass and make sure the upper left corner of the front of the photo aligns with the arrow on the printer. For more information, see "Placing Your Document on the Scanner Glass" on page 21.

3 Press Scan on the operator panel.

[redacted]

4 Click **Preview Now**.

5 Adjust the dotted lines to fit around the portion of the photo you want to scan.

6 In the **Send scanned image to:** drop-down menu, select the photo program you want to use.

NOTE: If the program you want to use is not listed, select **Search for more...** in the drop-down menu. On the next screen, click **Add** to locate and add your program to the list.

7 Change any settings.

8 When you finish customizing your image, click **Scan Now**.

When your document has finished processing, the selected program opens.

In other manuals, however, it is relatively easy to find operating instruction that are based on step execution, though usually even those jumps over a multitude of steps that probably are assumed to be obvious. As the operating instructions for the marking unit below, where the majority of the use is described in the sentence: "Enter a text to write a simple label."

Skriva ut din första etikett

Nu kan du skriva ut din första etikett.

För att skriva ut en etikett

1. Mata in text för att skapa en enkel etikett.
2. Tryck på .
3. Tryck på etikettskäraren för att klippa av den.

Grattis! Du har just skrivit ut din första etikett. Läs vidare för att lära dig mer om de olika möjligheterna som finns för att skapa etiketter.

The instructions of the above device are also an excellent example of the dangers of creating an original manual in a language then just translate it into other languages. In this case, it has the effect that it is not described anywhere how to obtain the in Swedish partially unique and frequently used letters "Å, Ä and Ö."

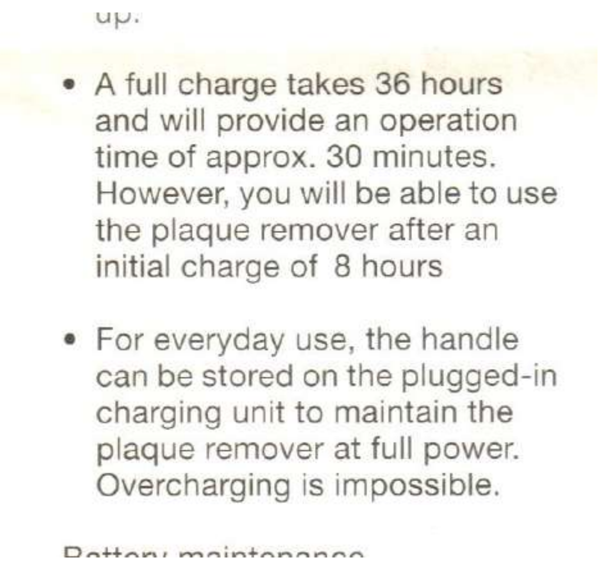
Essential instructions should, if possible, be written on the products.

Since some users probably will forget the instructions and therefore handle the products incorrectly. To avoid this, essential and non abandoned handgrip should be described directly on the objects.

Below is an example of a product where this is the case (the control devices to a mobile crane) and where it is not (the charger to an electric toothbrush).

Control panel to a smaller mobile crane.

If the operator misunderstand the instructions it may lead to serious mishaps ....


up.

- A full charge takes 36 hours and will provide an operation time of approx. 30 minutes. However, you will be able to use the plaque remover after an initial charge of 8 hours

- For everyday use, the handle can be stored on the plugged-in charging unit to maintain the plaque remover at full power. Overcharging is impossible.

Battery maintenance

How charging an electric toothbrush

This text can be read in the manual, among a host of less important instructions. Even if the user reads the text and also adds the charging time and other facts about the charging in his memory, it is likely that he forgets them long before the toothbrush is worn out. Which, among other things, may result in the risk that he charges the toothbrush for too short time and thus never gets a full using. This risk had easily been reduced if the manufacturer had added information about the charging time on the charger.

Maintenance/reparation/destruction instructions

The design of the maintenance instructions depends on the products.

An expensive product, like a car, should be accompanied with far more care instructions than a toy. This for several reasons including that the importance of that the former is maintained in good condition is of major economic importance for the customers.

Many other common products accompanied by a manual require, unlike cars, very little care. Thus the maintenance/reparation/destruction instructions can often be summarized in a few points that briefly deal with cleaning and disposal. There is however a few things you should keep in mind during the writing of these:

Exaggerated demands may have the opposite effect.

Often maintenance/reparation/destruction instructions implement pretty big demands on the users. If they perceive demands as excessive there is a risk is that the users choose to ignore even reasonable requirements. See for example the following quotes from the manuals for a common electric toothbrush. Where it is describes what the user should do with worn out samples:

Miljöinformation

Denna apparat är försedd med ett nickel-hydrid batteri som inte innehåller några skadliga tung-metaller. Råmaterial bör däremot återvinnas. Kasta därför inte den uttjänta apparaten i hushållssoporn[redacted]na istället apparaten till en Braun Service-verkstad.
Om du däremot vill göra dig av med batteriet på annat sätt, se kapitlet «Att avlägsna batteriet».

The text says that the raw materials in this device ought to be recycled and therefore it shall be given to one of the manufacturers service work shops.

Requirements without description of the risks when not obeying, is annoying.

It is quite common that there are requirements in the maintenance instructions that are not accomplished with an explanation about why. Which makes it hard for the users to choose an, in their opinion, reasonable level of care. The instructions for the toothbrush are also home for such examples, for instance:

Rengöring

Efter användning, skölj borsthuvudet noggrant under rinnande vatten i några sekunder med motordelen påslagen (II). Stäng sedan av apparaten och ta av borsten från motordelen. Rengör båda delarna separat under rinnande vatten (III). Torka dem sedan torra.

Emellanåt bör även laddenheten göras rent med en fuktig trasa.

The text says that after each use the whole toothbrusch shall be rinsed with the motor on. Then the brusch head shall be removed from the machine and then both parts shall be rinsed and wiped.

If these instructions are followed some of the idea of using an electric toothbrush is deflected, because the work avoided and time saved from using the electric brush is partially lost in the process of the cleaning the device. On the other hand, if one chooses to resist cleaning, one may get the sense of being a filth pig. Alternatively, this can be a source of argument between "pedant" and "filth pig" if there is more than one user of the same object. Here it would have been reasonable to explain what the consequence would be for those who do not follow the daily cleaning instruction. Would the effect be a nasty bacterial growth, which in turn can transmit diseases or would the effect is only be that the device looks untidy?

Risk analysis

Most of us probably harbour a variety of fears. Some are beneficial to us while others are not. It is beneficial to be afraid of adventures that we have reason to believe will end badly. For example, it is wise to feel fear if hanging over a cliff in a meagre string and unwise not to do so. The fears that are problematic, in contrast, are those that give a greater malaise than what is reasonable regarding the risk or consequences. I would imagine that almost everyone hosts unjustifiable fear for something. Among children, the proportion of unjustifiable fear higher is than among adults (for example, they are often afraid that there are monsters under the bed). While they may be less often than adults afraid of things that are really dangerous (like running across the street).

In the past we were, among other things, very afraid of fire, which judging by this promotional messages from a real estate dealer, is completely gone today.

Probably most of us have a latent fear of dying. A fear that flares up in the event that something serious happens. To prevent death at a too early age, we are constantly taking action, such as to look right and left before we go across the street, and by not eating whatever we find. Which on a group level seems to work pretty well, since the majority of everyone in Sweden die after the age of 75 (in 2010, for example, 46 601 women and 43 920 men in Sweden died, 36 497 of the women and 28 312 of the men were 75 years or older, according to the Welfare Board (Socialstyrelsen 2011, Causes of Death 2010)). Of those who died before the age of 75 years, more than half died from cancer or diseases in the circulatory system. Which organs affected by the deadly cancer seems, judging by the statistics, vary quite a lot and thus presumably the underlying reasons why the cancer occurred. Diseases of the circulatory system however is, of course, less scattered and ischemic heart diseases (mainly acute myocardial infarction: women 5.44%, men 9.41%) dominate as the cause of death.

The most well documented[1] risk factors for ischemic heart disease are:

- Age. From 35-44 to 55-64 years of age the risk of ischemic heart disease increases 15 times for men and 30 times for women.
- Gender. In the age group 50-59 the discussed heart disease are five times more common among men than among women.
- High proportion of saturated fatty acids in the diet. They who eat a lot of such as butter and/or meat has a higher risk than those who eat a lot of olive oil and/or fish. Wilhelmsen does, However, not quantify the difference in risk.
- High blood cholesterol. Men who have high cholesterol are at a 3.4 times higher risk than those with low levels.
- High blood pressure. A systolic pressure (the lower pressure, from when the blood returns to the heart) greater than 105 mm Hg doubles the risk compared to a pressure of 91 mm Hg. High blood pressure is considered, in addition to hereditary factors, be due to including overweight, sedentary, salt and/or alcohol consumption, and possibly also stress.
- Smoking. Smoking appears to double the risk (given that everything else is equal).
- Diabetes. The risk doubled for men with diabetes and it increases even more for ditto women.
- Heredity. Those who have a family history of such diseases are at a higher risk. Wilhelmsen does, however, not quantify the difference in risk.

1. According to Lars Wilhelmsen and Michael Marmot's chapter: Ischemic heart disease: risk factors and prevention, in Diseases of the Heart, second edition, edited by Desmond G Julina et al., WB Saunders Company Ltd., London, 1998.

Despite all these factors many appears to, in the current situation, focus on a few: smoking, high blood pressure and obesity. Even though Wilhelmsen says that there is not any substantial support for that the latter is a risk factor. Regarding the two previous risk factors, Wilhelmsen writes that they seem to be less important for ischemic heart disease in countries where the population has low cholesterol content in the blood. Furthermore, he writes elsewhere that there is evidence to suggest that an elevated level of cholesterol in the blood is necessary for the development of such diseases. I do not know what is true, though it seems likely that many of us, in this context exaggerates the dangers of smoking, obesity and high blood pressure and that we overlook the dangers of high cholesterol levels. If so, it could to some extent be due to that those who smoke or have an overweight are sinful. The same is true, to some extent, regarding high blood pressure because it can be caused by overweight (i.e. gluttony and other sinful things).

It might suggest that different routes to the same danger are more or less scary. There are other indications suggesting that it is true, as some who have had sex with someone in a brothel in Thailand may harbour greater anxiety about that they have been infected with HIV, compared to if they had met the sex partner on a beach. Although they used a condom at the brothel, while they at the beach practiced unprotected sex and thus ran a far greater risk to actually becoming infected. Generally, the reasoning may be summarized in:

The risk of injury causes fear, but different paths to the same injury is more or less scary.

Those who are afraid to do something that they intend to do, probably often make some sort of risk analysis before the action, it could be for instance:

- The lonely footpath through the park to be crossed on the way home late at night: it is sufficiently illuminated, it seems to hang some freaks at the benches?
- The man who offers a last drink at his home when the pub has closed: is he okay?
- The ladder leaning against the wall: is it realiable?

All risk assessments are, presumably, basically the same way:

1. What is the danger?
2. How could the dangerous thing happen?
3. Where can the dangerous thing happen?
4. What are the chances that it happends?
5. What precautions can/should I take to reduce the risk?
6. Is the risk worth taking?

For the woman who hesitates to go through the park in the evening, the result of the analysis could be:

1. Someone rapes me.
2. He forces me away from the path into the darkness, tearing off my dress and panties.
3. In the most dark and lonely place in the park?
4. Not so high because it’s very cold outside.
5. I walk fast and do not stop even if I am spoken to.
6. The detour takes half an hour extra and I am too tired.

It is likely, however, that we rarely carry out even a rudimentary risk analysis before we do an action that we do not fear.

These everyday risk analyzes will not be further discussed in this text. For it is from now on focused on risk analysis in technical systems. This is because there is authorities[23] requiring that manufacturers of technical systems, or those representing the manufacturers, perform risk assessments before the systems are delivered to the customers. The forms of these risk analyzes are to some extent prescribed by the relevant authority.

2. Machinery Directive applies to machines in which there is some kind of movement that is not driven by hand as well as their accessories. Also various lifting equipment and safety components are included. But there are exceptions. The most common exceptions are:

   - Motor vehicles.
   - Household appliances intended for domestic use[3].
   - Audio and video equipment[3].
   - Information technology equipment[3].
   - Ordinary office machinery[3].
   - Low-voltage switchgear and control gear[3].
   - Electrical motors[3].

3. Electrical/electronic devices are regulated primarily by the Low Voltage Directive. It regulates the design from an electrical point of view of virtually all products to be used with a voltage between 50 to 1 000 V. However, with some exceptions, such as electrical parts to elevators and medical devices.

The Machinery Directive and Low Voltage Directive enshrines that the products shall undergo a CE-marking procedure. The purpose of the rules is that the products sold in Europe are as harmless as possible for the users.

For products that fall under the Machinery Directive, the manufacturer shall ensure that they are safe by carefully analyzing them and if possible eliminate the risks he then finds. If it is not possible to eliminate the hazards, he shall warn for them on the products.
The product must also be accompanied by instructions, and their design is to some extent defined by the Directive. See the excerpt from the directive below.

"1.7.4.2 Contents of the instructions
Each instruction manual must contain, where applicable, at least the following information:
(a) the business name and full address of the manufacturer and of his authorised representative;
(b) the designation of the machinery as marked on the machinery itself, except for the serial number (see section 1.7.3);
(c) the EC declaration of conformity, or a document setting out the contents of the EC declaration of conformity, showing the particulars of the machinery, not necessarily including the serial number and the signature;
(d) a general description of the machinery;
(e) the drawings, diagrams, descriptions and explanations necessary for the use, maintenance and repair of the machinery and for checking its correct functioning;
(f) a description of the workstation(s) likely to be occupied by operators;
(g) a description of the intended use of the machinery;
(h) warnings concerning ways in which the machinery must not be used that experience has shown might occur;
(i) assembly, installation and connection instructions, including drawings, diagrams and the means of attachment and the designation of the chassis or installation on which the machinery is to be mounted;
(j) instructions relating to installation and assembly for reducing noise or vibration;
(k) instructions for the putting into service and use of the machinery and, if necessary, instructions for the training of operators;
(l) information about the residual risks that remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted;
(m) instructions on the protective measures to be taken by the user, including, where appropriate, the personal protective equipment to be provided;
(n) the essential characteristics of tools which may be fitted to the machinery;
(o) the conditions in which the machinery meets the requirement of stability during use, transportation, assembly, dismantling when out of service, testing or foreseeable breakdowns;
(p) instructions with a view to ensuring that transport, handling and storage operations can be made safely, giving the mass of the machinery and of its various parts where these are regularly to be transported separately;
(q) the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;
9.6.2006 L 157/48 Official Journal of the European Union EN (r) the description of the adjustment and maintenance operations that should be carried out by the user and the preventive maintenance measures that should be observed;
(s) instructions designed to enable adjustment and maintenance to be carried out safely, including the protective measures that should be taken during these operations;
(t) the specifications of the spare parts to be used, when these affect the health and safety of operators;
(u) the following information on airborne noise emissions:
— the A-weighted emission sound pressure level at workstations, where this exceeds 70 dB(A); where this level does not exceed 70 dB(A), this fact must be indicated,
— the peak C-weighted instantaneous sound pressure value at workstations, where this exceeds 63 Pa (130 dB in relation to 20 µPa),
— the A-weighted sound power level emitted by the machinery, where the A-weighted emission sound

pressure level at workstations exceeds 80 dB(A).
These values must be either those actually measured for the machinery in question or those established on the basis of measurements taken for technically comparable machinery which is representative of the machinery to be produced. In the case of very large machinery, instead of the A-weighted sound power level, the A-weighted emission sound pressure levels at specified positions around the machinery may be indicated.
Where the harmonised standards are not applied, sound levels must be measured using the most appropriate method for the machinery. Whenever sound emission values are indicated the uncertainties surrounding these values must be specified. The operating conditions of the machinery during measurement and the measuring methods used must be described.
Where the workstation(s) are undefined or cannot be defined, A-weighted sound pressure levels must be measured at a distance of 1 metre from the surface of the machinery and at a height of 1,6 metres from the floor or access platform. The position and value of the maximum sound pressure must be indicated.
Where specific Community Directives lay down other requirements for the measurement of sound pressure levels or sound power levels, those Directives must be applied and the corresponding provisions of this section shall not apply;
(v) where machinery is likely to emit non-ionising radiation which may cause harm to persons, in particular persons with active or non-active implantable medical devices, information concerning the radiation emitted for the operator and exposed persons."

To achieve the requirements of many of the items such as: "**e**", "**h**" and "**l-t**", it is required that the author, in addition to having the necessary knowledge of the machine, and the documentation of it, also has a risk analysis as the basis for this work.
The actual risk analysis could be done much in the same way as for the woman who is about to go through the park. But, probably to ensure that the analyst thinks through all types of risks, no matter what he or she fears, the authorities have created a checklist with suggestions regarding potential risks.
Below are comments on and description of risk analysis according to the Machinery Directive, and general advice on the application of the regulations. The text in *italics* is quoted from Annex 1 in the directive:

"1.1.2 Principles of safety integration
(a) Machinery must be designed and constructed so that it is fitted for its function, and can be operated, adjusted and maintained without putting persons at risk when these operations are carried out under the conditions foreseen but also taking into account any reasonably foreseeable misuse thereof.
The aim of measures taken must be to eliminate any risk throughout the foreseeable lifetime of the machinery including the phases of transport, assembly, dismantling, disabling and scrapping.
(b) In selecting the most appropriate methods, the manufacturer or his authorised representative must apply the following principles, in the order given:
— eliminate or reduce risks as far as possible (inherently safe machinery design and construction),
— take the necessary protective measures in relation to risks that cannot be eliminated,
— inform users of the residual risks due to any shortcomings of the protective measures adopted, indicate whether any particular training is required and specify any need to provide personal protective equipment.
(c) When designing and constructing machinery and when drafting the instructions, the manufacturer or his authorised representative must envisage not only the intended use of the machinery but also any reasonably foreseeable misuse thereof. The machinery must be designed and constructed in such a way as to prevent abnormal use if such use would engender a risk. Where appropriate, the instructions must draw the user's attention to ways — which experience has shown might occur — in which the machinery should not be used.
(d) Machinery must be designed and constructed to take account of the constraints to which the operator is subject as a result of the necessary or foreseeable use of personal protective equipment.
(e) Machinery must be supplied with all the special equipment and accessories essential to enable it to be adjusted, maintained and used safely."

This means that in the first place, the manufacturer shall aim to construct the device so that users can not be hurt, even if they have no personal protection and also, for example, have poor vision and are clumsy. If, despite these efforts, there are risks associated with the use of the device, which is not likely to eliminate with safety devices, the manufacturer may and must warn for those hazards with signs on it and information about them in the manual.

"1.1.3 Materials and products
The materials used to construct machinery or products used or created during its use must not endanger persons' safety or health. In particular, where fluids are used, machinery must be designed and constructed to prevent risks due to filling, use, recovery or draining."

Are any liquids or gases in any stage involved in the use of this device? No = OK, go to 1.1.4.

Yes = What ikind of liquid/gas? Isit dangerous (check the material safety data sheets) and to ensure that the safety precautions requirements are met by the design and the manual.

"1.1.4 Lighting
Machinery must be supplied with integral lighting suitable for the operations concerned where the absence thereof is likely to cause a risk despite ambient lighting of normal intensity.
Machinery must be designed and constructed so that there is no area of shadow likely to cause nuisance, that there is no irritating dazzle and that there are no dangerous stroboscopic effects on moving parts due to the lighting. Internal parts requiring frequent inspection and adjustment, and maintenance areas must be provided with appropriate lighting."

Is there any point/area on the device that the user needs to see particularilly well (eg. an indicator or a processing tool)?

Yes = is the lighting there not stronger there than on the surrounding areas?
Are there areas there irritating glare when looking on the spot?
Shadows?
Can these deficiencies result in that operators are forced to use awkward postures to see properly and/or that they do wrong manouvres = redo.

"1.1.5 Design of machinery to facilitate its handling
Machinery, or each component part thereof, must:
— be capable of being handled and transported safely,
— be packaged or designed so that it can be stored safely and without damage.
During the transportation of the machinery and/or its component parts, there must be no possibility of sudden movements or of hazards due to instability as long as the machinery and/or its component parts arehandled in accordance with the instructions. Where the weight, size or shape of machinery or its various component parts prevents them from being moved by hand, the machinery or each component part must:
— either be fitted with attachments for lifting gear, or
— be designed so that it can be fitted with such attachments, or
— be shaped in such a way that standard lifting gear can easily be attached.
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Where machinery or one of its component parts is to be moved by hand, it must:
— either be easily moveable, or
— be equipped for picking up and moving safely.
Special arrangements must be made for the handling of tools and/or machinery parts which, even if lightweight, could be hazardous."

Is the unit a large, difficult to grasp, heavy or are there any other risk to harm someone when moving the device? No = OK, go to 1.1.6.

Yes = consider the specific issues raised in the text above and, if necessary, read more in the chapter The ergonomics of tools.

"1.1.6 Ergonomics
Under the intended conditions of use, the discomfort, fatigue and physical and psychological stress faced by the operator must be reduced to the minimum possible, taking into account ergonomic principles such as:
— allowing for the variability of the operator's physical dimensions, strength and stamina,
— providing enough space for movements of the parts of the operator's body,
— avoiding a machine-determined work rate,
— avoiding monitoring that requires lengthy concentration,
— adapting the man/machinery interface to the foreseeable characteristics of the operators."

Is there someone that, at times, will work directly with the device (eg, load it with work-pieces or starts it)? No = OK, go to 1.1.7.

If yes, this step is important, especially if it is intended to be maouvered frequently or if it is handheld. This is because mosculoskeletal disorders are probably the most common type of damage that modern devices generate. For guidance and advice on the ergonomic design, see the chapter The ergonomics of tools.

"1.1.7 Operating positions
The operating position must be designed and constructed in such a way as to avoid any risk due to exhaust gases and/or lack of oxygen. If the machinery is intended to be used in a hazardous environment presenting risks to the health and safety of the operator or if the machinery itself gives rise to a hazardous environment, adequate means must be provided to ensure that the operator has good working conditions and is protected against any foreseeable hazards.
Where appropriate, the operating position must be fitted with an adequate cabin designed, constructed and/or equipped to fulfil the above requirements. The exit must allow rapid evacuation. Moreover, when applicable, an emergency exit must be provided in a direction which is different from the usual exit.

1.1.8. Seating
Where appropriate and where the working conditions so permit, work stations constituting an integral part of the machinery must be designed for the installation of seats. If the operator is intended to sit during operation and the operating position is an integral part of the machinery, the seat must be provided with the machinery. The operator's seat must enable him to maintain a stable position. Furthermore, the seat and its distance from the control devices must be capable of being adapted to the operator. If the machinery is subject to vibrations, the seat must be designed and constructed in such a way as to reduce the vibrations transmitted to the operator to the lowest level that is reasonably possible. The seat mountings must withstand all stresses to which they can be subjected. Where there is no floor beneath the feet of the operator, footrests covered with a slip-resistant material must be provided."

Does the device have controls that must be manouvered often? No (common) = OK, go to 1.2.1.
If yes, but the device is supposed to be indoors on the floor or on on a bench and the controls are accessible in a convenient way for someone which is outside the boundaries of the device= OK, go to 1.2.1.

Note that most devices with controls/control panel, as well known, neither have a cab or a seat.

"1.2 CONTROL SYSTEMS

1.2.1. Safety and reliability of control systems
Control systems must be designed and constructed in such a way as to prevent hazardous situations from arising. Above all, they must be designed and constructed in such a way that:
— they can withstand the intended operating stresses and external influences,
— a fault in the hardware or the software of the control system does not lead to hazardous situations,
— errors in the control system logic do not lead to hazardous situations,
— reasonably foreseeable human error during operation does not lead to hazardous situations.
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Particular attention must be given to the following points:
— the machinery must not start unexpectedly,
— the parameters of the machinery must not change in an uncontrolled way, where such change may lead to hazardous situations,
— the machinery must not be prevented from stopping if the stop command has already been given,
— no moving part of the machinery or piece held by the machinery must fall or be ejected,
— automatic or manual stopping of the moving parts, whatever they may be, must be unimpeded,
— the protective devices must remain fully effective or give a stop command,
— the safety-related parts of the control system must apply in a coherent way to the whole of an assembly of machinery and/or partly completed machinery. For cable-less control, an automatic stop must be activated when correct control signals are not received, including loss of communication."

Does the apparatus have a control system? No = OK.

All devices that is only operate with some kind of switch that is directly connected to the power source are not affected by this point.There are, however, a lot of equipment from simple ones with a relay between the control and the power source, through those who are started/stopped by some form of sensor, to advanced machinery with a variety of movements controlled via a control system.

Please note that all items are "must", i.e. This is considered to be particularly important, and if the device has some form of control, all points must be considered. But in reality, the analysis is prefereably done with the other issues related to the same risks, see the paragraph 1.4.3.

"1.2.2 Control devices
Control devices must be:
— clearly visible and identifiable, using pictograms where appropriate,
— positioned in such a way as to be safely operated without hesitation or loss of time and without ambiguity,
— designed in such a way that the movement of the control device is consistent with its effect,
— located outside the danger zones, except where necessary for certain control devices such as an emergency stop or a teach pendant,
— positioned in such a way that their operation cannot cause additional risk,
— designed or protected in such a way that the desired effect, where a hazard is involved, can only be achieved by a deliberate action,
— made in such a way as to withstand foreseeable forces; particular attention must be paid to emergency stop devices liable to be subjected to considerable forces.
Where a control device is designed and constructed to perform several different actions, namely where there is no one-to-one correspondence, the action to be performed must be clearly displayed and subject to confirmation, where necessary.
Control devices must be so arranged that their layout, travel and resistance to operation are compatible with the action to be performed, taking account of ergonomic principles.
Machinery must be fitted with indicators as required for safe operation. The operator must be able to read them from the control position.
From each control position, the operator must be able to ensure that no-one is in the danger zones, or the control system must be designed and constructed in such a way that starting is prevented while someone is in

the danger zone. If neither of these possibilities is applicable, before the machinery starts, an acoustic and/or visual warning signal must be given. The exposed persons must have time to leave the danger zone or prevent the machinery starting up. If necessary, means must be provided to ensure that the machinery can be controlled only from control positions located in one or more predetermined zones or locations. Where there is more than one control position, the control system must be designed in such a way that the use of one of them precludes the use of the others, except for stop controls and emergency stops. When machinery has two or more operating positions, each position must be provided with all the required control devices without the operators hindering or putting each other into a hazardous situation.

1.2.3 Starting
It must be possible to start machinery only by voluntary actuation of a control device provided for the purpose.
The same requirement applies:
— when restarting the machinery after a stoppage, whatever the cause,
— when effecting a significant change in the operating conditions.
However, the restarting of the machinery or a change in operating conditions may be effected by voluntary actuation of a device other than the control device provided for the purpose, on condition that this does not lead to a hazardous situation. For machinery functioning in automatic mode, the starting of the machinery, restarting after a stoppage, or a change in operating conditions may be possible without intervention, provided this does not lead to a hazardous situation.
Where machinery has several starting control devices and the operators can therefore put each other in danger, additional devices must be fitted to rule out such risks. If safety requires that starting and/or stopping must be performed in a specific sequence, there must be devices which ensure that these operations are performed in the correct order.

1.2.4 Stopping

1.2.4.1. Normal stop
Machinery must be fitted with a control device whereby the machinery can be brought safely to a complete stop. Each workstation must be fitted with a control device to stop some or all of the functions of the machinery, depending on the existing hazards, so that the machinery is rendered safe. The machinery's stop control must have priority over the start controls. Once the machinery or its hazardous functions have stopped, the energy supply to the actuators concerned must be cut off.

1.2.4.2. Operational stop
Where, for operational reasons, a stop control that does not cut off the energy supply to the actuators is required, the stop condition must be monitored and maintained.

1.2.4.3. Emergency stop
Machinery must be fitted with one or more emergency stop devices to enable actual or impending danger to be averted. The following exceptions apply:
— machinery in which an emergency stop device would not lessen the risk, either because it would not reduce the stopping time or because it would not enable the special measures required to deal with the risk to be taken,
— portable hand-held and/or hand-guided machinery. The device must:
— have clearly identifiable, clearly visible and quickly accessible control devices,
— stop the hazardous process as quickly as possible, without creating additional risks,
— where necessary, trigger or permit the triggering of certain safeguard movements. Once active operation of the emergency stop device has ceased following a stop command, that command must be sustained by engagement of the emergency stop device until that engagement is specifically overridden; it must not be possible to engage the device without triggering a stop command; it must be possible to disengage the device only by an appropriate operation, and disengaging the device must not restart the machinery but only permit restarting. The emergency stop function must be available and

operational at all times, regardless of the operating mode. Emergency stop devices must be a back-up to other safeguarding measures and not a substitute for them.

1.2.4.4 Assembly of machinery
In the case of machinery or parts of machinery designed to work together, the machinery must be designed and constructed in such a way that the stop controls, including the emergency stop devices, can stop not only the machinery itself but also all related equipment, if its continued operation may be dangerous.

1.2.5. Selection of control or operating modes
The control or operating mode selected must override all other control or operating modes, with the exception of the emergency stop. If machinery has been designed and constructed to allow its use in several control or operating modes requiring different protective measures and/or work procedures, it must be fitted with a mode selector which can be locked in each position. Each position of the selector must be clearly identifiable and must correspond to a single operating or control mode. The selector may be replaced by another selection method which restricts the use of certain functions of the machinery to certain categories of operator. If, for certain operations, the machinery must be able to operate with a guard displaced or removed and/or a protective device disabled, the control or operating mode selector must simultaneously:
— disable all other control or operating modes,
— permit operation of hazardous functions only by control devices requiring sustained action,
— permit the operation of hazardous functions only in reduced risk conditions while preventing hazards from linked sequences,
— prevent any operation of hazardous functions by voluntary or involuntary action on the machine's sensors. If these four conditions cannot be fulfilled simultaneously, the control or operating mode selector must activate other protective measures designed and constructed to ensure a safe intervention zone. In addition, the operator must be able to control operation of the parts he is working on from the adjustment point.

1.2.6. Failure of the power supply
The interruption, the re-establishment after an interruption or the fluctuation in whatever manner of the power supply to the machinery must not lead to dangerous situations. Particular attention must be given to the following points:
— the machinery must not start unexpectedly,
— the parameters of the machinery must not change in an uncontrolled way when such change can lead to hazardous situations,
— the machinery must not be prevented from stopping if the command has already been given,
— no moving part of the machinery or piece held by the machinery must fall or be ejected,
— automatic or manual stopping of the moving parts, whatever they may be, must be unimpeded,
— the protective devices must remain fully effective or give a stop command."

All these analyzes (section 1.2.2-1.2.6) are best done together with the other questions relating to the same risks, see the paragraph 1.4.3.

"1.3 PROTECTION AGAINST MECHANICAL HAZARDS

1.3.1. Risk of loss of stability
Machinery and its components and fittings must be stable enough to avoid overturning, falling or uncontrolled movements during transportation, assembly, dismantling and any other action involving the machinery. If the shape of the machinery itself or its intended installation does not offer sufficient stability, appropriate means of anchorage must be incorporated and indicated in the instructions."

Here it is, in my opinion most suitable to do an unconditional "brainstorming": What are the energies stored in the device (like high center of gravity), apart from those generated by the regular work movements, and how these could harm someone? Pay particular attention to any other operation than the usual use and do also take in account what could happened if the user was very clumsy.

"1.3.2 Risk of break-up during operation
The various parts of machinery and their linkages must be able to withstand the stresses to which they are subject when used. The durability of the materials used must be adequate for the nature of the working environment foreseen by the manufacturer or his authorised representative, in particular as regards the phenomena of fatigue, ageing, corrosion and abrasion. The instructions must indicate the type and frequency of inspections and maintenance required for safety reasons. They must, where appropriate, indicate the parts subject to wear and the criteria for replacement. Where a risk of rupture or disintegration remains despite the measures taken, the parts concerned must be mounted, positioned and/or guarded in such a way that any fragments will be contained, preventing hazardous situations.
Both rigid and flexible pipes carrying fluids, particularly those under high pressure, must be able to withstand the foreseen internal and external stresses and must be firmly attached and/or protected to ensure that no risk is posed by a rupture. Where the material to be processed is fed to the tool automatically, the following conditions must be fulfilled to avoid risks to persons:
— when the workpiece comes into contact with the tool, the latter must have attained its normal working condition,
— when the tool starts and/or stops (intentionally or accidentally), the feed movement and the tool movement must be coordinated."

Here, the following analyze could be appropriate:

1. Where is the potentially dangerous parts in this device (what could be harmful if it came loose, cracked, or the like).
2. What events could lead to that the respective part becomes dangerous?
3. What could make the event occurring?
4. Which human injuries could it lead to if it occurs?
5. What is the probability that this will occur?
6. Are there structural measures to take?
7. How difficult/expensive are these measures?
8. How large is the remaining risk
9. What actions are worth doing, when taking into account the possible injuries and the risks for the injuries before and after the measures has been taken?
10. Can the remaining risks be reduced through some kind of maintenance? If so, implement appropriate maintenance requirements in the manuals.
11. Is there a residual risk after the agreed design measures? If yes, ensure that there are adequate warnings on the device and in the operating instructions.

"1.3.3 Risks due to falling or ejected objects
Precautions must be taken to prevent risks from falling or ejected objects."

This is a very important point, especially in the case of machines that perform mechanical work. In these, it is quite common that processing tools or work-pieces under processing breaks and bits are thrown out with high speed. For example, the grinding wheels shatter and parts are threwed towards the operator. Such risks are more difficult to eliminate than the risk that moving parts coming loose inside the machine, since the operator may want to see the processing and need to access the processing point. For further analysis, see the analysis scheme proposed under the paragraph 1.4.3.

"1.3.4 Risks due to surfaces, edges or angles
Insofar as their purpose allows, accessible parts of the machinery must have no sharp edges, no sharp angles and no rough surfaces likely to cause injury."

The corner edges should as far as possible be rounded. This is difficult to do in a nice way when the device is already built, but simple in the design stage.

"1.3.5 Risks related to combined machinery
Where the machinery is intended to carry out several different operations with manual removal of the piece between each operation (combined machinery), it must be designed and constructed in such a way as to enable each element to be used separately without the other elements constituting a risk for exposed persons.
For this purpose, it must be possible to start and stop separately any elements that are not protected.

1.3.6 Risks related to variations in operating conditions
Where the machinery performs operations under different conditions of use, it must be designed and constructed in such a way that selection and adjustment of these conditions can be carried out safely and reliably.

1.3.7 Risks related to moving parts
The moving parts of machinery must be designed and constructed in such a way as to prevent risks of contact which could lead to accidents or must, where risks persist, be fitted with guards or protective devices.
All necessary steps must be taken to prevent accidental blockage of moving parts involved in the work. In cases where, despite the precautions taken, a blockage is likely to occur, the necessary specific protective devices and tools must, when appropriate, be provided to enable the equipment to be safely unblocked. The instructions and, where possible, a sign on the machinery shall identify these specific protective devices and how they are to be used.

1.3.8. Choice of protection against risks arising from moving parts
Guards or protective devices designed to protect against risks arising from moving parts must be selected on the basis of the type of risk. The following guidelines must be used to help to make the choice.

1.3.8.1 Moving transmission parts
Guards designed to protect persons against the hazards generated by moving transmission parts must be:
— either fixed guards as referred to in section 1.4.2.1, or
— interlocking movable guards as referred to in section 1.4.2.2.
Interlocking movable guards should be used where frequent access is envisaged.

1.3.8.2 Moving parts involved in the process
Guards or protective devices designed to protect persons against the hazards generated by moving parts involved in the process must be:
— either fixed guards as referred to in section 1.4.2.1, or
— interlocking movable guards as referred to in section 1.4.2.2, or
— protective devices as referred to in section 1.4.3, or
— a combination of the above.
However, when certain moving parts directly involved in the process cannot be made completely inaccessible during operation owing to operations requiring operator intervention, such parts must be fitted with:
— fixed guards or interlocking movable guards preventing access to those sections of the parts that are not used in the work, and
— adjustable guards as referred to in section 1.4.2.3 restricting access to those sections of the moving parts where access is necessary.

1.3.9 Risks of uncontrolled movements
When a part of the machinery has been stopped, any drift away from the stopping position, for whatever reason other than action on the control devices, must be prevented or must be such that it does not present a hazard.

1.4 REQUIRED CHARACTERISTICS OF GUARDS AND PROTECTIVE DEVICES

1.4.1. General requirements
Guards and protective devices must:
— be of robust construction,
— be securely held in place,
— not give rise to any additional hazard,
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— not be easy to by-pass or render non-operational,
— be located at an adequate distance from the danger zone,
— cause minimum obstruction to the view of the production process, and
— enable essential work to be carried out on the installation and/or replacement of tools and for maintenance purposes by restricting access exclusively to the area where the work has to be done, if possible without the guard having to be removed or the protective device having to be disabled.
In addition, guards must, where possible, protect against the ejection or falling of materials or objects and against emissions generated by the machinery.

1.4. Special requirements for guards

1.4.2.1. Fixed guards
Fixed guards must be fixed by systems that can be opened or removed only with tools. Their fixing systems must remain attached to the guards or to the machinery when the guards are removed.
Where possible, guards must be incapable of remaining in place without their fixings.

1.4.2.2. Interlocking movable guards
Interlocking movable guards must:
— as far as possible remain attached to the machinery when open,
— be designed and constructed in such a way that they can be adjusted only by means of an intentional action. Interlocking movable guards must be associated with an interlocking device that:
— prevents the start of hazardous machinery functions until they are closed and
— gives a stop command whenever they are no longer closed. Where it is possible for an operator to reach the danger zone before the risk due to the hazardous machinery functions has ceased, movable guards must be associated with a guard locking device in addition to an interlocking device that:
— prevents the start of hazardous machinery functions until the guard is closed and locked, and
— keeps the guard closed and locked until the risk of injury from the hazardous machinery functions has ceased. Interlocking movable guards must be designed in such a way that the absence or failure of one of their components prevents starting or stops the hazardous machinery functions.

1.4.2.3. Adjustable guards restricting access
Adjustable guards restricting access to those areas of the moving parts strictly necessary for the work must be:
— adjustable manually or automatically, depending on the type of work involved, and
— readily adjustable without the use of tools.

1.4.3. Special requirements for protective devices
Protective devices must be designed and incorporated into the control system in such a way that:
— moving parts cannot start up while they are within the operator's reach,
— persons cannot reach moving parts while the parts are moving, and
— the absence or failure of one of their components prevents starting or stops the moving parts.
Protective devices must be adjustable only by means of an intentional action."

This (section 1.2.1-1.2.6, 1.3.3 and 1.3.5-1.4.3) is, in my experience, many times the central part of the risk analysis, as these points concerns things that we are afraid of such as clamping, crushing and amputation injuries. Therefore, these items shall be reviewed with extra thoughtfulness and it is advantageous to analyze them together because each point is part of the same thought:

1. Is a motor, pneumatic cylinder or other source of power so strong that it could cause injury (consider also the case, for example, that the pneumatic pressure is raised: No= OK!
   An electric toothbrush, for example, has a driven motion but the engine is so weak that there are no risks associated with the movement. While a mixer has the potential to injure the user.
   Yes = What is potentially dangerous movements in this device?
2. Under what circumstances could someone be injured by the motion? Brainstorm, but consider also the potential problem sources listed in paragraphs 1.2.1-1.2.6, 1.3.3 and 1.3.5-1.4.3.
3. How severe could the injury be?
4. What is the probability that it will occur?
5. Are there structural measures to take?
6. How difficult/expensive are the measures?
7. How large is the remaining risk?
8. What actions are worthy taking regarding the possible injury and the risk of injury before and after action?
9. Is there a residual risk after the agreed design measures? If yes, ensure that there are adequate warnings on the device and in the manual.

"1.5 RISKS DUE TO OTHER HAZARDS

1.5.1. Electricity supply
Where machinery has an electricity supply, it must be designed, constructed and equipped in such a way that all hazards of an electrical nature are or can be prevented.
The safety objectives set out in Directive 73/23/EEC shall apply to machinery. However, the obligations concerning conformity assessment and the placing on the market and/or putting into service of machinery with regard to electrical hazards are governed solely by this Directive."

Electric shocks are not only uncomfortable, they can also be deadly. Additionally, there are often all sorts electrical connections, et cetera, in an apparatus. On the other hand, electrical safety is an old and well-tested knowledge and there are plenty of safe devices for connections et cetera. But to be on the safe side, it should be ensured that all high voltage connections are made so as to minimize risk of injury even in the event of that a cable comes off, liquid enters, or the casing is damaged and the ground connection for some reason does not work.

"1.5.2 Static electricity
Machinery must be designed and constructed to prevent or limit the build-up of potentially dangerous electrostatic charges and/or be fitted with a discharging system."

This paragraph could be applicable when, for instance, fine dust is transported through a ventilation duct. In there static electricity could develop, which in turn causes an explosion in combination with the dust. Therefore such ducs shall be grounded.

"1.5.3. Energy supply other than electricity
Where machinery is powered by source of energy other than electricity, it must be so designed, constructed and equipped as to avoid all potential risks associated with such sources of energy."

If so, this paragraph shall be included in the risk analysis after paragraph 1.4.3.

"1.5.4 Errors of fitting
Errors likely to be made when fitting or refitting certain parts which could be a source of risk must be made impossible by the design and construction of such parts or, failing this, by information given on the parts themselves and/or their housings. The same information must be given on moving parts and/or their housings where the direction of movement needs to be known in order to avoid a risk.
Where necessary, the instructions must give further information on these risks.
Where a faulty connection can be the source of risk, incorrect connections must be made impossible by design or, failing this, by information given on the elements to be connected and, where appropriate, on the means of connection."

Another question that probably is very sutable for "brainstorming": How could anyone get hurt on the device if he/she mounts removable parts in a wrong way. Do also take into account parts that are not supposed to be removed but where disassembly is possible. This is particularly true for the driven movements in the device. If the analysis shows that there is a risk of injury if something is installed wrongly, this should primarily be avoided through redesign so that the part can not be installed wrong.

The risk that such accidents actually occur is reasonably the highest if it involves technical solutions which the users might be unfamiliar with. Which could be the case with mixers, but probably not traditional chucks on drilling machines.

"1.5.5 Extreme temperatures
Steps must be taken to eliminate any risk of injury arising from contact with or proximity to machinery parts or materials at high or very low temperatures. The necessary steps must also be taken to avoid or protect against the risk of hot or very cold material being ejected."

Is there any part of the device that gets hot? (Or, which is unusual except if there are expanding gases, extremely cold?) One common cause, and important to consider, is the frictional heating caused by mechanical processing. Since then, there is also the risk that the hot material is thrown out with high speed. Thus another reason to, as far as possible, cover spots where mechanical processing is performed.

"1.5.6 Fire
Machinery must be designed and constructed in such a way as to avoid any risk of fire or overheating posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery."

Fires are caused, as well known, by the combination of oxygen + fuel + sufficient heat= fire. Oxygen is almost always present, so if one of the other two ingredients are present one should consider whether the third may occure. If any part of the device is extremely hot: could there be some form of dust clouds, flammable vapors or gases in the environments where the device is used = serious fire hazard, extraordinary measures are required (see explosions below).
And on the contrary, it is used in such environments: are there any circumstances in which it could be hot= serious fire hazard, extraordinary measures are required (see explosions below).
In addition, one should consider the combination: bad electrical connection + high current + plastic housing= fire.

"1.5.7 Explosion
Machinery must be designed and constructed in such a way as to avoid any risk of explosion posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery. Machinery must comply, as far as the risk of explosion due to its use in a potentially explosive atmosphere is concerned, with the provisions of the specific Community Directives."

Is there such risks? See the specific directive.

"1.5.8 Noise
Machinery must be designed and constructed in such a way as to avoid any risk of explosion posed by the machinery itself or by gases, liquids, dust, vapours or other substances produced or used by the machinery. Machinery must comply, as far as the risk of explosion due to its use in a potentially explosive atmosphere is concerned, with the provisions of the specific Community Directives."

If the device generates noise, the noise level shall be measured, since the level has to be specified in the manual. If the level is found to be high, there are a number of simple measures to reduce it:

1. The noise level is proportional to the square of the rotational speed, so a relatively small reduction of the rotational speed gives quiet a reduction of the noise level.
2. The noise coming out of an enclosure mainly through openings, thus to seal even small openings in an enclosure can provide significant reductions in noise.
3. Major plate surfacescan function as loud speaker, particularly those that are in contact with rotating parts. Thus, such structures should be avoided by rubber machine shoes, bracing of steel surfaces, sufficient gaps between metal surfaces and rotating machine parts, and more.

"1.5.9 Vibrations
Machinery must be designed and constructed in such a way that risks resulting from vibrations produced by the machinery are reduced to the lowest level, taking account of technical progress and the availability of means of reducing vibration, in particular at source. The level of vibration emission may be assessed with reference to comparative emission data for similar machinery."

Will a person be more than temporarily in contact with the device? If not (most common), the vibrations are not a health and safety problem, other than that it creates noise, see in this case in the point above about noise.

"1.5.10 Radiation
Undesirable radiation emissions from the machinery must be eliminated or be reduced to levels that do not have adverse effects on persons. Any functional ionising radiation emissions must be limited to the lowest level which is sufficient for the proper functioning of the machinery during setting, operation and cleaning. Where a risk exists, the necessary protective measures must be taken. Any functional non-ionising radiation emissions during setting, operation and cleaning must be limited to levels that do not have adverse effects on persons."

Is there anything in the device emitting radiation (apart from sound or thermal radiation)? This only applies to specific devices and those who use such sources in their constructions are reasonably well aware of that this is the case. And he should also be well aware of the risks that arise and how they are prevented.

"1.5.11 External radiation
Machinery must be designed and constructed in such a way that external radiation does not interfere with its operation."

Is there a risk that the device used in environments where hazardous radiation occur? Can it then affect the device so that it becomes dangerous? I'm too poorly versed in what it could mean in practice. Interference of electromagnetic fields and/or radio signals (EMC) however is quite a common error source for electronic devices. And anyone who wants to do a rudimentary test can create electromagnetic fields with a powerful transformer on high load, followed by radio signals generated by a cell phone. For real EMC tests is required, however, advanced equipment and special skills provided by special test institutes. Fortunately the electronic devices bought on the market shall be EMC tested by the manufacturer who also shall provide the approval documents. It also requires that, from a health and security point of view, that the operation is not only disturbed by external radiation, but also that the interference causes risks for human injuries. Which to my knowledge is rare. And regarding EMC, I have never been involved in that such tests has caused errors that can lead to injury, not even when it came to motor vehicle electronics.

"1.5.12 Laser radiation
Where laser equipment is used, the following should be taken into account:
— laser equipment on machinery must be designed and constructed in such a way as to prevent any accidental radiation,
— laser equipment on machinery must be protected in such a way that effective radiation, radiation produced by reflection or diffusion and secondary radiation do not damage health,
— optical equipment for the observation or adjustment of laser equipment on machinery must be such that no health risk is created by laser radiation."

Is there a laser? If not, the point is OK. Is there a laser (very rare): Follow the manufacturer's safety instructions.

"1.5.13 Emissions of hazardous materials and substances
Machinery must be designed and constructed in such a way that risks of inhalation, ingestion, contact with the skin, eyes and mucous membranes and penetration through the skin of hazardous materials and substances which it produces can be avoided. Where a hazard cannot be eliminated, the machinery must be so equipped that hazardous materials and substances can be contained, evacuated, precipitated by water spraying, filtered or treated by another equally effective method. Where the process is not totally enclosed during normal operation of the machinery, the devices for containment and/or evacuation must be situated in such a way as to have the maximum effect."

Are there any dangerous substances in the device, such as strong acids or the opposite? If not, the point is OK. Are there (very rare): Follow of the chemical manufacturer's safety instructions.

"1.5.14 Risk of being trapped in a machine
Machinery must be designed, constructed or fitted with a means of preventing a person from being enclosed within it or, if that is impossible, with a means of summoning help."

Is there any possibility to fit inside the device? If not the point is OK. Otherwise, ensure that the device can't be started if someone is inside it and that he always can get out.

"1.5.15 Risk of slipping, tripping or falling
Parts of the machinery where persons are liable to move about or stand must be designed and constructed in such a way as to prevent persons slipping, tripping or falling on or off these parts.
Where appropriate, these parts must be fitted with handholds that are fixed relative to the user and that enable them to maintain their stability."

If there are no gangways built into the device (which is the absolutely most common), this point is OK.

"1.5.16 Lightning
Machinery in need of protection against the effects of lightning while being used must be fitted with a system for conducting the resultant electrical charge to earth."

Is the device intended for outdoor use? No = OK!

"1.6 MAINTENANCE

1.6.1. *Machinery maintenance*
Adjustment and maintenance points must be located outside danger zones. It must be possible to carry out adjustment, maintenance, repair, cleaning and servicing operations while machinery is at a standstill. If one or more of the above conditions cannot be satisfied for technical reasons, measures must be taken to ensure that these operations can be carried out safely (see section 1.2.5). In the case of automated machinery and, where necessary, other machinery, a connecting device for mounting diagnostic fault-finding equipment must be provided. Automated machinery components which have to be changed frequently must be capable of being removed and replaced easily and safely. Access to the components must enable these tasks to be carried out with the necessary technical means in accordance with a specified operating method."

The first paragraph is mainly about large machines such as automatic processing stations in the manufacturing industry. These usually have a protective cover around the work zone and the persons operating it shall, as far as possible, not have to go into the work zone to do routine work.

The diagnostic troubleshooting on the equipment discussed in the third paragraph is usually and conveniently in the unit's software, and it is operated via the standard control panel.
Incidentally this point is considered in the analysis described after section 1.4.3.

"1.6.2. Access to operating positions and servicing points

Machinery must be designed and constructed in such a way as to allow access in safety to all areas where intervention is necessary during operation, adjustment and maintenance of the machinery."

No comments.

"1.6.3 Isolation of energy sources
Machinery must be fitted with means to isolate it from all energy sources. Such isolators must be clearly identified. They must be capable of being locked if reconnection could endanger persons. Isolators must also be capable of being locked where an operator is unable, from any of the points to which he has access, to check that the energy is still cut off. In the case of machinery capable of being plugged into an electricity supply, removal of the plug is sufficient, provided that the operator can check from any of the points to which he has access that the plug remains removed. After the energy is cut off, it must be possible to dissipate normally any energy remaining or stored in the circuits of the machinery without risk to persons. As an exception to the requirement laid down in the previous paragraphs, certain circuits may remain connected to their energy sources in order, for example, to hold parts, to protect information, to light interiors, etc. In this case, special steps must be taken to ensure operator safety."

This point is partly about risk when, for example, a repairman turns off the device to repair it and someone who does not know that turns it on again before the repairman is ready. And partly it is about the risk that there are movements with force though the device is turned off, like when a pneumatic cylinder sinks when the air pressure is lost. These risks scenarios should be considered in the analysis described under section 1.4.3.

"1.6.4 Operator intervention
Machinery must be so designed, constructed and equipped that the need for operator intervention is limited. If operator intervention cannot be avoided, it must be possible to carry it out easily and safely."

No comments.

"1.6.5 Cleaning of internal parts
The machinery must be designed and constructed in such a way that it is possible to clean internal parts which have contained dangerous substances or preparations without entering them; any necessary unblocking must also be possible from the outside. If it is impossible to avoid entering the machinery, it must be designed and constructed in such a way as to allow cleaning to take place safely."

No comments.

"1.7 Information

1.7.1 Information and warnings on the machinery
Information and warnings on the machinery should preferably be provided in the form of readily understandable symbols or pictograms. Any written or verbal information and warnings must be expressed in an official Community language or languages, which may be determined in accordance with the Treaty by the Member State in which the machinery is placed on the market and/or put into service and may be accompanied, on request, by versions in any other official Community language or languages understood by the operators."

This is a “typical European Union" point aiming at manufacturers oof products sold in large scale. Single machines constructed for a specific customer in a certain country does only need to have information and warnings in the main language spoken in the country, possibly combined with a suitable standard warning symbols for the dangers.

"1.7.1.1 Information and information devices
The information needed to control machinery must be provided in a form that is unambiguous and easily understood. It must not be excessive to the extent of overloading the operator. Visual display units or any other interactive means of communication between the operator and the machine must be easily understood and easy to use."

It is quite common that control panels and the like are difficult to understand (see the chapter About manuals), which in several respects is an abomination, and in addition, such panels create risks for human injuries. An easy way to, to some extent improve the situation, is to ask a few, on the device inexperienced people, to test it, under the supervision of the programmer.

"1.7.1.2 Warning Devices
Where the health and safety of persons may be endangered by a fault in the operation of unsupervised machinery, the machinery must be equipped in such a way as to give an appropriate acoustic or light signal as a warning. Where machinery is equipped with warning devices these must be unambiguous and easily perceived. The operator must have facilities to check the operation of such warning devices at all times. The requirements of the specific Community Directives concerning colours and safety signals must be complied with."

It can sometimes be difficult to know if a device is broken or not and that can sometimes lead to damage. For example, on a regular smoke alarm you can not see if the battery is running low. So therefore, they starts beeping until the battery is completely empty.

In the manufacturing industries with automated processing stations can be impossible to hear if a machine has stopped working, and it can lead to, for instance, that workpieces are stacked at its intake. To make the staff aware of the error there are often a beacon on the top of each machine. The beacons sends different messages depending on its status for the moment. And hopefully they follow the current directives.

"1.7.2 Warning of residual risks
Where risks remain despite the inherent safe design measures, safeguarding and complementary protective measures adopted, the necessary warnings, including warning devices, must be provided."

Here it is important to ensure that the, in the risk assessment decided, warning devices actually are fastened on the device.

In addition to the above guidelines for risk assessment of machinery/equipment in general, there are additional analysis points for certain types of devices (see extract below from the table of contents in the Machine Directive (2006/42/EC). If the object of the analysis included in the list below, the relevant points shall be analyzed, in the same way as the points in the general section (see above).

2. SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR CERTAIN CATEGORIES OF MACHINERY
2.1 FOODSTUFFS MACHINERY AND MACHINERY FOR COSMETICS OR PHARMACEUTICAL PRODUCTS
2.2 PORTABLE HAND-HELD AND/OR HAND-GUIDED MACHINERY
2.3 MACHINERY FOR WORKING WOOD AND MATERIAL WITH SIMILAR PHYSICAL CHARACTERISTICS

3. SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET HAZARDS DUE TO THE MOBILITY OF MACHINERY
3.1 GENERAL
3.2 WORK POSITIONS
3.3 CONTROL SYSTEMS
3.4 PROTECTION AGAINST MECHANICAL HAZARDS
3.5 PROTECTION AGAINST OTHER HAZARDS
3.6 INFORMATION AND INDICATIONS

4. SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS TO OFFSET HAZARDS DUE TO LIFTING OPERATIONS
4.1 GENERAL
4.2 REQUIREMENTS FOR MACHINERY WHOSE POWER SOURCE IS OTHER THAN MANUAL EFFORT
4.3 INFORMATION AND MARKINGS
4.4 INSTRUCTIONS

5. SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR MACHINERY INTENDED FOR UNDERGROUND WORK
5.1 RISKS DUE TO LACK OF STABILITY
5.2 MOVEMENT
5.3 CONTROL DEVICES
5.4 STOPPING
5.5 FIRE
5.6 EXHAUST EMISSIONS

6. SUPPLEMENTARY ESSENTIAL HEALTH AND SAFETY REQUIREMENTS FOR MACHINERY PRESENTING PARTICULAR HAZARDS DUE TO THE LIFTING OF PERSONS
6.1 GENERAL
6.2 CONTROL DEVICES
6.3 RISKS TO PERSONS IN OR ON THE CARRIER
6.4 MACHINERY SERVING FIXED LANDINGS
6.5 MARKINGS

Man

Dad is mad

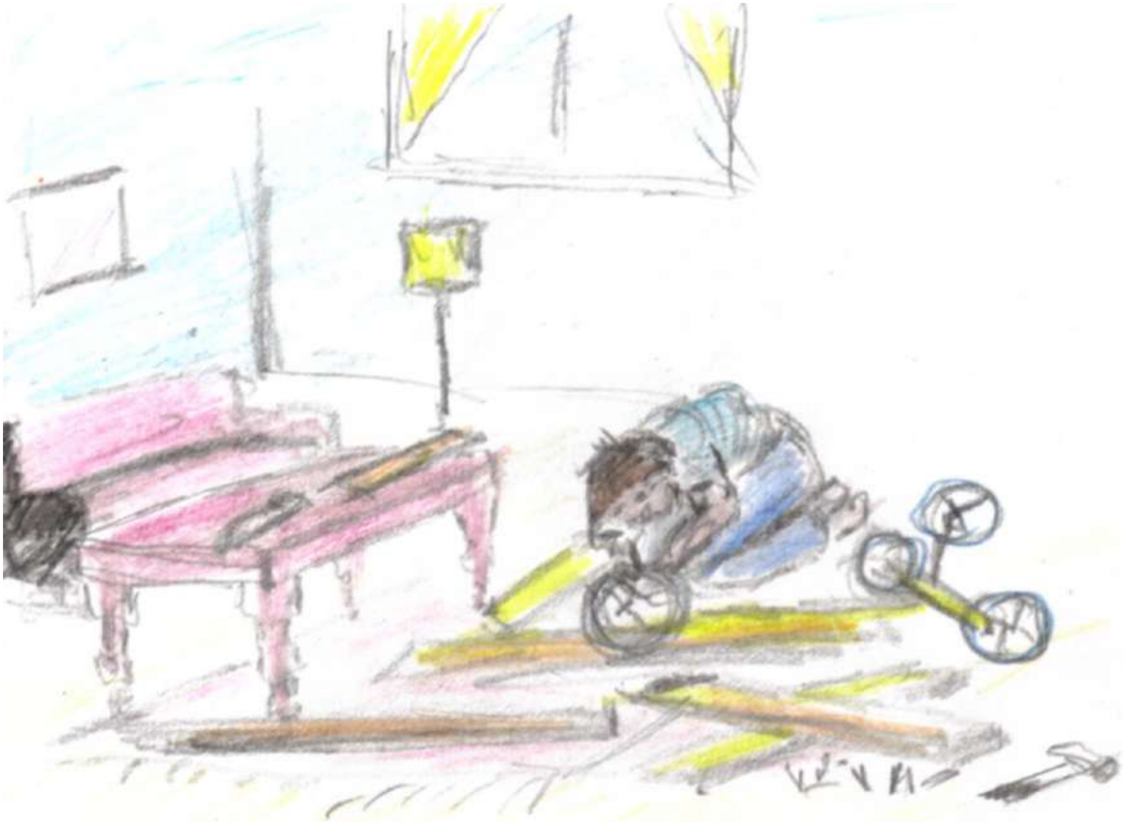
Note! Even the deepest of depressions will pass!

If someone is behaving very strangely, it may be due to that he or she has a disease of the brain, a mental illness. its not easy to know if someone is mentally ill. Often the sick do not even know it themselves. At least not at first, but he or she may say very strange things.

Or do strange things,

feel very sad,

extremely happy,



or sometimes very angry.

Some believes that their neighbors are spying on them,

hear voices that nobody else hears,

or believes in crazy things such as that they will get sick if they don't wash their hands once an hour.

Others collect all sorts of things, which for most people are just trash.

Better to live in a sunny past than in a dark present!

It is sometimes said that one should live in the present. And it makes sense for those who likes what is happening in the moment, but it is less successful for those who are currently suffering. In the latter case, thoughts of a better future might alleviate the suffering. While those who are worried about the future probably feel better when think about the past.

If for instance, mom is very sick, but still does not want to go to the hospital, society may decide that she must go there anyway. If so the police may come and take her to the hospital.

Then she had to be there until the doctors think she's fine.

There she can talk to someone who is specializes in talking to people so that they become healthy.

Sometimes it helps but a lot of talking is required.

It may also happen that she gets electric shocks.

It sounds very dangerous because electric shocks are dangerous.
Although these shocks are so well adapted,
that they just kind of shakes the brain a little.

With a little luck the shaking makes mom happier.

In addition, she probably gets medications. They are very good if only the doctors manage to find just the right type. Though it is not as easy as it sounds, because there are a lot of different medications with strange names like:

Clozapine, Clozaril, Zyprexa, Risperdal, Belivon, Seroquel, Zeldox, Abilify and Serdolect.

And even if the doctors actually manage to find the right medication, it takes a long time before they manage to come up with what is the right amount of medicine.

When completed, it will take some time yet before the medicine is working well.

And when the medication works well, it takes a very long time to recover. In the meantime, mom probably doesn't have the strength to do much.

Though there are also those parents who behave weird without being mentally ill. It may be because he or she has a special personality. You can tell sometimes from that they are very good at some difficult things like research and very poor at easy things, like to fry eggs.

Or weird in other ways like that they do not understand a damn about what others may need.

What can you do if you feel worried about your father or mother?

Talk to any teacher, nurse, or counselor at the school where you go!

What is love?

How is love defined?

For many, love is a very important phenomenon and cultural works, especially musical ones, it is often described. Serious explanations of the phenomenon is, however, quite scarce. For example, in Bonnier´s conversation dictionary from 1925 a number of words starting with love are explained but not the actual word love. Regarding the verb loving not even variations on the word is included. The same observation can be made in more modern encyclopaedias such as the Nya Uppslagsverket (The New Encyclopaedia) published by Informationsförlaget in 1987.

In the Bible (**Corinthians 13** in the **New Testament**), there is a description of the nature of love, which perhaps can be seen as a definition since it describes a state of gentleness which, by implication, those who feel love may experience:

Love is patient and kind. Love is not envy, it does not boast, it is not proud. It is not rude, is not selfish, it does not roars up, it would not hurt.

A poster saying:

*"Love
Take as much as you need"*

There is also some literature on the subject, but I do not understand the explanations presented in these. A librarian at the Stockholm Public Library, familiar with the topic, claimed that in their collection of informative books about love four prominent authors excels: Francesco Alberoni, Nathaniel Branden, Tomas Böhm and Erich Fromm. Of these four, I have read suggested works of all but the last one. The first gives in the book **I love you** (**Alberoni F**, 1996) the following explanation of what love is:

Love is the inner, emotional back of the birth of a new togetherness and a new me. And the beloved is the hub, the axle around which the reconstruction takes place. It is the experience of merging with the beloved and creates a new identity that transforms and transforms myself and the world I live in. It is the experience of discovering that I am part of a new world, a new heaven and a new earth. And the one I love is the entrance giving access to all of this.

The third expresses it in a similar way, a bit clearer, but still not quite crystal clear, in his book **After the love** (**Böhm T**, 1984):

A love relationship will also give the feeling of coming home. A return to a place where you have never been. This return does not mean that the new relationship is a reminiscent of the old relation with the early parents. Rather it means to come home to a truer, more restful version of oneself, which is both liberated and created with the other.

While the second author in **The psychology of love** (**Branden N**, 1996) suggests the following much more concrete definition:

Romantic love is a passionate spiritual-emotional-sexual attraction between a man and a woman that reflects the great respect they have for each other.

Several of these authors argue that there are those who think they love someone even though they in actually do not. For example, Nathaniel Branden writes:

Many men and women seem to be in love with a fantasy rather than the person they say they love. One reason may be that they have repressed needs, repressed desires, repressed pain, repressed desires that they on a conscious plan perhaps are unaware of, while they unconsciously seek to satisfy, resolve and restore them. A person who is not aware of their deepest needs, can be attracted to someone because of rather superficial characteristics, some of them raise a hope or a dream that these needs could receive feedback in a relationship.

One explanation for why some people falsely think they feel love can be that possibly there is some confusion about what it means. Especially among those who, like me, do not understand the answers given in the literature about the phenomenon. The purpose of this chapter is to reduce this possible ambiguity.

Does love exist, and if so, why?

I thought that love was just a word, they sang about in song I've heard.

From **La vie en rose** by **Edith Piaf**

If love would not exist, there are many songwriters, poets and others who for centuries have written about nothing, which does not seem likely. In order to investigate the matter, I asked six persons[1] if they believe that love exists and if so, why? All answered yes to the first part of the question. The answers to the second part of the question were more diverse. Three of the respondents answered something like that it allows the human specie to survive and two said that it makes the relationships better.
The results thus indicate that we believe that love exists, though we may disagree a bit about why.

1. Three men and three women men (mean and median age: 47, 46, min-max: 38-55 years) who all claimed that they had loved at least one person.

Can the object for love be whatever?

Judging by how the word is used, we can love in many different ways and the objects for love may vary. There are those who claim that they love, for example, chocolate. But it’s probably not the same sense that they feel for a life-mate, because then they would probably not eat the chocolate. Moreover the feeling that they have for a life-mate is probably not the same as they have for the kids or the dog.
In the literature the feeling is, of course, described in different ways by different authors. Here are some examples where the object of love is a prospective or current partner in a sexual relationship.

A. *She loved him with every cell of her body. She found joy in every part of him - his hilarious laughter, the happy eyes that almost always looked like he just heard a joke, his presence in every a awake moment. She loved his impulsive way to touch her cheek at the most unexpected moments. He made her feel alive and cherished.*

B. *She loved Frank flexible thinking - that he spent the day with joining geometric shapes, yet able to express himself eloquently in writing and playing the piano with sincerity and beauty. About his remarkable inner one only need to consider the houses he designed for it to be publicly shown.*
Mamah realized that she was attracted to him for the same reasons that made others shy away. He did not mince words. And he was eccentric, but with the same sort of eccentricity she had come to admire in her father.

Out of love for Frank by **Nancy Horan**.

C. *Despite her violent surprise, she could not help putting her hand on his defenceless neck, and he shook and trembled violently.*
Then he looked up at her with that incredible pulling power in his big glowing eyes. She was completely unable to resist it. From her breast flowed the immense desire to meet him: she must give him anything, anything.

From **Lady Chatterley's Lover** by **D. H. Lawrence**

D. *When I knew he could not catch me, I turned my head to watch him sleep. I stole from him - but only with my eyes - a bit of his sleep, his curved brown eyelashes, and his curved lips whose crimson stood out against the pink of his skin. I could have spent the whole night to looking at him, but I felt guilty for this insidious theft. I stopped after a few minutes and retained the dissatisfaction for myself.*

From **Love without resistance** by **Gilles Rozier**

In these quotes names and gender markers were replaced with X and Y. Which in case A looked like this:

A. X loved Y with every cell of his/her body. X found joy in every part of Y- Ys hilarious laughter, the happy eyes that almost always looked like Y just heard a joke, Ys presence in every moment. X loved Ys impulsive way to touch Xs cheek at the most unexpected moments. Y made X feel alive, and cherished.

The quotes were then read for the participants but with the X and Y exchanged with their own name or the name of a partner that they love or have loved, and in addition had a sexual relationship with.
Then they were asked to categorize the quotes in any of the categories: I feel very much the same for my love, I feel pretty much the same for my love, and to some extent I feel the much the same for my love and I do not recognize the feeling at all. Most recognized themselves quite or very well in the first quotation (table 1). In the other, however, they recognized themselves less.

Table 1. The number of respondents who recognized themselves "very well", "pretty well" and so on in the various quotations.

	I feel very much the same for my love.	I feel pretty much the same for my love.	To som extent I feel the same for my love.	I do not recognize the feeling at all.
A. X loved Y with every cell of his/her body. X found joy in every part of Y- Ys hilarious laughter, the happy eyes that almost always looked like Y just heard a joke, Ys presence in every awake moment. X loved Ys impulsive way to touch Xs cheek at the most unexpected moments. Y made X feel alive, and cherished.	2	3		1
B. X loved Ys flexible thinking - that Y spent the day with joining geometric shapes, yet able to express Yself eloquently in writing and playing the piano with sincerity and beauty. About Ys remarkable inner one need only to consider the houses Y designed for it to be publicly shown. X realized that X was attracted to Y for the same reasons that made others shy away. Y did not mince words. And Y was eccentric, but with the same sort of eccentricity X had come to admire in Xs father.		3	2	1
C. Despite X violent suprise, X could not help putting X hand on Ys defenseless neck, and Y shook and trembled violently. Then Y looked up at X with that incredible pulling power in Ys big glowing eyes. X was completely unable to resist it. From X breast flowed the immense desire to meet Y: X must give Y anything, anything.		1	1	4
D. When I knew Y could not catch me, I turned my head to watch Y sleep. I stole from Y - but only with my eyes - a bit of Ys sleep, Ys curved brown eyelashes, Ys curved lips whose crimson stood out against the pink of Ys skin. I could have spent the whole night to looking at Y, but I felt guilty for this insidious theft. I stopped after a few minutes and retained the dissatisfaction for myself.		1	1	4

After this ranking the interviewees were asked to do the same thing with the name of the beloved replaced with the name of their favourite candy and relevant adjectives and nouns replaced with qualities that the candy may have. Which would have looked like this:

X loved Toblerone with every cell of X body. X found joy in every part of the product - the pretty packaging, the pointy bits, the sound when he broke off a piece. X loved the taste of milk chocolate mixed with a hint of almond. Toblerone made X feel alive and cherished.

Almost none of the participants then recognized themselves in any of the quotes. This, for candy manufacturers, disappointing results suggests that the feeling for, for example, a particular chocolate is not the same as for a prospective or current partner in a sexual relationship.

The corresponding exercise with Y replaced with the name of one of their children's (for the three participants who have children) or a treasured belonging gave equally low results. The results became slightly higher when the quotes were changed to address someone they really like, but when the relationship is not of a sexual nature. Taken together, this suggests that love has to do with sex.

Additionally half of the respondents (3 of 6) answered no on the question: Have you felt the same feeling[2] to someone or something that you did not want to have a sexual relationship with.

Though the other half said yes and it may be due to:

- They did not answer truthfully.
- They have not felt true love for someone.
- The subject of true love can be something that you do not intend to have sex with.

Since it is unclear which of these alternatives is correct, it is not entirely clarified whether you can feel love for whatever or not.

2. The same feeling, that you have felt for someone that you had or wanted to have a sexual relationship with, that you think is love.

Can love for someone or something end and if so, why?

Old love does not rust

Old proverb

Some people, at least in literature and on film, feel love for someone after only a short period of time together and they then continue to love the person for life even if they never meet again. Is it normal? Or are such stories exceptions? All participants believe that true love can really run out (table 2), but most people believe that there is someone they would again feel love for, if they met him/her under appropriate circumstances. Some also think that they still feel love for someone that they have not seen for a long time.

The reason that all of the participants believe that love can end may be that in reality they have not felt true love, though it could reasonably also be that:

- The old loves are replaced by newer ones.
- The participants suppress old loves for the sake of a present one.
- They haven’t really thought the thing through truly enough.
- Or ...

An alternative explanation is that true love really can end. It does not contradict that the sentiment also may stay, not only in the movies but also in real life.

Table 2. The participants' answers to questions about the durability of love.

	Yes	No
Can true love to a person end?	6	0
Is there somebody that you fel love for even though you havent met in several years.	2	4
Else, is there someone that you would feel love for again if you met under suitable circumstances?	5	1

How important is love?

But now abides faith, hope, love, these three, but the greatest of these is love.

First Corinthians 13

There are many real-life examples where people have sacrificed a lot for love. Like leaving wife/husband and children, abdicate the throne, committing suicide and so on. But there are many more examples of people who made the opposite and let the "common sense" prevail, though those we do not hear about. Because it lacks sensations and gossip value to tell about someone who did not cheat or didn’t commit suicide for love. This difference is reflected in the interviewees' answers to the question about how important love is[3]. A couple of respondents claim that they would sacrifice almost anything, while three of them are not willing to sacrifice anything but very little.

The difference may be due to different ability to feel real love, but it’s probably more likely that it depends on other things such as:

- The belief in ones own ability to built up a completely new life when one have left all the old behind.
- The courage to change lives.
- The strength to resist what others think.
- Or ...

The very most likely answer is though probably that love is of different importance to different people.

3. The answers to the free question: How much are you willing to sacrifice for a new romance that you for the moment think you love? (Consider, for example: health, eventual wife/husband, work, housing, and contact with any children, half of your money.)

They answered: In extreme cases, I could sacrifice everything except life, health and contact with the children, otherwise not so much (1 person), quite a bit, unfortunately (1 answer), damn much, like 90% (1 reply), some, such as jobs and housing (1 person), and nothing (2 persons).

What is love?

Many have speculated about this, not least songwriter who composed text lines such as:

Is this love - is this love - is this love -
Is this love that I'm feeling'?

Is This Love by **Bob Marley**

But they rarely develop the question further than that. This means that the usefulness of such texts often is of pretty limited for someone who wants to assess whether he/she really feels love.

Francesco Alberoni describes in the book, "**I love you**" how we more or less unconsciously in the transition to love, do love tests. The first of these tests is according to him the *authenticity test* which boils down to that those who think they love stays away from the object of the possible feeling and observes what happens. If he/she then feels despair and feel that he/she can't be without the object for the feeling, it is real love. Though I am rather sceptical to that the tests really give a true answer. Because if you try to stay away from something that you feel for, one always feel more or less in desperate need of it. Whether you loved it or just felt pretty good about it.

The second and final test Alberoni describes is the *reciprocity test* that is about if one's feelings are answered. Which of course does not have as much to do with what one feels, in addition to that the more the question seems interesting the more likely it is that one feels real love.

For those who are not fully satisfied with these two tests, there is, fortunately, aids in the form of additional self-tests. These tests appear, as a to rule, to based on that the testers estimates to which degree they feel that they, for example, feel desire for, or liability to anyone. Then the estimates are summed up and the higher the total, the greater is the love.

In order to investigate the "ingredients" that are included in the discussed sense, a number of randomly[4] selected love tests[5] were studied. The factors that to some extent were addressed in several of the studied tests (see table 3) are: omission, responsibility, desire, communication, long vision, sacrifice, thoughts of the other person, romance, and his or her ability to make the tester happy. The factor that was most frequently expressed in the tests was: desire, followed by thoughts of the other, and then deleting and sense of responsibility. One conclusion from the comparison could therefore be that desire is the main ingredient in love.

Table 3. Issues in three randomly chosen love tests. Classified by the nature of the topic of the question. And with a description of what the issue basically implies about its importance to whether it is love. All three tests are designed so that the higher the estimate the more likely that it is about love.

		Test A	Test B	Test C
Omission	The more one can open up for the object of the love, the stronger the love for the person is.	Yes, question 1	Yes, question 1 & partly 8	
Responsibility	The more responsibility one feel for the person, the larger the love.	Yes, quest. 9	Yes, quest.7, partly 5 & 8	
Desire	The more one wants to be with the person...	Yes, quest. 14	Yes partly 3, 4 & 9	Yes, quest. 4 & 12
Trust	The more one field trust for the person...	Yes, quest. 10		
Communication	The better the communication is…	Yes, quest. 7 & 13		Yes, partly quest. 14
Long vision	The longer one want the relation to last...	Yes, quest. 6 & 12		Yes, partly quest. 1 and maybe also 8 & 9
Sacrifice	The more one is willing to sacrifice/forgive...		Yes, quest.2 & 6	Maybe 8, 9 & 10
Thoughts	The more one thinks about the person…	Yes, quest. 2		Yes, quest.2, 5, 7 & 13
Romance	The more romance/passion…	Yes, quest. 5 & 11		Yes, maybe quest. 11
Support	The more emotional support…	Yes, quest. 4		
Jealousy	The more one want to have nonopoly on the person	Yes, quest. 3		
Stability	The more trust one have for the stabilty in the the relation..	Yes, quest. 15		
Ability to make the tester happy	The morehe/she is the only one making one happy..	Yes, quest. 8		Yes, maybe quest. 3
In love	The faster one feel in love....			Yes, quest.6

4. The first three, in this context, useful tests, I found when goggling the word "love test".
5. The questions in the downloaded tests are presented in the Annex in the Swedish original version of this chapter.

Against this way of seeing the phenomena, one can probably have several important objections. Among other things, or in particular, the test shows more how you are as a person than how you feel about the test object, compared to how it felt/feel about others. This means that a person that is more likely to feel desire, open up, and to show great responsibility would always win the tests compared to those who is in the opposite way.

The thing comes in a somewhat different light if the questions had been "compared to others I have met." But there still remains a lot of objections, such as the more romantic and/or reliable object of the test is, the higher the score. Which has the effect that test objects that do not exude these qualities always will have lower scores, regardless of what the tester actually is attracted to.
In addition, many of the issues are rather rational consideration than emotional ones, like:

The better you communicate ... the more confidence you have in the stability of the relationship ...

Considerations that may be wise to take in account if you want to judge the wise ness in initiating/continue a relationship, but they have reasonably not so much to do with your feelings for the test object. Emotions are, as familiar, phenomena’s such as: anxiety, sadness, desire and longing. Either love is an entirely own feeling, or the cumulative effect of a host of other emotions, such as the aforementioned. In the latter case, the feeling of love for someone could be quantified in terms of desire, etc. (see the suggestions in table 4). In this case, the purpose of each question is to quantify the degree of any of the emotions involved in the feeling of love.

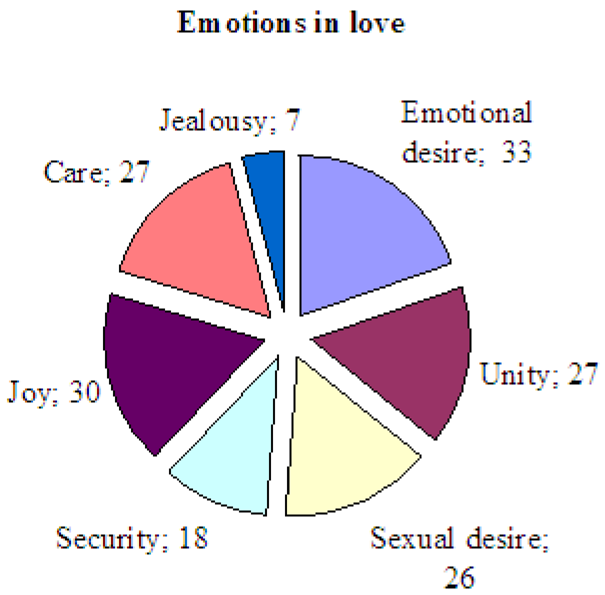
Table 4. Each of the questions in the three tests linked to any of seven feelings[6], I guessed, could be relevant and reasonably exclusive.

The feelings ranked in chart 1	The number of questions in each test that appears to discuss the listed feeling (pcs.)			Share of the total amount of questions in all three tests (%)
	Test A (totaly 15 questions)	Test B (totaly 9 ques.)	Test C (totaly 14 quest.)	
Emotional desire	2	1	5	21
Unity	4	1	2	18
Sexual desire	2	1	3	16
Security	4	2	2	21
Joy	1	1	2	11
Care	1	3		11
Jealousy	1			3

6. Here it is assumed, that for instance security is an emotion and that it gives a dominant contribution to the desire to give oneself away to someone, but it doesn’t need to be so. Though it is of less important in this discussion.

Love tests, as described earlier, assumes that every emotion gives a contribution to the overall feeling of love that is proportional to the number of questions in which they are involved. To some extent, determine if it is the actual case, I asked the respondents rank how much effect those in table 4 listed emotions have on their sense of love. All interviewees managed successfully to rank the emotions (see figure 1), suggesting that they feel that they contribute in different ways. And the overall ranking score for each emotion did not point out security as the most important emotion, even though it is the emotion involved, together with emotional desire in the most test questions. This means that someone who very much feel emotions, which my interviewees rated higher than security (such as joy and care), will receive unfairly low scores in relation to the importance that the participants believe that the feelings have. That person then perhaps becomes, unjustly, very disappointed with the test results.

Chart 1. The overall ranking score for each feeling regarding its contribution to the overall feeling of love. The participants had to rate the contribution of each feeling 1-7, where 7 = max.



Emotion	Explanation of the word to the interviewees
Emotional desire	The more one is longing for to be with the loved.
Unity	The more one feel like the couple consists a team against the rest of the world.
Sexual desire	The stronger and more often one wish to have sex.
Security	The more anxiusness that dissapear with the love.
Joy	The more joy the love brings out.
Care	The more one care about the loves wellbeing.
Jealousy	The more one is worried about loosing the love.

If love however is an own feeling, it is not fair to try to quantify it through other emotions. And given that the question: how much do you love X on a scale of 1 to 9, does not help the respondents so much further in their wonderings whether he/she feel love or not, other measures to estimate precisely that feeling are needed. So here's an attempt to suggest a model for such estimates:

The one who asks someone who loves a person what he/she thinks is so special with the loved one, probably gets several superlatives in response. These superlatives can be either 'true' observations that the respondent has observed or qualities that he or she would not have raised to the skies if he/she did not love. This difference in the feeling could be love. This can be described by the formula:

Σ (feelings for the loved one - sober observations of that person) = love for him/her.

It means that love is the sum of differences between the emotional experiences, the object of love creates in different ways compared to what the experience would be if the person that feels love did not feel love for the person.

Note that the model assumes that everything that has to do with the subject of love does not give this feeling but instead they gives relatively neutral, or perhaps even in some cases, negative emotions.

An easy and perfectly constructed example:

Ulla thinks of her boyfriend Peter and, in particular, that his shoes left large stains on the floor in the hallway the night before. She remembers how disappointed she was over this, until Peter came up to her and looked so beseechingly at her, like only he can do. Then she got like warm inside and hugged him. As she hugged him, she felt his special fragrance, a blend of diesel oil and dandruff shampoo and the warm feeling inside was even stronger. Now that she's thinking about this again, she again had the same feeling.

By the formula would look like this:

Ulla's love = ((the feeling that Peters praying expressions brings her - the feeling the same expression would have given if she had a neutral attitude towards him) + (ditto for his scent)).

Nurse the feeling!

In the end its the only thing left.

With the foregoing explanation, we have five modern explanations of the discussed phenomena:

1. Alberoni's, quoted in the introduction, about that love is an own emotion which seems to unite and transform.
2. Thomas Böhm's, who is on to something similar. But with the emphasis on that it gives something that might resemble to harmony.
3. Nathaniel Branden's that in contrast to the previous means that love is a combination of attraction and admiration.
4. That love is composed of a variety of emotions, such as desire and joy, and each of them can be quantified and then added up to a value that together constitutes the love.
5. The one described on the previous page about that love is the sum of the differences.

The interview subjects were told to think about these descriptions one at a time and they were then asked to assess how consistent explanation was with their perception of what love is, by placing each of them in one of the categories: very well, pretty well, some, not at all.
Most of them did not seem to recognize themselves particularly well in any of the explanations (table 5), but the one who got the best grades was the one by Nathaniel Branden. The one that got the worst rating was Thomas Böhm's followed by Alberoni's. The reason that everyone did not recognize themselves in the same definition can be:

- A part, or none of them answered truthfully.
- A part, or none of them, has felt true love for someone.
- True love can be felt in different ways.
- Some or all certainly feel or have felt like in some of the explanations, but they do not realize this.
- None of the definitions are good.

Table 5. How well those interviewed recognized themselves in the various explanations. Total score = 4 x number of ranked "Very well" + 3 x "Pretty well" + 2 x "Some" + 1 x "Not at all".

How well do you think the following explanations of love fits your own idear of what love is?	Very well	Pretty well	Some	Not at all	Total grade
Love is the inner, emotional back of the birth of a new collectivity and a new me. And the beloved is the hub, the axle around which the reconstruction takes place. It is the experience of merging with the beloved and create a new etentity that transforms and transform myself and the world I live in. It is the experience of discovering that I am part of a new world, a new heaven and a new earth. And the one I love is the entrance giving access to all of this.	0	2	3	1	13
A love relationship will also give the feeling of coming home. A return to a place where you have never been. This return does not mean that the new relationship is a reminiscent of the old relation with the early parents. Rather it means to come home to a truer, more restful version of oneself, which is both liberated and created with the other.	0	1	4	1	12
Romantic love is a passionate spiritual-emotional-sexual attraction between a man and a woman that reflects the great respect they have for each other.	2	3	1	0	19
love is composed of a variety of emotions, such as desire and joy, and each of them can be quantified and then added up to a value that together constitutes the love.	1	3	1	1	16
Love is the sum of differences between the emotional experiences, the object of love creates in different ways compared to what the experience would be if the person that feels love did not feel love for the person.	2	0	2	2	14

What is the difference between desire, to be in love or to love someone?

Encyclopaedias do not give a clear answer here, see examples in table 6.

Table 6. Some examples of what dictionaries and encyclopaedias can learn about the difference between desire, being in love and to love someone.

Phenomena	Bra Böckers lexicon 2000	The National Encyklopedia
Desire	Not included.	Not included.
In love	Not included.	Not included.
Love	No definition is presented, however, a historical and cultural exposé on the phenomena is given.	*"An at the same time comprehensive and widely accepted definition of love can hardly be given."* The text is then followed by an exposé like that of Bra böckers lexicon.

Several of the interviewees said that desire is sexual, being in love is deeper and to love someone is even deeper (table 8).

Table 8. What the respondents considered to be the difference between desires, being in love and to love someone.

What is the difference between desire, to be in love or to love someone?
Desire is sexual, in love is passionate, love= unity.
Desire is shallow, in love is deeper, love= really deep and it comes after the other.
Desire= one wants the person sexually, in love= a further step on the way to love, to love someone is something unselfish.
Desire= longing for someone, one can not get, in love= likes someone and wants to be with the person, love= one likes the whole person and all pieces come togehter.
Dont know.
Desire= a demand that does'nt need to be fulfilled, in love is when it is new, to love someone is more durable.

A theory about love (Leander G, 2004) is that it is the experience of a number of chemical substances that provides excitement and joy, are activated and/or released in the body when we think about or spend time with a particular person. These substances are according to the author phenyl ethylamine (also available in chocolate), endorphins (neurotransmitters for happiness) and dopamine (pleasure hormones).

According to Alberoni everyone who is truly in love has to simultaneously feel twenty specific emotions (table 9), otherwise he/she is not truly in love. None of the participants could, however, recognize themselves in all the feelings listed by Alberoni, even though all claimed that they had been in love. Which, if you believe Alberoni, is not true, and if so, it might not be true that they have ever loved someone. If so, it may be because it is taboo to choose to be with someone without loving him or her. Therefore, the participants lie when they say that love or have loved someone. Which in turn may be due to that the objects for "the love" has forced them to claim such lies. Another possible explanation is that they do not know what love means. Alternatively, it has somewhere in the chain between what Alberoni meant and how the respondents interpreted it, been some critical misunderstandings.

Table 9. Have the participants really been in love?

Think of someone you think you certainly been in love with, do you then recognize:	Yes	No
The feeling that previously only to have followed others' rules and not one owns dreams.	1	5
Suddenly one know what to do, earlier one was blinded.	1	5
The beloved are the only one who you can love.	3	3
The feeling that all evil is impermanent, but love is resistant.	1	5
Everything that we see around us have a meaning.	3	3
One feels free.	3	3
One loves everything.	2	4
One becommes another person.	4	2
One leaves the old lying personality and wants to be honest.	2	4
One can do without most as long as one have love.	3	3
One cares not about money, what one has one parts with the beloved and if it is the belowed who has one parts that.	2	4
One melts together even in the life before the belowed was a part of it.	2	4
One feels that love is like a miracle.	3	3
Both are the others leader.	4	2
We wants to share the whole life with the belowed.	5	1
We dont see any bad sides of the belowed only good sides.	5	1
We gets and inner power to improve ourselves.	3	3
Ones body unifies with the others in something holy.	1	5
One wants everything together.	4	2
One who loves wants everybody to be happy, but realizes that its not the case.	5	1

Though regardless of if the respondents have felt true love or not, I assume that they felt something special when they thought they were in love. And that probably is god enough.

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What’s normal – in Sweden

This chapter is based on data from various studies that have been carried out by established institutions such as Sifo opinion and data from governmental databases.
The data presented are primarily based on interviews and surveys, among us living in Sweden (see the reference list). In the majority of the cases the participants were randomly selected among those who were between 15-84 years, when the surveys were made. Here we present these data as percentages of the respondents (which as a rule is intended to represent the whole adult population of Sweden). Mostly the results are described in the terms: Uncommon/few, pretty common, many, very common and most people.

Uncommon/a few = 0-10%.
Pretty common/quite a lot = 10-25%.
Many/a lot = 25-50%.
Very common/a majority> 50%.
Most > 70%.

Physical specifications

Breathing
Normally healthy young people breathe 12-14 times per minute when they are at rest and every breath contains from 0.4 to 0.500 litres of air (Nienstedt M. 1985).

Faeces
We produce about 150 grams of faeces per day (Nienstedt M. 1985). The stools consist to two-thirds of water, and cellulose, bacteria and residues of cells detached from the intestines. The greater intake of cellulose-rich foods, such as root vegetables and whole grain bread, the more faeces.

Head hair
We have almost 100 000 hairs on the head and they normally grow 0.4 millimetres per day (Nienstedt M. 1985).

Stature
The average stature for men aged 16-84 years is 179.4 cm, and ditto for women 165.5 cm (SCB, 2005).

Menstruation
A menstrual cycle lasts about 28 days (Nienstedt M. 1985). At the first day of bleeding she loses 3-50 ml of blood, but the amount of liquid is greater because the blood is diluted with, among other things, secretions from the uterine lining.

Saliva and sweat
We normally produce about 1-1.5 litres of saliva and 0.5-1 litres of sweat per day (Nienstedt M. 1985).

Semen
Semen consists of sperm and semen. An ejaculation usually consists of 2-4 millilitres of semen (Nienstedt M. 1985).

Urine
An adult excretes 1 to 2.5 litres of urine per day depending on body size, food and drink consumption, age and the amount of sweat secreted (Nienstedt, M. 1985). The need to empty the bladder normally begins when about 250 millilitres of urine is collected in it. When over 450 millilitres is collected the need to empty the bladder is acute.

Weight
The average weight for men aged 16-84 years is 81.9 kg, and ditto for women 66.7 kg (SCB, 2005). The majority (2/3) consider themselves to have a normal weight, while one third thinks that they are overweight (Sifo 2003: Project 1510646). According to another source (SCB 1998: 290), the majority of us aged 16-84 years, have a normal weight (men 51%, women 50%). But there are also many who are overweight (men 45%, women 45%). However, very few who are obese (men 7%, women 12%). But is even fewer who are underweight (men 4%, women 5%).

Living conditions

Here data on housing, finances, health, sex life, and more are presented. These data are collected by public authorities and private market investigative firms. For more data on how much time we use for various tasks, I recommend searching the SCB reports based on their surveys about our living conditions.

Name

The most common Christian name[1] for females in Sweden (SCB, 2009: page 607, data from the year 2008), is Marie (445 404 people), of which 18.4% had it as the first name. Maria is followed by Anna (303 759 persons, of which 37.8% have it as first name, Margareta (256 604, 10.3%), and Elisabeth (198 870, 10.0%) and Eva (192 306, 47%).
The most common Christian name[1] for males in Sweden (SCB, 2009: page 606), is Erik (302 308 people), of which 21.3% have it the first name. Then follows Lars (235 806 persons, of which 43.5% have it as first name, Karl (212 202, 28.5%), Anders (192 783, 43.1%) and Johan (172 276, 44.5%).
The most common sirname[1] in Sweden (SCB, 2009: page 608) is Johansson (265 308 people). Followed by Andersson (263 518). Karlsson (201 681), and Nilsson (178 845) and Eriksson (142 959).

1. Each spelling is in the statistics recognized as a separate name. Thus it distinguishes, for example, between Elisabet and Elisabeth. If these two ways of spellings are merged, there are 354 371 women named Elisabet/Elisabeth.

Driver's license and/or car possession

According to the Swedish Institute for Transport and Communications Analysis (SCB 2009: I: Table 223-225, data from 31 December 2008), there are 4 258 463 non deregistered cars in Sweden. If these cars where distributed over the population from 20years and upwards, they would sum up to 0.6 cars per person. Of these, 52.2% are owned by men, and 27.3% of women. 14.1% of the cars are from 1990 or earlier. According to the Road Authority (SCB 2009: Table 227, data from 31 December 2008) 5 897 522 persons has driving license for a car. Which is about 78% of the population over 18 years. Most (men 86%, women 80%) also have access to a car (SCB 2002: II, data from Statistics Sweden's surveys about our living conditions).

Accommodation

Property
According to Statistics Sweden (SCB 2002: I, Table 161, data from the year 1999, newer data are not available) the majority (60%) of us lives in single-family homes (villas and the like). On average, there are two room units (including kitchen) per person, one person households has 3.26, two residents have 2.24, three residents 1.71, four residents has 1.41 and households with five residents has 1.21 in average room units per person. The majority (55%) has normal sized home in relation to the household size and a lot (36%) has a large apartment/house. A few (7%) have a very large house and there are even fewer (2%) who are overcrowded[2] (SCB 2002: IV, Table 3 space). Many (men 48%, women 47%) have access to a holiday home (SCB 2002: II).

2. Overcrowded are those who have more than two residents per room (kitchen and living room un-counted). One-person households, however, are not counted as overcrowded.

Accommodation expenditure
The average accommodation cost for one-person households in a villa is 50 000 SEK/year, while it costs 36 000 SEK for those who live in a condominium and 37 000 SEK for those who live in rented dwellings (SCB 2002: III, data from 2000, newer data are not available). The corresponding figures for married couples with children in villas is 79 000 SEK/year, 74 000 for condominiums and 61 000 SEK for rented dwellings.
Most (53%) believe that the cost for electricity is a fairly or very small fraction of the accommodation cost (Sifo 2011: Project 1523775). Maybe because about 40% of those living in villas, to some extent, heats it with firewood or the like (SCB, 2004).

Pets
According Sifo (Sifo 1994: Project 3241080) it is quite a lot (37%) who are living in a household where there is a pet of some kind.

Annoying neighbours
The majority (Sifo 1996: Project 3251970) is never disturbed by their neighbours regardless of if they live in an apartment or a villa (apartment accommodation 67%, villa/townhouse accommodation 89%, and people living in the country 93%). Few people (1-3%) think that they are often disturbed by their neighbours. Among those who are disturbed at times, dominate those who lives in apartments (13%), compared to the villa/townhouse residents (2%) and those who live in the country (0%).

Choice of residential
According to Sifo (Sifo 1995: Project 3242560) most people want to keep living where they currently live. This applies particularly to those living on the countryside (about 90% of them are content to stay where they live), but it applies even those who live in a suburb (about 70%), or in the town centre (about 65%).
Most (about 75%) believe it is important that there are green spaces in the neighbourhood and that it is important that the area is quiet and undisturbed (about 70%). The most common reason to move from the current home is that the cost is too high (about 60% said so). The second most common cause is messy and annoying neighbours.
Another survey made by Sifo (Sifo 2002: Project 3826070) also indicate that many think it is important that it is close to nature and green spaces (men 30%, women 35%) and that it is a quiet residential area (men 36% , women 36%). Quite a lot (men 13%, women 15%) think it is important that there are good transport links to the area and that it is close to shops (men 10%, women 16%), as well as safe and secure (men 15%, women 16%). There are also quite a lot who think it is important that it is a beautiful and pleasant outdoor environment (men 18%, women 22%) and that it is suitable for children (men 13%, women 20%). A few (men 7%, women 6%) think it is important that the property has high standard or that there are few immigrants in the area (men 2%, women 3%), or that it's close to work (men 8%, women 9%).

Changes at home
Most people (both men and women about 74%) wants to change their homes (Temo 2002). The most common (both men and women about 27%) want to remodel the kitchen, which usually involves replacing the fixed kitchen layout. The next most common desire is to rebuild the bathroom, which usually involves replacing of the fixed bathroom furnishings.

The accommodation of the elderly
Many (46%) wants to continue living in their home even when they become old (Sifo 2003: Project 1510903).

Sauna and balcony/terrace
It is pretty common to have access to a sauna at home (15% of the population, Statistics 2004, data from 1999). And it is even more common, according to the same survey (data from 2002) to have access to a balcony or a private patio on the ground (92% did so).

Layout, size and views
The majority (83%) are satisfied with the layout of their accommodation/size (80%) and 75% are satisfied with the view (SCB 2004).

Economy

The distribution of household expenses
According to Temo (DN/Temo 2002) the majority (over 50%) of all cohabiting persons splits the family expenses equally. There are also quite a lot of relations (approximately 33%) in which those who earn the most pays for a larger part of the expenses.

Income from employment
The average monthly wage for workers in the private sector (SCB 2009: Table 305, data from 2008) is for men 23 600 and women 21 000 SEK. While the male white collar workers on average earn 36 100 SEK/month and the female ditto earns 28 200 SEK/month. In the government sector, the average salary for men is 31 000 SEK and for women it is 27 200 SEK. In the municipal sector the equivalent is 24 700 SEK for men and 22 800 SEK for women. In the municipal sector the equivalent is SEK 36 500 for men and 26 500 SEK for women.
Men with a maximum of nine years education in average earn 24 700 SEK per month (table 306) while ditto women earn 21 400 SEK. Those with a maximum of two years of secondary education earn slightly more (26 300 men, women 22 600 SEK), but those with a longer-secondary education did not earn more (26 200 SEK men, women 22 400 SEK). While persons who had a post-secondary education less than three years earned: 32 100 men and women 25 800 SEK. Those with a post-secondary education longer than three years earn: men 38 200 SEK, women 29 100 SEK. Graduate trained men earned an average of 46 400 SEK and ditto women earned 39 100.

Income from capital
The average interest income is 4 204 SEK (Swedish National Tax Board in 2001, data from 1999). On average we gain 10 358 SEK on our capital including deductions for capital losses. Finally, we pay an average of 6 056 SEK in debt interests.

Shares
According to Temo (Temo 2000: I) the majority (66%) own some form of shares or equity funds. The majority (54%) have shares in a mutual fund. But there are also many (36%) who own listed shares and quite a few (15%) owns unlisted shares.

Pocket money
Temo (Temo 2001) have shown that many children (boys 38%, girls 40%), gets pocket money monthly. The next most common is weekly payments (boys and girls 30%). It is also quite common to get money when needed (boys 28%, girls 31%). There are very few who receive all or part of the child allowance (5% boys, girls 9%). There are also quite a few who do not get any money at all for their own use (boys 5%, 4% girls). Boys receive an average of 189 SEK/month, while girls get 252 SEK/month. Weekly pocket money is most common among children aged 7-9 years (an average of 74 SEK/month) while the monthly payment is most common among those aged between 13-15 years (average 434 SEK/month). Most (54%) use it for candy/snacks/ice cream/soda. A majority of the children (63%), however, also saves money. On average, the children save 19% of the money they get.

Faith in God

According to Sifo (Sifo 2000: Project 3805270), it is a lot who believe that there is a higher power (39% of the men and 52% of the women). It is also pretty common to believe that there is a God (10% of the men and 16% of the women). While only a few believes that there is a God and that Jesus is the saviour of the world (6% of the men and 10% of the women). However, it is also common to not believe in any of that (43% men and 20% women).
A few, almost every day, pray for a while in the morning or in the evening (men 10% and women 16%), or to meditate almost every day (10% of men and 18% of women).
According to another survey by Sifo (Sifo 2000: Project 6815520) many (30%) very often or fairly often gets in contact with the Bible in any way.
Yet another study by Sifo (Sifo 1998: Project 4181100) shows that most men and the majority of women (men 80%, women 58%) do not believe in reincarnation (i.e. rebirth). Few men, but quite a lot of women (men 8%, women 17%), however, believe the opposite. Others believe in it partly (men 6%, women 13%) or do not (men 7%, women 12%).

Ghosts
The majority (57%) do not believe that people comes back after death (Sifo 2012: Project 1524152) and even more (79%) have never seen or felt that they had been in contact with, or had a perception of, a person who is dead.

Health

Cause of death
The most common causes of death[3] (Welfare 2002, data from 2000) are diseases in the heart and/or in blood vessels (men 46%, women 47%). The second most common cause of death is cancer (men 25%, women 22%), followed by respiratory diseases (men and women 7%). Few people die due to any other cause of death, such as injuries and poisoning (6% men, women 3%) and digestive diseases (men and women 3%).

3. The cause of death is the disease or injury that initiated the chain of disease events that directly led to the death or the circumstances of the accident or violence which produced the fatal injury. Each deceased has only one underlying cause of death.

Average life length
The average life expectancy is 77 for men and 82 years for women (SCB 1998: 317, data from 1998).

Pharmaceuticals
According the Welfare Board (Socialstyrelsen 1998), the majority, at some point during a two week period, has used a drug (men 68%, women 85%) Some of the, in the report, recognized drugs are: cough syrup (men 9%, women 12%), penicillin/sulpha (men 2% , Women 4%), vitamins, etc. (men 23%, women 34%), ulcer medication (men 3%, women 4%), herbal remedies (men 8%, women 15%), pain killers without a prescription (men 35%, women 49%), of which regularly: men 1.2%, women 3.0%, painkillers with prescription (men 8%, women 14%), sleeping pills, regularly (men 1.6%, women 2.3%), antidepressants regularly (males 1%, 2% females), nerve sedative, regularly (males 1%, females 1%).

Mental health
The majority (Sifo 2001: Project 3815030) of us (men 95%, women 93%) believe that they feel very or fairly good mentally. While few (4% men, women, 6%) believe that they feel fairly or very bad mentally. 40% of the men and 45% of the women thinks that they sometime in the past year has felt depressed. While 60% of the men and 54% of the women thinks the opposite.
According to The Welfare Board (Socialstyrelsen 1998), it is pretty common to feel worry or anxiety (men 11.4%, women 19.7%).

Satisfaction with life
The majority (Sifo 1996: Project 3261600) of us (men 61%, women 57%) are on the whole quite satisfied with life. There are also many who are very satisfied (men 31%, women 34%). While a few are quite dissatisfied (4% men, women, 6%), completely dissatisfied (men 2%, women 2%), or don't know (males 1%, 2% women).
Many (men 43%, women 41%) think it has become somewhat better than what they expected ten years ago. Quite a lot (men 21%, women 23%) think, however, that it has become slightly worse, and almost as many (men 20%, women 20%) think it has become much better. There are few (men 9%, 7% women) who think it has become much worse, or who don't know (men 7%, women 9%).

Physical illnesses
According The Welfare Board (Socialstyrelsen 1998), it many that visit a doctor at any time during a three years period (men 24%, women 28.2%). It is more common among those over 65 years (30-40%), compared to those who are between 16-65 years (about 20%). The most common cause is musculoskeletal diseases (18.0%), circulatory diseases (13%), hypertension (7.4%), or nervous disorders (7.0%).
It is (Socialstyrelsen 1998) many who suffer from back pain, sciatica, or hip pain (men 33.8%, women 41.8%). Many suffer from pain in the neck or shoulders (men 30.3%, women 49.3%). It is also pretty common to feel pain in the hands, elbows, legs or knees (men 25.1%, women 33.6%). Moreover, it is pretty common among women with recurrent headache or migraine (men 8.9%, women 17.6%).

Allergies
Just over a third of us have some form of allergy or intolerance (Socialstyrelsen 1997). But according to SIFO (SIFO 1994: Project 3241080) at least one person is allergic to something in one third of the households, suggesting that The Welfare Boards data is an overestimation.

Cancer
Among men, the most common type of cancer is prostate cancer (26.9% of the cancer) and for women, breast cancer is the most common (27.1%) (SCB 1998: Press Release 7).

Constipation
It is (Sifo 2002: Project 3816230) quite a few (20%) who sometimes feel that the stomach is constipated. It is more common among women, and there are more times when they become constipated. Those who tend to be constipated often feel troubled by this, for example feels bloated (66%), or in a bad mood (32%).

Sexually transmitted diseases
A study from the National Public Health Institute (Folkhälsoinstitutet 2000: 17) shows that approximately one in five men and woman have had a sexually transmitted disease, and six percent have had it more than once. Among those 25-49 years, more than one in three has had a sexually transmitted disease. Those who have had a sexually transmitted disease have on average had 22 partners, compared with 8 among those who never had a sexually transmitted disease. Just over half of the women and one third of the men who took part in Lewin's investigation and have had a venereal disease, thought that they had been infected by a steady partner.

Food poisoning
About 6% of the Swedish population gets food poisoned each year, half of these gets food poisoning from food that they have cooked themselves (Livsmedelsverket 1998).

Crime

Public moral

According to Sifo (Sifo 1996: Project 3251970) most of us would not do anything if we saw that our neighbour worked even though he/she is officially unemployed and gets unemployment benefits from the society. Somewhat fewer, but still a majority, would not do anything if an acquaintance, who receives early retired benefits due to sickness, worked extra. If a colleague told about a successful tax manipulation, few would call the Tax Authority to tell them about it. Instead, they would tell the co-worker that it is wrong to cheat or just let it pass.

Percentage that has been victims of crime

Statistics from The Crime Prevention Council (Brottsförebyggande rådet 2002) shows that over a million crimes is reported in Sweden annually, which is 13 crimes per 100 inhabitants. Out of these, stealing in motor vehicles constitutes 12%, 11% vandalism, bicycle theft 6%, 5% assault, burglary of dwellings 1.2%, and sexual crimes 0.8%.

According to Sifo (Sifo 2002: Project 3826070) quite a lot of the households has experienced theft sometime in the last three years, such as bicycle theft (men 25%, women 23%), car crime (men 19%, women 16%). While just a few has suffered from theft in storage sheds or the like (men 10%, women 7%), vandalism (men 10%, women 9%), burglary (7% men, women, 6%). Many are also afraid of burglaries (men 26%, women 35%).

Steal from the workplace

According Sifo (Sifo 1998: Project 3281820), the majority (men 49%, women 61%) have never taken anything from their workplace. But there are also many who repeatedly are taking something (men 45%, women 33%).

Percentage who suffer from violence or threats

There are few of us between 16-84 years (men 10%, women 6%) that, over a one year period, will be subjected to violence or threats (SCB 1997: Living Conditions Report 91). Of these, 4% will be the victim of some form of physical violence. One percent of them get so much damage that they seek medical treatment, of which 75% are men. The dominant groups are young men (often associated with entertainment and in central parts of cities), women (who are exposed to violence in the home), and some professions (such as police and security guards).
According to Sifo (Sifo 2002: Project 3826070) in just a few of the households there is someone who has suffered from threats (men 6%, women 5%), or assault (men 2%, women 3%). Most (men 94%, women 85%) also claim that they are never afraid in their own neighbourhood. Some, however, feel fear sometimes (males 6%, women 13%). Among those who sometimes are afraid, many are afraid of being attacked (men 26%, women 41%).

Littering

Most (61%) claim that they never litter on the streets or in the nature (Sifo 2007: Project 1515606).

Alcohol related crimes

Alcohol plays a big role in violent crimes. About 70% of all offenders and about 40% of all victims of violence reported to the police, were under the influence of alcohol (Folkhälsoinstitutet 1998). Moreover, a large part of the violence reported to the police has happened in or near restaurants and other places where alcohol is served.

Alcohol related road accidents

In 3.5% of all road accidents involving motor vehicle drivers, it is suspected that any of the drivers has been intoxicated (Folkhälsoinstitutet 1998).

Food and drink

Alcohol
Spread over all residents over 14 years, the governments alcohol stores (Systembolaget) sell 3.9 litres of pure alcohol per person and year (Folkhälsoinstitutet 1998). Most of the alcohol is sold in the form of wine. In addition, alcohol is imported by private companies and sold directly to restaurants. Moreover, it is quite a lot (21%) who at any time during a one year period drinks home-distilled spirits.
Most (80%) think it is good that alcohol advertising on radio and television is forbidden (Sifo 2011: Project 1522398). And the majority (78%) are opposed to that channels based in the UK, despite the ban, sends such advertising directed against Sweden.

Fruit consumption
According to Sifo (Sifo 1995: Project 3242040) a majority (men 53%, women 66%), eats a serving of fruit 1-2 times per day. But there are also many (31%) who eats a fruit less than once per day. The majority (54%) believes that they eat enough fruit, but there are also many (43%) who do not. The main reason for not eating fruit more often is that they already consider themselves eating enough fruit (42%). Other reasons are that they don’t have fruit available (14%), fruit it is too expensive (10%) or not that they do not tolerate fruits (9%).

Vegetable consumption
The same institute (Sifo 1995: Project 3242040) has also shown that the majority (79%) eats a serving of vegetables 1-2 times per day. But quite a lot of us (14%) eat a serving of vegetables less than once per day. The majority (60%) thinks that they eat enough vegetables, but there are also many (39%) who would like to eat more. The most common reason for not wanting to eat more vegetables is to believe that the consumption is already sufficient (53%). Then reasons like not to have vegetables available (9%), it depends on the taste (8%) or that it is too expensive (7%) were mentioned. 5% think it takes too long to prepare, 3% are not used to eating vegetables and the same fraction (3%) say it is due to laziness and carelessness. 2% of the respondents say that they do not tolerate vegetables or that they are allergic and just as many say that they just forgets to eat it.
According to another study by Sifo (Sifo 2001: Project 3615210) most of them, who eat lunch at a restaurant, takes salad from the salad table (men 88%, women 67%). Many (about 40%) have dressing on their salad.

Desserts
Ice cream seems to be the most popular dessert to serve if someone gets guests. Since many (33%) preferably offers ice cream (Sifo 2004: Project 1512076), compared to the other dessert options in the survey, such as fruit salad and cake that all ended up under 10% of the respondents. Dairy ice cream is the most popular (64% holds dairy ice cream as their favourite favourites over other types, Sifo 2004: Project 1512370) and a third of us eat ice cream every week. Usually in the form of ice cream packages (43%) and vanilla is the most popular flavour (46% thought it’s their favourite).

Total food consumption

According to The Board of Agriculture (SCB 2000: Table 7.4, data from 2000) we eat[4] food for an average of over 1 000 SEK per month (1 330 SEK men, women 1 050 SEK, children 7-10 years 1 000, children 4-6 years SEK 830). If the total documented amount of purchased food during one year was put in a bag, the value of the bag would be distributed approximately as follows (Konsumentverket 1997), "other food" 25%, meat 16%, milk, cream and cheese 10%, candy, chips and ice cream 8%, vegetables, root vegetables and potatoes 7% bread, pasta and the like 7%, fruits and berries 7%, beer, soft drinks and mineral water 5%, cakes, sweeteners, jams and marmalades 4%, coffee, tea and cocoa 3 %.

4. If all meals are eaten at home and/or work in the form of food boxes.

Lunch habits

A majority (50%, Sifo 2001: Project 3615210) of those who eat lunch at a restaurant, choose a typical meat dish (steak, ground beef, stew or sausages). There are also many who choose dishes that are not typical fish or meat dishes (29%). Quite a few select fish dishes (19%) and few (2%) choose dishes without animal products (vegetarian food). Most men who eat lunch at a restaurant do it every day (men 71%, women 31%). Among women, it is common to eat at a restaurant at the most once a week (men 12%, women 50%). The most common reason for choosing a particular lunch restaurant is that it has good food (men 70%, women 85%). Other factors that many states as important when choosing a restaurant are: geographic location (49%), good service (44%) and that it looks good (31%). There are quite a few who think that the following factors are also important: the selection of food (23%), price (20%), the company (18%), or the range of additional (14%).

Dining habits

Again according Sifo (Sifo 2000: Project 3805040) the majority eats dinner at home most weekdays (men 78%, women 80%). An even larger percentage usually eat dinner at home even on weekends (men 86%, women 87%).

Nutrial content

The Board of Agriculture (SCB 2002: I, Table 368, data from 1999) says that we in average eat 121 grams of fat, 340 grams of carbs and 94 grams of proteins per person and day.

Smoking

Smoking is pretty common in Sweden (men 20%, women 25%, Sifo 2000: Project 3805450). Among men, there is also many snuff users (men 26%, women 2%). The most common, however, is not to do either (men 58%, women 76%).

Family life

Family circumstances

According to the population register (SCB 2002: I, 2000 data) 54% of all households consists of one person. There are about as many men as women who live in single households. 17% of all households consist of two cohabiting persons without children. 17.2% consists of cohabiting couples with children, where the youngest child is between 0-17 years, 4.7% consists of single women with children and 0.9% of ditto men.
According to Statistics Sweden (SCB 1997: Statistics, Social Services 1997: 2), half of all newborns have married parents and the majority (90%) of those who not have married parents, have cohabiting parents.
According to Sifo (Sifo 2000: Project 3806590) the majority who have children under 10 years lives together with the children's mother/father (men 85%, women 80%). Many of those who live with the child's/children's other parent (men 66%, women 50%) believe that both of them are have the practical main responsibility for the child/children. Many of them very often or fairly often, feel guilty because they do not have enough time for the children (men 36%, women 47%). But a majority, rarely/never, believe that this is the case (men 63%, women 51%).

The majority (80% of men and 81% of women) feels that it would be fairly or very difficult to end up in a divorce (2004: Project 1512206).

Socializing with family

Most (93%) spend time with someone/some of his relatives (Sifo 2005: Project 1514122) and the majority (59%) do so at least once a week.

Sex and relationships

Abortion

Nearly one of three pregnant women over 25 years has interrupted their pregnancy with abortion (Folkhälsoinsistutet 2000: 17). In the age group of women 18-24 years, 49% of those who had been pregnant have had an abortion. The proportion of repeated abortions is found to be greatest in the age 35-49 years, in that group every fourth woman has undergone two abortions. And according to The Welfare Board (Socialstyrelsen 2000) about 26 of 100 known pregnancies ended with abortion.

The wish for children's

Just over 3% of us wanted to achieve a pregnancy at the last intercourse (Folkhälsoinstitutet 2000: 17). Among 25-34 year olds, nearly one in ten people answered that they desire to have a child. Almost one in five women aged 25-34 have, during at least six months, tried to get pregnant without success. The majority (Sifo 2000: Project 3806590) of those who already have children, wants to have more children (men 67%, women 59%). But there are also many of those who do not have children who do not want to have children right now, or ever (men 30%, women 35%).
In another Sifo study (2004: Project 1512206) 60% of the men and 76% of the women thought that it would be fairly or very hard to end up without children’s.

Fertility

The average fertility rate in Sweden is about 1.5 children per woman (SCB 1998: 053).

Relation to sex partner

According to the Public Health Institute (Folkhälsoinstitutet 2000: 17) most people are married to the one they are having sex with (49% of men and 53% of women). Or living together without being married (22% of men and 23% of women). To go steady without sharing the same dwelling is also pretty common (about 14% of respondents). That the most recent intercourse was with a friend or former partner is less common (2-6% of the respondents). None of the women and less than one percent of the men had the last sexual intercourse with a prostitute and only one percent of them had sex with someone they did not know before.

Homosexuality

According to the Public Health Institute (Folkhälsoinstitutet 2000: 17) approximately 2% of us prefer to only be with people of the same sex. Furthermore, a few percent of the men and more than 17% of the women has fantasized sexually about people of the same sex.

How do we have sex

Vaginal intercourse is the predominant form of six (95% of the men and 94% of the women did so during the most recent intercourse, Folkhälsoinstitutet 2000: 17). Stimulation of the genitals using the hands is also very common (59% of men and 72% of women were stimulated with a hand during the last intercourse). Stimulation of the genitals using the mouth is quite common (about 25% of respondents). But few had anal intercourse (about 1% of respondents). The majority had ejaculation/orgasm (71% of the men and 62% of the women). According to the interviewed men 59% of the females had an orgasm and according to the women 76% of the men ejaculated.
According to Sifo (Sifo 2002: Project 3825940) many (men 58%, women 28%) think that there are occasions when one ought to have sex because the partner wants it, even if one does not feel like it. But there are also many who thinks the opposite (men 34%, women 54%). Many also have had sexual intercourse with the partner even if they themselves didn't have any lust (men 39%, women 40%), but there are more who have not had it (men 47%, women 42%).

When we have sex

Among those living with a partner (men 22%, women 19%) Saturdays (Sifo 2002: Project 3826260) are the most common day in the week to have sex on. There are also quite a few who usually have sex on Fridays (men 12%, women 11%) or Sundays (men 13%, women 10%). The rest usually have sex other days of the week, or do not know (men 38%, women 32%), or do not want to answer the question (men 31%, women 42%).

According to the same study, most of the sex is done in the evening (men 51%, women 42%). There are also quite a lot who usually have sex at night (men 14%, women 10%), or in the morning (men 13%, women 11%). The rest usually have sex at some other time of the day, or do not know (men and women 7%), or they do not want to answer the question (men 25%, women 37%).

38% of the men and 49% of the women strongly agree on that it is important that sex is spontaneous for it to be good (Sifo 2004: Project 1512206) and 48% of the men and 61% of the women strongly agree on that it is important to have time for romance.

Infidelity

It is common to, some time during a marriage or when cohabiting with someone, has sexual intercourse with someone other than the partner (men 38%, women 23%) (B. Lewin, 1996). 15% of the women and 11% of the men think that their partners have had sex with another person.

But 59% of the men and 71% of the women believe that it would be very difficult if they or their partner was cheating (Sifo 2004: Project 1512206).

Contraception

According to the Public Health Institute (Folkhälsoinstitutet 2000: 17), it is common that even those who do not want to make a pregnancy have sex without protection (42% had no protection during the last intercourse). The pill/p-rod/contraceptive injection is quite common (20%). 15% used a condom, 13% used IUDs and among 10% of those surveyed were sterilized (or their partner was).

Prostitution

According to the Public Health Institute (Folkhälsoinstitutet 2000: 17), almost 14% of Swedish men have paid to have sex with someone. The corresponding figure for women is 0%.

Sexual partners

Men on average have had 7.4 sexual partners and women 4.6 (Folkhälsoinstitutet 2000: 17). The top 10% most active men have had 29-560 partners each. Together, these 10% had 53% of all the sex partners. The top 10% most active women had 15-100 partners each. Together, these 10% had 41% of all the sex partners.

Sexual debut

The average (median) age at the first intercourse for both men and women aged 18-49 years are between 16-17 years (Folkhälsoinstitutet 2000: 17). The men and women who were older than 49 years had their first intercourse one or two years later (in median).

Sexual frequency

According to the same institution (Folkhälsoinstitutet 2000: 17), we have in average 65.4 sexual intercourses/year. When only counting those who have sex, they in average have 78.6 intercourses per/year. Sifo (Sifo 2002: Project 3826260) has shown that quite a few of those who live with a partner have sex several times a week (men 23%, women 16%). There are also quite a few who have sex about once a week (men 17%, women 16%) or several times a month (men 15%, women 13%). The rest have sex less often or are undecided (men and women 2%), or they do not want to say how often they have sex (men 24%, women 36%). According to a recent Sifo study (Sifo 2006: Project 1514666), 28% had sex 1-4 times in the last four weeks and 32% had it even more often. Most (men 71%, women 71%) are also satisfied with their sex life. In addition, 74% think that it is difficult to have a good relationship without a functioning sex life.

Sexual inability

The Public Health Institute argues (Folkhälsoinstitutet 2000: 17) that it is less common among men to feel that they have sexual dysfunction compared to among women. Decreased interest in sex is twice as common among women as among men. Men feel sexual desire more frequently than women, and younger individuals more frequently than older persons. Difficulty in getting an orgasm is most the common failure among women and premature ejaculation is the most common for men. According to Sifo (Sifo 2006: Project 1514666), the majority (60% of both men and women) think that at some point in their lives med experience dissatisfaction with their sexual capability. In another Sifo study (Sifo 2004: Project 1512206) quite many (men 33%, women 41%) replied that they believe that impotence is usually due to performance anxiety/stress/nervousness.

Where we have sex

According to Sifo (2002: Project 3825160), we most often have sex in the bedroom (men 97%, women 96%). The majority also fantasize the most about having sex in the bedroom (52% of the men and 51% of the women). But 12% of the men and 9% of the women fantasised about having sex in other areas in the home including balcony/garden/patio. The rest of the interviewees said they do not know.

Where we meet

The Public Health Institute also claims (Folkhälsoinstutet 2000: 17) that it is common to meet sex partners at bars or dance halls (29% of the men and 31% of the women). It is also quite common to meet the sex partner at acquaintances (28% of respondents). It is less common to meet them at work or in school (work: about 12% of the respondents, school/training: 8%). To meet someone when doing any hobbies is also uncommon (about 6% of the respondents). One percent had met the sexual partner through the personals and one percent of men had had the most recent sexual contact with a prostitute.

Characteristics of the partner

It is quite common (men 10%, women 18%) to find a partner whose properties very or fairly closely resemble their mothers or fathers (Sifo 2003: Project 1510814).

Education

According to Statistics Sweden (SCB 2002: I: Table 281), the largest part of the workforce (31%) has undergone elementary school supplemented with a secondary school education during up to 2 years. But quite a lot (21%) have only studied at the elementary school. There are also quite a few who have studied at elementary and at secondary schools for more than 2 years (18%), 16% have a post-secondary education that is less than 3 years long, or longer post-secondary education (13%).

Activities

This chapter presents some main data describing our everyday lives. They are collected by public authorities and private market investigation companies. For more data about how much time we use for various tasks, I recommend searching in the SCB reports based on their time-use studies.

Professional life

Working time
The average working time for men is about 41 hours per week and for women it is about 27 hours (SCB 1998: Living Conditions Report 79).
According to Statistics Sweden (SCB 2002: I: Table 293) quite a large part (28%) of the workforce is working overtime at least once a week. The majority (59%) has flexible working hours and they have worked at least 10 years with the current occupation (53%).

Work-related symptoms
Many (33%, Statistics Sweden 2002: I: Table 293) have been involved in conflicts/fights with other people at work sometime in the past 12 months. Many (45%) usually are fatigued in the body, and/or are tired and listless (38%). Quite a lot (20%) have trouble sleeping because they think about the job and/or feel uncomfortable about going to work (18%). Many (32%) had weekly pain in the upper and/or lower back (25%), it is also many that every week has sore shoulders (30%) and/or pain in the hips, legs or feet (24 %).

Work-related stress
According to Statistics Sweden (SCB 2002: I: Table 293), the majority (60%) of the workforce has far too much to do and many (38%) believe that it is stressful at least half of the working time. 47% also have a psychologically stressful work.
The majority (72%, Sifo 2001: Project 3815040-41) think it is the work requirements that makes them the most stressed. Quite a lot (15%) think, however, that it is the demands from family and/or leisure activities that make them the most stressed. Quite a few (23%) think that the demands from family, friends or some other non-work related factor that makes the everyday life heavy.

Job requirement
According to Statistics Sweden (SCB 2002: I: Table 293), the majority (67%) thinks that their work requires an apprenticeship period on up to a few months. Quite a lot (14%) also believe that they have too easy duties, while about 12% believe the opposite.

Duties
According to Statistics Sweden (SCB 2002: I: Table 293) many (men 28.5%, women 32.1%) performs computer work at least half the working time. There are also many who have a pure manual labour (men 39.5%, women 33.3%).
At least a quarter of the working time: 24.3% of the men and 11.6% of the women uses handheld or portable machines; 15.6% of the men and 1.5% of the females uses driven machines (cars, trucks or buses excluded); 13% of men and 4.5% of women works with stationary machines, 20% of the men and 5.8% of the women uses a car.

Sector
Many work in the sector of commerce/communications (19.2%), manufacturing companies (19.1%) or in health care/social care (18.5%, Statistics Sweden 2002: I: Table 284). The rest work in financial/business services (13.2%), education (8.7%), personal and cultural services/sanitation (7.9%) or in the public administration (5.4%).

Flatness towards managers
Most (68%, Sifo 2004: Project 1511710) does often or quite often tell the boss if they are unhappy with something.

Control over work
According to Statistics Sweden's Labour Force Survey (SCB 2002: I: Table 293), there are many (45%), which mostly can't decide when different tasks is to be done. Many (52%) have no control over their own work pace under more than half of the working day. There are also quite a few (26%), which mostly never decide about the organization of their own work.

Satisfaction with the work
Most (59%) feel very good at their job (Sifo 2003: Project 1511207) and the majority (72%) have never sought medical attention for because the situation at the job have made them physically or mentally ill.

Housekeeping

Children's participation
Temo has shown (Temo 2001) that most children (88%) between 7-15 years are helping at home. Most often, they make their own bed/cleans their room (61%) or take care of washing (26%).

The distribution of housework between the sexes
According to a survey from 1990/91 (SCB 1998: Living Conditions Report 79) men devotes about 20 hours per week to housework while women devote 33 hours. Personal needs (mostly sleeping) both sexes devoted about the same time for (men 68, women 71 hours per week). Both sexes, on average, had about as much free time (men 35, women 33 hours).
According to another study (SCB 1998, Women's Power Inquiry) woman makes 82% of all the household work. In only 10% of families with children she shares and he even on the unpaid work. Young couples without children share the household work relatively equally. Children will increase the women's household work while it remains unchanged for men. The un-equal ness is established in early childhood and tends to persist.
In yet another study by Statistics Sweden (SCB 1992, data from 1990-91) men devoted on average totally 6.36 hours per week to housework, while women uses 17.22 hours on it.

Grocery shopping
The majority of all visits to grocery stores (Movement Research and Consulting 2002) is to shop for the day or do some supplementary shopping (households with children 84%, households without children, 89%). Only a small proportion of the visits are made to shop for the whole month (households with children 3%, households without children 2%), or for a week (households with children, 13% of households without children 9%). Even on the big supermarkets the majority (75%) of the visits are done to get some complementary stuff. Quite a few (20%) have a written grocery list along to the store. But most decisions are made on the shop floor, both in terms of the type of product and the brand.
Among spontaneous purchases are diet supplements/herbal products, deodorants, cakes, biscuits, cheeses and sweets the most frequent. The geographical location of the store and habit determines which store we choose.

Cleaning
According to Sifo (Sifo 1994: Project 3241080) virtually all of us vacuum clean and most (90%) also cleans the toilet when cleaning the home. Most (85%) dusts the furniture and cleans the sink and wet dryers the bathroom and kitchen floor (80%). According to most women and many men, women are responsible for cleaning the home (men 37%, women 70%). There are more men than women that believe that cleaning is carried out jointly (men 30%, women 18%). There are quite a few men and very few women who claim that it is essentially the man that is in charge of the cleaning (men 25%, women 5%).

Wet cleaning
In most households (80%) the bathroom is wet-cleaned at least once a week (Sifo 1994: Project 3241080). Most (76%) also wet-clean in the kitchen at least once a week, and quite a lot (about 25%) do so several times a week. The majority of the households (nearly 60%) wet-clean also other floors at least once a week. The majority (approximately 60%) cleans the toilet several times a week, but there are also many (about 35%) which make it about once a week. Many (about 40%) clean the dishcloth in the kitchen at least once a week.

Change of linen
In the majority of the households (60%) the sheets are normally changed every fortnightly (Sifo 1994: Project 3241080). Quite a few (25%) changes more or less frequently (about 12%). There are more men than women (men 32%, women 19%) who believe that it is done every week.

Dishwasher and washing machine
Most (men 71%, women 72%, SCB 2002: II) have access to a washing machine. The majority also have access to a dishwasher (men 55%, women 56%).

Meals
Statistics Sweden claim (SCB 1992, data from 1990-91) that during weekdays we, in average, spend one hour of our time on eating (men 1.02 hours, women 1.08 hours). During the weekends we spend a slightly longer time (men 1.32 hours, women 1.34 hours).

Personal hygiene and appearance
According to the same source as above we during the week spend, on average, nearly an hour on personal hygiene, dressing and undressing (men 0.44 hours, women 0.52 hours). During the weekends, the time is slightly longer (men 0.51 hours, women 0.56 hours).

Quite a number of women over 39 years (28%) have at least once used anti-wrinkle creams (Sifo 2004: Project 1512532), although only 15% believe that they might help. And most (88%) were not bothered at all by their potential wrinkles.

Most (men 91%, women 71%) have no complexes about their appearance (Sifo 2003: Project 1510150). Out of the 9% male and 28% of women have one or more complex, weight is the most common (47% men, 43% women). Most (men 96%, women 88%) of those who believe they have complex, would not be willing to perform plastic surgery. The results from another interview (Sifo 2009: Project 1518329) suggest the same thing as most (men 91%, women 86%) even in that study stated that they would not be willing to go through plastic surgery to improve their appearance.

Sleep
According to Statistics Sweden (SCB 1992, data from 1990-91) we in average sleep 7 hours per night during the weekday nights (men 7.13 hours, women 7.34 hours). During the weekend nights we in average sleep over 8 hours (8.31 hours men, women 8.35 hours). Quite a few (men 17%, women 19%), in the weekdays, goes to bed between 22:00 to 22:30, and the majority (men 53%, women 60%) has gone to bed at 23.00. Quite a few (men 30%, women 17%), however, goes to bed around 23.00-24.00. After 06:30, the majority has gone out of bed (men 66%, women 55%).
According Welfare (Welfare 1998), many of us between 16-84 years often feel tired (men 31.5%, women 45.7%) and there are quite a few who have trouble sleeping (males 13.6%; females 22.1%).

According Sifo (Sifo 2000: Project 6305090), the majority (approximately 75%) thinks that they sleep enough. The majority (about 75%) also consider it to be easy for them to fall asleep. It is less common to have difficulty falling asleep (13% of men and 20% of women). Among people who are older that 49 it is more common (85%) to sleep enough compared to the younger (65%).

Socializing

According to a study (Nilsson Å 2002) we hang out once a week with someone outside the family. The age group in which the largest proportion of people spending time with someone outside the family, are those between 35-64 years (49%), followed by 20-34 years (42%), 0-20 years (29%), 65-79 years (25 %) and 80 - (13%). Until the retirement age nearly half of those living in large cities meets friends several times a week, compared with just over a quarter of those who live in rural areas. In rural areas, however, they spend more time socializing intergenerationally. Mainly we hang out with people in our own age, while older people often associate with people who are younger than them.
According to Statistics Sweden (SCB 1992, data from 1990-91 for people aged 20-64 years) those living alone spend, on average, the greatest part of their leisure time socializing with people outside the family (men 19.57 hours/week, women 18.29 days/week). Those who are cohabiting with someone spend significantly less time on this (men 10.30 hours/week, women 9.58 hours/week).

Traditions

Christmas

According to Sifo (Sifo 2000: Project 6605260) the most common tradition is to visit relatives (82%) on Christmas Eve. The second most common is to see "Donald Duck's Christmas" on TV (76%). It is also very common to play any type of game (53%). It is also usual to travel somewhere (33%), go to the early Christmas ceremony at church (30%) and dance around the Christmas tree (26%). It is quite common to play Christmas games (24%) or to read the Christmas gospels (14%).
Among those who play games the most common is to play board games (86%) but it is also common to play cards (43%) or video games (24%).

According to Temo (Temo 2000: II), it is very common to have Christmas ham (about 80%) and a Christmas tree (almost 80%) during the Christmas season. It is common (approximately 40%) to make toffee, have a Santa Claus or to eat stockfish. There are few (8%) that will not have any of this at home.
It is, according to Temo, more common (52%) to celebrate Christmas in more than one home compared to in just one (48%). It is also common (34%) to be involved in several Christmas parties.

Cultural consumption

The information in this subchapter is based on data from an annual survey about the Swedish media habits conducted by the Nordic Centre for Media and Communication Research. Data are taken from the survey in 2000 (Nordicom 2000). The data are based on telephone interviews with 2 300 persons aged between 9-79 years in which the centre asked the interviewees to estimate how much books, TV and so on that they have read/seen the day/week before the interview.

Cinema visits

There are quite few as one average week visiting a cinema[5] (men (8%, women 9%)., It is most common among those aged 15-19 years (22%) and it is least common among those aged 65-79 years (1 %). The proportion of cinema visitors are greatest in Stockholm (14%) compared with other reported localities (4-8%). The proportion of cinema visits is the highest (12%) among those with a "long" education at a university (> 3 years).

5. Including visits to film clubs and film festivals.

Book reading

It is common (39% of the population) to an average day, read a book of any kind (Nordicom 2000). An average week the majority of us is reading in a book (men 51%, women 66%). It is most common among the

highly educated compared with the less educated (78% high-educated, low-educated 38%). It is most common among 9-14 year olds to read a book an average day and it is least common among those who are between 35-44 years (9-14 years 66%, 35-44 years 37%).
There are a higher proportion of women than men that reads fiction an average week (49% vs. 31%). But it is the same percentage who reads non-fiction (21%). Many (32%) buy the book in a bookstore or borrow it at a library (23%), 12% reads a book that they have borrowed from someone while 10% had received it as a gift, and 8% buy it through a book club. 4% of the books are purchased at kiosks, department stores or bookstores for used books.

Reading tabloids

It is many who, an average day, read a tabloid[6] (men 31%, women 25%). It is most common among people between 35 - 45 years and between 55 - 64 years (30%), and it is the least common among those aged 9-14 years (18%). The proportion of evening papers are slightly larger in Stockholm (32%) compared to the rural areas (29%) and especially compared to Malmö (16%). The percentage varies three percentage points depending on the size of the household. Approximately 25% read only one tabloid while 3% reads two. The proportion of tabloid readers was lowest (19%) among those with "long" university education (> 3 years).

Reading newspapers

An average morning most of us read a morning paper[7] besides Metro (men 75%, women 74%). The average reading time among those who read newspapers is for both sexes about 30 minutes. It is most common among those aged over 65 (percentage 85%, reading time 48 min.) And it is least common among those aged between 9-14 years (37%, 13 min.). The proportion of newspaper readers is a bit larger in cities/large towns (79%) compared to the rural areas (69%). This especially if Metro is included in the question, then the proportion rises to 77% in Stockholm and Gothenburg, and 86% in Malmö. The percentage varies slightly depending on the size of the household (one person 70%, 82% two persons, and three persons 76%, four or more 68%). The majority (63%) read only one newspaper, while 11% read two. 38% only reads a provincial newspaper, while 23% only reads a big city newspaper. The proportion of newspaper readers is slightly higher among those with higher education (81% among those with an university education on up to 3 years and 86% among those with a college education> 3 years) compared with those with lower education (<9 years education, (i.e. only the old type of elementary school) 79%, 9 - 10 years (i.e., modern elementary school) 72%, and those who attended high school without studying further 74%).

7. The newspaper referred to in the survey is papers that come in the morning and at least once a week. The question was asked about the reading the day before the question day and asked for all weekdays. Note, however, that half of all newspapers only come out 6 days a week.

Listening to the radio

Most (about 80%) an average day listens on the radio (RUAB 2000). The average time they listen is approximately 3 hours. This time is relatively similar in the range of 20-79 years, i.e. between 3-3.5 hours/day. Those who are between 9-19 years in average listen far less on the radio (about 1.5 hours/day). Among the older listeners (50-79 years) the Swedish national radio channels dominates in total (about 80%). The younger listeners (between 9-34 years) listens, however, at least as much on commercial radio stations as on Swedish national radio (9-19 years approximately 60% commercial channels, 20-34 years approximately 49% commercial channels). They aged between mostly listen to Swedish national radio (35-49 years 60% Swedish radio).

Listening to music via the Internet

Quite a few (29%) listen to music via Internet services like Spotify sometime during a typical week (Sifo 2010: Project 1518232).

Reading special journals/professional journals

Many reads an average day at least one special/professional journal[8] (men 35%, women 29%). It is most common among those aged 55-64 (38%) and it is least common among those who are between 15-19 years (13%). The fraction of special-/professional journal readers is slightly larger in Stockholm (37%) compared to

Gothenburg (33%) and Malmö (29%), while it in the rest of Sweden is about 31%. 27% read only one special-/professional journal while 5% read two or more. The proportion special/professional journal reading is highest (47%) among those with a "long" university education (> 3 years).

8. With special journal the survey meant papers which focus on one or a few special interests, the professional journal referred to in the survey are magazines from the unions and also professional magazines.

Visiting theatres

According to Statistics Sweden (SCB 2002: I: Table 620), it is common to, some time during the past two years, have visited a theatre (men 35.9%, women 44.6%). Those who have studied at a university to a greater extent visit theatres (56.6%) compared with those who have only studied at the primary school or equivalent (31.6%) or primary + secondary school (36%).

TV viewing

Most people watch TV an average day (men 89%, women 87%). The average time watching TV among those watching TV is about 2 hours (males 118 min., Women, 121 min.). Those who watch the most television are those between 65-79 years (95%, 157 min.), followed by 9-14 years (93%, 97 min.), 45-64 years (89%, 118 min.), 15-24 years (87%, 109 min.), and finally those who are between 25-44 years (82%, 106 min.). Highly educated people are looking less than less educated (83%, 103 minutes compared with 92%, 147 min.). The proportion of TV viewers is relatively equal all over Sweden. And the proportion is relatively similar regardless of the size of the household (one person 87%, 91% two persons, and three persons 85%, four or more 88%). The majority looks at more than one channel, but about a third looks at one channel only. Special TV channels such as film, news or sports channels are seen by less than 10% of the TV viewers.
Data from Statistics Sweden's survey of living conditions (SCB 2002: II) indicate that most people have access to a television set (men and women 98%) and a video recorder (men 88%, women 85%).

Reading weekly-/monthly magazines

It is common to read at least one weekly-/monthly magazine[9] an average week (men 27%, women 39%). It is most common among those aged between 65-79 years (46%) and it is least common among those between 35-44 years (22%). It is slightly more common in the country (36%) compared to Stockholm and Gothenburg (30 %). The fraction readers of a weekly-/monthly magazines are lowest (28%) among those with a "long" university education (> 3 years).

9. With weekly-/monthly magazines the survey meant mens-/women’s journals, and youth magazines that are targeted to a "broad" audience, i.e. non-specialist magazines.

Advertising avoiders

Many (about 39%) of us avoid advertising in most media (Sifo 2008).

Non-profit organization activities

Most (92% men, 89% women) are members of at least one non-profit organization (SCB 2001). The most common is to be a member of a union (58% of the population). It is also common to be member of a consumer cooperative (30%). It is quite common to be a member of an association for housing (23%), a sports club for team sports (19%), a sports club for other sports (15%), or a cultural organization (11%). Quite a few are in an open-air compound (9%), a hobby compound (8%), a senior organization (8%), a political party (7%), a motor organization (7%), or a disability or patient association (5%). Other types of organizations presented in the report organize less than 5% of the population.

Cell phone use

According Nordicom (Nordicom 2000), most people have a private mobile phone (men 84%, women 77%). The age groups with the highest proportion who have a private cell phone are between 15 - 24 years (91%) and the group with the lowest proportion is between 65-79 years (52%).

Physical training

According to Statistics Sweden (SCB 2002: I: Table 614), the majority (men 60.6%, women 57.5%) at least once during the past 12 months have exercised any sport. Those with higher education have done that to a higher extent exercised any sport (75.9%) compared with those who have only primary school or equivalent (43%) or primary + secondary school (58.9%). The age group with the highest proportion of persons that have exercised any sport is those between 16-24 years (85.2%).

According to the same source (SCB 2002: I: Table 613), many (men 29.6%, women 32.2%) have walked in the woods and fields sometime in the last 12 months. Those with higher education have done it to a greater degree (34.8%) compared with those who had only primary education or equivalent (26.8%) or primary + secondary school (31.3%). The age group with the highest proportion who have walked in the woods and fields are between 55-64 years (41.9%).

Musicianship and song

Statistics Sweden (SCB 2002: I: Table 617) also argue that quite a few (men 16.9%, women 13.3%) at some time during the past two years has played a musical instrument. Of these, 6.4% play every week. Those with higher education to a greater extent plays musical instruments (23.2%) compared to those who have only primary school or equivalent (12.8%) or primary + secondary school (17.5%).

Computer use

According to Nordicom (Nordicom 2000), the majority (men 66%, women 61%), has access to a personal computer at home. 27% of respondents use the computer at home on an average day. The age group with the highest proportion with access to a computer is them who are between 9 - 14 years (83%) and the group with the lowest proportion is between 65-79 years (23%). Also regarding the use of the computer on an average day, the 9-14 year olds are in the top (40%) and 65-79 year olds in the bottom (9%). The proportion who have access to computers is slightly larger in Stockholm (66%), Gothenburg (69%) and Malmö (71%), compared with the rest of Sweden (60 - 63%). The proportion of people with access to a personal computer is the highest (85%) among those with "long" university education (> 3 years).
The majority (59%) use an average day the computer to communicate on the Internet, play games (24%), private office tasks such as reading letters and doing accounting (23%), employment (17%) and education (16%). The age group that is most active on the internet is those between 15 - 24 years (67%) and those who played most games are those between 9 - 14 years (67%). Internet use is relatively evenly split between men and women (men 59%, women 57%). While men are playing games more often (men 27%, women 18%). The most common use of the Internet is to send e-mail, 65% of respondents do that on an average day and 50% of them are looking for some kind of information online.
Most (SCB 2002: II) have access to a computer at home (men 76%, women 70%) and the majority also have access to the Internet (men 66%, women 60%).

Religious practices

According to Statistics Sweden (SCB 2002: I: Table 611), many (men 31.6%, women 42.2%) at least once during the past 12 months, has participated in worship or revival. Those with higher education have to a higher extent participated in worship or revival meeting (41.2%) compared with those who have only passed primary school or equivalent (36.7%) or primary + secondary school (34.6%). The age group with the highest proportion who participated in the church service is them between 65-74 years (47%). The age group with the lowest proportion is them between 16-24 years (30.4%).

Writing

According to the same authority (SCB 2002: I: Table 618), many women and quite a few men (men 24.4%, women 48.1%) at some time during the last 12 months has been writing a diary, poems, letters, articles or the like. Those with higher education did it to a greater extent (46.8%), compared with those who have only primary school or equivalent (31.8%) or primary + secondary school (33%).

Tipping, lottery, horse racing, etc.

Winning a big win on the lottery is the dream that the majority (53%) would prefer to see come true (Sifo 2003: Project 1511174), above option like to make an exotic trip (22%), win gold in the Olympic Games (3%), start your own business (3%), taking a year off (10%), or become a pop star (1%). And according to the Swedish national lottery company (Svenska spel 2002) most (approximately 85%) of all adult Swedes plays more or less regularly. Those who play regularly mostly play Bingolotto, on horse racing, tipping or Lotto. Buying lottery tickets, however, are usually an impulsive act. On average we spend 3 200 SEK a year. According to the Swedish national lottery company (Svenska spel) gambling is relatively evenly distributed geographically, age-wise and socially. We also spend a relatively constant part of our disposable income (2.5-3%), regardless of economic fluctuations. And men spend slightly more money on games than women.

Sport consumption

According to Statistics Sweden (SCB 2002: I: Table 615), the majority of men and many women (men 58%, women 39.2%) at some time in the past 12 months has visited a sporting event. Those with higher education have to a higher extent visited a sporting event (49.3%) compared with those who have only primary school or equivalent (42.9%) but to a lesser extent than those who passed primary + secondary school (51.5%). The age group in which most were on such events in the last 12 months is those between 16-24 years (67.1%).

Studies

On average we spend about 2 hours a week of our time on studies of any kind, according to a survey from 1990/91 (SCB 1998: Living Conditions Report 79).

Leave/vacation

Parental leave

Most commonly, women use all the parental leave paid by the society (69% of all families) (SCB 1998, Women's Power Inquiry). The men who used it, in the year the study is based on, only used 10% of the total parental leave days. The largest portion of leave days to take care of a sick child is also used by women (69%). Men often take their parental leave days spread throughout the year: often during the holiday season in the summer and during the Christmas and New Year holidays. In the northern counties there is also an increase during the elk-hunting. The woman is alone with the children 47 and the man 18 hours a week.

Vacation planning

According to Statistics Sweden (SCB 2002: I: Table 621) the majority (men 62.7%, women 63.1%) at some time during a year goes on a holiday trip that is at least a week long. Those with higher education to a higher extent do holiday trips (76.5%) compared with those who has only studied at an elementary school or the equivalent (50.7%) or primary + secondary school (62.2%). Among those under 65, the proportion is about 64-70%, while it is lower among those aged 65-74 (53.2%) and especially for those who are 75-84 years (34.9%).
According to Sifo (Sifo 1999: Project 3995680) is very common to plan to go away during the holidays (63% of men and 60% of women), but it is also common to not do that (30% of men and 34% of women).

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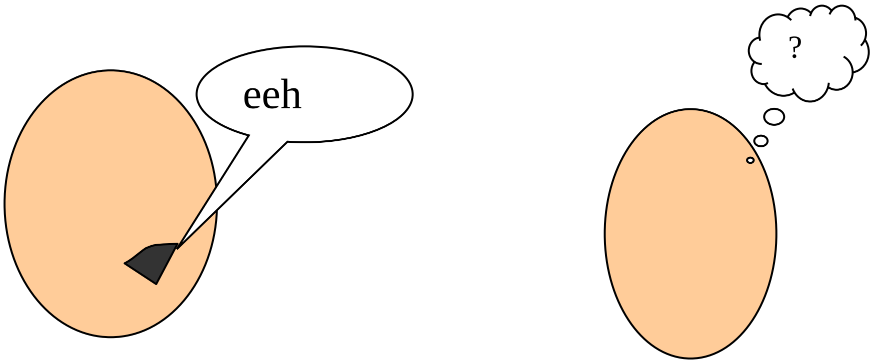
Sifo (2003: projekt 1511207) Trivsel på jobbet. Telefonintervjuer 22-30 september 2003 med 1 057 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo 2004: projekt 1511710) Besvärliga människor. Telefonintervjuer 12-19 januari 2004 med 661 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo 2004: projekt 1512076) Efterrätter. Telefonintervjuer 31 mars – 6 april 2004 med 1000 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2004: projekt 1512206) Impotens. Telefonintervjuer 4 – 12 maj 2004 med 456 män och 544 kvinnor som var 18 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2004: projekt 1512370) Glassvanor. Telefonintervjuer 21 – 24 juni 2004 med 907 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2004: projekt 1512532) Antirynkkrämer. Telefonintervjuer 30 augusti - 7 september 2004 med 483 män och 616 kvinnor som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2005: projekt 1514122) Umgås med släkten. Telefonintervjuer 19 – 25 oktober 2005 med 1 000 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2006: projekt 1514666) Bättre sex. Telefonintervjuer 16 – 27 mars 2006 med 542 män och 607 kvinnor som var 25 – 70 år gamla, Sifo Research & Consulting AB, Stockholm.
Sifo (2007: projekt 1515606) Nedskräpning. Telefonintervjuer 8 – 11 januari 2007 med 1 000 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2009: projekt 1518329) Skönhetsoperationer. Telefonintervjuer 2 – 5 februari 2009 med 489 män och 511 kvinnor som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2008) Reklamundvikare i Sverige 2008, Sifo Research & Consulting AB, Stockholm.
Sifo (2010: projekt 1518232) Spotify och andra musiktjänster på Internet.
. Telefonintervjuer 25 – 29 november 2009 med 1 207 personer i åldrarna 9 – 79 år, Sifo Research & Consulting AB, Stockholm.
Sifo (2011: projekt 1522398) Alkoholreklam. Telefonintervjuer 2 – 5 maj 2011 med 1.000 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2011: projekt 1523775) Elförbrukning. Telefonintervjuer 28 november – 9 december 2011 med 2.000 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Sifo (2012: projekt 1524152) Spöken. Telefonintervjuer 23 – 26 januari 2012 med 1 000 personer som var 15 år eller äldre, Sifo Research & Consulting AB, Stockholm.
Socialstyrelsen (2002) Dödsorsaker 2000, Socialstyrelsen, Stockholm.
Socialstyrelsen (1998) Hälso- och sjukvårdsstatistisk årsbok 1998, Socialstyrelsen, Stockholm.
Socialstyrelsen (2000) Aborter 1998, Socialstyrelsen, Stockholm.
Svenska spel (2002) Allmänt om spel, Svenska spels hemsida, Svenska spel, Visby.
Temo (2000: I) Två av tre svenskar äger idag aktier. Telefonintervjuer 13-22 december 1999 med 1 858 personer som var 16 år eller äldre, Temo AB, Stockholm.
Temo (2000: II) Julfirande i Sverige 2000. Telefonintervjuer 11-20 december 2000 med 1 100 personer som var 16 år eller äldre, Temo AB, Stockholm.
Temo (2001) Barns veckopeng och sparande. Telefonintervjuer november 2001 med 500 föräldrar med barn i åldrarna 7-15 år, Temo AB, Stockholm.
Temo (2002) Boendebarometern 1/2002 – svenskarnas drömmar kring sitt boende. Telefonintervjuer juni 2002 med 1 000 personer som var 16 år eller äldre, Temo AB, Stockholm.

About talking



In a conversation between two people, it is usually so that one of them (A) says something that the other one (B) responds to. Usually, there is a wide range of different answers B can give to A's statement or question, depending on a variety of circumstances. For example, consider the following simple conversation:

A: - Nice weather!
B: - Yes really!

Or
A: - Nice weather!
B - Do you think so? I think it’s too hot.

Or
A: - Nice weather!
B: - Yes, but it will be worse tomorrow.

B's response will obviously depend largely on the actual weather conditions prevailing in the moment and his or her attitude to these conditions. In addition, the answer depends on where the conversation takes place, if is in a noisy environment it is likely that answer will be shorter than if the circumstances are appropriate for small talk. Furthermore, it is crucial witch relationship B feels that he/she has to A. If B is works in a shop and A is a customer, the answer is probably different compared to if B is married with A and he/she is in a bad mood. This can be discussed for quite some time, since there is no patent answer that always works best. The optimal answer for B depends namely on B's purpose with the conversation. And the best answer is the answer that suits this purpose the most. There are a number of relatively standardized situations where the purpose of the call, at least for one the parties is more obvious than in other situations, such as:

- Conversation between telemarketers and presumptive clients.
- Children trying to get mom or dad to buy them ice cream.
- Pickup at the pub.

Such situations are quite translucent as to what is appropriate to say in order to achieve the purpose. Phone vendors participate in introductory courses and have talk scripts to follow. Parents discuss among themselves and with good friends how to best tackle the children's wishes/nagging. What is appropriate to say in the restaurant environment with the aim of sharing the bed with someone have been discussed in several books and many of them who have been in such situations probably also have discussed the matter with his friends. In situations where the aim of the talk primarily is to amuse the participants, the methods are however less investigated. The purpose of this chapter is to, through questions to others, to some extent, determine how I could get better in these everyday conversations.

I therefore asked eight people to answer my questions (see Appendix) and all said yes. Four of them were men and four were women. They had an average age of 44 years (median: 45 years, min - max: 38-49 years), varying levels of education, professional, income, family and housing conditions.

It has happened, which I am ashamed of, that when someone has proudly told me about something that they have done. I have immediately over triumphed their performance, something that I sometime later on have regretted, since I think the people I talked to may not always have wanted that information. Instead, they might have been offended because they, for instance felt that they were not "seen". I.e. that their performance was not considered in relation to their abilities in the current subject. A reasonable reaction on their part would then be to feel compelled to prove that they have done more. Which in turn maybe lead to a kind of competition about who has performed the most. But on the other hand, a response that only contains an appreciative comment without any details on how I relate myself to the topic, may have been perceived as that I am ignorant or uninterested in the subject. With a risk that a potentially interesting conversation dies prematurely. Here are three examples:

A: - I have finally got started with running once a week.
B: - Once a week, myself, I run every morning.

A: - I have finally got started with running once a week.
B: - Great, that will be rewarding within a few months.

A: - I have finally got started with running once a week.
B: - Great, I myself started that way a few years ago and now I'm very energetic and I can run a couple of times a week.

Which of these should I choose (question 1 in the Annex)?

Five of the eight respondents felt that the best answer is one that encourages the speaker and then describes some of the listeners' own experiences in the subject. The other respondents thought that it was the next best option. The other two options: to simply say something encouraging, or to just say something about the own performance without saying anything encouraging, was ranked about as bad. Though as seen in the Annex the respondents had to relate to an ailment, and in those cases its maybe more comforting to hear that others suffer from similar afflictions, compared to when ones performances are over triumphed.

I have noticed that those who are reasonably professionals in asking questions, i.e. radio journalists, rarely comment the answers to their questions. Instead, they respond to them with a humming sound, sometimes complemented by a supplementary question. It that how we want people to respond? Myself I get the feeling that the person is either not listening or did not understand what I said, if the reaction consists of only an "mmm" sound. I rather appreciate an evaluative comment that makes me understand that the listener understand what I'm saying. But what do others prefer (question 2)?

The respondents thought (see table 1), as I do, that the best response indicates that the listener understands the situation. Secondly they ranked humming combined with a supplementary question. It is somewhat surprising because, in my experience, there rarely is anyone, other than radio journalists, who do so. Simply hum, however, was ranked the last among the options. Even lower than the response that indicates that the listener does not understand. Maybe because in the latter case the speaker knows that the listener has understood it wrong, maybe since him or her, with good conscience, then can explain again. But if the person hums the speaker hovers in uncertainty of whether further explanation is needed or not.
But even if the listener has the ambition to always respond in a way that both encourages and shows that he/she has understood, it is sometimes impossible. Sometimes because you do not have a clue about where the speaker wants to end up. In this situation it is likely that an attempt to ask a question of type "E" becomes one of type "D". And then, according to the results, it might be better with a response of type "B", if the following question makes sense. Otherwise, "C" is the least bad option. However, I rarely hear someone use the questions of that type. As far as I remember, I have actually only met one person who used such questions, and I liked it.

Table 1. Which response is best?

If you tell something that you think is interesting or important, what kind response do you prefer (grade, 5 = best):	Participant number: 1	2	3	4	5	6	7	8	Average
A. Only a humming sound.	3	1	3	1	2	1	1	2	1.8
B. A humming sound and a question.	5	3	2	3	4	4	2	4	3.4
C. A question likes, for example: is that good or bad?	2	2	5	5	3	2	4	1	3.0
D. An evaluation of what you said that gives you a hint that the listener hasn't understood.	1	4	1	2	1	3	3	3	2.3
E. An evaluation of what you said that gives you a hint that the listener did understand it in the same way as you.	4	5	4	4	5	5	5	5	4.6

I am pretty often asked by acquaintances how the weekend had been. After I have answered I face the choice to either ask the same question in return, even though I know what the answer will be, or to ask a question that I do not know the answer to. Other times it has on the contrary been me who started to question and then I get the question back, and then I regretted that I started because I then had to admit that it did not happened anything. What do people in general want? Does that who asks courtesy questions generally want to have the same questions asked back?

Among the respondents (question 3) there were slightly more (4 persons) who always wanted to get the same question returned than the option: "No, I have no need to tell the listener if he/she does not seem to have any interest in knowing" (3 persons) or "It depends on the question"(1 person).

Thus, the results give no guidance at all. Which in itself is some guidance, because it suggests that there is no silver bullet solution for this. But often, it is not such problem, since many do not give any time for a corresponding counter question, because they says something else that requires a response or comment. Then it feels weird to go back to the previous topic.

A similar situation occurs when someone asks how I'm doing. This simple conversation opening gives me the option to either answer with standard response like "good," "just fine", "great", or to reveal that I feel a little cold, have slept little bad or some other more honest report about my situation. The advantage of the first type of response is that it allows us to more quickly slip into interesting questions instead of talking about minor flaws in my welfare, and secondly, it does not force the requester to show compassion. The main disadvantage is that it usually is not entirely true. If I almost always was on top, it would surely soon become my normal state and then great would then be something even better. Moreover, the effect, for those that on their questions about health always get answers like "just fine", the effect might be that he or she believes that everyone else walks around in a constant euphoria. Which might make the questioner might feel sadder than necessary. But it is perhaps quite obvious to everyone that the question is just asked out of courtesy and that no one really is interested in an honest answer?

The results of this study suggest, however, the opposite, as none of the participants prefer answers like "great" or similar (question 4, table 2). It is somewhat strange because the most common answers are things like "great" or other superlatives. Three respondents instead said that they always want an honest answer, but I find it hard to believe. Moreover, it is a wish that is hard to live up to, since what is an honest answer to such a question? And how egocentric can one be when telling about ones situation at the moment? Though there were almost as many who felt that "C" or "D" is the best.

Table 2. Appropriate response to polite questions.

If you ask someone about how life is, what answer do you prefer:	Number of yes
A. Great, fine, just fine, or similar even though the person has his/her everyday ailments and problems.	0
B. An honest answer if I have time to listen else something that doesn't force me to ask follow-up questions.	1
C. If it is someone I care about, I want an honest answer otherwise not.	2
D. A moderately honest answer is always the best, i.e. I do not want to become embroiled in some emotional misery, but prefer when someone replies things like "a little pain in the foot, but otherwise good" rather than "just fine".	2
E. An honest answer is always best.	3

Warning! Even someone who can not argue for his case may be right, but his truth becomes more difficult to absorb.

Some people almost always use themselves and their own feelings, or their immediate environment as argumentation and reference material. I think this may be a bit tiring. In addition, it gives, according to me, low credibility to the claims presented. What does other think about that?
A high proportion of the participants seem to like it (question 5), because it was a dead heat between those who preferred references to subjective sources (I think= four respondents) as "objective" ditto (it was written in the newspaper=4 participants). But no one liked the third option, to refer to another person (Donald says ...). So the results provide no guidance, except that it suggests that it provides poor credibility to a statement, when referring to a third person.

A relatively common and problematic situation arises when I get invited for dinner and the food is not according to my taste. Even if the host does not ask how it tastes, I think that it is expected of me to say that the food is tasty. A silence in that respect can be interpreted as that I think it is no good. If I then lie and say that it is good, I can either support my lie through taking more of it or risk that my host suspect that I'm lying. Though to tell the truth is probably worse, because it shows that I care so little about my host that I am willing to hurt him just not to compromise on my honest ness. According to a guidebook[1] in conduct, the guest should take a little bit to taste, even if the food does not attract. If it then turns out that it tastes bad, the guest should primarily torment himself anyway through eating it, or alternatively, leave the food on the plate. The authors give, however, no guidelines for what the guest should say about the food's taste or other qualities. But what action do the interviewees prefer if they are hosts or hostesses?
Five of the respondents (question 6, table 3) ranked the option that the guests ask for extra seasoning the highest. In second place came the option that's about that the guest is playing so well that the host does not notice that he/she is suffering. The majority also had the same view of the inverse relationship, if they were invited to dinner (question 7). As only three of them in that case would choose one of the options that allow the host to understand that they do not like the food, before the option to pretend to like it, or to ask for extra seasoning. Thus, in the future, when the situation arises, I will ask for extra seasoning.

Table 3. What should I as a guest do if the offered food tastes bad?

If you invite someone for dinner and he does not like what You serve, do you prefer that the guest (grade, 5 = best):	Participant number: 1	2	3	4	5	6	7	8	Average
A. Forces himself to eat the food without saying anything In order not to hurt you.	3	4	2	1	2	1	1	1	1.9
B. Claiming to be full after one bite and then leaves the rest on the plate.	2	1	5	3	3	3	3	4	3.0
C. Asks for extra spices, more sauce or the like and thus succeedes in making the dish edible for him or her.	1	5	3	5	5	5	5	2	3.9
D. Akts so well that you do not notice the suffering and you therefore get the impression that the food was appreciated.	4	3	4	4	4	4	2	3	3.5
E. Tastes the food and then leave it on the plate without comments.	5	2	1	2	1	2	4	5	2.8

1. Manners & etiquette - written and un-written rules that make it easy to socialize, Charlotte and Clara Thompson, Semic Press 2001.

Occasionally, I get annoyed on someone and then feel like debriefing my feelings face to face with someone who knows that person. But I understand that some people do not like to discuss the negative characteristics of someone who is not present. One explanation for this, as I heard, is that anyone who speaks badly about someone who for the moment is not present, will speak badly about you when you are absent. But is that really true?

A majority (6 of 8) seems to think that the explanation given above, about why one should not speak badly about others, is true. Because they said they have had been in groups where any absent person became the subject of the others criticism (question 8), regardless of whoever it was. And these six people also believed that it is common. The other two said they did not recognize themselves in that the subject of criticism can be anyone in the group and I share that view. Though whether it’s normal or not, the results suggest that many people think it is normal.

Slightly more of the participants prefer to be confirmed in their complaining (4 persons, question 9), compared to being contradicted (3 persons). And since I knew the respondents well, I can say that I very rarely heard criticism of someone not present from one of those who prefer to be contradicted. In addition, the difference between the sexes is large in this matter, as all women except for one prefer to be confirmed, while two of the four men would be contradicted. The last of the four men replied that it totally depends on whether the criticism is justified or not.
Overall, this shows that criticism of someone who is not present too many people really is a touchy subject, especially among men. So sensitive that some even prefer to be contradicted in the criticism rather than to be confirmed. Even though that probably is an unpleasant experience.

When someone calls a friend or acquaintance to ask something, it is common that the conversation begins with some small talk not associated with the case to make. It turns, however, sometimes out that the called party does not have time to talk. Some start by saying that they do not have time to talk, others will wait until after the first greetings are done, while others brings it up way into the conversation. These three options might look like this:

B: - Hello Bengt here, I can not talk now, I can call you later.

Compared to:

B: - Bengt!
A: - Hello Bengt! What’s up? Do you have a nice weather?
B: - Well thank you, it is good and the sun is shining, but I can not talk right now. Can you call later?

Or:

B: - Bengt!
A: - Hello Bengt! What is the situation? Do you have nice weather?
B: - Well thank you, it is good and the sun shines.
A: - Can I borrow your tent?
B: - I can not talk right now. Can you call later?

I do not know which option I, as callers think is the worst of these three. The first feels very impolite and terse. The second and third is somewhat more pleasant to hear. But then it is my "shame" that I interfered, without checking if Bengt had time to talk. All three cases, however, in my opinion, is better than not to respond at all, since then I have no "proof" that Bengt know that I wart’s to speak with him.

According to the aforementioned guidebook[1] about how one should behave the caller shall, after the presentation, ask if the called is having his dinner, and if so, would it be better to call a little later. Which does not give a particularly exhaustive guidance, because someone who constantly asks that would appear as an idiot.

The respondents' answers give no guidance (question 10). Besides that the majority prefer to directly be interrupted (6 persons), Compared to that the listener waits until the issue is addressed, and then says that he/she does not have time to answer (2 persons).

Sometimes I wonder if there is something wrong with my hearing. Other times, such as in a noisy environment or if the person whose voice I do not perceive is speaking very low, I know that the fault is not due to any gaps in my hearing. Either way, it does not feel good to ask someone to repeat what he just said, especially if it happens several times during the same conversation. The worst case is if, when I hear what he said, it is revealed that it was not important, but, for example, simple courtesy phrases. Though I think it is even worse to guess what people are saying. And the most embarrassing situations arise, in my opinion, when I guess wrong and he/she in an annoyed way corrects me. How do the interviewees think that I should act (question 11-12)?

In the case of non-essentials as many (4 persons) prefers that the listener directly pretends to hear as those who prefer to take it several times. However, if there are important things discussed all but one would prefer to take it several times rather than that the audience pretends to hear.
Since I as a listener often does not know if what is said is important or not, when I do not hear it, the results indicates that I in the future should ask for repetitions until I am sure I heard correctly.

Several I know have a habit that once I share something that for the moment bothers me, they try to give me a solution to the problem. Which sometimes, for various reasons, can be annoying? Unfortunately, I am too often like that myself. Sometimes I have also experienced the opposite, i.e. I described a problem for someone who I think can help me, to get some good advice, without getting anything but sympathy and comforting words as an answer. The latter gives me the feeling that the listener do not care about me and my problems. But it really may be that they do care, but that he/she for my sake doesn't want to "write me in the face" what I should do, because he or she does not want to be served ready-made solutions.
According to a famous book about the differences between men and women written by John Gray[2] women talk about their problems to create closeness and not necessarily to get help to solve them. Men, however, only talk about problems if they really want to be helped to find solutions.

They interviewees answers (question 13) suggests that it to some extent is true, since three of the four men said they always want the listener to come up with a solution, while three of the women and one of the men claimed that they sometimes want a solution and other times not. Only one of the respondents, however, was so "feminine" that she never wants anyone to come up with solutions to her problem. A possible conclusion is that one should be more careful to give advice if it is a woman who describes a problem than if it is a man and vice versa.
An alternative conclusion could be that when we have problems with physical solutions, like suggestions for an appropriate store for a specific purchase or a construction solution, we are happy to receive practical advice. Unlike if the problems are of emotional nature, then we primarily are looking for emotional support. If it is true, then persons that are more pondering about problems that have physical solutions more often like to have hands-on advice than the contrary, persons who more often is pondering on emotional problems. If the former is more common among men, the effect on group level would be that men more often want practical help with their problems, than women.

2. Men from Mars and women from Venus, by John Gray, Bromberg's publishing house, 1992.

One of the reasons why I sometimes do not want to be proposed solutions is that if I do not like the proposal, I face dilemma: Either explain why the proposed solution does not work in my case, or thank for the proposal and then pretended to forget it.
In the former case, I am often forced to elaborate on the problem. As the listener, judged by the proposed solution, did not understand. And the effect is a conversation that is not so funny.
In the latter case, it feels like I'm lurking the person and it is also not fun. The very least funny effect evolves if the person later, with anticipation in his voice, asks if I did as he suggested.

How do the interviewees think that I should act (question 14)?

The answers unfortunately gave me no clear guidance as it was a dead race between those who prefer that someone they gave some advice on an issue thanks and says that it is good, but then “forgets” it, compared to those who prefer that the listener directly explains that the advice is bad.

Sometimes it has happened that I tell something I heard from a friend, and then the listener smoothly or mockingly claims that it is a tall tale. Then I felt ashamed as a dog. Nevertheless, I have done the same thing myself when I have had the opportunity. Sometimes, however, it has not been a good idea as we have ended up in a situation where I then have to prove that it is a tale, and in the end, we have almost quarrelled. Which has made me think about whether it would be best to never speculate on whether something is a tall tale or not.

Judging from the respondents' answers (question 15, table 4) most storytellers prefer to hear that it’s a tall tale (options A and B), compared to formulations where the word "tale" is not mentioned (answer C). Oddly enough, the "hard" variant (A) was rated as high as the more elusive variant (B). Thus, I might continue writing people in the face, in this regard, when the opportunity arises.

Table 4. What if it is a tale that is told?

You tell something that you heard have happened to an acquaintance of an acquaintance and the listener realizes that it is probably the case of a tall tale, what do you prefer (3 = best):	Participant number: 1	2	3	4	5	6	7	8	Average
A. The listener says that it is a tall tale.	1	3	3	3	1	2	1	3	2.1
B. He / she says type: strange I have heard that before, but then there was another person, it may be the case of a tall tale.	2	2	2	1	3	3	2	2	2.1
C. The same as i alternative B but without saying that it might be a tall tale.	3	1	1	2	2	1	3	1	1.8

Swedish greeting rules!

In principle, everyone, for the day, new faces should be saluted with a head movement and/or a greeting. Apart from if the meeting takes place in a context where it is common to meet many people. In practice this means that it is not socially acceptable to greet an unknown person on a street in Stockholm, while the opposite on a deserted forest path nor is it. In the foregoing context only people with any kind of distinctive community saluts each other. For example, motorcyclists greet each other in traffic but motorists do not.

Quite often, when someone makes an exposition which I suspect will be long, I face the dilemma whether I should wait until the end of it with my questions, or if I should take them gradually during the storytelling time. The benefits of the first scenario are that the narrator will not be interrupted and that some issues become outdated as the story develops. The disadvantages are that I have to keep all the comments in my head while I take in and ponder the rest of the story, and that all comments will be unnaturally stacked when the story is finished. The options can be illustrated by the following examples:

A: - I went to Västerås last weekend. On the way there we passed a major traffic accident, which meant that we were stuck in a traffic jam for hours.
So when we arrived there, we had missed half the first half of the match.
Furthermore, we did not have time to eat in advance, so I had to buy five hot dogs.
But my team won, so it was worth it.

B: - Was it a hockey game?
A: - Yes.
B: - Was there a lot of cars involved?
A: - Yes, at least five cars.
B: - Wasn’t it pretty cold last weekend?
A: - Well it sure was ten degrees below zero, but I had my warmest clothes on.
B – Did you eat dinner on the way home?
A: - Yes, we stayed at a pizzeria.

Or:

A: - I went to Västerås last weekend.
B: - Was it a hockey game?
A: - Yes, and on the way there, we passed a major traffic accident, which meant that we were stuck in a traffic jam for hours.
B: - Was there a lot of cars involved?
A: - Yes, it was at least five cars and when we arrived to the stadium, we had missed half the first half of the match.
B: - Wasn’t it pretty cold last weekend?
A: - Well it sure was ten degrees below zero, but I had my warmest clothes on. Furthermore, we did not have time to eat in advance, so I had to buy five hot dogs.
B – Did you eat dinner on the way home?
A: - Yes, we stayed at a pizzeria. But my team won, so it was worth it.

How should I act in this respect (question 16)?
All four women and one man thinks I should take the issues as and when they arise. But two of the other men prefer to have all the questions and comments made after the story is finished. While it for the last man does not matter. So there is, based on the results, no clear approach which is always the best in this matter. Except, perhaps, that women more often than men, wants the events to be told in dialogue form.

It happens, albeit rarely, that a friend praises me for a piece of clothing that I wear. Which makes me happy, but sometimes the praising makes me wonder if it might mean that my other garments, according to the person, are ugly. On the other hand, it is even more rarely happening that someone tells me that a garment is ugly. Though the few times it has happened, it has been far more valuable to me than the times I received praise. Because it is much easier for me to do something about an ugly garment, i.e. threw it away or save it for the next time I paint the house. Compared to trying to find more garments similar to the nice one, the next time I buy clothes. I wonder what other people think and how I should act in case any of my friends happen to have particularly ugly or good looking clothes?

Most interviewees think apparently not as I do, since they prefer to get praise for the nice garment compared to criticism for an ugly one (5 of 8, issue 17). Thus, I might stick to praise in the future. In addition, maybe I should not trust that others will help me to sort out even my ugliest clothes.

It happens that someone tells me a story that they have already told me earlier. Maybe because they, as well as I, have a hard time keeping track on which I have already told a story. If it happens I have the choice to quickly stop the narrator and tell that he has already told me or to wait until the story is told and then tell him that it is a rerun, or not to pretend that it's a rerun. The first variant might embarrass the speaker less, but it feels brisker. The third is probably nicest, though it may give the impression that I, as a listener am forgetful or a bad listener. Which of these responses does other prefer (question 18)?

The option ranked highest was to be interrupted immediately, pointing out that the story is already told (table 5), compared to that the listener does not pretend that he have heard the story before, or to tell when the story is fully told. The least uncertain conclusion from the results is that at least I should not select the last variant.

Table 5. What if someone tells the same story that he has already told before?

You tell something you already told the listener before, which response do you prefer then (grade, 3 = best):	Participant number: 1	2	3	4	5	6	7	8	Average
A. The listener directly points out that you already have told the story to him/her.	2	1	3	3	1	3	3	2	2.3
B. He/she pretends like you haven't already told it.	1	3	1	2	3	2	2	3	2.1
C. He/she waits until you have told the whole story and then says that you have told it before.	3	2	2	1	2	1	1	1	1.6

It sometimes happens that others misunderstand things that I tell. Sometimes the misconceptions may have negative consequences, such as if it is a question of directions. Then it is obviously an advantage if I explain again. Other times, such as when dealing with pure chitchat, an explanation will lead to that the conversation is disturbed and thus becomes less entertaining. Knowing this creates in such situations, a small dilemma. Should I correct the listener's perception with the risk that the fluidity of the conversation will suffer? Or is it best to let the listener live with the misconception for comforts sake? What do those who misunderstood prefer?

The answers (question 19) suggest that in general it is best to explain again until the listener seems to understand. Since six of the participants chose that option, even if it is about pure chitchat.

Sometimes when I walk into an ongoing conversation, I think that I do not want to trouble the participants through asking if what has been said so far, but I still don't want to be quiet. Maybe I also think it is a little exciting to, as quickly as possible, guess what they are talking about and as proof of that I guessed right, I', as soon as possible, do a comment. Some times have I met irritated eyes, other times surprised ditto, but usually it does not result in any, for me, noticeable reaction at all. So what do people think?

Many interviewees claims, to my surprise, that they prefer that the new participant asks for a brief summary (question 20, table 6) compared to that he guesses right on what was previously said, and says a relevant comment. And the majority thought, of course, that the worst option is if the new participant guesses wrong and comes with an irrelevant comment. These results suggest, therefore, quite clearly that the alternative to ask for a summary is the best choice (since when guessing there is always the risk of guessing wrong).

Table 6. What should be the one who comes into a call to do?

You're talking to someone and a third person Joins you and do (rank what you prefer, 3 = best):	Participant number: 1	2	3	4	5	6	7	8	Average
A. The person guess what you're talking about and say something that is highly relevant.	1	3	2	2	2	3	3	3	2.4
B. The person asks you to repeat what has hitherto been said.	3	2	3	3	3	1	2	2	2.4
C. He / she guess what you're talking about and says something irrelevant.	2	1	1	1	1	2	1	1	1.3

Finally, I have the habit to, in a rather straightforward way, correct statements that I think are wrong, so that there will be no confusion as to what, in my opinion, is correct. I suspect, however, that not everyone appreciates my frankness. It turned out, unfortunately, that my suspicions may be true, because it was just one of the respondents that in these contexts appreciate a straightforward manner (question 21), compared to the "softer" options. Given how they responded to this question, and given that all participants know me and the way I converse very well, I think I can not get a clearer sign on that I should quit the habit.

Appendix. The questions in the interviews

1. You tell someone that you have an ailment of some sort and the one you talk to has a similar ailment but worse, what do you prefer (grade, 3 = best):

A. He/she responds through describing his own ailment.
B. He/she answers something with the purpose to console and then tells about his/her own ailment.
C. He/she answers something with the purpose to console and then asks about your health in general without mentioning his/her own problems.

2. If you tell someone something that you think is interesting or important, what kind of response do you prefer (grade, 5 = best):

A. Only a humming sound.
B. A humming and a supplementary question.
C. A question likes, for example: is it good or bad?
D. A valuation of what you said that gives you a hint that the listener hasn't understood.
E. An evaluation of what you said that gives you a hint that the listener did understand it in the same way as you.

3. If you ask someone you know how for instance, weekend or holiday has been, do you want that the respondent asks you the same thing?

A. Always.
B. It depends on the issue.

C. No, I have no need to tell the listener if he/she does not seem to have any interest in knowing,

4. If you ask someone about how life is, what kind of response do you prefer:
A. Great, fine, just fine, or similar even though the person has his/her everyday ailments and problems.
B. An honest answer if I have time to listen else something that doesn't force me to ask follow-up questions.
C. If it is someone I care about, I want an honest answer otherwise not.
D. A moderately honest answer is always the best, i.e. I do not want to become embroiled in the worst emotional misery, but prefer when someone replies things like "a little pain in the foot, but otherwise good" rather than "just fine".
E. An honest answer is always best.

5. Which of these introductions do you think gives the most credibility to the following:
A. I think that ...
B. I have read in the newspaper that ...
C. My husband ...

6. If you invite someone for dinner and he does not like what you serve, do you prefer that the guest (grade, 5 = best):
A. Forces himself to eat the food without saying anything in order not to hurt you.
B. Claiming to be full after one bite and then leaves the rest on the plate.
C. Asks for extra spices, more sauce or the like and thus succeeds in making the dish edible for him or her.
D. Acts so well that you do not notice the suffering and you therefore get the impression that the food was appreciated.
E. Tastes the food and then leave it on the plate without comments.

7. If instead you are invited for dinner, how would you then prefer to rank the alternatives?

8. Have you been a member of a group where any absent person, as a rule, been subject to the criticism of others, regardless of who it was and if so, do you think it is common?

9. If you say something unfavourable about an absent person to someone who also knows the guy. Do you then prefer to:
A. The one you talks to confirms your opinion.
B. He defends the absent person.

10. If you want to tell something to someone who does not have time to listen, do you then prefer:
A. That the person directly interrupts you and tells that he/she does not have time to talk.
B. That the person waits until you have said what you had to say and then tells you that he/she does not have time to respond.

11. If the one you are talking to can not hear what you say, but what you say is really unimportant, what do you prefer (grade, 3 = best):
A. That the listener asks what you said and you have to take it several times.
B. He/she asks once and then pretends to hear.
C. He/she immediately pretends to hear.

12. If the one you are talking to can not hear what you say and what you want to say is important, what do you prefer (grade, 3 = best):
A. That the listener asks what you said and you have to take it several times.
B. He/she asks once and then pretends to hear.
C. He/she immediately pretends to hear.

13. If you tell someone about a problem you are experiencing, does it mean that you (grade, 3 = best):
A. Always wants that the listener tries to help you to come up with a solution.
B. Sometimes wants help with a solution and sometimes not.

C. You never want someone else to serve you solutions to your problems.

14. You give someone a piece of advice on an issue that he has described to you, which do you think is the best:
A. He/she thanks and says that it is good, but then “forgets” it.
B. He/she immediately explains that the advice is bad.

15. You tell something that you heard have happened to an acquaintance of an acquaintance and the listener realizes that it is probably the case of a tall tale, what do you prefer (grade, 3 = best):
A. The listener says it is a tall tale.
B. He/she said type: strange I have heard that before, but then there was another person, it may be the case of a tall tale.
C. The same as i alternative B but without saying that it might be a tall tale.

16. If you tell a long story about something that you, for example, have experienced, do you prefer to speak undisturbed until you have finish the whole story. And that the listener waits with comments and questions until you're done, or do you think it is better that the questions are asked as they show up.

17. Let's say you're wearing a garment that your friend thinks is exceptionally neat and one that he/she thinks is the opposite, which would you prefer:
A. He/she praises the neat garment, or
B. Says a delicate comment about that the "ugly" garment is not so neat.

18. You tell something that you have already told the listener before, what response do you prefer (grade, 3 = best):
A. The listener directly points out that you already have told the story to him/her.
B. He/she pretends like you haven’t already told it.
C. He/she waits until you have told the whole story and then says that you have told it before.
19. If someone in a chitchat situation says something that you misunderstand and you therefore respond in a way that is incompatible with the person's actual thought, what do you prefer then:
A. The person explains again.
B. The person spins on the new thread.

20. You're talking to someone and a third person joins you (what do you prefer, 3 = best):
A. The person guesses what you’re talking about and says something that is highly relevant.
B. The person asks you to repeat what has been said so far.
C. He/she guesses what you're talking about and says something irrelevant.

21. If you say something to a person who rightly know you're wrong, what do you prefer then:
A. The person bluntly says that you are wrong, or:
B. Says it with words like: I do not think that's right since ...

The logarithmic man

Anyone who lights a candle in a previously completely dark room, will notice a huge difference. Two candles and the room appear even more clearly. Though once it burns 100 light, to add a 101st does not give much (if any light is collected in one part of the room). Not even a 100 additional lights will give much more.
In the same way we experience sound. Those who have ever turned the volume control of an old-fashioned music system knows that after only a small increase above zero, the sound, with a tiny additional increase will increase considerably. If the volume control on the other hand, is set on half the maximum output a tiny increase causes no audible difference. Since at that level it requires a much bigger increase to notice anything.

This is because our experience of light and sound is not linear, which means that our experience of these stimuli do not follow the actual increase of the stimulation, which in the above cases are linear (i.e., two is twice as much as one, four is twice as much as two and so on).

It is fortunate that we do not respond linearly to such stimuli, because then we would either get a severe overdose of light a sunny day or not see anything in the twilight. The eye responds to bright light by "blinding down". The darkening is described mathematically by something that we call logarithms.

Logarithms are a type of scales as well as 1, 2, 3, 4, 5 is a scale. But unlike the latter, every next step on a logarithmic scale, a little less valuable than the previous one. No matter where on the scale, the next higher value in providing a somewhat smaller increase compared to the previous value (see chart 1).
A practical and common logarithm is the one that has the number 10 as a base. That means something that is measured to 10 becomes 1 (it is the number of times you should multiply 1 by 10 to get the value 10) and that which is measured at 100 is 2, i.e.:

$10 = 1 \times 10^{1}$ = i.e. the 10 logarithm of 10 is 1,
$100 = 1 \times 10^{2}$ = the 10 logarithm of 100 is 2.
$1553 = 1 \times 10^{3,191171}$
$25769,23 = 1 \times 10^{4,411101}$

The number of times that 10 shall be multiplied with one to get the figure.

If the actual measured value of particular stimuli is called x and the perceived effect of this stimulus is ten-logarithmic and called y is:

y = log10 (x), or in other terms log10 x, log x, x log

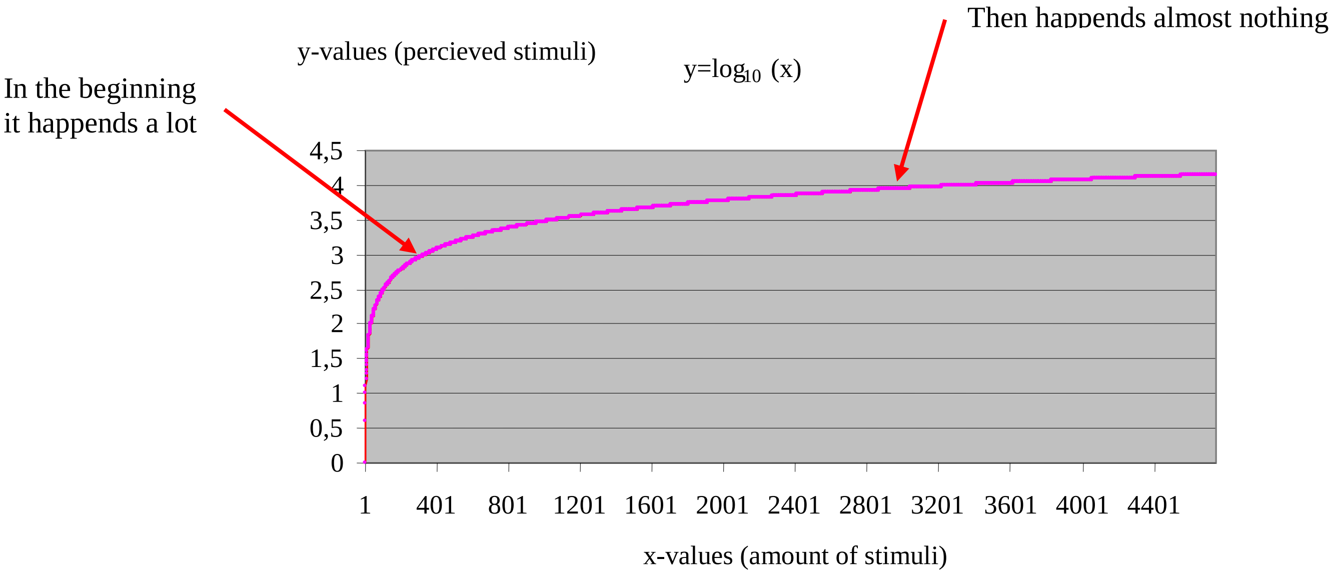


Chart 1. The logarithm of all integers from 1 up to about 4700 with the base 10.

I think that our other senses also respond logarithmically although it seems to be less well documented. Skin sensory cells note a light touch. A hundred times more pressure is felt more, but far from a hundred times more. The sense of taste notes acidity from a drop of lemon in the water or saltiness from a few grains of salt. A tenfold higher dose does not provide a tenfold stronger reaction. One hundred grams of cayenne pepper in a pot doesn't make it 100 times stronger than if it contained one gram. We note the relatively low doses of odorous substances, but we can also withstand even high doses and fortunately we also get used to the smell.

Moreover I believe that we in general react logarithmically, here are some suggestions:

I have often reflected on how much a single glass of wine or a beer gives and how little the feeling of drunkenness increased for each additional glass. When I have had a number of glasses later get up to, such as for going to the toilet, I realize that I more or less without noticing it have reached another level of intoxication. After the toilet, I might continue to drink. Well aware that I am drunk, but without feeling any greater increase until maybe the next visit to the toilet. Which suggests that I feel that my brain reacts less linear than my body. The same, I have heard of many others. The measurable effects of alcohol intake in the form of quantity of alcohol in blood relate, however, with some delay, linearly to the amount of alcohol consumed.

Anyone caught stealing something (i.e. wrongfully taken something worth more than 800 SEK), are likely to be convicted for theft. The minimum punishment for theft (apart from the alternative punishment of probation and/or community service) is 14 days in jail. But no matter how much the person is caught stealing, the punishment can never be more than two years in prison.

A glass of water decreases thirst. Ten additional glasses would, of course, better quench the thirst, but not ten times better.

We get more pleased from a bit of credit for each of the ten great things we achieved compared to tenfold as much praise for one of these things?

We can sometimes feel exhausted, but it's usually not the case. Instead, we have much more to give before the real exhaustion arises. Though we rarely work so hard and for so long that we reach this point.

To wait for five seconds while the computer thinks is annoying. If the computer thinks in fifty seconds, it is even more annoying, but not ten times more.

The first kiss that you exchange with someone you were very interested in, was probably more special and tumultuous and memorable than the tenth, which in turn maybe gave more than the hundredth etc. When you kissed a while, maybe you went to bed with each other. In bed, or perhaps earlier, you caressed each other and probably the first caress felt more than the next and much more than the hundredth caressing at the same place.

The more something, such as an event, deviate from the normal course, the more reason it is to talk about it. But probably we all have sometimes experienced that once you tell something really different, the reactions are often not much different from if what was said was something completely ordinary.

If nothing happens in one's life, an event such as to trade a pair of pants, may become quite large. But when life habitually carries ten corresponding tasks on the agenda for the day, life does not feel ten times more stressful.

It will not be twice as tasty with the double amount cream in the sauce, but it will be, like, twice as fat.

Those who do not have any money at all, rejoice hundred crowns to spend. A thousand crowns is of course even more fun, but probably not ten times as fun. A little girl without toys would certainly enjoy the first doll a lot. Ten additional dolls would not give ten times greater joy.

A nasty epithet hurt. If the epithet is repeated ten times or twice does not make much difference.

What is the point of the argument?

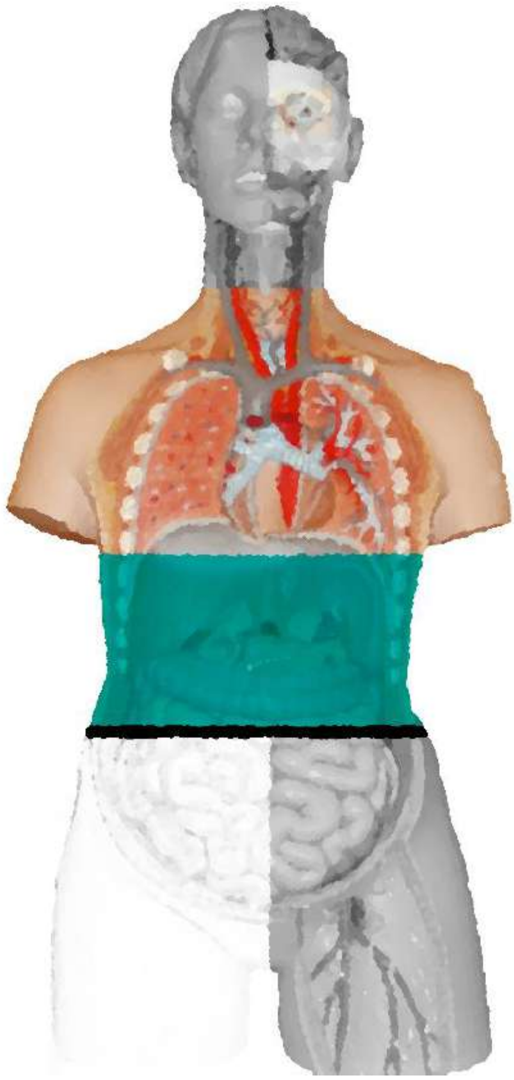
Anyone who thinks that the emotional response to something (anything) is linear is risking sub-optimizing his/her existence, if the response actually is logarithmic.

Which is caught in the old proverb "everything in moderation".

What would you choose:

- Getting rich.
- Reaching all your goals career wise.
- Having high living standard.
- Having a fine family.
- Live a happy life.

Human properties



What are properties?

Properties are explained in Nordstedts dictionary (Palmér J & Freidländer H, 1987) with words like: character traits, features, qualities, nature, characteristics, attributes. Words that are used to show that the following text is a description of someone or something. It can be easily seen that every person is more like every other human being compared to, for example, trees or hamsters. In comparison with trees, virtually everybody is very verbal and analytical. In relation to the hamsters, we are all big. The differences that may exist between us, apart from some obvious visual differences are relatively small and they depend largely on when the comparison is made. A normally timid person may appear far more temperamental than hot-tempered ones, if the comparison is made when the former is cursed and the latter is asleep.
For it to be a property (traits/characteristics/etc.), that describes a particular person in relation to other ones, it must reasonably be a scale or a contrast. I.e. we can be long or short, thick or thin. However, we rarely describe someone with obvious thing like that he or she has only one mouth, and that his/her feet are at the bottom when he stands. Table 1 suggest a number on properties with potential to be distinctive, between people.

Table 1. Some suggested distinctive human characteristics and possible opposites.

Property	Possible contrary
Temperamented	Phlegmatic
Funny	Boring
Diligent	Lazy
Aesthetic	Unaesthetic
Practical	Unpractical
Restless	Calm
Uncertain	Confident
Observer	Man of action
Emotional	Cool/logical
Adventurous	Cautious
Tall	Short
Physically proportional	Physically disproportionate
Physically weak	Physically strong
Optimistic	Pessimistic
Coordinated	Uncoordinated
Innovative	Wants to preserve
Want to be in the centre	Modest
Habitious	Curious/rebellious
Acquisitive	Uninterested in owning
Social	Unsocial
Wants luxury	Wants to live simple
Selfish	Unselfish
Mentally vulnerable	Mentally strong
Generous	Stingy
Secret	Open
Quick	Slow
Cheerful	Melancholic
Forgetful	Desirous
Sloppy	Careful
Nice	Unpleasant
Focused	Unfocused
Intelligent	Unintelligent
Honest	Ingratiating
Friendly	Unfriendly
Dreamer	Realist
Kind	Contagious
Dominant	Humble
Theoretical	Untheroretical

Good self confidence = good?

A good self confidence can mean the ability to accurately assess ones abilities and low self confidence sometimes means the opposite. But a good self confidence may also mean a greater confidence in ones abilities than what is justified, while low self confidence, also in this aspect, may be the opposite. Good self confidence is sometimes, as well as bad ones, bad for the individual. If a person that, for example, claims to be a very talented driver, but in reality is quite dangerous in the traffic, have a too good self confidence. While a person who considers himself to be a bad driver, probably drives more cautious.

What is best?

There are advantages to be tall compared to the opposite short, but someone who is really long probably will hit the head more often and will have a harder time getting suitable clothes, compared to someone with a normal stature. Most people would rather be thin than thick, but being is extremely thin suffer from a greater risk to die of this compared to someone who is slightly overweight. Cheerfulness is considered to be a positive attribute. Though anyone who is constantly smiling, even in difficult times, will risk to be regarded as a lunatic. Focus on the task is great to have, until the focus turns into unresponsiveness. In short, there are probably, regarding many properties, so that there is an optimum somewhere between the extremes. For many properties, this optimum is probably in the range of the normal distribution on the property. It goes probably for all physical characteristics such as length, weight, size of ears, trachea diameter et cetera. All major discrepancies in that respect probably leads to physical and/or mental health problems. But for some other properties, especially of mental character, relatively extreme deviations may lead to success. In order to, to some extent, determine what is best asked 8 persons[1] to estimate what they think is the optimal level of the previously listed properties.

For the majority of the listed properties the interviewees did quite agree on what's best (for 30 of the 38 listed properties at least six of eight had the same opinion, table 2). Although the interviewees were asked one at a time and even though they should reasonably have somewhat different ideas about what the different features mean. Additionally, they more often thought that the optimum is located in any of the two extremes, than in the normal range. It was only regarding the property pairs temperamental/phlegmatic, emotional/cold and logical, adventurous/careful, possessiveness/uninterested in owning, wants luxury/wants to live simple, dominant/submissive that they agreed that the optimum is within the normal range. Thus, the participants believe that extreme people, in many respects, is better than what they perceive as normal people.

1. Six men and two women were asked to participate in the study, and all said yes. The average age was 45 years (median: 46 years, min - max: 39-48 years) and they had varying levels of education, occupation, income, family and housing conditions.

Table 2. What is the optimum of the various properties discussed according to the participants (number of votes). When at least six thought the same, it is crossed out in green.

Property	Over normal	Normal	Under normal	Possible contrary
Temperamented	0	8	0	Phlegmatic
Funny	6	2	0	Boring
Diligent	6	2	0	Lazy
Aesthetic	6	2	0	Unaesthetic
Practical	8	0	0	Unpractical
Restless	0	5	3	Calm
Uncertain	0	6	2	Confident
Observer	0	5	3	Man of action
Emotional	0	8	0	Cool/logical
Adventurous	0	8	0	Cautious
Tall	3	5	0	Short
Physically proportional	8	0	0	Physically disproportionate
Physically weak	1	1	6	Physically strong
Optimistic	4	4	0	Pessimistic
Coordinated	8	0	0	Uncoordinated
Innovative	4	4	0	Wants to preserve
Want to be in the centre	0	7	1	Modest
Habitious	1	6	1	Curious/rebellious
Acquisitive	0	8	0	Uninterested in owning
Social	4	4	0	Unsocial
Wants luxury	0	8	0	Wants to live simple
Selfish	0	6	2	Unselfish
Mentally vulnerable	0	1	7	Mentally strong
Generous	3	5	0	Stingy
Secret	0	6	2	Open
Quick	7	1	0	Slow
Cheerful	6	2	0	Melancholic
Forgetful	0	1	7	Desirous
Sloppy	0	2	6	Careful
Nice	6	2	0	Unpleasant
Focused	6	2	0	Unfocused
Intelligent	7	1	0	Unintelligent
Honest	5	3	0	Ingratiating
Friendly	7	1	0	Unfriendly
Dreamer	1	6	1	Realist
Kind	6	2	0	Contagious
Dominant	0	8	0	Humble
Theoretical	7	1	0	Untheroretical
Sum	120	143	41	

Are properties equitably distributed?

I think it seems that, at least in the past, there was a perception that good and bad properties are somewhat evenly distributed. He who is poor in one this is good at the other, which the following three old proverbs suggest (See About proverbs):

Anyone who can do anything is a bungler in everything.
Lucky in games, unlucky in love.
It can not be the one to the other.

Do the participants in this study think that our good and bad sides balance each other? They were asked to rank themselves on the listed properties (above normal, normal, below normal). The estimates were then combined with what each participant thought is the optimum level for each characteristic (table 2). The results suggest that the participants feel they have far more good than bad sides. Since in more than half of the cases (160 of 8 x 38 = 304 possible outcomes, table 3) they estimated that they are at what they in the previous question considered to be the optimum level (green). Besides that the participants are well-behaved and socially functioning individuals it can be due to: wishful thinking, a too coarse scale, or with their personal perception of what concepts such as honesty means (see below) they are optimal individuals.

Table 3. A comparison between self-estimations of the characteristics and what each of the participants considered being the optimum level for each property. Green box indicates that they considered themselves to be at the same level that they previously estimated as optimal (none of the participants was during the interview aware of that their own estimates and opinions about what is optimal would be compared). Yellow fields indicate that they were one step away from what they considered to be optimal, while a red box indicates that they were two steps away.

Property	P 1	P 2	P 3	P 4	P 5	P 6	P 7	P 8	Possible contrary
Temperamented	Green	Green	Yellow	Green	Yellow	Green	Green	Green	Phlegmatic
Funny	Yellow	Yellow	Green	Green	Green	Green	Green	Green	Boring
Diligent	Yellow	Green	Green	Green	Yellow	Red	Green	Green	Lazy
Aesthetic	Green	Red	Green	Yellow	Yellow	Yellow	Green	Yellow	Unaesthetic
Practical	Green	Green	Green	Yellow	Green	Green	Green	Green	Unpractical
Restless	Yellow	Green	Green	Red	Yellow	Green	Yellow	Yellow	Calm
Uncertain	Yellow	Yellow	Green	Yellow	Green	Yellow	Green	Green	Confident
Observer	Yellow	Green	Green	Yellow	Yellow	Yellow	Yellow	Green	Man of action
Emotional	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Cool/logical
Adventurous	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Yellow	Green	Cautious
Tall	Green	Yellow	Green	Green	Yellow	Yellow	Green	Yellow	Short
Physically proportional	Red	Yellow	Green	Yellow	Green	Green	Yellow	Green	Physically disproportionate
Physically weak	Yellow	Green	Yellow	Yellow	Green	Red	Green	Green	Physically strong
Optimistic	Yellow	Yellow	Green	Yellow	Green	Yellow	Yellow	Yellow	Pessimistic
Coordinated	Green	Green	Green	Red	Green	Green	Green	Green	Uncoordinated
Innovative	Red	Yellow	Green	Green	Yellow	Yellow	Green	Green	Wants to preserve
Want to be in the centre	Green	Green	Green	Yellow	Yellow	Green	Green	Yellow	Modest
Habitious	Green	Yellow	Green	Yellow	Yellow	Yellow	Green	Yellow	Curious/rebellious
Acquisitive	Yellow	Green	Yellow	Green	Green	Green	Yellow	Green	Uninterested in owning
Social	Red	Yellow	Yellow	Red	Yellow	Green	Yellow	Green	Unsocial
Wants luxury	Yellow	Yellow	Green	Yellow	Yellow	Yellow	Green	Yellow	Wants to live simple
Selfish	Yellow	Green	Yellow	Yellow	Green	Green	Yellow	Yellow	Unselfish
Mentally vulnerable	Green	Green	Yellow	Green	Green	Red	Green	Yellow	Mentally strong
Generous	Yellow	Green	Green	Yellow	Yellow	Green	Yellow	Green	Stingy
Secret	Green	Yellow	Yellow	Yellow	Yellow	Yellow	Green	Yellow	Open
Quick	Red	Green	Green	Green	Yellow	Green	Yellow	Green	Slow
Cheerful	Yellow	Green	Green	Green	Yellow	Green	Yellow	Green	Melancholic
Forgetful	Green	Yellow	Yellow	Green	Red	Yellow	Yellow	Green	Desirous
Sloppy	Green	Green	Yellow	Green	Green	Yellow	Green	Yellow	Careful
Nice	Green	Yellow	Green	Green	Green	Green	Green	Green	Unpleasant
Focused	Yellow	Green	Green	Green	Green	Yellow	Yellow	Yellow	Unfocused
Intelligent	Yellow	Green	Yellow	Green	Green	Green	Green	Yellow	Unintelligent
Honest	Green	Yellow	Yellow	Green	Yellow	Green	Green	Yellow	Ingratiating
Friendly	Green	Yellow	Green	Yellow	Green	Green	Green	Green	Unfriendly
Dreamer	Green	Green	Green	Yellow	Yellow	Green	Yellow	Green	Realist
Kind	Yellow	Yellow	Green	Green	Green	Yellow	Green	Green	Contagious
Dominant	Green	Yellow	Green	Yellow	Yellow	Yellow	Green	Green	Humble
Theoretical	Yellow	Green	Yellow	Green	Green	Green	Green	Green	Untheroretical
Sum: 160	16	20	25	17	17	19	23	23	
Sum: 132	18	17	13	18	20	16	15	15	
Sum: 12	4	1	0	3	1	3	0	0	

Does different properties co-variate?

According to astrologers our personal nature depends on the position of various celestial bodies when we were born. They believe, in other words, that some/all mental characteristics can be grouped and all people fall into any of the groups depending on when each was born. Although the stars discussed in horoscopes is much farther away than the moon and the sun. Some also believe that they are affected by how much of the moon is shadowed by the earth. Although the majority (74%, Sifo, 2004) do not believe in that.

The part of the theory which suggests that characteristics can be grouped and each person can be divided into one of the groups can be true even if the explanation, it depends on the position of certain stars at birth, is not. Maybe because the groupings are based on profound experience of human personalities, which is "packaged" in pure gibberish to become marketable. In the same way as acupuncture traditionally is explained by nonsense, yet (in my experience) works.

To examine the state of the groupings made in astrology, two randomly selected astrology books were studied. The traits most often treated in these was diligent -lazy (in book discussed for two zodiac signs, and five in the other, see table 4), Emotional-cold/logic (included for two and four zodiac signs). Other properties were affected only in connection with a single zodiac sign, although the selection of characteristic descriptive words in table 1 is largely taken from these two books.
Thus it is, based on this material, impossible to say if it is the case that some properties are linked from person to person. Since horoscopes were too vague.

The participants' responses do not indicate that any of the listed property pairs are linked. Because there were no systematic correlation between properties that presumably could be related, such as fast = sloppy or vice versa slow = accurate, and intelligent = theoretical and vice versa unintelligent = un-theoretic (see table 5).

Table 4. The characteristics discussed in two randomly selected books about horoscopes. The figures shown in the column under the book title refers to the total number of signs of the zodiac in which either of the properties of a feature pair (or similar ones) is listed. Red = not mentioned, yellow = sparsely discussed by one author, green = discussed by both authors and/or for more than one zodiac sign.

Property	Stefan Stenudd (2006)												Ann Petrie (1983)											
	Aries	Taurus	Gemini	Cancer	Leo	Virgio	Libra	Scorpio	Sagittarius	Capricorn	Aquarius	Pisces	Aries	Taurus	Gemini	Cancer	Leo	Virgio	Libra	Scorpio	Sagittarius	Capricorn	Aquarius	Pisces
Temperamented	1							1				1	1			1								
Funny																								1
Diligent				1				1					1				1	1		1		1		
Aesthetic	1									1									1					1
Practical																								
Restless		1																						
Uncertain																		1						
Observer																		1						
Emotional				1							1				1	1		1					1	
Adventurous	1			1																	1	1		
Tall																								
Physically proportional																								
Physically weak																								
Optimistic	1												1											
Coordinated																								
Innovative		1							1		1	1												
Want to be in the centre																		1						
Habitious													1	1									1	
Acquisitive		1														1							1	
Social			1												1					1				
Wants luxury													1							1	1			
Selfish														1					1					
Mentally Vulnerable															1			1			1			
Generous																1								
Secret												1				1							1	
Quick	1															1								1
Cheerful																1	1				1			
Forgetful																								
Sloppy					1	1														1				
Nice																					1			
Focused									1		1										1			
Intelligent														1				1			1			
Honest																			1	1	1			
Friendly																						1		
Dreamer									1														1	
Kind																							1	
Dominant					1					1													1	
Theoretical																								

Table 5. Which properties are linked together from participant to participant including parents and siblings. The number in the yes (Y) column indicates the number of cases when the guessed correlation was supported by it was not supported.

	Y (pcs)	N	P1	P1 P	P1 M	P1 S	P2	P2 P	P2 M	P2 S	P3	P3 P	P3 M	P3 S	P4	P4 P	P4 M	P4 S	P5	P5 P	P5 M	P5 S	P6	P6 M	P7	P7 P	P7 M	P7 S	P8	P8 P	P8 M	P8 S1	P8 S2
Tempera-mented+ emotional	11	20			1	1	1				1							1	1	1						1	1				1	1	
Calm+ confident	12	19	1	1		1		1		1	1		1								1							1		1	1	1	
Innovative+ curious	15	16	1		1			1		1					1	1	1			1	1		1	1			1	1				1	1
Fast+ practical	15	16		1	1		1	1			1	1	1			1						1	1			1		1		1	1		1
Adventutous+ curious	15	16	1	1	1	1			1	1	1				1	1	1		1	1				1						1		1	
Curious + optimistic	10	21							1	1		1			1		1				1			1					1		1		1
Intelligent+ theoretic	18	13					1		1	1	1	1		1	1	1	1		1			1	1	1	1	1				1	1	1	
Cheerful+ optimistic	18	13		1	1	1	1		1		1	1	1	1	1	1		1	1	1				1						1	1		1
Restless+ adventurous	13	18		1		1	1	1		1	1	1	1		1		1				1			1				1					
Fast+ sloppy	7	24	1											1			1	1		1	1											1	
Unselfish+ nice	17	14	1	1	1	1		1				1	1		1		1			1	1	1	1			1	1			1	1		

Do we inherit properties?

There seems to be a widespread and ancient belief that we inherit characteristics from our parents, which old proverbs testify on (see About proverbs), for example:

The apple does not fall far from the tree.

We think we know that some features more or less depends on genetic inheritance, this goes for:

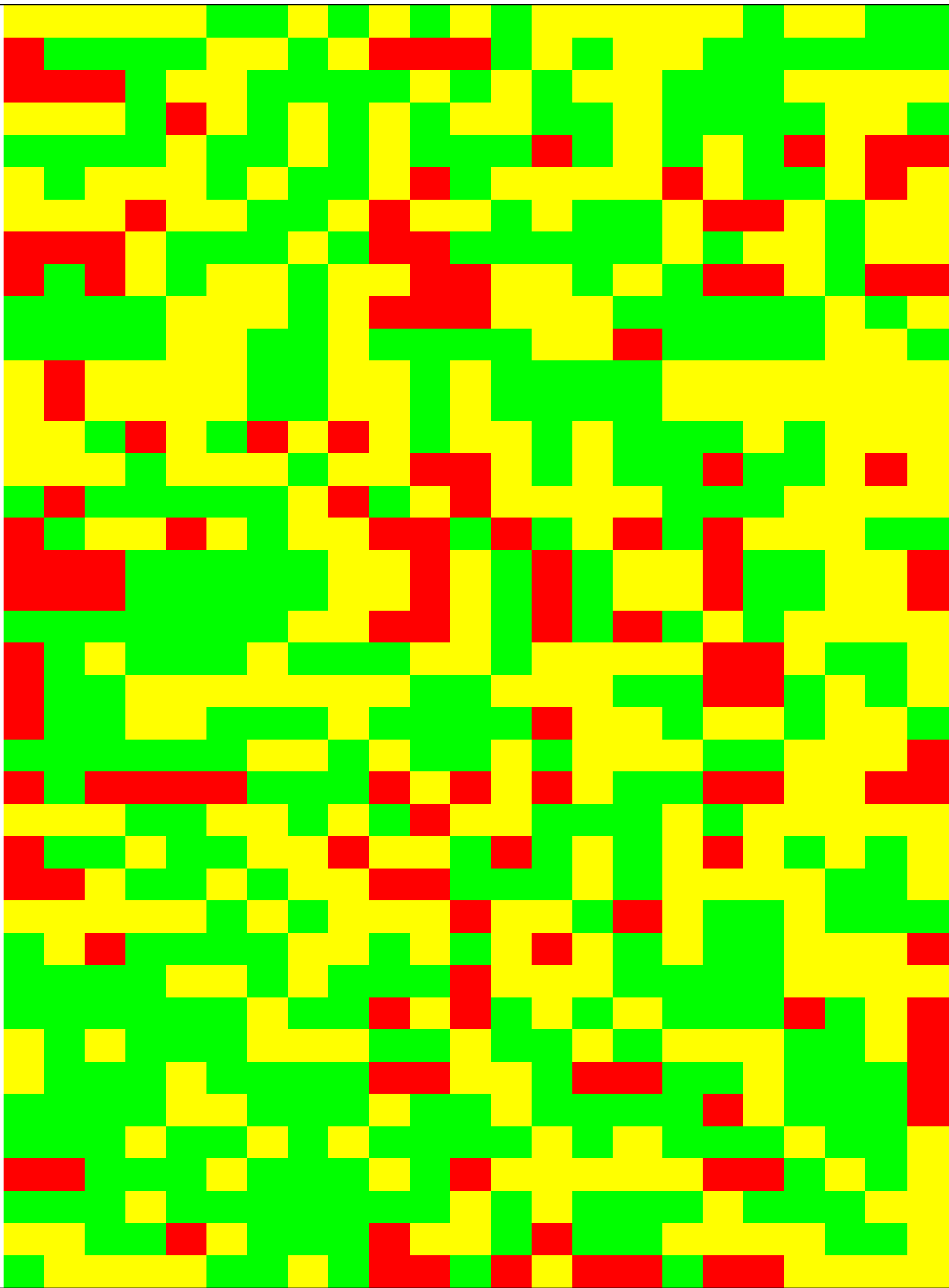
- Skin, hair and eye colour.
- Body constitution, i.e. stature, foot length et cetera.
- Intelligence.
- The risk of certain diseases.

Thus, the participants ought to be more like their siblings than others regarding these properties. But it is not supported by the results of this study. Since as many thought that they are different from their sibling/siblings in terms of intelligence and stature as those who thought they were the same in these aspects.

It is also reasonable to believe that social characteristics like niceness, kindness and friendliness to some extent depends on how our parents are and how we were brought up. If it is true, we should be more like our siblings than others, in these aspects. And among the participants in this study (table 6), it was more common that they rated themselves on the same level as the siblings regarding these properties (niceness: 5 of 8, kindness: 5 persons, friendliness 6 persons), than for all properties, where on average only 3 estimated the same value on themselves and their sibling/siblings. But on the other hand, in my experience, most people are quite nice, kind, and friendly. And those who excel in the other direction are few. Though they might set the level for what the opposite means. The responses suggest that this is the case since only one participant regarded any of their near ones to unfriendly. And no one considered himself to be unfriendly.

In addition, all of us have probably noticed the differences between siblings, even though they have the same parents and reasonably also fairly similar upbringing. The difference is partly explained by that no more than half of the genes are the same for two siblings with the same parents. The differences are also explained by the fact that they were born in different years, at different times of the year and that they have different order numbers in the line of siblings. The last difference has been shown (Schoenberg E 2008) to have a significant impact on the property pairs adventurous/cautious creature of habit/curious and rebellious, dominant/submissive. However, these similarities/differences did not show up in this study.

Table 6. The correspondence between the participants' rankings of themselves compared to their father (P)/mother (M) and siblings (S1-2). A green field indicates that their perception of themselves is consistent with the perception of the related parties. While red indicates that they were so far apart as possible in this three-step scale.



Property	Green	Yellow	Red
Temperamented	8	15	0
Funny	13	6	4
Diligent	10	10	3
Aesthetic	11	11	1
Practical	13	6	4
Restless	7	13	3
Uncertain	6	13	4
Observer	11	7	5
Emotional	6	9	8
Adventurous	11	9	3
Tall	15	7	1
Physically proportional	7	15	1
Physically weak	8	12	3
Optimistic	7	12	4
Coordinated	10	10	3
Innovative	7	9	7
Want to be in the centre	9	7	7
Habitious	11	8	4
Acquisitive	10	10	3
Social	8	12	3
Wants luxury	12	9	2
Selfish	12	10	1
Mentally vulnerable	6	5	12
Generous	8	14	1
Secret	9	10	4
Quick	9	10	4
Cheerful	8	13	2
Forgetful	10	10	2
Sloppy	12	10	1
Nice	14	5	4
Focused	11	11	1
Intelligent	13	5	5
Honest	16	5	2
Friendly	16	7	0
Dreamer	9	9	5
Kind	17	6	0
Dominant	10	10	3
Theoretical	6	10	7

	P 1			P 2			P 3			P 4			P 5		P 6	P 7			P 8			
	P	M	S	P	M	S	P	M	S	P	M	S	P	M	S	M	P	M	S	P	M	S1	S2
Green	13	21	19	22	17	20	23	22	17	11	15	15	17	14	16	17	21	16	19	16	14	14	7
Yellow	12	10	13	13	17	17	14	16	18	15	10	13	18	17	20	15	16	10	12	20	24	19	21
Red	13	7	6	3	4	1	1	0	3	12	13	10	3	7	2	6	1	12	7	2	0	5	10

Does our own perception of ourselves agree with others?

It could be that we have such different views on each other's properties, that it is not possible to make a coherent picture even of common friends. But the results from when I asked the seven participants, who know me well, how they perceive me, their answers showed rather large convergence regarding some factors (table 7), even though they were asked one at a time without any of the other participants present.

Table 7. The perception of me among the seven participants who know me well. The cases in which there was consensus (7 of 7) or close to consensus (6 of 7) are crossed out in green (13 of 38). The cases in which there was total disagreement (estimates range from above normal to below normal) are highlighted in red (15 of 38). My perception of myself is highlighted with black outlines.

Property	Above normal	Normal	Below normal	Possible contrary
Temperamented	1	4	2	Phlegmatic
Funny	6	1	0	Boring
Diligent	7	0	0	Lazy
Aesthetic	0	4	3	Unaesthetic
Practical	3	2	2	Unpractical
Restless	4	3	0	Calm
Uncertain	1	1	5	Confident
Observer	0	1	6	Man of action
Emotional	3	2	2	Cool/logical
Adventurous	4	3	0	Cautious
Tall	7	0	0	Short
Physically proportional	5	2	0	Physically disproportionate
Physically weak	1	5	1	Physically strong
Optimistic	5	2	0	Pessimistic
Coordinated	2	1	4	Uncoordinated
Innovative	5	2	0	Wants to preserve
Want to be in the centre	2	5	0	Modest
Habitious	2	3	2	Curious/rebellious
Acquisitive	3	3	1	Uninterested in owning
Social	7	0	0	Unsocial
Wants luxury	1	3	3	Wants to live simple
Selfish	2	2	3	Unselfish
Mentally vulnerable	1	4	2	Mentally strong
Generous	3	3	1	Stingy
Secret	0	1	6	Open
Quick	6	1	0	Slow
Cheerful	6	1	0	Melancholic
Forgetful	1	2	4	Desirous
Sloppy	3	2	2	Careful
Nice	7	0	0	Unpleasant
Focused	5	2	0	Unfocused
Intelligent	6	1	0	Unintelligent
Honest	6	1	0	Ingratiating
Friendly	6	1	0	Unfriendly
Dreamer	0	2	5	Realist
Kind	5	2	0	Contagious
Dominant	4	1	2	Humble
Theoretical	6	1	0	Untheroretical

The participants totally agreed on that I am diligent, tall, social and nice. In my case the length is quite characteristic (I am 193 cm tall), so it does not say much about whether it is generally easy to place people even on a three grade scale. Regarding the other three, it’s probably even harder to do any grading since the level varies depending on the situation. What the results are really saying is that the participants' perception of the me they knew is more diligent, social, and friendly than their references in general. Though the participants are friends of mine and we would probably not be friends if we did work out well together (i.e., if they considered me to be unsociable and unpleasant). So the result does not mean that I generally am perceived as social and friendly. Myself I do not consider myself to be social but I think I'm tall, diligent and nice.
Furthermore, I rated myself the same as the majority of participants (at least 4 of 7) regarding 25 of the 38 listed pairs of properties (even though I did not have the others' answers when I tested myself). While me only disagreed with at least 4 participants regarding 13 of the properties. Overall, I think these results suggest that those who know someone well, can have an opinion about the person that correspond fairly well with both others and the person's own opinion about his/her properties.
The 13 property pairs where my opinion differed from the majorities were:
Practical vs. impractical, emotional vs. cold/logical, physical proportionate vs. physically disproportionate, Want to be in the centre vs. modest, habitious vs. curious/rebellious, acquisitive vs. uninterested in owning, social vs. unsocial, wants luxury vs. want to live simple, selfish vs. unselfish, mentally vulnerable vs. mentally strong, generous vs. stingy, sloppy vs. careful, and friendly vs. unfriendly.
In the case of the pairs: emotional vs. cold/logical, Want to be in the centre vs. modest, greed vs. uninterested in owning, social vs. loner, wants luxury vs. want to live simple, selfish vs. unselfish, mentally vulnerable vs. mentally strong, generous vs. needles, sloppy vs. careful, and friendly vs. unfriendly, the difference can be partly explained with that others only can judge how I act with them, while I also can take in account how I feel in general, and how I act when I am all alone.
In their own estimation of the property pair forgetful vs. desirous, several participants claimed that they are good in remembering certain things (which they know a lot about, and/or they are interested in), but less good in remembering other things. If it is the case in general, and if we judge others memory in comparison to our own, the effect could be that those who are not interested in the same things, will both perceive the others memory as less good than their own. Since both may feel that the other person can not remember things that are "easy" to remember. The same reasoning could possibly apply to properties like: sloppy vs. accurate (someone who is sloppy in areas where the assessor believes that it is important to be careful, will perhaps be regarded as sloppy even if he/she is very careful in other areas). If the reasoning is correct, it could explain the widespread opinions about me regarding these two property pairs.
An additional reason for the differences in the assessments may be that we have different ideas about what different properties imply. The large amount of synonymous to the selected words (see table 8 in the Swedish original version of this book) with, perhaps, slightly different meanings leaves much room for varying opinions. In addition, a portion of the words selected to describe the studied properties are, according to the dictionary, even to some extent interchangeable. For example: phlegmatic and lazy and pessimistic and melancholic.
Thus, it is reasonable to believe that we have a somewhat different opinion about what different characteristics means. A comparison between my opinion and another persons ditto suggests that this is the case (se table 9 in the Swedish version of this book).

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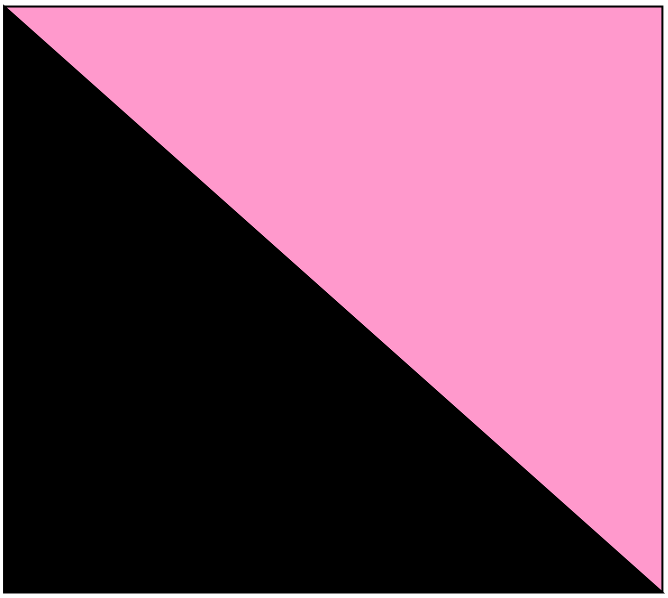
Properties are not constant!

The degree of, for example, envy / kindness which we feel towards other people's success probably varies depending on:

1. How well we can relate to the person. The more we can relate to the person, the more likely we are to feel envy. An example of this is that many people probably feel more envious against the people who are competing with them than far more successful people they only know through the media.
2. The more a person's success supports our own aspirations, goals or desires, the more we become sympathetic to the success. An example of this is the joy that athletes face in their home country when they reaped successes in competitions against other nations ditto.
3. The more satisfied we feel with ourselves, the more we are benevolent towards others' successes.

How we want to make love



It is said that sexual partners should talk to each other about their sexual preferences, to maintain a good sex life. Though there are risks associated with disclosing sexual fantasies or desires. Besides the most obvious risk that one may get hurt when realizing the other person is not satisfied, there is a risk that if the partner makes a request and it doesn't become as successful as in his/her imagination, a certain disappointment may appear.
In other situations in which two people who do not know each other have sex, there is sometimes no room for a discussion about each other's wishes before the intercourse. Then the choices that the participants do, will have a significant impact on if the intercourse becomes successful or not.
Either way, the likelihood that the sexual proposals will be appreciated, if they are about things that people of the opposite sex usually like. But what do they like?

In order to, to some extent, spread the light in any darkness regarding this topic, eight people were asked to answer questions about their sexual preferences and all said yes. Four of them were men and four were women with an average age of 49 years (median: 47 years, min - max: 38-64 years) with different marital status, all of them have had at least one sexual partner. They were asked about how they would like it if they could wish for free, no matter what was the matter with potential partners and sexual activity for the moment.

The result of the first question in the interview confirms that many are bad at explaining how they would like to have sex. This since five of the eight participants answered no to the question: *Have adequately explained how you really want it in your sex life with your long-term partners?*

Nevertheless, as many thought that their sexual partner often has known how they wanted it, and they usually have known how the other person wanted it[1]. So further studies on the subject is perhaps unnecessary. Though according to the results from a survey on the Internet (YouGov, 2010), less than half (47%) are satisfied with their sex life. And according to psychotherapist, who is also an expert in the subject, Margaret Nordeman (Nordeman M, 1992), it is, particularly for women, often difficult to talk to their partner about their sexual needs.

1. The first of these questions was: D*o you think your sex partner (-s) have known how you want it?* Three responded *yes*, two responded *often*, and three *no.*
The second was: *Do you think you normally have known how your/your sex partner (-s) wanted it?* And three answered *yes*, one *maybe*, one *often*, and three *no.*

Where?

I have, from many different sources heard, both jokingly and seriously, that women want long sex acts with prolonged foreplay while men prefer quickies. Though in real life I have not noticed that women are so categorical, some quickies in the kitchen have been more appreciated than traditional intercourses with ditto foreplay. It is also supported by that all the participating women, as well as the men rated the alternative that the next intercourse would take place in the kitchen during the day, on the upper half of the ranking scale, see table 1. But the women rated the more traditional proposals: *Foreplay on the couch and final in bed*, and *In bed before falling asleep* higher than men.

Table 1. Where would the participants prefer to have sex? The result where the correlation between the sexes was lowest is highlighted in red.

If you could choose where the next intercourse with a permanent partner would take place, rate (9 = best).	Participant number: Men					Women					Both sexes
	1	2	3	4	Average	5	6	7	8	Average	Average
Foreplay on the couch and final in bed.	4	8	4	7	5,8	9	9	7	4	7,3	6,5
In bed before falling a sleep.	3	4	3	8	4,5	6	7	9	8	7,5	6,0
In the kitchen during the day.	5	9	8	9	7,8	5	8	6	9	7,0	7,4
In a bathtub.	2	7	6	4	4,8	4	5	5	5	4,8	4,8
In a parked car.	9	6	1	5	5,3	3	3	4	6	4,0	4,6
While you are driving a car.	1	2	7	1	2,8	1	1	1	1	1,0	1,9
While your partner is driving.	8	1	2	2	3,3	2	2	2	2	2,0	2,6
Out in the nature.	6	5	9	6	6,5	8	6	8	7	7,3	6,9
Out in an urban area.	7	3	5	3	4,5	7	4	3	3	4,3	4,4

In reality (Sifo, 2002: Project 3825160) over 95% of us usually have sex in the bedroom and the majority apparently fantasize most about having sex in the bedroom (52% of men and 51% of women). Other spaces in the home, including the kitchen, only 12% of men and 9% of women fantasize about having sex in. The remaining 36-40% of the respondents said, however, that they did not know where in the home they would like to have sex. Sifo results thus indicate that to suggest a quickie in the kitchen is not a given winner.

Both the men and the women in average rated the option: *Out in the nature*, high on the scale. It suggests that such proposals may become popular. In addition, the participants were asked if they feel that a particular risk of being caught in the act makes it extra exciting and the majority (5 persons) felt that this is the case. Though despite that, almost a third of us have never had sex outdoors (YouGov, 2010) and less than half (45%) have had sex in a place where there is a high risk to get caught in the act. Which implies that neither such proposals are given winners.

Background music and lighting

In the world of porn films the light, for obvious reasons, is never turned off. But I've seen in least one "normal" movie how the woman turns off the lamp and the man turns it on again, several times. Probably to convey that the woman did not want to be seen in her nakedness, while the man wants to watch her. And the participants seem, to some extent, to agree with that, since all the three men who responded ranked the option *It is dark*, the lowest. While more women than men rated *Many lamps are lit*, the lowest. The majority, however, preferred that the room is slightly illuminated, as 5 out of 7 rated one of the options *Some candles burn* or *The bed light is lit*, the highest.

Most also seem to prefer that it is silent or nearly silent and calm, as they ranked its *quiet*, its *quiet in addition to the night's usual sounds*; *Weak and soft music in the background* above the options containing noisy music.

Thus one should probably take a chance and leave the ceiling light on and/or put on rock music if you are about to have sex with someone whose preferences you don’t known.

Table 2. Is it to be dark and quiet, or bright and noisy? The options that got the highest average ranks are crossed with yellow.

What do you generally prefeer, rate (5= best)?	Participant number:										Both sexes
	Men					Women					
	1	2	3	4	Average	5	6	7	8	Average	Average
It is dark	-	1	1	1	1.0	2	2	3	4	2.8	2.0
A few candles are burning	-	4	5	2	3.7	5	5	1	1	3.0	3.3
The bed light is on	-	3	4	4	3.7	4	3	5	5	43	4.0
No lights are lit but the room is slightly illuminated by the lights of the night	-	2	3	5	3.3	3	4	2	3	3.0	3.1
Many lamps are lit	-	5	2	3	3.3	1	1	4	2	2.0	2.6
It is quiet	-	5	3	1	3.0	3	3	4	4	3.5	3.3
It's quiet in addition to the night's usual sounds	-	4	4	2	3.3	4	4	5	5	4.5	4.0
Weak and calm music in the background	-	3	5	4	4.0	5	5	1	3	3.5	3.7
Weak but noisy music in the background	2	2	2	3	2.3	2	2	3	1	2.0	2.1
High and noisy music in the background	1	1	1	5	2.0	1	1	2	2	1.5	1.8

Noise during the sex act

Judging by porn films, men prefer to be quiet during the act, while women prefer to moan and scream. Is that the reality? The results suggest that there is some truth in that, at least if the purpose of the movies is to please men. This since three of the men prefer that she cries a bit even before her orgasm and nobody wants her to not scream at all, but only one of the men like to shout himself before the ejaculation. In addition, three of the women prefer that the men don’t scream.
But no one seems to be fond of sex act in which a participant screams all the time, no matter who it is.

Regarding moaning it was more egalitarian in that the majority, regardless of sex, wants that the partner moans a bit even before the orgasm. Though no one likes that he/she moans all the time. And there are more people who want that the partner moans than those who want to moan themselves.

In summary, it likely that to moan every now and then during an intercourse will be successful for a girl, it can also pay off to cry a little. But one does not need to feel compelled to moan just because the partner does, since he or she may do so only for his/her own enjoyment's sake.

Table 3. Sounds meanwhile the intercourse ongoing.

Do you prefeer to:	Concerning themselves: Men	Concerning themselves: Women	*Do you prefeer that your partner:*	Concerning the partner: Men	Concerning the partner: Women
Not scream	2	3	Not scream	0	3
Scream only when you comes	1	0	Scream only when he/she comes	1	0
Scream also during the act	1	1	Scream also during the act	3	1
Scream the whole time	0	0	Scream the whole time	0	0
Be quiet	0	1	Is quiet	0	0
Moan only when you comes	2	1	Moan only when he/she comes	1	1
Moan also under the act	2	2	Moan also under the act	3	3
Moan the whole time	0	0	Moan the whole time	0	0

The results suggest that there are more people who like to talk a little during an intercourse compared with being quiet. Hopefully those who claimed that they like to talk, do it because it gives them pleasure or amusement. Instead of that they do it for the partner's sake.
The majority also like that the partner talks, as long as it is about the intercourse. Like that he or she says that its good, says sexy words or tells about their desires for the moment.

Thus, it seems like a good idea to talk about the sexual act while it is in progress. But you should not feel forced to do it just because the partner is talking, since the talking might be something that gives the speaker pleasure.

Table 4. Talking while an intercourse is going on.

Do you prefer to (multiple simultaneous choices are possible):	Concerning themselves		*Do you prefer that your partner (multiple simultaneous choices are possible):*	Concerning the partner	
	Men	Women		Men	Women
Not talk	0	2	Not talk	0	1
Say that it is good	2	2	Say that it is good	1	3
Say sexy words	2	1	Say sexy words	3	1
Say what you want your partner to do	4	2	Say what he/she wants your to do	2	2
Talk about anything	0	0	Talk about anything	0	0

Caressing and kissing

One of the most famous authors of factual books about intimacy, Francesco Alberoni states in **I Love You** (Alberoni F, 1996):

The woman wants to make love when she is rested, when she has plenty of time ahead of her. And before the act she needs to be caressed with, and then the desire comes. Afterwards she likes to linger and chat in the semi-darkness, surrounded by her beloved. The man on the other hand has another mental pattern. He wants to take her suddenly, even with force, even if she is tired and says no. He is convinced that she likes the game, she is just as excited as he is. He is convinced that her refusal is a relic of childish shyness. Therefore, he insists. She tries to make him understand what she wants by hints, in a symbolic way. But she has no success.

A substantial majority of the participating men, however, said that they like to both give and receive caresses on the genitals and surrounding areas (table 4). The feet, lower legs and arms were less interesting in this context. These results are also supported by research conducted by the National Public Health Institute (Folkhälsoinstitutet 2000: 17) which shows that 59% of the men and 72% of the women were stimulated by their partners hand on their genitals at the last sexual intercourse. The difference between the sexes that the National Public Health Institute points out, does not mean that men in general like caresses less than women. The difference may be due to that many women have difficulty reaching orgasm from intercourse alone (Nordeman, M., 1992). Furthermore, it is technically much easier to stimulate a woman than a man during an ongoing intercourse. Judging from the responses in this survey, most also likes to give and receive kisses on and around the genitals.

Table 4. The number of respondents who likes to get and give caresses and kisses on various parts of the body.

What do you think about?:	Gettting		Giving	
	Caresses	Kiss	Caresses	Kiss
Fets and lower legs	2	2	3	2
Inner thigs	6	6	7	5
Buts	7	6	7	6
Scrotum/outside the vagina	7	7	7	8
Penis/vagina	7	7	7	7
Stomach	4	4	5	6
Breasts	6	6	6	6
Arms	4	4	4	4
Face	5	8	5	8

Based on the results, it is reasonable to believe that it will be prosperous to touch and/or kiss the genitals. And if the partner does, it is probably because he/she likes it. Not because he/she "sacrifices" for you to have a good time.

In addition, the participants were asked to freely answer the question: *How do you want to be touched on your genital?* And the results (table 5) suggest that men want to be caressed softer than what women want. Since all men except one said anything about soft, but two of the women used the word "hard" and only one said that she wants to be petted softly.

Table 5. About how we want to be touched during sex.

How do you want to be touched on the genitals?	Men	Women
Start soft end harder	1	0
Softer with age	1	0
Soft	1	1
Hard/pretty hard	0	2
Variating	1	1

Oral sex

Vaginal intercourse is the predominant form of sex (Folkhälsoinstitutet 2000: 17), since more than nine out of ten fucked vaginally the last time they had sex. And if the choice is between normal sexual intercourse and oral sex, almost all the participants in this study choose the former (table 6). Despite that, all liked oral sex. One reason for this could be that many of their partner’s maybe hasn’t been so good at satisfying them orally. Something that, at least I, has heard quite a few men say. For example, it seems to be a lot of girls that make it so that the mouth and the penis is hidden, which obviously takes away some of the male pleasure of it. If it is generally the case that we are poor in satisfying each other with our mouths, it may be because we have different sex. A support for the "theory" is that guys I knew who been given a blow job by both men and women claims that men are technically better at it than women. How it is for women I do not know because I haven’t asked. If the "theory" is true it indicates that we should try harder to communicate about this. As a first step on the road to greater knowledge, I can tell you that the majority (three men and two women) of the participants[2] wants variation in how their partner uses the mouth and tongue. The responses also indicate that women wants, which also goes for stimulation using hands, to be stimulated harder than what men wants, since two of the women stated that they would like to be licked hard.

Table 6. The participants' opinions about oral sex.

What is most according to your taste? (several choices possible):	Men	Women
I dont like oral sex	0	0
I like oral sex as a part of the fore play but not the whole way	1	3
I like it but if the chice is between intercourse and oral sex, i prefeer intercourse to orgasm	3	2
I like and if the chice is between intercourse and oral sex, i prefeer oral sex to orgasm	0	1
I prefeer to give oral sex rather than getting it	1	2
I prefeer to get oral sex rather than giving it	1	1

2. The question was: How do you want your partner to do with his/her mouth and tongue?

Shaved or natural

Women want for themselves to be shaved under their arms (4 of 4, table 7) and most (3 of 4) also want their legs to be shaved. But none of the women want to be completely shaved in the genital area. One of them expressed her opposition against this so that she would feel "paedophile warning" for a man who wanted to see her genital area completely shaved. Three of the women like however be shaved with a retaining bush at the front. For men, they had more modest wishes. In addition to that three of them prefer that he has shaven his face, there were only one who wants him to also be shaved in the genital area. The majority of the men want to have their hair left, apart from in the face (4 of 4). One of the four, however, likes to be shaved under his arms and in his genital area. The men prefer that women are shaved under their arms and on their legs (4 of 4) and in the genital area (4 of 4). The difference between the sexes is thus quite clear. Both men and women want women to be more shaved than men, aside from in the face. And it is easy to understand considering that we reasonably are attracted to the physically distinctive details. Women thus are probably, to a greater extent than men, attracted to muscles, penis and body hair. While men are probably more attracted to prominent breasts, curvy waist and buttocks, vagina and less hair on the body.

Thus, it seems fruitful for a woman to at least shave her armpits and legs and possibly also her genitals, while men maybe should avoid shaving other body parts than their face, if the aim is to please someone whose taste is unknown.

Table 7. The participants' preferences regarding body hair.

Concerning you	Men	Women	Concerning your partner	Men	Women
You have all hair left	0	0	Your partner have all hair left	0	1
You are shaved in the armpits	1	4	You partner have shaveded armpits	4	1
You are shaved in the face	4	1	Your partner is shaved in the face	2	3
You are shaved on the breast	0	0	Your partner is shaved on the breast	2	0
Your legs are shaved	0	3	Your partner have shaved legs	4	0
Your genitals are shaved but there is a little bush in front	1	3	Your partners genitals are shaved but there is a little bush in front	3	1
Your genitals are completely shaved	1	0	Your partners genitals are completely shaved	1	0

What we would like to do

We've all probably wishes we'd like to get satisfied in bed and other things that we absolutely do not want to do and additionally other things that we can do for our partner's sake. The interviewees were faced with a number of variants and according to the results (table 8), it is, especially as a man, not a good idea to mix in a third person. In addition, the results suggest that women like to be caressed in the anus when they have sex, and that men do not mind doing it. The contrary, however, is apparently not as popular. Regarding striptease and anal sex the opinions are mixed, but you may find that a fairly large proportion of both men and women are in favour of this. Which I think may be an effect of there was so few participants. But nevertheless the results clearly show that there are those who like it.

It thus seems to be quite a good chance that anyone can accept to fulfil the desires that are listed in the table, except those involving a third person.

Table 8. The percentage of the participating men or women who would like to do the suggested thing, who would not, and how many that are willing to do it if the partner very much wants to (the Ok option).

What wouldyou like to do with your partner?	Men				Women			
	Yes	No	Ok	Yes + ok	Yes	No	Ok	Yes + ok
Having threesome with my partner and another person of my gender	1	2	1	2	0	4	0	0
Having threesome with my partner and another person of my partners gender	1	3	0	1	0	4	0	0
Have anal sex	2	1	1	3	2	2	0	2
That my partner caress my anus during the act	2	0	2	4	4	0	0	4
To caress my partners anus during the act	2	0	2	4	2	2	0	2
To shave my partners genitals	3	0	1	4	1	2	1	2
See my parter strip	4	0	0	4	1	2	1	2
Strip myself	2	2	0	2	1	2	1	2
See my partner having sex with someone else	0	4	0	0	0	4	0	0
Have sex with someone else while my partner is watching	1	2	1	2	0	4	0	0

What makes us horny?

It is likely that we all sometimes are more horny than usual. When and in what situations this occurs, appears to be very individual. According to the responses (table 9) is for some people linked to a particular time of the day and for others it has to do with the seasons, alcohol intake, or the menstrual cycle. One of the men said that he is hornier after lunch, but none listed the evening or morning. Even though men sometimes are considered (Klein S, 2008) to have a greater desire to have sex in the morning when they wake up, because they then excreted large amounts of the male hormone testosterone. And none of the women mentioned alcohol. Despite the fact that it, according to my experience, makes a big difference.

A bias factor in the responses may be that the respondents were free to answer the question in the table header. If the question had instead been accomplished with fixed responses like: on a vacation, when in love, when I'm drunk, it is reasonable to believe that several had answered yes to at least one of these responses. This given how people can behave when they are drunk, and apparently more children are born nine months after the summer holidays, as well as how much more sex couples have in the romantic phase compared to later in a relationship.

But when one's partner is hornier than usual we will hopefully get aware with time even if the question is never posed. However, it may be useful to bear in mind that it might differ from person to person.

Table 9. The participants' free responses to the question when they feel hornier than usual.

When are you hornier than usual?	Men	Women
In spring (has to to with the light)	1	0
After lunch	1	0
When i’ve been drinking alcohol	1	0
When in love and on vacations	0	1
During about a week after menstruation	0	1
In the mornings	0	1
Before and during menstruation + during pregnancy	0	1
Dont know	1	0

It is probably also possible to awake the partner’s lust through, for example: dressing in a certain way, showing a certain body part, or starting a porn video. On a question about the former: *Is there a particular variant of a garment or a way of dressing that turns you on?* Two of the men answered: *short dress, one mentioned clothes showing her breasts and another one said stay ups.* I.e. information that probably is common knowledge for most women. The opposite is, however, for me unfortunately unknown and judging by what my male friends said about it, there is among us a lack of knowledge about this. It can be due to several things such as:

- Women may not show as clearly what they think is sexy, because they have learned not to glare on a particular body part.
- They are, in this aspect, more complex than us men.
- Men are less interested than women in finding out how they should dress to be sexy.

The participating girls gave no greater guidance either, since they responded: *no; jeans that fit well; stylish underwear; suits, preferably made of silk; he must have style without being showy.*

If it is generally the case that we men less than women know how to dress to turn women on, and girls "suffer" from that we look un-sexy, this gender difference is probably negative for both sexes. And to improve the situation, I think the female sex has to collectively speak out in this issue.

Concerning the possibly sexy body parts, the answers were similar. In the sense that men fairly uniformly pointed out the lower part of the body, i.e. on the question: *Is there a body part that you become very excited to see*? Answered: *ass/butt* (1 answer); *thighs* (2 replies): *long legs, narrow butts* (1 reply). Women's responses sprawl much more: *no; the whole body, abdomen, face, hips, and hands.* Oddly enough, it was just one who mentioned the genital areas. Maybe it is because when it is exposed one is either already horny, or sex is out of the question, since the naked partner is in the shower and in a hurry to work.

The last of the above proposed ways to make someone horny, watching porn together, may not be as successful, since it probably require some horniness from the beginning to want to do this. Additionally, it may be sensitive to show to ones partner that one gets horny by seeing others having sex. Finally, I have heard some people say that they do not get turned on by such films. But a clear majority (seven of the participants) claimed that they certainly get horny of porn (the question was: *Do you get horny by porn (given that it is in your tastes)?)* So it is reasonable to believe that a proposal to look at porn has good chances to be received well.

To enjoy and orgasm

One idea I had carried with me from my teens is that we guys are more fixated on having sex than girls are. But with age, I have become more and more doubtful that it is altogether true. The participating men seem, judging by the responses (table 10), also to share my doubts. The women, however, had pretty much the perception that it is so. The gender difference may be due to that men's sexual prowess is reduced by approximately 30% between age 25 to 40 years of age (Leander G, 2004), because the testosterone production decreases. Which women might not be as aware of as men? The results can also be interpreted so that we believe the partner is enjoying it more than we do.

The issue where both sexes were reasonably consistent was that it is more important for him to have an orgasm. And according to the National Public Health Institute (Folkhälsoinstitutet 2000: 17), it is also more common for men than woman to get it (at the last intercourse, 71% of men and 62% of women had an orgasm). Though it’s not always easy to know if your partner had an orgasm or not. But according to the men surveyed in the National Public Health Institute study, the men thought that 59% of their partner’s had an orgasm and according to the women 76% of the men ejaculated. Suggesting that people in general have a pretty true picture of the situation in this aspect.

Table 10. Who enjoys sex the most?

Who generally enjoys most:	Men					Women				
	She	He	Both	Nobody	Dont know	She	He	Both	Nobody	Dont know
To think about sex	0	0	1	0	3	0	3	1	0	0
To know that there will be sex	0	2	2	0	0	0	3	1	0	0
To know that there will be forplay	2	0	2	0	0	3	1	0	0	0
The intercourse before the orgasm	1	0	2	0	0	1	3	0	0	0
During orgasm	2	0	2	0	0	2	1	1	0	0
After orgasm	3	0	1	0	0	2	1	0	1	0
For who is it the most important to have orgasm	1	3	0	0	0	0	3	1	0	0

It probably has some significance for both parties, where and how an orgasm comes. My experience is that for girls, the question is not as complex as those that have an orgasm from the intercourse movements alone prefer to just fuck until they reach orgasm. While those who need to be helped with fingers are happy to do it themselves or that the partner does it. They ultimately who does not have orgasms during intercourse appears to accept it. For men, the options are slightly more, both in terms of the way to ejaculation and the ways to deal with the results. In order to, to some extent investigate which ways people prefer, the participants were asked to rank some alternatives (table 11). The traditional ejaculation in the mouse is undoubtedly the most popular among those interviewed. But the guys on average ranked option that has to do with the mouth or anus higher than the girls. While girls rated ejaculations on their body higher than boys. However, among the girls there was a larger variation than among the men, suggesting that they, also in this area, have a more individual standpoint than us guys.

Table 11. Best ejaculation. That which was ranked on average the highest, and also the most similar, is highlighted in yellow.

The best ejaculation. Rank (7=best)?	Participant number:										Both sexes
	Men					Women					
	1	2	3	4	Average	5	6	7	8	Average	Average
In the mouth and then spit it out	6	5	-	4	5.0	2	4	3	2	2.8	3.7
I the mouth and then swallow	6	6	-	6	6.0	1	3	1	5	2.5	4.0
In the vagina	7	7	-	5	6.3	7	7	7	7	7.0	6.7
In the face	2	2	-	2	2.0	4	5	2	4	3.8	3.0
On the body	3	3	-	3	3.0	5	6	6	6	5.8	4.6
In the anus	5	4	-	7	5.3	3	1	5	3	3.0	4.0
On an object	1	1	-	1	1.0	6	2	4	1	3.3	2.3

Spanking

I think some are excited to be smacked on the ass during intercourse. It is also confirmed by two of the girls (table 12), but all four guys said that they do not like it. However, almost all participants can accept to give spanking, if the partner wants it and most even think that it, in that case, is exciting.

The results thus indicate that women should not take a chance and do some spanking on the buttocks during the intercourse, but there's a pretty good chance that it will be successful if the man does it.

Table 12. The participants' views on spanking.

Your view on getting/giving spanking on the ass during intercourse.	Men	Women
I don’t like to spank someone	0	1
I don’t like to spank but if my partner wants it I do it for him/her	1	1
If my partner likes it I think it is sexy	2	2
I like to spank	1	0
I don’t like to be spanked	4	1
I don’t like to be spanked but if my partner wants to do it I do it for him/her	0	0
I don’t like to be spanked but if my partner wants to do it I think it is sexy	0	1
I like to be spanked	0	2

Dominating or not

Again in the world of porn, it seems, in my experience, to be that men are dominant and women submissive. Is it that how we generally wants it? Yes, the responses suggest that, since three of the girls said they prefer that he decides (table 13).

Table 13. Who should decide? Participants were asked to answer freely and responses could be categorized into the following four groups.

If the choice is between that you or your partner decide what should happen during the intercourse, what do you choose?	Men	Women
Me	1	0
The partner	1	3
Variated	2	0
Dont know	0	1

Hard or soft

Finally the participating was asked what they think is the better of the two options: *if the penis is pushed hard or soft into the vagina?* All the girls responded *hard* but two of the men said *softly* and the other two said something like: *Depends, both are good at the right time*.

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How to get laid

This text is about how to meet and have sex with someone who had hitherto been unknown to you. The most critical factor for success in this is, of course, your appearance in her eyes. It is partly possible to do something to improve your opportunities in this aspect. And probably all men, as well as women, put a little extra effort in the choice of clothing and other items before they go out with the intent to get laid. But as men's perception of what is neat/cool, do not always go hand in hand with women's ditto, it may pay off to consult a woman about styling and then, as far as possible, follow her advice.

Once out at the nightclub the most important moment is to choose a subject that wants to be picked up by you. With a good choice the chances increases radically and the effort to achieve the goal is very much reduced. While the opposite is usually is neither fun nor fruitful. Thus, the question is: who is interested in you? It is, above all, revealed by the way they look at you (a girl that never looks at you even though you are in her field of vision is probably not interested in you).

Three boys and three girls (mean, minimum-maximum age: 42, 38-47 years) were asked to rank the expressions in the faces of the ladies below. From who seems the most (8 points) to the least (1 point) interested, if one by one of them stood in front of the interviewee with a countenance as in the picture.

1

2

3

4

5

6

7

8

The majority (5 of 6) of the participant’s ranked number 1 as the most interested. Thereafter, number 8, followed by 5 and 4. The second was considered by most, to be the least interested (all but one gave her 1-2 points), second-fewest points was given to number 7, followed by 6 and 3.

In addition to how they look at you, there are other signs that reveal if a girl is interested in you. The participants in this study suggested:
- She reacts in some way (e.g. smiling a bit more) when we get eye contact.
- If she fixes her hair a lot, emphasize her breasts and/or is biting on her lip.
- When we have eye contact she opens up her body language and it becomes interplay of eye contacts (watching/looking away).

- She consults her friend.

The next step on the way to tonight's goal is to establish contact. It is of course absolutely crucial if there is to be a continuation. My experience is that it is best not to go too quickly to verbal communication but to continue for a while with flirting from a distance. This is because:

1. It is fun and exciting for both.
2. The risk of making a fool of you is much less than when closeness begins.
3. If she already has a partner who is only away temporarily, it can be embarrassing.
4. Most probably people look better from a distance (it goes for both parties).
5. In the distance, the truth has not yet come to light and the subject of tonight’s dreams has time to build up a nice fantasy picture of your advantages.

Though at some point you have to move on, thereby creating a situation that can be quite problematic: to trespass someone's territory. The participants in this study suggests, based on their own experiences, the following openings:

- *I usually try to improve her ability to make contact. By placing myself nearby, in a way that enables her to stand near me. When we made contact, I usually listen to and follow what she says with my comments and questions.*
- *I usually walk up and introduce myself. Then I try to establish a physical contact (type occasionally hold her hand or nudge).*
- *He shall give enough compliments that one is cute/fine and not push too hard but still be close.*
- *He should be moderately intrusive, not boastful, not to speak too much about himself. And if it is empty in her glass, or if he should buy a drink for his own, he should ask her if she wants.*

Then remains to bring her to bed. My experience is that it is quite difficult and very whimsical. In particular, as both I and the prospective generally have been drunk. The latter is also an advantage, in that both horniness and courage increases from both sides. Roughly speaking, there are only two ways out: either you make a fool out of yourself in her eyes to such an extent that her interest cools, or the adventure carries on for a while. What does it then mean to make a fool of you?

She does not know you and do not knew you and thus not what a good, nice and funny person you are. This insight builds up over time. Which means that the very first thing you say to her, gives her the whole picture of you (besides the qualities she puts into your appearance and behaviour)? Next thing you do or say adds further clues into endlessly.
"Making a fool of you" can be just about anything. The reason may not be that the behaviour itself is bad or abnormal, but that it in her case triggers a lousy memory from the past. Some examples that participants enumerated:

- *The guy gets too drunk (cited by all respondents). And the majority also mentioned that the guy looks tired.*
- *Additionally one interviewee claimed that's there is, like, one billion wrong thing to do. The most common (besides drunk and tired) are that I'm going too hard for it, her friend gets jealous and the fact that I live in the suburbs.*
- *She already has a boyfriend/husband.*

An almost necessary (and very nice) step on the road to the first love-making is the first kiss. I have, as far as I remember, never gone to bed with a girl that I haven’t previously been kissing. Most often we have started to kiss already on the place where we met. It may seem difficult to know when the time is right. But most often the opportunity gives itself. Especially due to that the initiative as a rule is taken by her. She leans forward, signal with her lips and stares into my eyes.
Though mind you! Even after the first kiss, it is far from given that there will any lovemaking.

Good Luck!

Differences with age

"Middle-aged people between 40 - to 50-year-old begin to notice changes that they do not want to see and many are trying to escape. It could be wrinkles, grey hair, baldness, and that the maximum sports performance deteriorates or that virility is not like before."

From **Attitudes towards older people in employment** by **Per Erik Solem** in (Aronsson A and Kilbom Å, 1996).

With time, we change in different ways. This is partly due to the aging process and partly because the world is changing. This chapter describes an attempt to, as far as possible, isolate and examine what changes can be attributed to the former. The material is based primarily on well known knowledge of physical aging and secondarily on information from Swedish studies with repeated interviews with the same people. Unfortunately most studies with repeated interviews, that I have seen, presents very sparse data on the relatively subtle differences that may be due to aging. Therefore the information here is in third place based on data from other studies. As this was not enough to illuminate the areas in which I think we change, the information is also based on structured interviews with ten persons (6 men and 4 women). On average, they were in the middle of the middle age, i.e. 45 years (median: 47 years, min-max: 38-49 years) and they had varying levels of education, occupation, income, family and living conditions. The questions to the participants are reported beside each line up of answers.

The procedure has both advantages and disadvantages regarding the veracity of the responses and the how relevant the answers are for people in general, probably mainly:
(+ Advantage, disadvantage -):

- The sample is small and not representative for the general population.
+ Since it was interviews and I held the pen, I could to a greater extent assure that the respondents thought through their answers compared to if they had written down their answers themselves. In addition, I was able to, to a greater extent, assure that I understood their responses compared to if I had only been obliged to interpret what they had written.
- It may happen that some questions were misunderstood and that the respondents thus responded to anything other than what was intended. From that respect open interviews would have been better because they are not stopped at a short answer.
- All people think probably a little different from day to day, so the responses captured only partially true changes over time.
- The participants compared rather the image they have today of what they thought when they were teenagers with what they think now, than compared the actual thoughts from then and now.
- Questions about quantifying something probably give very different answers depending on the language and the terms of reference of the respondents. For example, perhaps the real difference is less for a person who said that the difference are huge, compared to someone who said that it is only a slight difference.
- There is some risk that others have made observations about the age effects that the participants made their own even if it does not applies to them.

+/- The answers are based partly on the open-ended questions, which have the advantage that the participants to a lesser extent are given the answers through the questions and they have more space to take up various aspects in the response, compared with fixed answer alternatives. The downside is that some of them may not be thinking about taking up some viewpoints that they actually shared.

Men has, to larger extent than women, been forced to press down their feelings. Which reasonably have contributed to that women for good and for bad are closer to them.

The most obvious effects of aging are physical. Which I and contemporaries with me (between 40-50 years) have notices in the form of drier skin[1], less hair[2] on some spots and more in others, changed hair colour[3], and impaired vision[4]. Many of those who are doing much harder physical activities than people in my vicinity, may also find that their body becomes weaker and less resistant to physical load[5] after early adulthood. From the age of 40, we also get about 1mm shorter for every year that passes (Spiriduso W et al., 2005). In addition, deteriorating apparently shows in our fitness[6], hearing[7], the ability to get children[8] and our reaction time[9], although I have not noticed any of it. At even higher age awaits worse physical deterioration.

1. The production in the skin's oil glands decreases and the skin therefore looses some of its shine, gets drier and less smooth after adolescence and onwards (Lindehag A.-G, 1989), see also figure 1-16, which depicts two siblings from childhood.
2. Men often have less hair on their crown, which is "compensated" with stronger hair growth on other parts of the head, such as bushy eyebrows, see figure 7-16.
3. The hair colour change over the years, blonde child may, for example, over time, become dark-haired and later get hints of white or silvery hairs, see figure 7-16.
4. With increasing age (Lindehag A.-G, 1989) the pupil are gradually reduces and less light reaches the eye's internal parts, so a 70-year-old receives two-thirds less light than a 20 year old. In addition, the lens becomes stiffer in our 40s, which means that we get more and more difficult to see clearly on short distances.
5. From the age of 30 the amount of bone mass and muscle power is reduces with around one percent per year (Spiriduso W et al., 2005).
6. Aerobic power decreases with about one percent per year from 20 years of age (Lindehag AG, 1989).
7. Hearing cells begin to atrophy already in our 20s and 50 years later, about half of them has disappeared (Lindehag AG, 1989).
8. About at 35 years of age women's ability to have children begins to fall (Lindehag AG, 1989).
9. The reaction time increases by about 0.5 ms/year from 20-years of age (Spiriduso W et al., 2005).

Picture 1-6, Christina born 1943.

About 7 years 21 31 41

46 67 years

Picture 7-16, Carl-Gustav born 1946.

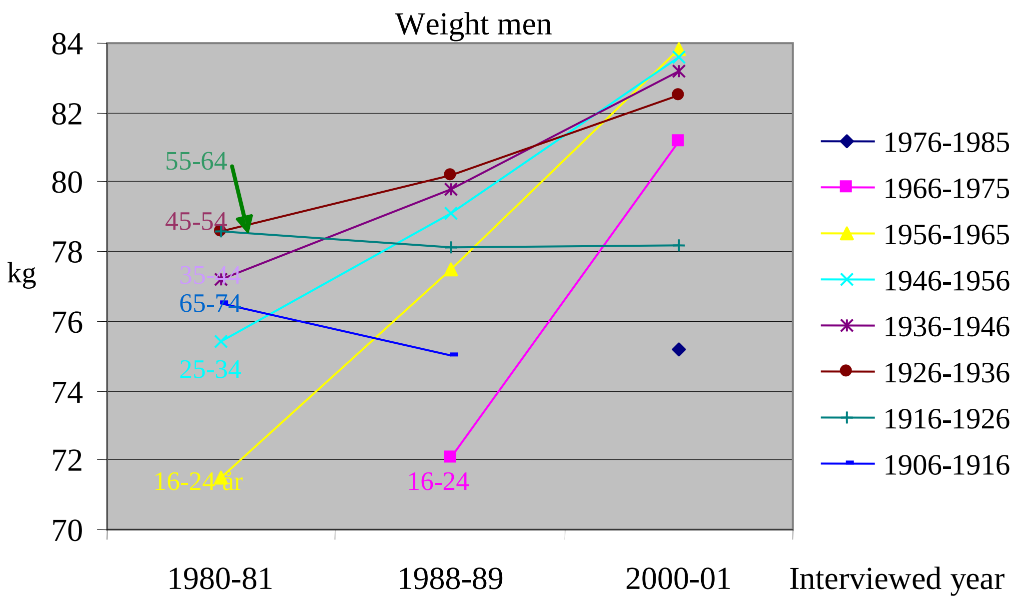
About 4 years | 17 | 23

28 | 38 | 48 | 63 years

The production of sex hormones is also reduced with age. At about 25 (Leander G, 2004) mens testosterone production is at its peak and then it has declined by around 30% by the age of 40. Thereafter, the production is relatively constant further upwards in age. Testosterone builds muscles, hold down the fat mass, increases sex drive and men's ability to get and maintain an erection. In addition, testosterones effects on the brain we still only have vague notions about. A reasonable guess, in my opinion, is that it increases aggressiveness and decreases empathy. Which I think is supported by the testimonies from men who have doped themselves with anabolic steroids. I think we can also recognize ourselves in the image of an older man who the psychotherapist Margaret Nordeman describes in her book "**Love at old age**" (Nordeman M, 1992): *"a man can undergo an amazing transformation from being a stringy and metering father to a playful, caressing grandfather."*
In addition, researchers (Hallsten L, 1996) has revealed that from 20-year and upward men's care for others increase, while women show the same concern over the whole adult period. Men also appear to become less performance-driven from early adulthood to middle age (Helson R and A Stewart, 1994), however, women do not.

Furthermore "female" hormones (oestrogen) decreases with age, especially in the menopause (Leander G, 2004). It is reasonable to believe that it also has psychological effects, such as perhaps, that the properties considered being characteristic for women is, to some extent, reduced. In conclusion (Helson R, Soto CJ and Cate RA 2006) men become more "feminine" and women more "masculine" from the late middle age.

A common, though not given, effect of age appears to be increasing weight. Since most people I have known for a long time has more stomach today than they had ten or twenty years ago. But I have met few really old people who are obese. So in my experience this weight gain does not continue until we die. It could be because our bodies become less able to absorb nutrients and/or that we will have decreased appetite. These observations are supported by results from SCB's interview studies (chart 1), which shows that we gain weight from the time we are young adults until we reach our sixties, and then we reduce weight again. These results are also supported in part by research (Spiriduso W et al., 2005) which shows that Americans are gaining weight until they are 45-50 years (women) and 40 years (men). Then 55-year-old men start losing weight, while women do the same when they are in their 70s.



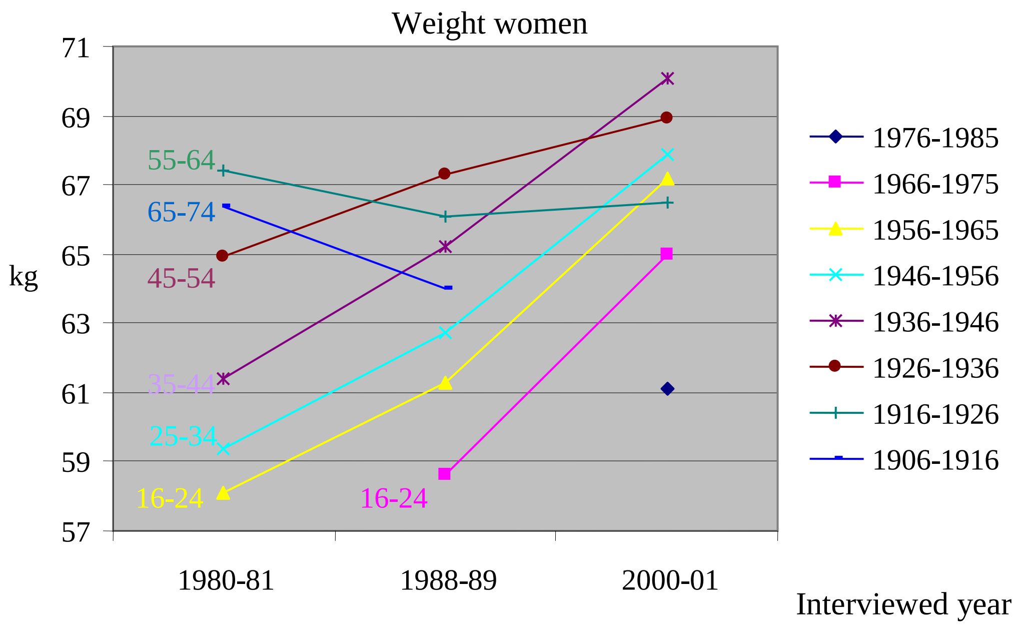
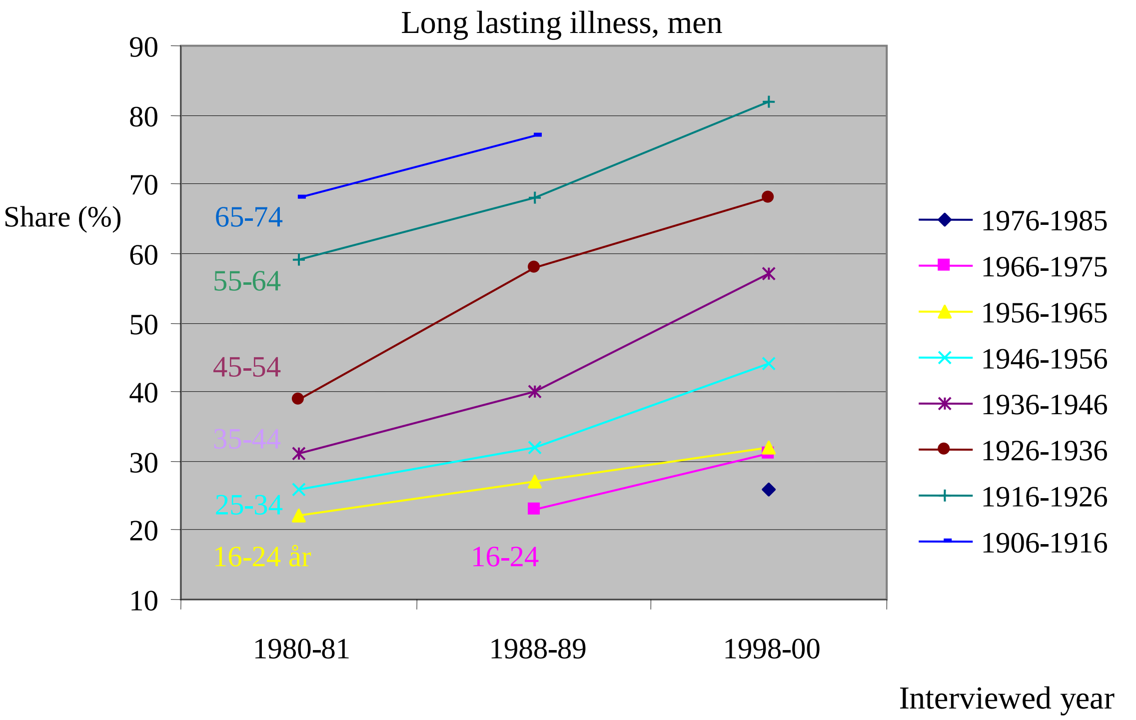


Chart 1. Average weight according SCB[10] for a large number of people, who have been interviewed about this and other issues several times over the years.

10. Retrieved from a table on SCB's website, the data come from their surveys of living conditions (ULF) through annual interviews with about 10 000 people. A large portion of these persons have been involved from the time these studies began in 1975. The data presented in SCB's table is not presented by year of birth, but by age therefore the cohorts to some extent are overlapping, and the values do not match completely with the survey results.

For obvious reasons, it is a larger and larger percentage of us who are ill during long periods. Since many will never fully recover and there are constantly new cases added. When we are around 20 years old is about 20% and then the rate just increase (chart 2).



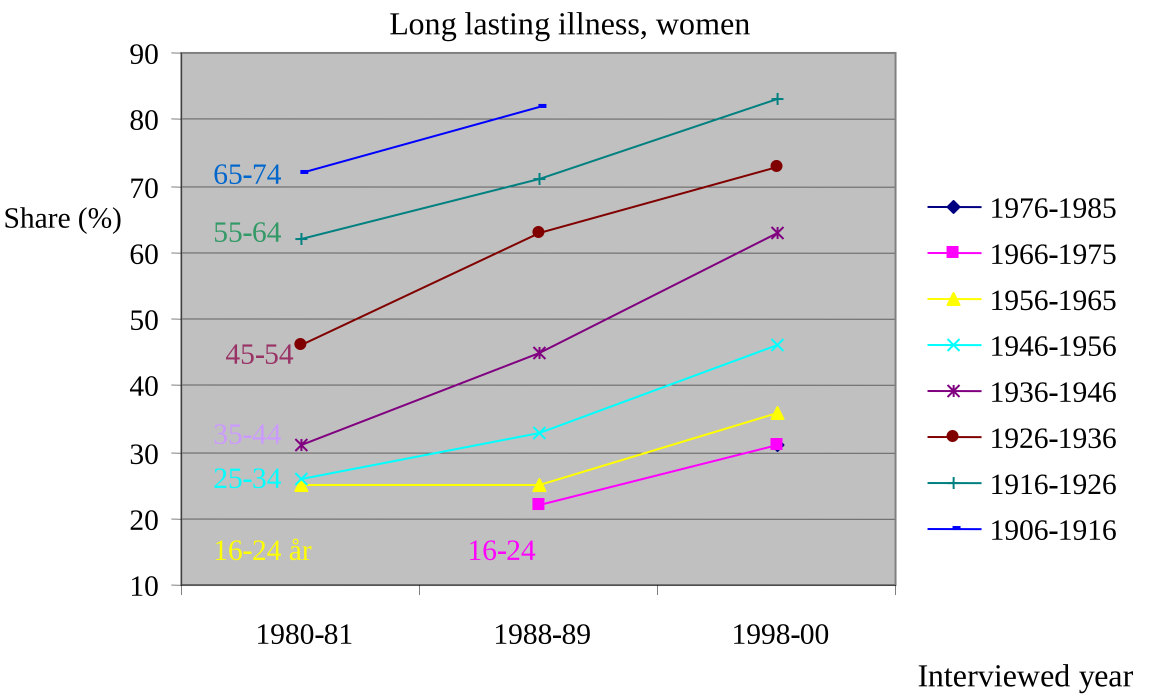
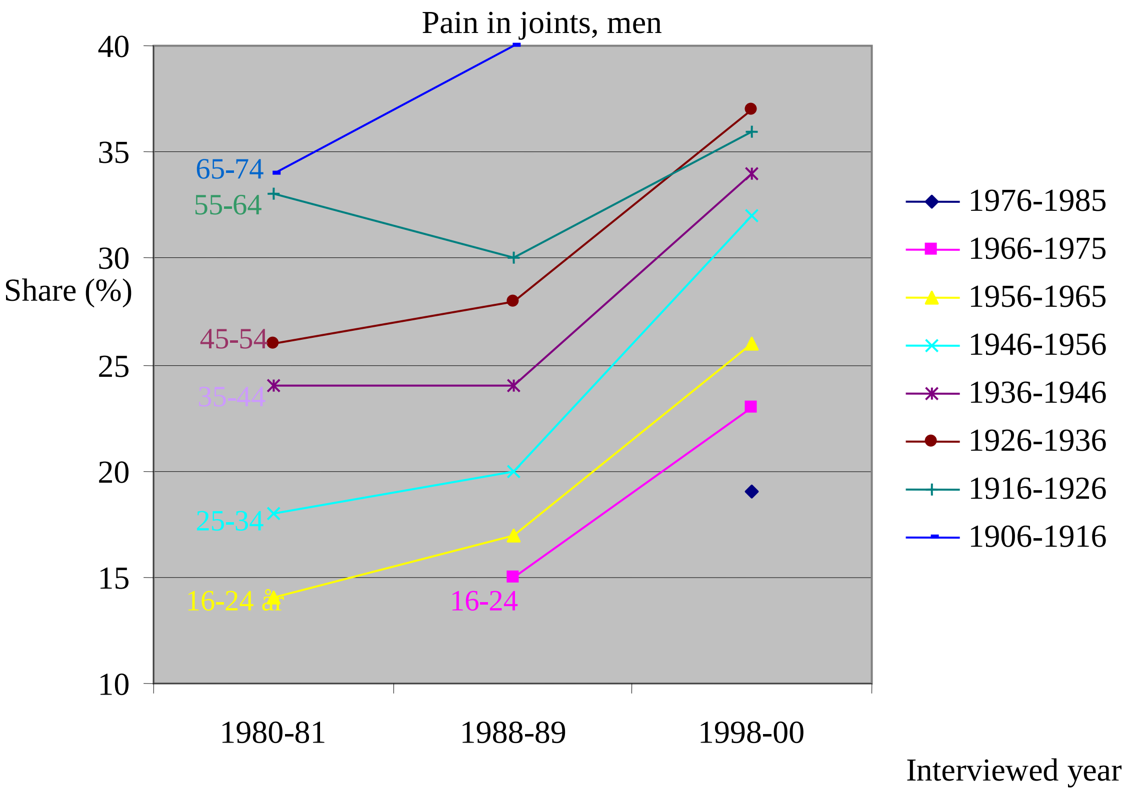


Chart 2. The proportion (SCB, 2002)[11] of each generation who, in recurrent surveys, answered yes to the question if they have "any long-term illness, problems following an accident, a disability or weakness or if they regularly use medicine for something."

11. The data presented in SCB's table is not presented by year of birth, but by age therefore the cohorts to some extent are overlapping, and the values do not match completely with the survey results.

More and more people also gets problems with the musculoskeletal system, such as pain in the joints (see chart 3).



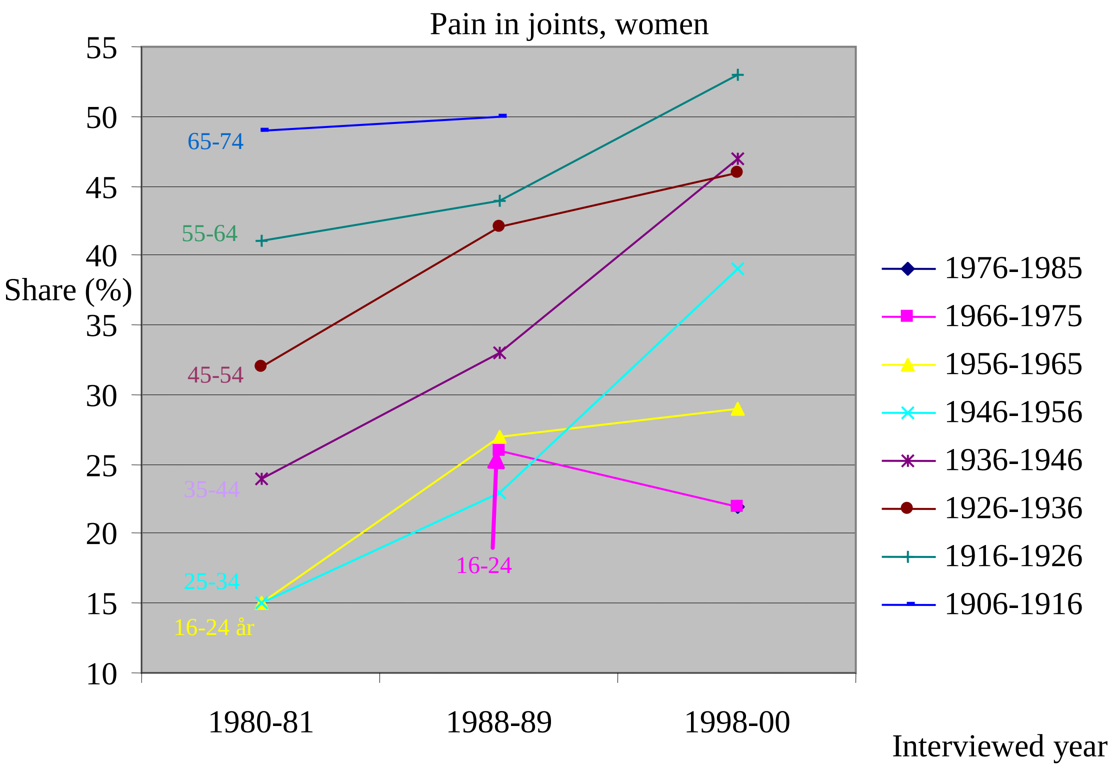


Chart 3. The proportion (SCB, 2002, Figure 3.6) that answered "yes" to questions about pain in the joints[11].

With increasing age, however, fewer and fewer people are smoking (see chart 4). Though it is probably mainly an effect of that smoking in general has declined. But to some extent it seems to also be an effect of age because, at almost every subsequent time point (see the chart below), there were a higher proportion of smokers in the younger generations than in the older ones.

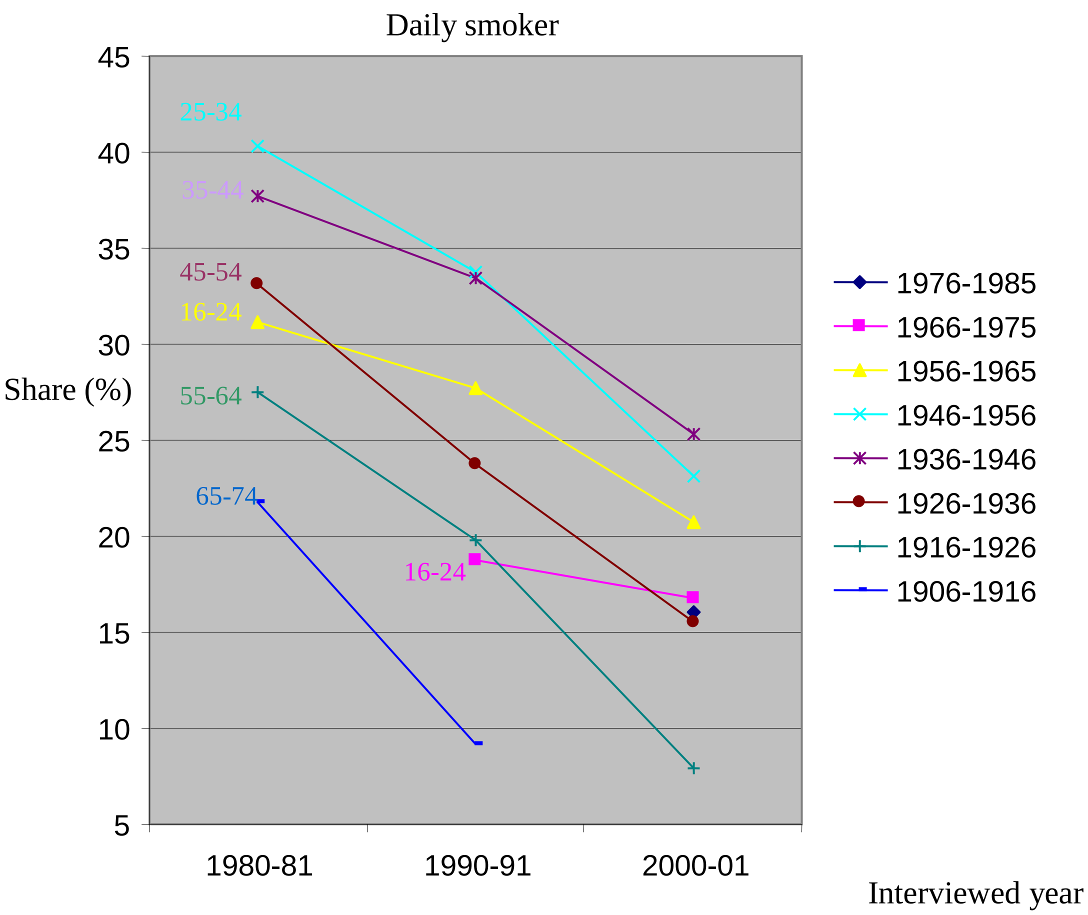


Chart 4. The proportion of each generation who are smokers, according to SCB[12].

12. Retrieved from a table on SCB's website.

The income, however, increases with age (chart 5). At least until one gets a long-term illness or retire.

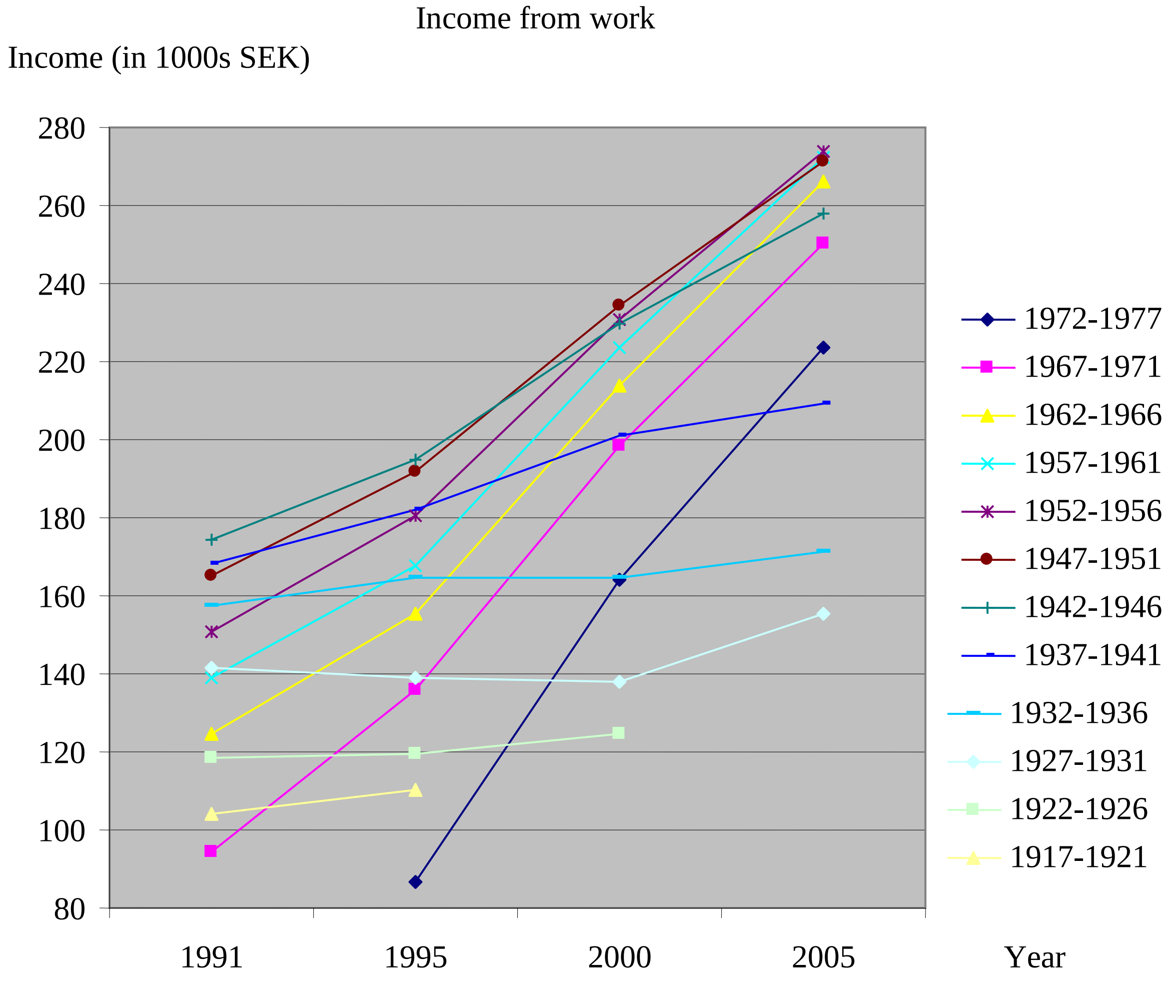


Chart 5. The development, according to SCB[12], of the total income (income from wage jobs + business incomes + social benefits + pensions) from 1991 to 2005.

Unfortunately, it may not be an effect of aging. The increase in earned income is probably rather due to the worlds and especially Swedens economy improved during the presented period (see chart 6).

Chart 6. The total value of everything produced in a year, averaged over all the inhabitants (GDP per capita) in 1 000's SEK, here with 2000 as the base year (SCB, 2010).

Even if everything else were equal, most people would improve their economy every year because of that their accumulated wealth grew larger. For many, this wealth consists not of what we in the ordinary sense regards as capital. Instead, it consists of the things we believe we need in our lives. Over time, more and more of what has ever been on the wish list is added to everyone's little "fortune".

Results from SCB's ongoing interviews with more or less the same people (SCB, 1997, summary table: tangible assets) shows that we purchase the most common capital goods (cars, boats and TVs) already in our late teens, others (caravans and washing machines) we buy when we had children. The rest of the stuff that was included in the study (freezers, videos, and dishwashers) increased very much in existence for all age groups during the studied period. Thus, the results suggest that many have a relatively large part of the material "wealth" fairly early in adulthood. Which should reasonably result in that we can then use more money to create a gold edge on our existence and/or to save some money.

To study whether this is the case we have agreed on a measure called deprivations index. It weighs the size of the home, savings, vacations, the prevalence of dishwasher, freezer, TV, car caravan, boat, an equity holding of at least 13 000 SEK and the occurrence of payment problems (chart 7). With this index, the picture is somewhat different. Some generations (born in 1954-61 and 1962-69) became "richer" during the studied period, while the older ones got "poorer". It does not mean that they felt poorer. Maybe they moved to smaller homes or got rid of the car to prepare for old age, though it may not be as likely for the oldest participants was only 64 years old. But it was a severe economic crisis in Sweden just before the third measurement occasion and that had the effect that many Swedes got poorer without it had anything to do with age.

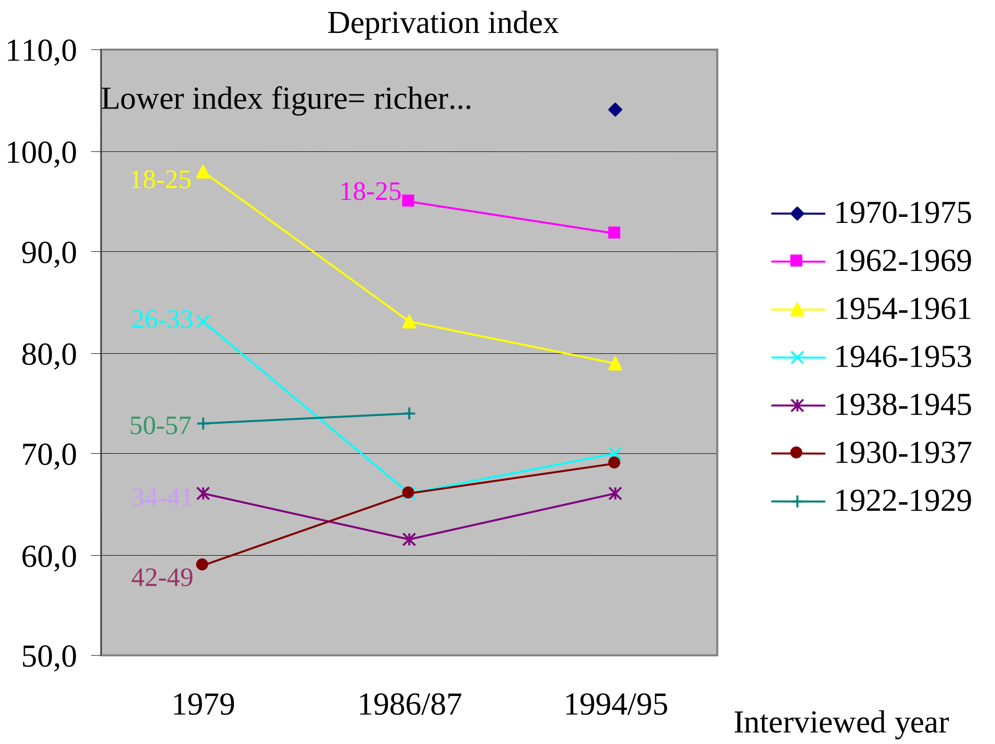


Chart 7. An index that weighs together various indicators for the personal economy. The data used comes from ULF surveys (SCB, 1997, Figure 10.5).

Money in the bank and the amount of capital is, after all, only a subset of what makes life worth living. There are many other factors that many probably values higher, such as the ability to travel and drinking alcohol. SCB's ongoing interview studies (SCB, 1997, summary table: leisure) shows that several of these factors like visits to restaurants, sports events and cinemas and decreases with age. The same applies to own musicianship and sporting. The only one of the studied leisure activities that seems to increase with age (up to 70 years of age), judging from the presented results, is the proportion who have walked in the forest more than 20 times in a year. Not even the number of vacations abroad increases with age (chart 8), at least not after we turn 65.

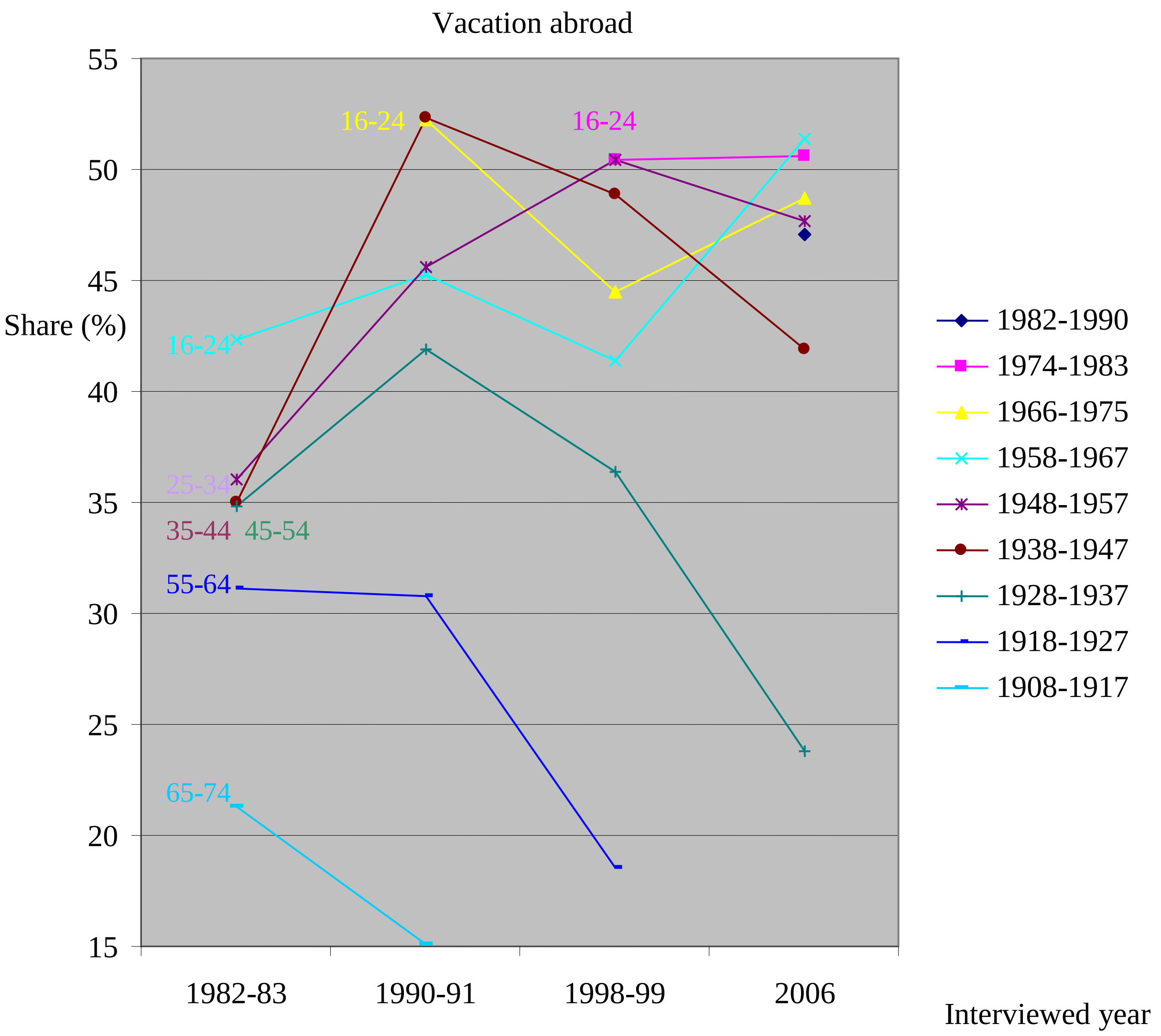


Chart 8. The proportion of a generation that has been on holiday abroad, some time during the past 12 months according to SCB[10].

I think that I quite often have heard older people say that they do not feel old. Instead, they claim that they feel like when they were in their 20s. A reasonable explanation for this, I think, is that they as well as I, since childhood have a well-rooted picture of how old people are and they do not recognize themselves in that picture. Since they still have about the same preferences as when they were young, which at that time, were strictly associated with youth. And they do not realize that these former teen idols, like Mick Jagger, by the youth of today probably are seen as old men with a completely old fashioned style. The music that the youth of today like, they do not understand at all.

Regarding musical taste the reasoning was confirmed by half of those participating in this study, since they responded that they today have the same taste in music as when they were teenagers (table 1), but the second half felt that they have a broader taste nowadays (3 persons), or followed the trends (2 persons). Overall, it doesn’t give much support for the theory that we generally retain the taste in music we embraced in our youth. One reason why so many has changed their musical taste over time could be that our taste in adolescence is formed by our closest friends, but then gets a more unique character from the different roads we travel on through life. This reasoning is supported (Labouvie-Vief G et al, 1995, Kruger R f, Johnson W, Kling K, 2006) by that the personality becomes more and more complex and unique from childhood and onwards.

There were fewer who thought that their interest in music has increased (2 persons) compared to ditto for clothes (4 persons). This can be an effect of that the times changed. For, as I remember, clothing and fashion was far less important in the 70 - and early 80's, when the majority of the participants were teenagers. Music, I think, however, was about as important as today. The difference would then not be an effect of age.

Though it may also be that the participants are increasingly able afford "fancy" clothes today than before. Or that they have less time and/or calmness to listen to music today, but they however believe that it is worth taking the extra time to choose clothes with greater care. If this latter reasoning is closer to the truth, the difference may be an effect of age.

Table 1. What did you like when you were 18-years and what do you like today? (→ =same, ↘ =decrease, ↗ =increase):

Participant no:	1	2	3	4	5	6	7	8	9	10
Music	wider	→	→	→	wider	Have followed the develop.	more modern	wider	→	→
Intrest in music	↘	↘	↘	→	→	→	↘	↗	↗	→
Clothes	fashion ↘	→	→	→	maturer	fashion ↗	→	brands ↘	more bohemic	fashion ↘
Intrest in clothes	↘	→	→	→	↘	↗	↗	shape ↗	→	priceworthy ↗

There were more participants who have gone more to the left, than those who have gone to the right, of the political spectrum (table 2). One explanation for this, except that the sample may have been skewed, could be that we seem to go from arguing based on our own needs in the early years, through arguments based on the groups needs, to more principle based arguments in older days[13]. Other (McCrae & Costa PT, RT, 2006) have also shown that we become more unselfish and humble with age. This suggests that the effect may to some extent be generalized. Something that speaks in the opposite direction is that high earners probably to a greater extent than people with low-income votes on the right wing, and it’s probably more that goes from having a low income to high income than vice versa.
It was just one of the participants who said she has become more interested in politics over the years. It is contrary to data from Statistics Sweden (chart 9) which suggests that younger adults become more politically interested with age.

Table 2. What did you like when you were 18-years and what do you like today, regarding?

Participant no:	1	2	3	4	5	6	7	8	9	10
Politics	more left	→	wider	→	→	→	more right	→	more left	more left
The intrest for politics	→	→	→	→	→	↘	→	↗	→	→

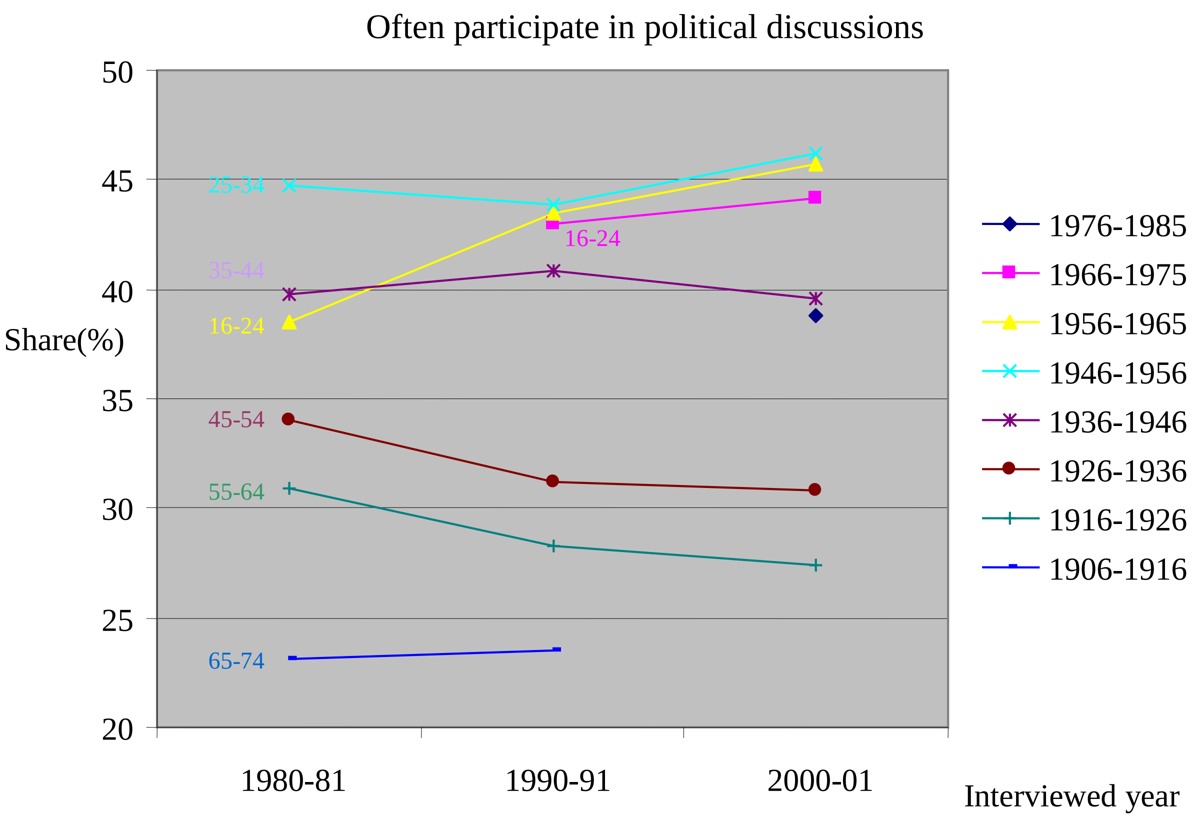


Chart 9. The proportion of each generation that often is involved in political discussions, according to SCB[10].

13. A scientist (Kohlberg L, 1981) examined people's arguments to resolve hypothetical dilemmas such as: *"Is it right to steal medicine from a pharmacist to give to your severely ill wife, if you do not have money to pay for the medicine?"* He found that the arguments followed a line of development from *egocentric* arguments (referring to peoples own, individual interests), to *group-oriented* (referring to family, community or authorities) and finally to self-selected, *non-partisan* arguments (referring to universal principles).

For myself, I can say that my willingness to follow simple rules decreases. If it is universal, it could be due to that we as children are to follow very simple rules:

*Do not cross the street if the traffic light shows a red man***.**

Since young kids are not capable of handling complex and conditional instructions:

Make an assessment of the traffic situation and pass the pedestrian crossing in the first place when there are no cars around, whether it is green for pedestrians or not. Secondly, you pass when all the cars are so far away that they can not possibly get to the crosswalk before you have passed and consider the prevailing road conditions when assuming the time it takes for you to cross the roadways. Third, you pass when it is green for pedestrians and all vehicles are standing still.

During adolescence and early adult life, we gradually replace these simple rules with other more complex ones. And we become less stubborn in our thinking from the 10s - to 60-year-olds (Labouvie-Vief G et al, 1995). Some simple rules, we test and reject even as small kids. While we rejected others relatively more complicated, but still simplified rules, later. Still others we may be breaking during adolescence and then re-follow them. For example, it is more likely to, any time in that period, shoplift something in a store, than later in life. It was also confirmed by the majority (7 of 10) of the participants, since they at least once between 10-20 years of age shoplifted something in a shop[14], and only two of them have shoplifted anything after adolescence. Although only 4 of 10 has become more law abiding with age (table 3). Which might suggest that a reduced amount of violations of clear and simple rules, such as the prohibition of stealing, is offset by more offences to more complicated ones, such as traffic rules.

Table 3. What is your view on the current situation and back in time on:

Participant no:	1	2	3	4	5	6	7	8	9	10
Law abiddingness	↗	↗	→	→	↘	↗	↗	→	↘	→

14. The answers to the question: *Did it sometime between you were 10-20 years happened that you shoplifted something from a store, and how old were you the last time you shoplifted?*

It is also a fact that the older we get, the more of what it is happening we have been through before. Which means that we can rely more on old experience instead of simple rules. This results in fewer and fewer mistakes in our daily lives. But probably less training and experience in meeting new situations and thus presumably a decreased ability and desire to do so. I seem to have noticed that there is a huge gap between older people, in this regard. Some seem to completely lack the ability to adequately respond to new situations, while others gladly take on any problem or any situation in a very rational way. I think I also have noticed that people from the former group have lived a life with far fewer challenges than the latter. If so, generally speaking, this is not an effect of age, instead it is an effect of the lack of training in how to respond to new situations.

It is often said, as you know, that the more we know about something, the less we become overconfident. Whoever, for example, only knows one way to cure a sick person might suggest this way for all ailments. While a doctor has a whole variety of cures to choose from, and it forces him or her to do in-depth studies to determine the cause of the problem. Presumably the same applies to all aspects of life. Over time, we have for example, tried more and more food and we have more and ore difficulty to select a single favourite dish. With greater knowledge of the human way to act in different situations, we have reasonably more difficulty to condemn the actions of others. I think, for example, that children more clearly repel awkward children than adults do with ditto adults. There are also researchers (McCrae & Costa PT, RT, 2006) who suggest that openness increases from infancy to the late 20s and then decrease again. This seemingly increased openness may be an effect of us over the years becomes more "polite" to each other. But it is obvious that children are more likely to embrace new people, such as new friends, compared to adults. In addition, they are forced to constantly confront new situations (there's always a first time for everything). So really, maybe children are less conservative than adults, at least from a certain perspective. One guess is that kids/teens in any case faster embrace technology they think is cool and people who fit into the group, but they might to a greater extent than older repel things that are not considered cool or right. It is in line with the majority of the responses in this study, since they felt that they had an unchanged view on different/new things but a greater openness to odd people (6 of 10, table 4).

Table 4. What is your view of the current situation and back in time at:

Participant no:	1	2	3	4	5	6	7	8	9	10
Odd persons/ viewpoints	→	↘	↗	↗	↗	↗	→	↗	↘	↗
Openess for different/new thing	→	↘	→	→	→	↗	→	→	↘	→

I myself had in my 20s large ambitions and wove great dreams for the future. At thirty, I realized that it would not be so. Somewhat later I accepted that. Most of those interviewed (6 out of 10, table 5) shared my view in that they felt they had less desire to make a career. Which in and of itself, both for me and the majority of the interviewees, could be an afterthought because none of us have made any traditional career. Given that it means that over time get hierarchically higher and higher management positions in an organization.

For some people, however, is "making a career" equated with making more money. It’s called having an instrumental attitude to work. In one study (Ohlsson B, 2009) with deep interviews of 16 workers with such a view of what the career entails, it was concluded that the willingness declined after the participants started a family. Half of those who feel a decreased desire to pursue a career had a family and it is possible that the decreased desire to some extent is explained by this fact.

For many people, there is no possibility to become the boss, or make more money since the profession or the organization on the workplace is such that they can not become managers, regardless of how appropriate they are and how willing they are to accept the assignment. The wage increases are also generally limited to a few percent per year. Then it is reasonably healthiest to let the desire to make a career die.

There are fortunately other ways to achieve success or make a "career". One of them is to become very good at something, for example, work or a hobby. In order to capture such "career aspirations" to some extent I asked the participants about possible differences in their general ambition level over time. But even these responses suggest that the desire to make a career has declined since half of the respondents (table 5) answered that the level of ambition has been reduced and only one person said that it has risen. This result is not representative of people in general, because research (Helson R, Soto CJ and Cate RA 2006) have shown that in general, we are the most ambitious in the middle of the middle age, because we then have the most roles at work, in society and in the private life. And they summarized research on how middle-aged people describe themselves and are described by others, with that they then peaks in skills, productivity and social responsibility.

Table 5. They interviewed opinion at the moment, and back in time about career and their level of ambition.

Participant no:	1	2	3	4	5	6	7	8	9	10
To do a career	↘	↘	↘	→	↘	↘	→	→	↗	↘
Your level of ambition	↘	↘	→	→	↘	↘	↗	→	→	↘

An important characteristic for success, regardless of what you consider to be success, is to withstand doing even the boring elements included in most tasks. My experience is that I, with age, have become better at that. From the time I was little and voluntarily just devoted myself to what I thought was fun, that is, played. Through adolescence, when I as well as others forced myself to clean the room or doing homework, et cetera. Until now, when I often grab the boring tasks with decent energy to get rid of them. There is also research (McCrae & Costa PT, RT, 2006) showing that virtues such as duty and obligation of self-discipline increases with age.

But the majority (8 of 10, table 6) of the participants argued that, in contrary to the reasoning above, that they had the same or less energy to do boring things today compared to earlier in life.

A possible explanation is that the contrast ratio, in addition to that the sample might be skewed, could be that the participants in this study with boring stuff related to anything but dull moment in professional practice or anything else that they want to develop in. Finally, it may an additional evidence for that the desire to make a career actually decreases with age.

Table 6. The interviewee’s energy to do boring things.

Participant no:	1	2	3	4	5	6	7	8	9	10
Your energy to do booring things	↗	↘	↗	→	↘	↘	↘	→	→	↘

Another way to achieve success or make "career" is to break new ground in a field. That’s what many of history's most successful people are remembered for, regardless of whether they, in addition to the pioneering efforts, made a traditional career or not. In an attempt to make some estimate of the participants' ability to innovate have decreased with time, they were asked about creativity. Happily, there were only two of them who believed that their creativity had decreased with time. The remaining eight felt that it was either constant (6 of 10, table 7) or had increased, but that does not mean that is the case. It could be that they actually become less innovative, but do not want to accept it or do not understand the concept of creativity, but rather misinterpret it as "creative work".

Table 7. The participant’s creativity.

Participant no:	1	2	3	4	5	6	7	8	9	10
Your creativity	→	↘	↘	→	↗	↗	→	→	→	→

In order to determine whether the ability to innovate in general decreases or increases with age, I studied the ages at which a number of prominent people made their most famous contributions. This by systematically going through the first 399 pages of a volume of the Swedish National Encyclopedia[15] while noting the ages when the described scientists and inventors made their greatest achievements (chart 10). This review showed that they performed their first major achievement on average in their 40s (mean 41 years, median 39 years). Many of them have since made more great achievements at higher ages. The results thus indicate that creativity in any case does not decrease until the middle age.

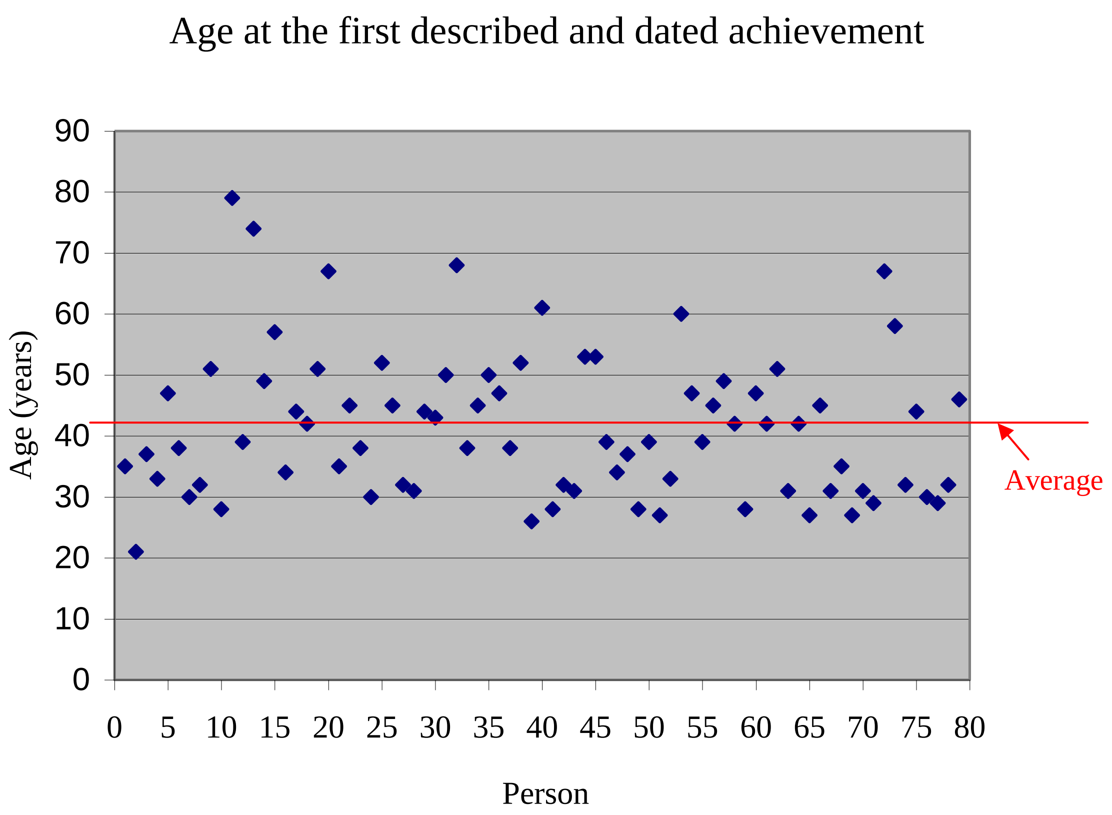


Chart 10. The year that the 80 first presented scientists and inventors described in the Swedish National Encyclopaedia made their first dated great achievement.

15. The volume referred to is the first. Therein are, on the first 399 pages, 80 scientists and/or inventor that are presented in such a way that achievement and highlights are also dated. The reason that no other prominent persons were included in the study is that for example, regarding artists and politicians it is often in the nature of things that they do not get attention until after a period of successful work. A shortcoming of this study is, however, that in many cases the achievements described in the Encyclopaedia are summaries of earlier research. The effect of that is in this context that the most successful period shifted upward in age. Age is shifted further upwards since the magnificent ideas that form the basis for the exploits always comes before the actual achievements, as the achievement usually is dated to the year in which they in finished form were presented publicly. An opposite effect in this study is that some of the involved scientists lived long ago, in a time when people generally lived much shorter time than today. Witch may result in that persons who would have been able to do more achievements if they had lived long enough, died before it was time.

Sadly, I have noticed that with age, there are fewer and fewer things that amuse me. The nature of what amuses me has also changed. When I was little, I as well as other children, was a lot more amused by things that involve any degree of physical activity, such as rocking or playing ball. Later these activities stopped to amuse me. However, some new pleasures were introduced, such as drinking alcohol, travel and to have sex. But most of these newer pleasures came into my life in adolescence. And beyond that period, few new pleasures have been added. I have also made the most of what still amuses me so thoroughly, that I feel like I need bigger and bigger doses or better "quality" to really be amused. Several of the participants were on the same track, i.e. they added to the answers to the questions in table 8 that with age they have higher demands on the TV shows, movies or books that they consume. There were also more people who felt that they were less amused by what amuses (4 of 10) compared with those who believed the opposite (2 of 10). Though in contrary to my theory it was a large number who believed that there were more things that amuse them today than in the past (3 of 10) compared to the opposite (0 of 10). Note that those who thought they are less amused by the causeless or action claimed that other pleasure have come along, that compensates for the loss. The answers concerning certain specific entertainments, support, however, to some extent the theory, since it was more that are less amused than more by: films (5 of 10 are less amused, compared to 1 of 10 who are more entertained) and TV (4 vs. 3). The exceptions were the pleasure of literature (3 less than 4, which are more entertained) and food (2 versus 7). The former, I have no explanation for, but the latter could have several reasons such as: that we as adults do not take the food for granted as when we did when we were children; we ourselves to a greater extent can choose what we want to eat; or that food -passion is a contemporary phenomenon.

Table 8. They interviewer's opinion at the present and in the past about:

Participant no:	1	2	3	4	5	6	7	8	9	10
Is it other things that amuse you compared to when you were 18?	More intrests ↗	A little more intrests ↗	→	→	→	→	→	Caruselles et cetera ↘	Slightly more intrests ↗	Action ↘
Are you as emused of the amusements?	→	↘	↘	→	↗	↘	↗	↘	→	→
Has your joy of **film** changed?	→	↘	↘	Different →	→	Bad movies ↘	↗	↘	↘	→
Has your joy of **literature** changed?	↗	↗	↘	→	→	Bad literature ↘	↘	→	↗	↗
Has your joy of **TV** changed?	↘ Nowadays only news	↗	↘	→	Facts ↗	Bad TV ↘	→	→	↘	↗
Has your joy of **food** changed?	↗ More gourmé	↗	↘	→	↗	↗ Partly due to more products	↗ Maybe a time phenomena	↗ Wider	↘	↗

Children are afraid of a lot of things that they later in life are not the least bit afraid of, like ghosts under the bed. However, they are perhaps not at all afraid of things we want them to be afraid of. For example, we want them to be afraid of getting hit by a car or getting beat up by someone in their age. The latter is unfortunately quite common among teenagers (SCB, 1997, diagram 18.7 and overview table: victims of violent and property crimes), but with increasing age, the risk is reduced, but the fear of the same increases. I think it also applies to risky stuff such as climbing on things or driving a motorcycle. It is also confirmed by the fact that half of the participants (table 9) explicitly said that they were more afraid of doing things that can cause physical harm. Adventurousness is also considered (McCrae & Costa PT, RT, 2006) to decrease from the 20s and up.

Personally, I have noticed that I find it far more unpleasant to see violent movies now, compared to when I was in my teens. I believe this is due to an improved ability to imagine the possible negative consequences of being beaten or hurt in any other way. Which in turn has the effect that I am more afraid of this. But there were more persons who thought it was less uncomfortable to see violence on film (5 persons), compared to more (4 persons). Nor regarding real violence a clear trend in line with my idea was noticed.

Table 9. The participants' fears.

Participant no.:	1	2	3	4	5	6	7	8	9	10
Is there something that you have got more scared of, from adolescens until today?	Risky things ↗	→	→	Illness ↗	→	Risky things ↗	Risky things ↗	Risky things ↗	Using a lift ↗	Risky things ↗
Is there something that you have got less scared from adolescens until today?	Make a fool of myself ↘	→	→	Don´t know	Illness ↘	Social things ↘	Social things ↘	Misstakes at work ↘	Talk to an audience ↘	→
Do you think it is more or less uncomfortable to see violence on film nowadays compared to when you were a teenager?	↘	↘	→	↗	↘	↗	↘	↗	↘	↗
How about real violence then in for instance the news?	↗	→	→	↗	↘	→	↘	→	↘	↗

One positive thing about getting older is that I am less worried about what others think about what I do or say. It can depend on several things, like:

1. With age, my personality has become firmer and firmer. I.e. I adapt it less and less for the people I meet. Which in turn means that I, to a lesser extent, need to ask myself if I have adapted appropriately.
2. With age, I have more experience of what works and it makes me not have to worry as much about what I say or intend to say.
3. Most people that I meet are people who have known me for long, and already have a solid picture of me, regardless of I would do or say something in their eyes, stupid or evil in the next moment.
4. As a child, I was much more exposed to criticism/guidance from, for example, my parents, compared to today, when I rarely get criticized whether it is justified or not. This "constant" present danger reasonably made me more insecure.
5. Finally, it is now quite rarely that I meet new people whose early impressions of me can be very important for me in the future in relation to how it was in younger days.

Most of the participants (8 of 10) also shared my opinion, that it means less today what others thinks[16] about them. And half (5 of 10, table 9) indicated that they with age has become less afraid of making a fools of themselves from a social perspective.

The amount anxiousness probably changes through life. When we were young, we should have had the most reason to worry about things because the future was more uncertain. And we should have been more worried about dying, because we had more life to lose. Researchers (Costa J, et al., 1987) has also noted that the emotional fluctuations decreases with age (from 45 years and above), which could mean that the anxiousness decreases.

But it could on the other hand be that the turmoil in general, paradoxically increases with age, just as the fear for violent crimes. The results of the present study suggest that, since there were more who felt that the overall turmoil has increased (5 of 10, table 10) compared to those who found that it has decreased (3 of 10). Moreover mental disorders, such as depression, get more common with age (Hagnell O et al., 1994)[17].

Table 10. The participants' anxiousness.

Participant no.:	1	2	3	4	5	6	7	8	9	10
Do you think your total anxioussness has decreased or increased with age?	↗	↗	↗	↗	↘	Small things ↘	↘	↗	→	→

16. The questions were: *How much does it matter what others think about what you say, what you wear, or where you work, today, and how has it changed?*

17. Researchers concluded after letting experienced psychiatrists interview 1 369 people in the city Lundby in 1957 and 1972 about their mental health. These results does not contradict that emotional volatility generally decreases because there are few who suffer from severe mental disorders such as depression.

The older I get, the greater my past will be. Additionally, it feels like I can slide a lot more in the past. If I, for example, sees someone who I knew twenty years ago, it feels like the days when we knew each other partly comes be back for a while. Which of course was impossible when I was about twenty years old. Likewise, the choices that I made for, say, ten years ago, have a much greater impact on my life today compared with the effect choices I made when I was three years had on me when I was thirteen. Moreover, the situation on the whole, is more the same every year. I.e. housing, clothing, work, friends, interests, and thinking changes less and less. Each additional year also gives a smaller and smaller contribution to the total time I had lived. Finally, the number of new impressions per time units gets fewer and fewer. All this ought reasonably to have the effect that it feels like time goes faster and faster. An experience shared by almost all the interviewees (9 of 10) that thought[18] that time passes more quickly with age. And six of them described the difference in terms such as "large" or "huge".

Another effect could be that it is getting harder and harder to find a specific event, among many other similar events in the memory mazes. That could in turn give the impression of memory degeneration. It is also shown (Hallsten L, 1996) that the elderly are worse than younger people in quickly and accurately retrieve information from their memory, and also that the short-term memory is impaired (Zacks R and L Hasher, 2006).

However, more participants felt that they remember as much as before (5 of 10, the question was: *Do you feel that you remember as much of what is happening now as before?),* Compared with those who claimed to remember less (4 persons). It may be due to that a possible degeneration of the memory is first noticed at older ages, or perhaps that the participants have not noticed that they remember less. One response from a participant supports the latter “theory”, since she claimed to remember as much *"even though I find that I actually forget things I think I remember."*

18. The answers to these questions: *Do you think it feels like time goes faster or slower with age? And how big is the difference in that case?*

I also think that my nightly dreams have changed through life. The biggest difference I noticed is that the dreams I feel are nightmares gradually become rarer. An observation that three of the interviewees mentioned when answering the question: *Has your nightly dreams changed through life and if so, how?* Four others said they had not noticed any difference but one thought that he dreams more nightmares, one did not knew and the last one claimed to dream less but with much the same content as before. Thus there is no real support for that the number of nightmares decreases with age.

The social patterns probably also changes through life. A small child is susceptible to interact with other people and they can quickly replace a mate, while as we get older it gets much more difficult to do so. As some friends and acquaintances for various reasons disappear from one's proximity with time, the effect should be that the number of persons included in ones frequent socializing outside of work decreases with time. Furthermore, the need and type of socializing changes with each change in ones private situation. A single may need more interaction during leisure time, for example to counteract the feeling of loneliness. While someone who has a partner and children may yearn for moments of solitude. Then over time, since more and more people will have children and/or a permanent partner, it is reasonable to believe that socializing outside of family and work, on average decreases.

The above speculation is supported by results from SCB's interview studies (SCB, 1997, summary table: social relations) which shows that the proportion of time spent with friends and/or colleagues every week decreases sharply with age.
It is also supported by almost half of the respondents (4 of 10), since they on the question: *How has your social life varied with time?* Replied something like: *"the same friends as before but I spend less time with them."*

Most children play with selected persons among them they casually meet, like neighbours and classmates. This means that more or less all of their mates know each other and socialize in various configurations over time. While later in life we live and operate in different geographic locations and/or workplaces, and thus meet new people who are more or less completely isolated from the rest of our acquaintances. In addition, perhaps, children's entertainment such as games, have more to gain on that there are more participants than adult ones. This should, collectively, have the effect that our social life becomes more geographically and socially wide spread with time.
This reasoning is supported by the fact that many of those interviewed (5 of 10), on the question above said things like: *"In the past I spent time in a gang where everyone knew everyone. Today I spend time in different configurations that do not know each other."*

The relationship to and perception of ones parents ought to change through life. For many children, the parents are everything. But as both children and parents get older, the situation changes so that the child’s need for the parent decreases. And successively the parents should more and more treat the child as an adult. They boast them less and post more adult requirements. In early adulthood, when children have the right to leave their parents, they may distance themselves extra to build a life of their own. Then they maybe later in life, approaches the parents again. Finally, the parents may become weak and helpless, which might leads to the reverse dependencies.

Five of the interviewees expressed opinions[19] showing that they are mentally closer to their parents nowadays, compared to when they were teens. But only two of them had during the same period increased their socializing with the parents. Which is in line with results from Statistics Sweden (SCB, 1997, diagram 17.2) showing that between 16-64 the number of contacts with the parents is fewer and fewer with age.

19. *Have your opinion about and your interaction with your parents varied over time from when you left home?*

The sexual activity is probably most depending on practical conditions such as if you have or do not have a sexual partner. But if the conditions in such respects would be constant, perhaps the sexual activity would go down because of, say: the amount of sex hormones drops; ones confidence is improved; the sexual act feels more and more monotonous; we feel less attractive or find our partner less attractive. This reasoning is supported by researchers (Öberg P, 2005)[20] which demonstrated that after 30, the importance of sexuality in life is radically reduced and we believe that we were the most physically attractive around 32-years of age.

Fortunately the majority of the participants disagreed on that, since four of them felt that their sexual activity is constant, and two said that the activity was the same in cases where they had a sexual partner.

I think the ability to fall in love decreases with age from teens and up, partly for social reasons and partly for physical ones. The latter is due to that the amount of sex hormones decrease and the former primarily to the issue, as such, becomes less hot as more and more of ones friends are involved in stable relationships. But it was only four of the respondents who claimed that the ability to fall in love had declined with age. This suggests that my theory is wrong.

Our age preferences in terms of the opposite sex probably also changes with time. In the way that we with increasing age are attracted more by, for example, forty year olds when we are in that age ourselves compared to when we were twenty years younger. The fact that most people actually choose partners with equal age suggests that this is the case, although there are exceptions.

20. Among the participants in the study who were up to 30 years old, about 70% of the women and 80% of the men thought that sexuality is an important part of their lives. Among the older participants the importance of sex decreased quite linearly down to that about 15% of the women and 35% of the men at the age of 85 years thought that sex is an important part of their lives. But it need not be an effect of age because it may also be an effect of that the participants have permanent partners that they might have got tired of having sex with. Alternatively, it is over time fewer and fewer people who have someone to have sex with.
Results from another study of older people in the Gothenburg area (H70 project, Nordeman M, 1992) indicate the later. Since only a quarter of the single 70-year-old men and a few percent of ditto women who participated in the study still had intercourse. While more than half of the married men and over a third of ditto women had sex.

Young children often wake up early even on days off, while older children sleep longer. After adolescence the ability to be able to sleep late in the day, appears to decrease. And many seniors that I knew, gets up very early in the mornings even though they could lie in bed half the day if they so wished. However, there where only two of the respondents who thought[21] they goes up earlier and goes to bed earlier now than before. Two further claimed that they nowadays have difficulty to sleep after long party nights. But as much as four persons felt that they had the same rhythm now as before.

I have also heard from a larger proportion of all children I have asked about the seasons, that they prefer winter, compared with adults which I have asked the same thing. It is quite easy to understand because children do not see the dark sides of winter in the forms of:

1. That the car is cold and hard to get started. In addition, it may have to be shovelled from snow and ice.
2. It is dark, both on the way to and from work.
3. Heating costs for the dwelling will be higher.
4. The risk of slipping and getting hurt increases.
5. We are more tired, but still stay up late for various reasons.

Children, however utilizes more of the good sides of the winter as they are playing with the snow in different ways. But the interviewees did not share my opinion[22], when the majority of them (6 of 10) valued the seasons in the same order as before. The in average rated the summer the highest, followed by spring and autumn tied for second place. Of the four who have changed their preferences, three have downgraded summers and as many has upgraded spring and/or fall. But it was only two of them who nowadays ranked winters worse. It is possible that the responses have been different if I asked about what they liked as a kid, but then maybe the oblivion would have been larger. In summary, the answers gave no support for my theory.

The participants experienced, on average, that what have changed the most over the years is their economy (table 11). Which is reasonable to believe and also something that I can confirm since I know the participants. Fortunately, for all of them it has changed to the better. Regarding other issues the ratings were, however, more wide spread. The men felt to a greater degree that their face has changed (median ranking for men: 8, women: 5), while women to higher degree thought that their values has changed (men: 3, women: 8). I have no explanation for that, other than that it may be an effect of selection. The men rated changes in their empathy higher than women, which could be a support for the previously described theory that men with lower testosterone levels are "softer". That I can also personally confirm for several of them, and some also mentioned it themselves. The last major difference between the sexes is that women rated the changes in their skin except the face higher than the men. It could be explained by that their skin actually has degenerated more. If it is the case, it could be because they have been given birth. But it could also be due to that they care more for their skin and thus are more liable to notice that it has become drier and/or more wrinkled.

In addition, the majority of the more tangible phenomena’s (face, muscles and joints, economy) on average were ranked higher than the less tangible factors (level of ambition, what pleases me, my values, my empathy, my taste in clothing, my taste in music). Suggesting that the participants believe that ageing is more a physical than a spiritual issue.

21. *Have your daily life rhythm changed from the time you turned 18 and if so, how?*

22. *How do you rate the four seasons and how do you think your ranking looked when you were a teenager?*

Finally the changes in clotting taste were ranked higher than the changes in musical taste. And that gets some support in that there were more who felt that their taste in music was unchanged (5 of 10, table 1) compared to those who thought the same about their taste for clothes (4 of 10).

Table 11. What has changed the most (10) and so on, down to the least (1).

	All participants				Women	Men
	Average	Median	Min	Max	Median	Median
Face	7	7	4	10	5	8
Muscles and joints	7	6	3	10	6	7
The skin except in the face	5	5	1	10	6	4
The level of ambition	5	5	1	10	5	5
What cheers you up	5	4	2	8	4	5
Your values	5	5	1	10	8	3
Your economy	8	9	4	10	9	9
Your empati	5	6	1	9	3	7
Your clothing taste	5	6	1	10	6	6
Your music taste	4	3	1	7	3	3

I saw a TV show about age, where the discussion participants (mostly older people) were asked what their best age so far has been. All answered "now", although at least their physical form and prospects regarding this reasonably must have been better. In addition, I think many talks with far more joy of childhood and adolescence than the present. At least one study (Oberg P, 2005) also shows that most people who passed the 25-year-olds perceive themselves to be younger, would prefer to be younger and believe that others see them as younger. It is also supported by the fact that it sold a lot of products, such as skin creams and laser treatments against hair loss, whose purpose is to hide our aging.

The participating, however, did not think[23] that childhood was their best time. But it was a couple of persons that there best age were when they were about 18 years old. The majority (6 of 10) chose instead, surprisingly enough, a period after the age of 30. Two of them motivated with that the children’s were young then, while four justified it in terms of that they knew more and/or feel safer. It is in line with that the majority of the respondents care less about what others think about them. And that, in turn, is probably a very important factor for the overall well-being, probably, for most people, more important than the physical degeneration that had hitherto been noted. And probably even more important than other possible negative effects of aging, such as decreased pleasure from that which pleases. Furthermore, it is possible that the everyday mistakes gets fewer with increasing experience, resulting in that those who suffer from making mistakes suffer at fewer occasions. Finally, the amount of future to worry about decreases with increasing age. The result also has some support in Öberg's study, which indicate that from about 50-years and older we, relatively constant, think we were at our best in the 45's. And the three participants in this study, who considered their best time to be now, were all between 45-48 years old.

[23.] Answer to the question: *Your idea of the age that has so far been the best and why?*

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The purpose of clothing

Clothes protect us from extreme temperatures, solar radiation, insect bites, et cetera. They provide space for storage of things we want to carry with us and sends messages to those we meet. Despite this there is a lack of standards and guidelines for apparel properties, apart from regarding sizes as well as protection functions in protective clothing. Why is that? Is it perhaps because our clothing habits in the first place don't have practical grounds?

In order to, to some extent investigate this, I interviewed seven persons[1] about their opinion on the matter. The responses to a question about the meaning of clothing (table 1), however, suggests that the practice is certainly based on practical grounds. But even if the participating largely enumerated practical reasons perhaps the aesthetic, after all, weighs heavier in the everyday choice situations. Which would make practical standard clothes impossible to sell? Alternatively our clothes already meet the needs and further regulations on the design therefore are un-necessary.

Table 1. What the participants in this study responded to the question in the table header.

What do you think is the purpose of clothes?
Comfortable
Protects from heat and cold and because we have a tradition of covering ourselves.
Protect the body and tel others who I am.
To protect the body from environmental factors.
Protects from cold, suitable for the cause, tels who you are.
Neat, keeps you warm, provides stooring facitities.
One have to wear something because we use to do so + protects against cold et cetera.

1. Five men and two women, on average, they were 48 years old (median: 46 years, min - max: 38-75 years).

I think many, on questions about why they dress the way they do, would answer that it is because they feel comfortable in such clothes. In an attempt to go deeper than that, the participants were asked to rank a number of properties that could be important regarding footwear.
All of them ranked "provides good grip" high and three ranked it the highest of all properties. And it is reasonably an important requirement for a large fraction of all circumstances where shoes are used. As far as I can think of is it just in bowling and dance that good grip is a disadvantage. In addition, the participants felt that "good storage facilities" is an unimportant feature for shoes. And it fits well with my experience, which is that we rarely keep things in our shoes. While most other qualities can both be an advantage just as well as a disadvantage. Better protection from wetness usually means denser shoes, which makes the feet sweatier. Shoes that are easy to put on (as cloggs) often have other shortcomings, like that don't stay so well on the foot and thereby rub more in the event that they would be used for a long walk. Shoes that protect against cold are hot and therefore increases the risk of sweating during hot weather and so on.
Properties like sexiness and neatness is partly a matter of taste and secondly, according to the results, differently important for different participants. In addition, some of the properties particularly wear resistance and low load on the musculoskeletal system, are only relevant for those who are walking or standing a lot with shoes on.

Table 2. The participants' ranking of a number of features for shoes. It was up to the participants themselves to interpret what different properties means (they had no explanation of what was meant by each property).

Rank the following properties for shoes 14= best)	Average ranking	Standard devience	Participant 1	2	3	4	5	6	7
Provides good grip.	12.1	1.9	11	14	12	14	10	10	14
Protects from water.	9.3	4.5	12	11	13	12	11	5	1
Easy to put on/take off.	10.9	1.3	10	12	10	9	13	11	11
Protect from cold.	9.4	3.5	13	10	7	7	12	4	13
Protect from sharp objects.	5.6	2.7	3	9	5	8	3	3	8
Protects from heat.	5.0	3.2	9	6	2	3	1	9	5
Sexy.	3.9	4.6	1	1	4	2	2	14	3
Easy to clean.	6.0	2.2	5	2	6	6	9	8	6
Minimizes the risk for wear on the body.	10.0	3.2	14	7	14	11	8	6	10
Low musculoskeletal load.	7.0	1.9	4	8	9	5	7	7	9
Looks good.	9.4	4.2	8	4	11	4	14	13	12
Antiperspirant.	5.0	2.6	6	5	3	10	5	2	4
Good storage capacity.	2.0	1.2	2	3	1	1	4	1	2
Durable.	9.4	3.1	7	13	8	13	6	12	7

Luckily, everyone, more or less explicitly, can create their own specification before each purchase of shoes. When the specification is designed it remains to assess which shoes, to the most reasonable price, meets the requirements the buyer consider to be the most important.
It appears like, judging from the participants' ranking of five different pairs of shoes (see photos below), we have a fairly common view of which shoes that provide good grip, have good/poor water resistance, good/bad ergonomics and airiness (table 2). For other criteria, however, the interviewees' perceptions were more widespread.
To sum up, which footwear features is desirable varies with the situation, and it may not be possible to make a general specification for these (except that they generally should provide good grip and do not need to have any storage compartment). In addition, it appears as the perception of how well different shoes meet various possible requirements varies between different users.
No wonder then that we have not managed to agree on standards or guidelines for other than some aspects of some work shoes.

According to the participants, these shoes are the worst regarding: grip, safety, cleaning, ergonomics and tear strength. In addition, they are difficult to put on / take off and they chafe. But they are the sexiest, neatest and the least sweaty.

Table 3. The participants' rankings of the five pairs of shoes above. Their assessment is based on the same images, but with a higher magnification. The green and red boxes indicate that the shoes, is considered the best and worst, even with regard to the distribution measurements.

Assess a number of shoes, based on these criteria on a scale of 1-5, where 5 = best	Average ranking					Standard deviance				
	1	2	3	4	5	1	2	3	4	5
Provides good grip.	3.7	4.7	1.0	2.4	3.1	1.0	0.5	0.0	0.5	1.1
Protects from water.	4.9	3.6	1.0	2.4	3.1	0.4	0.8	0.0	0.8	0.9
Easy to put on/take off.	3.1	3.3	1.9	4.9	1.9	1.2	0.5	1.6	0.4	0.4
Protect from cold.	3.7	4.7	1.4	1.7	3.4	1.0	0.5	0.5	0.8	0.8
Protect from sharp objects.	3.5	3.5	2.0	2.2	3.8	1.2	1.0	1.3	1.6	1.3
Protects from heat.	1.7	3.0	3.0	4.1	3.1	1.1	1.4	1.6	1.2	0.9
Sexy.	2.1	3.6	4.4	1.6	3.3	1.1	0.8	1.5	0.8	1.0
Easy to clean.	3.9	2.4	1.6	4.6	2.6	1.5	0.8	1.1	0.5	0.8
Minimizes the risk for wear on the body.	2.7	3.7	1.6	3.7	3.3	1.1	1.6	1.1	1.4	1.0
Low musculoskeletal load.	2.0	5.0	1.1	3.4	3.4	0.6	0.0	0.4	0.5	0.8
Looks good.	2.1	3.6	3.9	2.1	3.1	1.1	1.0	2.0	1.1	1.2
Antiperspirant.	1.1	2.1	4.6	4.4	2.7	0.4	0.7	0.5	0.5	0.5
Good storage capacity.	[redacted]									
Durable.	3.7	4.0	1.3	2.6	3.4	1.5	1.0	0.5	1.4	0.8

Regarding jackets/outerwear there were even less consensus among the participants regarding which characteristics that are important (table 4). Apart from that providing good grip is considered to be unimportant, and protection from the cold and wet were considered important. And in addition, as little consensus in the assessment of which garments that best/worst meet different requirements (table 5).
The former can be explained by that in Sweden we only use jackets/outerwear outdoors and that only when the climate indoors and outdoors differ significantly. And the larger the difference, the more important the outer garment. This means, of course, that to protect against the conditions in Sweden that are often troublesome when we are outdoors (rain/snow) are the most important features for such garments.
The latter may be explained by that it is more difficult to rank different jackets from photos than it is to rank shoes, because it is poorly shown, for example, how thick they are.

Table 4. The participants' ranking of a number of properties for jackets/outerwear.

Rank the following properties for jackets 14= best)	Average ranking	Standard devience	Participant						
			1	2	3	4	5	6	7
Provides good grip.	1.1	0.4	2	1	1	1	1	1	1
Protects from water.	12.1	1.8	11	13	13	14	10	10	14
Easy to put on/take off.	9.4	1.4	10	11	8	10	8	8	11
Protect from cold.	13.0	1.0	14	12	12	12	14	14	13
Protect from sharp objects.	3.3	1.4	4	5	2	5	2	2	3
Protects from heat.	5.3	4.1	3	14	3	4	3	3	7
Sexy.	5.6	3.8	1	6	6	3	4	13	6
Easy to clean.	8.3	1.8	9	7	10	8	5	9	10
Minimizes the risk for wear on the body.	6.1	3.2	12	8	5	6	6	4	2
Low musculoskeletal load.	5.3	2.8	8	2	4	2	7	5	9
Looks good.	11.4	2.5	7	9	14	13	13	12	12
Antiperspirant.	6.3	1.6	6	4	7	7	9	6	5
Good storage capacity.	8.0	3.8	5	3	11	11	11	11	4
Durable.	9.7	2.1	13	10	9	9	12	7	8

Table 5. The participants' rankings of a number of outwear (see next page). The green and red boxes indicate that the jacket is considered the best and worst.

Assess a number of jackets, based on these criteria on a scale of 1-5, where 5 = best	Average ranking					Standard deviance				
	1	2	3	4	5	1	2	3	4	5
Provides good grip.										
Protects from water.	4.5	1.3	4.0	3.2	2.0	0.8	0.5	0.6	1.3	0.6
Easy to put on/take off.	2.6	2.6	3.4	4.0	2.4	1.3	1.8	1.7	1.2	0.9
Protect from cold.	4.3	1.0	4.0	2.7	3.0	1.0	0.0	1.1	0.8	0.9
Protect from sharp objects.	3.0	1.5	5.0	2.5	3.0	0.9	1.2	0.0	0.5	1.3
Protects from heat.	2.2	3.7	2.8	3.7	2.7	1.5	1.8	1.5	1.5	0.5
Sexy.	2.7	4.5	3.8	2.3	1.7	0.8	0.8	1.5	1.2	0.8
Easy to clean.	2.3	2.8	4.3	3.3	2.2	1.2	1.2	1.2	1.4	1.5
Minimizes the risk for wear on the body.	2.4	3.6	1.8	4.0	3.2	0.9	1.5	1.8	0.7	1.3
Low musculoskeletal load.										
Looks good.	3.3	3.5	3.7	2.7	2.2	1.4	1.0	1.5	1.6	1.5
Antiperspirant.	2.5	4.8	2.0	3.3	2.0	1.2	0.4	0.9	1.2	1.1
Good storage capacity.	3.8	1.3	3.3	3.8	3.0	1.0	0.8	1.4	1.6	0.9
Durable.	2.7	1.2	4.8	3.2	3.2	0.8	0.4	0.4	1.2	1.2

One possible conclusion from this is that it is probably even more difficult to create a common specification for outerwear than for shoes.

When participants choose to buy a new jacket it may not due to better meet any of the ranked qualities, instead maybe the reason is purely economic (table 6).

Table 6. The interview answers to the question in the table header.

Has it happened to you ever bought a new winter coat, though you already had one fulfilling the same function, and if so, why?
Yes, because it was half the ordinary price.
Yes, I was tired of the old one and wanted something new.
Yes, one get tired of them before they are worn out.
Yes, it was nice, it was half the price and i got convinced.
No.
Yes, because I was stupid.
Yes, because I wanted two winter coats.

Regarding clothing on legs and torso the interviewed showed even more disagreement, both on which properties are important (table 7 and 9) and about which garment that best meets various requirements (table 8 and 10). It can, however, not be explained by that the use of such garment vary with the season, because almost everyone wear them every day and all day long. The variation in the ranking of the photographed garments can also not, to the same extent as for jackets, be explained with problems in the assessment. Since none of the photographed pants/skirts are bolstered and these garments usually aren't.

One guess is that we more often than regarding shoes and jackets use leggings (pants), and clothing on the upper body (shirts) for cultural/aesthetic reasons rather than practical ones. Another explanation could be that the pants and the shirt are used the whole day, as opposed to shoes and jackets. Which may mean that for some, the most important features for these kinds of garments is how they suit them in an indoor environment. Unlike the case for outdoor shoes (which we in Sweden normally don't wear indoors) and jackets.

Table 7. The participants' rankings of a number of properties for leggings (pants/dresses/skirts).

Rank the following properties for pants 14= best)	Average ranking	Standard devience	Participant						
			1	2	3	4	5	6	7
Provides good grip.	2.3	2.2	2	1	1	3	1	1	7
Protects from water.	9.0	3.7	11	13	7	8	10	2	12
Easy to put on/take off.	9.4	3.1	10	11	8	11	12	3	11
Protect from cold.	10.1	3.3	14	12	5	7	11	9	13
Protect from sharp objects.	4.6	1.8	4	5	4	5	2	8	4
Protects from heat.	5.4	4.7	3	14	2	4	3	10	2
Sexy.	6.6	5.1	1	6	12	1	4	14	8
Easy to clean.	8.0	1.7	9	7	9	10	5	7	9
Minimizes the risk for wear on the body.	9.4	3.8	12	8	14	14	6	6	6
Low musculoskeletal load.	5.3	3.1	8	2	3	2	7	5	10
Looks good.	11.9	2.7	7	9	13	13	14	13	14
Antiperspirant.	6.0	2.6	6	4	10	6	9	4	3
Good storage capacity.	7.4	4.9	5	3	6	12	13	12	1
Durable.	9.6	2.6	13	10	11	9	8	11	5

Table 8. The participants' rankings of a number of leggings (found on the page before). The green and red boxes indicate that the pants/skirt is considered the best and worst.

Assess a number of leggings, based on these criteria on a scale of 1-5, where 5 = best	Average ranking					Standard deviance				
	1	2	3	4	5	1	2	3	4	5
Provides good grip.										
Protects from water.	4.6	2.2	2.0	3.6	2.6	0.5	1.6	1.0	1.1	1.1
Easy to put on/take off.	1.4	4.4	4.0	1.9	3.3	0.5	1.1	0.8	1.1	0.5
Protect from cold.	4.7	2.0	1.0	3.9	3.4	0.5	0.0	0.0	0.9	0.5
Protect from sharp objects.	4.9	1.6	1.7	3.6	3.3	0.4	0.5	1.1	0.8	0.8
Protects from heat.	2.7	4.0	3.1	2.4	2.6	1.3	1.4	1.6	1.6	1.1
Sexy.	4.0	3.9	3.3	1.7	2.0	1.4	1.1	0.5	1.1	1.4
Easy to clean.	3.7	3.0	4.2	1.0	3.2	1.2	1.3	0.8	0.0	1.2
Minimizes the risk for wear on the body.	1.6	4.0	3.6	2.1	3.7	1.1	1.4	1.3	0.7	1.0
Low musculoskeletal load.										
Looks good.	4.0	4.0	2.7	2.1	2.1	1.2	1.2	0.8	1.5	1.5
Antiperspirant.	2.1	4.0	4.4	1.6	2.9	0.9	1.2	0.5	1.0	1.2
Good storage capacity.	4.0	1.4	4.7	2.7	2.1	0.8	1.1	0.5	1.0	0.4
Durable.	4.7	1.7	3.4	2.6	2.7	0.5	0.8	1.4	1.5	0.8

Table 9. The participants' ranking of a number of properties for shirts (clothes on the upper body).

Rank the following properties for shirts 14= best)	Average ranking	Standard devience	Participant						
			1	2	3	4	5	6	7
Provides good grip.	2.3	3.0	2	1	1	1	1	1	9
Protects from water.	5.3	3.9	3	13	5	7	2	2	5
Easy to put on/take off.	9.9	3.4	8	11	12	13	10	3	12
Protect from cold.	9.4	2.2	7	12	6	9	11	10	11
Protect from sharp objects.	5.1	1.7	6	5	4	6	3	4	8
Protects from heat.	7.1	4.6	5	14	7	5	4	13	2
Sexy.	7.6	5.0	1	6	13	3	5	12	13
Easy to clean.	9.9	2.8	9	7	11	12	6	14	10
Minimizes the risk for wear on the body.	8.4	3.0	14	8	10	8	7	8	4
Low musculoskeletal load.	5.3	3.1	10	2	3	2	8	5	7
Looks good.	12.7	2.0	13	9	14	14	14	11	14
Antiperspirant.	8.4	3.6	11	4	9	11	12	9	3
Good storage capacity.	4.9	4.1	4	3	2	4	13	7	1
Durable.	8.7	2.2	12	10	8	10	9	6	6

Table 10. The participants' rankings of a number of shirts and the like (next page). The green and red boxes indicate that the shirt is considered the best and worst.

Assess a number of shirts, based on these criteria on a scale of 1-5, where 5 = best	Average ranking					Standard deviance				
	1	2	3	4	5	1	2	3	4	5
Provides good grip.										
Protects from water.	5.0	2.0	2.3	4.0	1.7	0.0	1.0	0.6	0.0	1.2
Easy to put on/take off.	3.2	3.8	3.4	1.5	4.0	1.5	1.1	0.9	1.2	1.2
Protect from cold.	4.5	2.0	3.2	3.8	1.0	1.2	0.0	0.4	0.4	0.0
Protect from sharp objects.	4.2	3.0	3.6	2.6	1.8	1.3	1.0	0.9	1.3	1.8
Protects from heat.	3.0	2.0	3.0	3.5	2.8	2.2	0.9	0.9	0.8	1.8
Sexy.	2.0	2.7	2.8	2.5	4.7	1.3	1.9	0.8	1.2	0.8
Easy to clean.	2.7	4.3	3.0	2.2	3.3	1.9	0.8	1.3	1.0	1.2
Minimizes the risk for wear on the body.	2.0	4.5	3.8	1.5	3.5	1.1	0.5	0.8	0.8	1.2
Low musculoskeletal load.										
Looks good.	3.2	2.3	3.2	2.3	4.0	1.7	1.2	1.2	1.8	0.9
Antiperspirant.	1.7	3.3	3.3	2.2	4.5	1.6	0.8	0.8	0.8	1.2
Good storage capacity.	3.0	2.7	3.3	4.4	2.0	1.7	0.6	1.5	1.3	1.7
Durable.	4.0	3.8	3.3	2.8	1.0	1.1	0.8	1.5	1.0	0.0

The difference between men and women in our culture is significantly greater for leggings than for any other type of clothes (apart from bras). Since almost only women uses skirts or dresses. One guess about the reason for the difference is that in the times when there were no toilets, it was a great advantage for women, but not men, to wear a skirt. With a skirt they were better protected from cold, insects and glances when they performed their needs. While skirts would have made men more vulnerable when performing the most common need. Nowadays, these arguments are less important, as evidenced by the fact that women have largely abandoned the skirts and dresses.

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The type of clothes for which the appearance reasonably should have at least importance is underwear, as they are rarely seen by other than the user and his/her partner, and, in some jobs, by colleagues in the dressing room. Thus the choice of underwear and the rationale for using them would be of more practical than aesthetic nature, in relation to other clothing. Partly confirmed by the participants (table 11). But the announcements about, especially, lingerie testify that the aesthetic arguments are in focus even for this type of garments. For how can a pair string panties in lace constitute adequate protection for the pants?

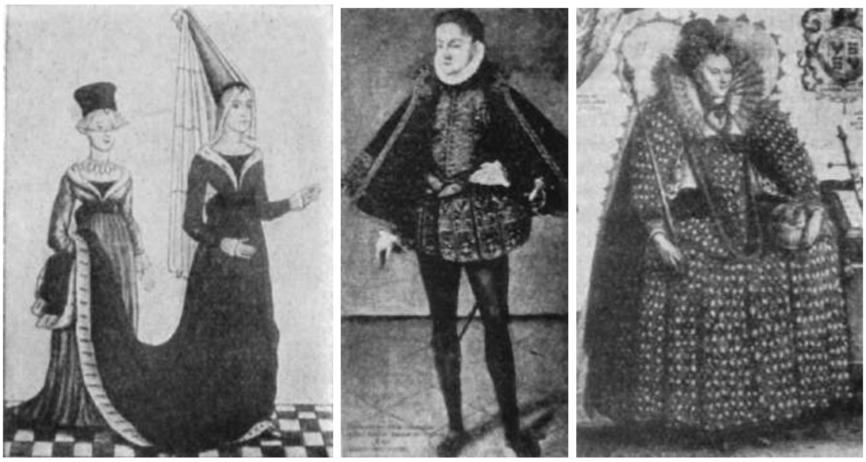
Table 11. If and why the participants use underwear.

Do you use underwear and if so why?
Yes, because I am taught to wear it.
Yes, the trousers are keept clean longer.
Yes, smell and dirt stopper and they protects my genitals.
Yes, because it’s more comfortable and the trousers are keept clean longer.
Yes, otherwise the pants gets dirty.
Yes, to protect the trousers from shit and the dick from the zipers.
Yes, so that dick and scrotum lays correct.

In summary, it can be noted that, in any case, the interviewees claim that they put emphasis on the practical aspects of clothing and the practical aspects are different for different types of garments. The weighting of these practical aspects are different from person to person, and the evaluation of how good different garments meet these practical aspects varies between individuals. But the more the garments are designed to protect the body from disturbing external factors (such as slippery roads, wet and cold): the less the variation appears to be.

But it is still marketed plenty of clothes that are both expensive and impractical, why? Some would say that they have, for example, high heels and tight skirts since that are required in the work. Others would respond that it makes them feel so sexy, or beautiful in these clothes, that it’s worth the price and discomfort. But what is considered to be attractive varies over time and between different groups and cultures.

In the past, contemporary upper class was often seen in clothing that was very complicated to put on, expensive, uncomfortable and it was probably hopeless to perform physical work while wearing them.



1500s

1600s

1800s

Probably the meaning with these hopeless clothes was to show that here came someone, so rich or important that he/she did stand above the menial manual labour. Perhaps this approach, to some extent, remains in our collective subconscious. When we do not intend to perform manual labour, we do not use garments that signal such work. Instead, we emphasize the opposite, with impractical garments and accessories like ties and jackets, high heels and tight skirts. If so, this could be summarized as:

Even today we show our distance to simple manual labour, more or less unconsciously, with clothes that do not meet practical requirements.