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Information Design 2

## **Text Design**

Revised edition 2015

Rune Pettersson  
Institute for infology

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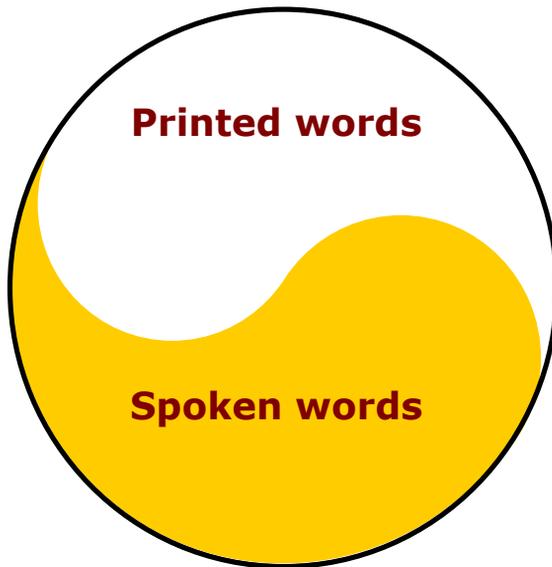
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**Information Design 2**

# **Text Design**



**Rune Pettersson \* Institute for infology**

## *Information Design 2–Text Design*

Yin and yang, or yin-yang, is a concept used in Chinese philosophy to describe how seemingly opposite forces are interconnected and interdependent, and how they give rise to each other. Many natural dualities, such as life and death, light and dark, are thought of as physical manifestations of the concept. Yin and yang can also be thought of as complementary forces interacting to form a dynamic system in which the whole is greater than the parts. In information design, theory and practice is an example where *the whole is greater than the parts*.

In this book drawings and photos are my own, unless other information.

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Tullinge 2015

# Preface

Information design is a multi-disciplinary, multi-dimensional, and worldwide consideration with influences from areas such as language, art and aesthetics, information, communication, behaviour and cognition, business and law, as well as media production technologies.

Since my retirement I have edited and revised sections of my earlier books, conference papers and reports about information design, message design, visual communication and visual literacy. The result is this series of six books:

*Information Design 1–Message Design*

*Information Design 2–Text Design*

*Information Design 3–Image Design*

*Information Design 4–Graphic Design*

*Information Design 5–Cognition*

*Information Design 6–Predecessors & Pioneers*

These books include definitions, selected results from research, theoretical considerations, as well as practical guidelines for message design. The intended reader is especially interested in research and theory related to message design, and the design of information materials and information sets.

Tullinge, Sweden

Rune Pettersson, Ph.D.

Retired Professor of Information Design

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# Languages

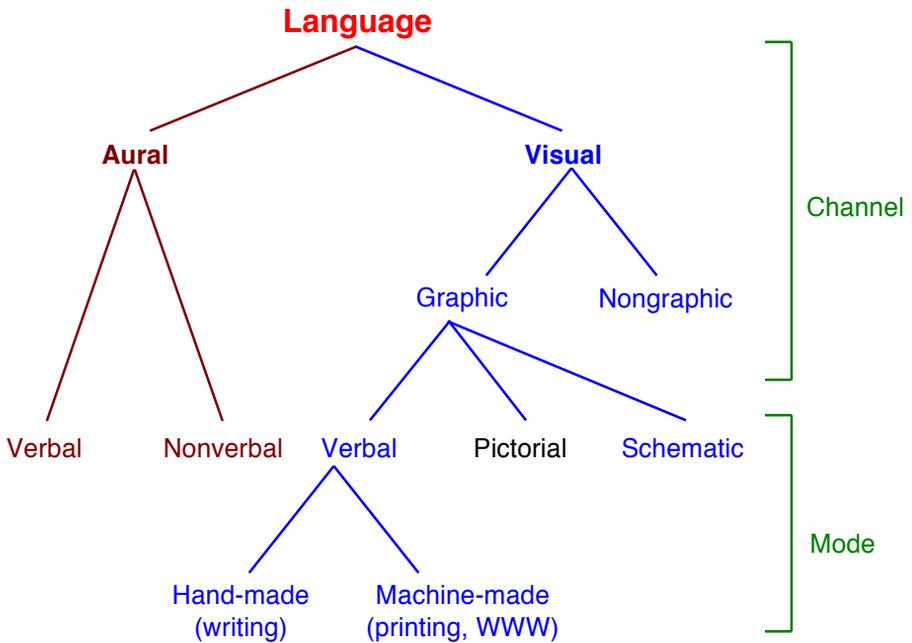
According to Skinner (1957), language is a behaviour that is learned by habit. Children imitate adults until they learn the language spoken by them. On the other hand, Eriksson (1986) cites Chomsky (1959) who argued that language is not “a set of habits.” Instead, the development of language is a continuous and creative process working in concert with the surrounding. The brain develops verbal proficiency making it possible for Man to formulate and understand an infinite number of sentences. This view has been supported by the findings of a number of scientists after Chomsky (e.g., Littlewood, 1984; Slobin, 1973).

## Language models

According to semiotics, all cultural processes may be seen as communication processes (Eco, 1971). Thus, there are different languages, such as spoken, written, and visual languages. Lotman (1973) suggested that any system used as a means of communications between people can be regarded as a language. Cochran (1987) concluded that humans cannot transfer ideas whole and intact from one person to another. Human communication depends upon an interactive series of successive approximations presented in metaphors. She found “linguaging” useful in directing attention to the actions of people as they share their own ideas, listen to others, or learn from technologically produced sights and sounds.

There are many approaches to language and language classification systems. Twyman (1982) pointed out that while linguistic scientists distinguish between spoken and written language, graphic designers distinguish between verbal and pic-

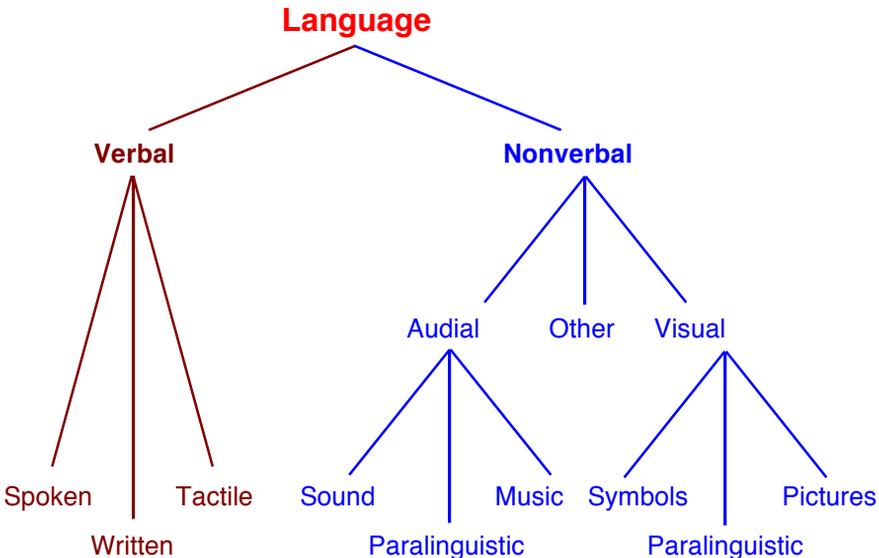
torial language. From a design point of view, written, printed, or displayed texts or verbal graphic language are important components of visible language. Twyman noted that examples of poor design that hinder the comprehension of text contents are far too commonplace.



*Language model 1. Twyman’s (1982) language model is devised to accommodate the approaches to language of linguistic scientists and graphic designers. Reproduced by permission of the author.*

However, if the linguistic representation (e.g., the medium and its content) is placed at the forefront, another approach is natural. In this model, linguistic differentiation is based on the form of the messages: words, sounds, images, and other forms.

Thus, verbal language has spoken (aural), written (visual), and tactile categories. Audial language comprises sound effects, music, and paralinguistic sounds (all aural). Visual language has symbols, pictures, and paralinguistic visual expressions (all visual). Other languages are based on smell, taste, touch, etc.



*Language model 2. The Pettersson language model (1989) is based on the form of representation. The model can be divided into additional sub-categories.*

Unlike verbal language systems, which work linearly and require rational cognitive development in order to use them effectively, images and visual language speak directly to us in the same way experience speaks to us: holistically and emotionally. Languages differ in their ability to express concepts with precision and flexibility. Physics, chemistry, and mathematics, for example, employ non-ambiguous symbol and equation languages. In verbal and technical descriptions, the language of

specialists must be as unambiguous as possible. Only people with the appropriate specialized knowledge may understand languages such as these. Often normal prose is open to multiple interpretations, namely, it is ambiguous. Pictures are often ambiguous too. Visual languages attempt equivalence with reality. Visuals are iconic and they often resemble the thing they represent. Images speak directly to us in the same way experience speaks to us, that is, emotionally and holistically (Barry, 1998).

In the animal world various body signals supply most of the communications between individuals. Animals send messages by displaying parts of their bodies in various ways. Message receivers “respond” with equivalent displays or movements. Bees have developed an advanced “language.” After returning to the hive, a bee can perform a dance informing other bees about, e.g., the location of a source of food.

Body language and paralinguistic and extra-linguistic signals are also important in Man. Some scientists suggest that body language accounts for up to half, or more, of all our communications with others. By the time we are adults we are all highly sensitive to the tiniest changes in expression, gesture, posture, and bodily adornment of our companions. We acquire this sensitivity through intuition rather than analysis. If we took the trouble to make a more analytical study of body appearances, we could become even more sensitized to them, and could avoid some of the pitfalls into which our intuition sometimes leads us (Morris, 1985).

Many movements and gestures can be interpreted without ambiguity in a given cultural community but not outside that community. In some societies, for example, the raising of an eyebrow, consciously or unconsciously, designates surprise. Or shrugging the shoulders designates indifference. But confusion

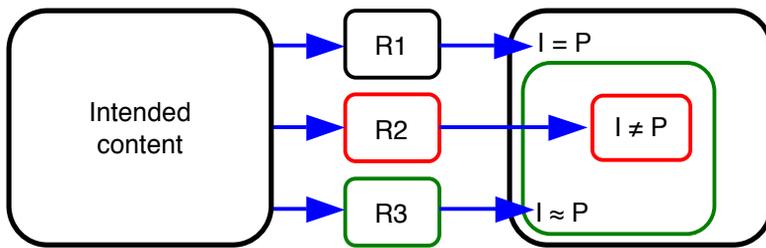
and misunderstandings can occur before visitors to foreign cultures learn to understand the body language prevailing there.

Our body language is partly instinctive, partly learned and imitative (e.g., Fast, 1971). An interesting fact is that bilingual persons change their body language, gestures, and eyelid movements when they switch (spoken) languages. Brun (1974) gives many examples of sign languages. We can see examples of “formal” signs almost every day. Deaf people are often very skilled in using their highly developed and structured visual verbal sign language. Other less sophisticated kinds of sign languages are used by, e.g., umpires in sporting events, traffic policemen, people directing airplanes on the ground, etc. Further examples are the sign languages used in the production of radio and television programs, and movies.

Thousands of alternatives are available to a sender wishing to transmit a rendition of some reality to receivers. Senders always utilize a “filter” and quality checks before selecting one of the many available text and picture options. The choice is based on the sender’s subjective opinions. The sender selects the option believed to be the most efficient for each purpose and each transmission situation. The selected pictures/texts are then edited in one of many ways for the purpose of enhancing reception impact.

Thus, a selected, edited version of reality is transmitted to receivers. In mass communications, message reception can be affected in countless ways. For example, television reception may range from very bad to very good. Different viewers also perceive the same text and/or image in different ways, since there are always great inter-individual differences in perception (Pettersson, 1987).

The context in which a message is seen can convey a “pre-understanding” of the message’s contents. Pre-understanding is vitally important to our perception of any message. The language we choose to use in any given situation is in itself a device conveying pre-understanding to the reader/listener/viewer. Message response is sometimes easy to predict. This predictability is often heavily exploited in movies, television, and theatre.



*A large number of different representations, texts and/or pictures are always possible. The representations (R) convey identical (R1), discrepant (R2), or acceptable (R3) perceptions (P) of the intended content (I).*

Winn (1993) noted that a great deal of perceptual organization occurs pre-attentively, not under cognitive control. The way a message is organized, therefore, will have an important effect on the way the perceptual system structures what it detects and, in ways that the perceiver will not be aware of, on how that information is interpreted.

There is no unambiguous verbal or visual language. In a closed, homogeneous cultural group, “ordinary” pictures and texts probably give rise to similar interpretations and perceptions of a specific reality, single object, event, message, or content. However, we do not know the magnitude of the individual

“tolerance ranges” in which different texts and pictures generate reasonably identical perceptions. One representation may produce accurate perception of content by one person but a completely different perception by another person.

Perception of a given text/image by a random receiver in exactly the manner intended by the sender is unlikely. Senders, though, do not often require identical perception of transmitted messages by all receivers. A large number of approximate interpretations may suffice. A well-written explanatory and elucidating caption can enhance understanding of the content. One study (Melin, 1986a) of student perception of texts and pictures in lexivision (i.e., openings in a book where documentary and analytic pictures and descriptive texts interact) showed that pictures were better at expressing contrast and specification and texts were better at expressing logical relationships such as cause and effect. Some lexivisual presentations utilize the respective advantages of text and image.

To be able to produce a verbal message in any medium, it is important to understand the possibilities and the restrictions of verbal language. We need to know how oral and written verbal languages are constructed and how various audiences and individuals perceive them. Major characteristics of verbal language are listed below in the form of short summary statements.

## *Properties of verbal language*

- Verbal languages have “digital coding” using combinations of letters (including numerals) to represent content (Elkind, 1975).
- There is no direct correspondence between groups of letters, words, and reality. Each meaning is defined and must be learned (Elkind, 1975).
- The properties of letters are limited. A letter has a given position in an alphabet, it has a name, and it is represented by one or more sounds and is used in a context (Elkind, 1975).
- It may take only 2-3 seconds to recognize the content in an image (Paivio, 1979; Postman, 1979), but 20 – 30 seconds to read a verbal description of the same image (Lawson 1968; Ekwall, 1977) and 60 – 90 seconds to read it aloud (Sinatra, 1986). In verbal and visual languages prior experience and context are very important to the perception of contents.
- Verbal languages have varying levels of meaning (Eco, 1971): (i) phonemes (without meaning); (ii) morphemes (with meaning); (iii) syntagms, sub-meanings; (iv) complete meanings.
- Semantic codes, grammar, and syntax must be exactly defined (Chomsky, 1959).
- A written text can convey information, contain analyses and describe feelings and facts (Melin, 1986a).
- It is more likely that graphically complex texts will be read than “plain” texts (Melin, 1999).
- It takes less time to read a graphically complex text than a “plain” text (Melin, 1999).
- Readers often react in a positive way to graphically complex texts. Texts with good typography will be noticed (Melin, 1999).

- People usually have no difficulty in reading the jargon used in professional or technical languages but understanding the concepts the words represent may be difficult for a non-specialist (Melin, 1986b).
- The more abstract a word is the harder it is to relate it to any specific activity (Melin, 1986a).

### *Perception and memory of verbal language*

- The perception of linear representations requires slow, sequential, processing for comprehension of content (Perfetti, 1977; Sinatra, 1986).
- There is a large degree of perceptual constancy. We can view a text from various distances and various angles and still get the same perception of the text content (Pettersson, 1989).
- Memory retrieval is a serial integration process and entails sequential processing by auditory-motor perception systems (Sinatra, 1986).
- Word identification is a multi-stage process. The right brain hemisphere carries out visual-lexical analysis. Word naming and word meaning are processed by the left hemisphere (Pirozzolo and Rayner, 1979).
- Reading a text is very structured with several eye fixations on each line (Ekwall, 1977).
- The non-verbal components of visual literacy are the real “basics” in literacy learning, and visual literacy is the active reconstruction of past visual experience with incoming visual messages to obtain meaning (Sinatra, 1986).
- Perception of a text is relative. Different people perceive and depict a given text in widely differing ways (Pettersson, 1987). We will remember more from a graphically complex text than a “plain” text (Melin, 1999).

- Perception of verbal content is apparently easier when a text is read than heard. Thus it is easier to assimilate and profit from a rich language by reading than by listening (Pettersson, 1987).
- The end of a sentence should be determined by syntax rather than by a set with of a line (Bork, 1982; Hartley, 1980).
- Utilizing specific textual structure does not facilitate recall of instructional text (Frase and Schwartz, 1979; Hartley, 1980).
- Verbal depiction of the content and execution of even simple pictures requires relatively long descriptions (Pettersson, 1987).
- When illustrations provide text-redundant information, learning information in the text that is also shown in pictures will be facilitated (Levie and Lentz, 1982; Melin, 1999).

### *Properties of text*

Reading is still one of the most important modes of formal education and the ability to read is therefore essential. To describe the properties of text, linguists work with advanced text analysis. According to Klare (1985) over 200 readability formulas exist. Only three will be noted here: the readability index, the character index, and the nominal quotient. The number of words in a sentence appears to exert the strongest effect on reading rate and reading comprehension (Catalano, 1990; Newell, 1990). The premise on which the readability and character indexes are based is that long words and long sentences make a text difficult to read.

The two factors which best designate the linguistic comprehensibility of a text are sentence length and the proportion of long words. An easily comprehensible text is characterized by short sentences, short words, and simple sentence structure.

Other variables which affect the comprehensibility of text are the vocabulary's degree of abstraction, the number of syllables in words, the commonness of words used, the choice of subject, the subdivision into paragraphs, the prevalence of clauses, headings and sub-headings, line length, inter-line distance, illustrations, the size of letters, the relevance of the text to the reader, and the page size. The *index of readability* (LIX) is calculated as follows:

- Count the number of words in the text.
- Count the number of words with more than six letters.
- Count the number of sentences.
- Divide the number of long words by the total number of words and multiply the product by 100. This yields the average word length (WL).
- Divide the number of words by the number of sentences. This yields the average sentence length (SL).
- $WL + SL = LIX$ .

20–30 = simple text, suitable for children's books

30–35 = literature

35–45 = moderately difficult text, weekly magazines

45–50 = popular science subjects

50–55 = difficult text, trade literature

55+ = extremely difficult text

The *character index* can be looked on as a visualisation of the readability index. Each sentence is analysed and noted on a chart depicting a system of coordinates, in which the y-axis represents the number of long words and the x-axis the number of words per sentence. Thus, by graphically providing more than a

single mean, the character index offers more thorough information about a text than the readability index.

The *nominal quotient* gives the total number of nouns, prepositions, and participles divided by the total number of pronouns, verbs, and adverbs in the text. A good information text has a quotient of slightly more than 1.0. A text with a lower nominal quotient seems “chatty,” whereas a text with a higher nominal quotient is cumbersome and hard to read.

The text should also be well worth reading. This designates the properties of the content of a text and is very dependent on the reader’s degree of interest. Each group of readers selects reading material on the basis of personal preference. Studies of readability have resulted in lists with reading suggestions for various age groups.

## **Literacy**

The tools of the Information Age have put vast volumes of information at our fingertips. According to Scott, Kirsch, and Jenkins (1998, p. 17) the International Adult Literacy Survey (IALS) defined literacy as “using printed and written information to function in society, to achieve one’s goals, and to develop one’s knowledge and potential.” The concept of “literacy” was restricted to the ability to *use language to read and write*.

### *Traditional literacy*

The traditional definition of literacy has been extended several times. In 2000 United Nations Educational, Scientific and Cultural Organization (UNESCO) defined literacy in the following way: “Literacy is the ability to read and write with understanding a simple statement related to one’s daily life. It involves a

continuum of reading and writing skills, and often includes also basic arithmetic skills (numeracy)” (UNESCO, 2004, p. 12).

In 2003 UNESCO proposed this definition: “Literacy is the ability to identify, understand, interpret, create, communicate and compute, using printed and written materials associated with varying contexts. Literacy involves a continuum of learning in enabling individuals to achieve their goals, to develop their knowledge and potential, and to participate fully in their community and wider society” (UNESCO, 2004, p. 13).

In 2004 UNESCO made clear that literacy is much broader than the ability to read and write: “In acknowledging the fact that literacy involves oral, written, visual and digital forms of expression and communication, literacy efforts conceived in terms of the plural notion of literacy intend to take account of the ways in which these different processes interrelate in a given social context” (UNESCO, 2004, p. 14). Adolescent literacy, articulacy, critical literacy, family literacy, post literacy, print literacy, and public literacy belong to this category.

The term *non-literality* refers to cognitive schemes (Bowers, 1990). Non-literality is expressed in many forms such as gestures, music, smell, sound, speech, taste, touch visual images, and writing (Forceville, 2006). Children easily comprehend non-literal meanings that are based on features like colour, shape, and size (Clark, 1993; Seitz, 1997).

### **Adolescent literacy**

Adolescent literacy refers to the set of skills and abilities that students need in grades 4–12 to read, write, and think about the text materials they encounter. In recognition of the unique psychology and neurology of adolescence, distinct from the literacy development of younger readers or adults, the International

Reading Association (IRA) has outlined seven guiding principles of literacy development (Atwell, 1998; Moore et al. 1999).

### **Articulacy**

In his book *Examining Oral English in Schools* Hitchman (1966, p.10) argued that the individual “needs ‘spoken literacy’; and *beyond* this the greatest power of language of which he is capable – we may call this ‘articulacy’. He must use language in order to learn to think. The development of language and the development of power of thought go together and react upon each other.” The concept *articulacy* may be further explained as the condition of being *articulate* that is the ability of speaking in a clear and effective manner.

### **Critical literacy**

Critical literacy is an instructional approach to literacy that advocates the adoption of critical perspectives toward text. It encourages readers to actively analyze texts and it offers strategies for uncovering underlying messages. According to critical literacy literate consumers of text should adopt a critical and questioning approach (Hagood, 2002; Wikipedia, 2012).

### **Family literacy**

Family literacy is an educational method providing parents and children with family-focused and long-term educational services. A literate family tends to be a stronger family with children more likely to be successful in school (Wikipedia, 2012).

### **Post literacy**

*Post literacy* or *Post literacy education* is a concept used in adult and continuing education programs, especially in developing countries. Unlike Continuing education these programs

provide skills that might otherwise be provided in primary education (Wikipedia, 2012).

### **Print literacy**

Traditional literacy is sometimes referred to as *print literacy* (Suhor & Little, 1988).

### **Public literacy**

Traditional literacy is sometimes referred to as *public literacy* (Moraitis & McCormack, 1995).

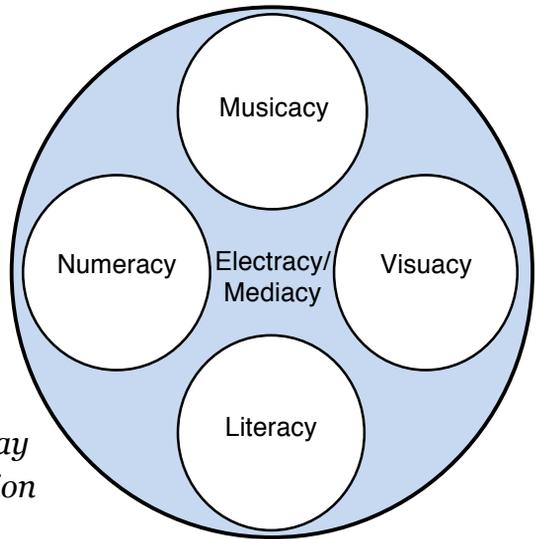
### *New literacies*

Several authors have seen a broader definition of literacy and proposed categories of literacy. With reference to the basic skills that underpin our school curricula and education it was suggested that articulacy, graphicacy, (print) literacy and numeracy constitute four categories of literacy (Balchin and Coleman 1965, 1966). Dake (2000) argued that an important part of literacy is the development of flexibility and fluency of thought.

Buckingham (1993a) used the term *New literacy* for new forms of literacy made possible by development of digital technology. According to Erstad (1998) we need to abandon the notion of literacy as a set of disembodied “skills” and to recognise that literacies are always inevitably situated within specific practices and specific social contexts, what some educators term a social theory of media literacy. A person may be illiterate in many aspects, which is hard in our modern society. Hugo and Skibbe (1991) argued that the illiterates of the future might not be those who cannot read, but those who cannot see.

Sutton (1993) noted the similarities between information literacy, media literacy, and visual literacy. Traditional literacy is not enough anymore. In a discussion on the evolution of im-

agery technologies, Fredette (1994) cited Loveless (1992), who wrote about the evolution of media technologies and identified their changing effects on consciousness, and their parallel role in redefining the traditional concept of literacy. Loveless suggested that the children of the future will need to be literate in both “data in motion” and “images in motion.” According to Loveless the latter means being literate in the language of photography, film, video and satellite communications. Obviously, a modern definition of literacy must include much more than traditional reading and writing.



*This illustration shows the main literacy categories. Area specific literacies may be seen as a depth extension of the figure.*

Today authors write about a large number of different literacies. A search on Google in February 2011 on the word literacy gave more than 39 million entries. Some literacy concepts are rather similar and most of them have been defined in many different ways. It is very hard, if at all possible, to find any consensus in the various literacy definitions. In my view a number of literacies are assigned to five main categories of literacy: 1)

literacy, 2) musicacy, 3) numeracy, 4) visuacy, and 5) elec-tracy/mediacy. A sixth literacy category is called “area specific literacies.” There may be area specific literacies in all five main categories.

### *Musicacy*

Music is a sophisticated language with its own logic and syntax. Music reading and writing skills are quite different from language reading and writing skills. *Musicacy*, or *musical literacy*, is the ability to understand and work with music. *Musical literacy* incorporates the ability to read music and understand how to make the notes on a page audible (through singing or playing an instrument). The term also refers to the skill of writing music for others to play (Perez, 2009). Musical literacy means the ability to read and understand the pitches, the rhythms, and the meaning of the music (Telfer, 2004). Musical symbols on the printed page reveal a great deal about the musicality of a piece. Each detail in the notation brings the music alive. Several pedagogies and have evolved to teach the skills of reading and writing music in elementary grades. Some regard musical literacy almost as equally important as aural skills. To be musically literate, a person has to be comfortable with musical expressions.

### *Numeracy*

Numeracy is the ability to understand and work with numbers and other mathematical concepts. To be numerically literate, a person has to be comfortable with logic and reasoning (NCES, 1993). Innumeracy or numerical illiteracy refers to a lack of ability to reason with numbers. Economic literacy, financial literacy, and statistical literacy belong to this category.

*Economic literacy* is knowledge and understanding of basic economics. Economic literacy is a vital skill in the modern society, just as vital as reading literacy (Duvall, 1988).

*Financial literacy*, or *financial capability*, is the ability to understand finance. It refers to the set of skills and knowledge that allows an individual to make informed and effective decisions through their understanding of finances. In 2003 the Organization for Economic Co-operation and Development (OECD) started a project to improve financial education (Wikipedia, 2012).

*Statistical literacy* is a term used to describe the ability to understand statistics and relationships of numerical information. It is necessary for citizens to be able to critically evaluate and understand numeric information presented in different media such as Internet, newspapers and television (Heiberger and Holland, 2004).

## *Visuacy*

It seems that rather similar concepts have been developed in different places and at different times. Diagrammatic literacy, digital visual literacy, graphicacy, graphical literacy and visual literacy are all concerned with the ability to understand and work with different kinds of visual representations. The term *visuacy* is suggested as an umbrella term for these concepts.

Enser (1995) noted that we now belong to a society experiencing technological advances that are serving to promote the importance of the visual medium for message transmission and knowledge representation. I agree with Enser that this is a paradigm shift offering both opportunities and challenges, especially for the education and information professions. I also foresee two other paradigm shifts. In the future we will focus on

the information content rather than on the documents as such. We will also see a shift from emphasis on teaching to emphasis on learning. In this context it may also be noted that Malmberg (1996) pointed out that the culture industry transforms pleasure into mere entertainment and a society of entertainment is emerging.

### **Diagrammatic literacy**

Reading diagrams involves perception, domain knowledge, narrative, motivation and bias, as well as social consensus. Relationships between visual elements in a diagram mirror relationships between objects in the real world. So far there are no universal conventions for diagrams.

Allmendinger (1998) argued that people use the same high-level skills when they read diagrams as when they read prose. Reading diagrams involves perception, domain knowledge, narrative, motivation and bias, as well as social consensus. Diagrams are visual models. They depend on point, line, plane, volume, value, colour, and texture, as well as text. Each visual element corresponds to something in the real world. Relationships between visual elements in a diagram mirror relationships between objects in the world.

Coll, Coll, and Thakur (1994) compared graphs with tables. They found that business students performed more accurately with tables, and engineering students performed more accurately with graphs. The business students were faster and more accurate than the engineering students. However, both groups preferred tables. According to Allmendinger (1998) diagrammatic literacy is a matter of getting people to make better decisions based on fairly sophisticated graphics information. Lowe (1993) found that experts and novices apply different mental strategies

when they read diagrams. The experts base their interpretations on underlying principles and domain based categories. Beginners, however, rely more on visual patterns in the diagrams.

### **Digital visual literacy**

Digital visual literacy (DVL) is the ability “both to create and understand certain types of information, in this case visual information created with a computer” (Spalter and van Dam, 2008, p. 94).

### **Graphicacy**

The concept of *graphicacy* is concerned with the visual-spatial capacities people require in order to generate and interpret information in graphic information such as charts, diagrams, graphs, maps, plans, photographs and symbols. The study of geography, at school, college, and university levels, is the best way to improve and impart the skill of graphicacy (Balchin and Coleman, 1965, 1966). To be graphically literate, a person has to be comfortable with symbols and graphical expressions. The content itself largely determines the nature of the graphic entities and the way they are organized. Graphics are far more readily available and widely used than ever before (Wilmot, 1999). There are no universal conventions for graphics. Danos and Norman (2009) developed a taxonomy to be used as a research tool to gain an understanding of how the skills needed to understand and create drawings can affect students’ learning abilities and hence of the importance of design as a ‘third culture’.

### **Graphical literacy**

Pictures, maps and other types of graphs have been used throughout the ages, since or before written verbal language

and discussed literacy in graphs, which was beginning to approach word literacy (Fry, 1981). Graphical literacy was defined as “the ability to read and write (or draw) graphs” (p. 383). Another definition includes more types of visual representations. Here graphical literacy is the ability to interpret charts, maps, graphic, and other pictorial presentations used to supplement the prose in textbooks, non-fiction trade books and newspapers (Tierney, Readence and Dishner, 1990). Graphics are far more readily available and widely used than ever before. There are no universal conventions for graphics. It seems that graphical literacy is more or less the same as graphicacy.

### **Visual literacy**

Visual literacy is a broad concept with bits and pieces from several areas of knowledge. Many definitions or explanations of visual literacy, visualization and understanding of pictures have been considered. See *Visual literacy* in the section *Visual language*.

### *Electracy/Mediacy*

The two terms *electracy* and *mediacy* seem to represent quite similar concepts, both include the ability to understand and work with digital media. *Electracy* describes the skills necessary to exploit the full communicative potential of new electronic media (Ulmer, 2003). *Mediacy* is a facility in interacting and working with media (Wikipedia, 2012). As we become interconnected media consuming individuals we also have the opportunity to be active contributors. Much of it is multimedia with audio, images and text. Electracy/mediacy are to digital media what literacy is to print media. 21st century literacy, computer literacy, digital literacy, hypertext literacy, multi-literacy,

multimedia literacy, multimodal literacy, new media literacy, screen literacy, and transliteracy belong in this category.

### **21st century literacy**

21st century literacy is the set of abilities and skills where aural, visual and digital literacy overlap. These include the ability to understand the power of images and sounds, to recognize and use that power, to manipulate and transform digital media, to distribute them pervasively, and to easily adapt them to new forms (The New Media Consortium, 2005).

### **Computer literacy**

Computer literacy is the ability and knowledge to use computers and technology efficiently. A computer-literate person only needs to be a computer user, not a computer programmer.

Considine and Haley (1992) argued that computer literacy clearly relates both visual literacy and media literacy to the traditional concepts of literacy, reading and writing. Monfils (1994) argued to be computer literate, a person needs only be a computer user, not a computer programmer. It is, however, not always easy to be a computer user. Sterner (1997) noted that users of all kinds of appliances often expect to be able to use the specific appliances without first reading any instructions for use at all. When people fail and realize that they need instructions for use they expect to be able to follow a clear text with pictures, and a good index, as well as a trouble-shooting guide. This however, is usually not at all the case. Instruction manuals may be hard to understand and they do not always meet even modest quality expectations.

Modern computer systems often have user interfaces based on symbols intended to function in various countries, in various cultures and subcultures. These symbols may, however, actually

not function at all for the intended users. Griffin et al. (1994) studied how international business people interpreted and understood commonly used clip art graphic symbols. The symbols were taken from a Harvard Graphics software package for business presentations. Based on 4,530 opinions expressed by 302 subjects in Japan, Sweden, Tanzania and the USA, regarding 15 of the symbols in the software package, Griffin et al. made the following two conclusions:

- There are many ways to interpret symbols. Very few people share the same understanding of any given symbol.
- There are strong cultural differences in interpreting the meanings of symbols.

Computer users should not be satisfied with the present situation. Users should demand better graphical interfaces as well as better instructions for use. Better user interfaces would probably fast increase the number of computer literate users.

As personal computers have become commonplace and more powerful, the concept of computer literacy has moved beyond basic functionality to more powerful applications under the heading of *multimedia literacy*.

### **Digital literacy**

Digital literacy is the ability to locate, organize, read, interpret, understand and use images, sound and text in digital environments. A digitally literate person can evaluate and apply new knowledge gained from a wide range of digital sources in order to create and reproduce data and images in multiple formats through digital manipulation. (See Luce-Kapler, 2007; Jones-Kavalier and Flannigan, 2008; Metros, 2008.)

### **Hypertext literacy**

Hypertext literacy is a literacy made up of new and technologically altered kinds of access (ACLA, 2006). Publishing on the web has made the virtual printed word the creation of not just the select and selected few. Anyone now can easily publish a web site that reproduces the form of established publications, whether journalistic or academic, while the content can bear little to no resemblance to the kinds of publications that trained the web-writer's eye.

### **Multiliteracy**

Multiliteracy is the ability to understand and use literacy and literate practices with a range of texts and technologies (including computers, cell phones, the Internet, and social networking sites.) A multiliterate person is flexible and strategic and can fully participate in life as an active and informed citizen. (See Anstey & Bull, 2006; Borsheim, Cope & Calantis, 2000; Merritt & Reed, 2008).

### **Multimedia literacy**

Multimedia literacy, *new media literacy*, *screen literacy*, is the ability to cope with the numerous media in use today. Multimedia utilizes several different content forms to convey information. (See Alexander, 2008; Spalter & vanDam, 2008; Wikipedia, 2012).

### **Multimodal literacy**

Multimodal literacy is the ability to shift modes from open to closed networks. (See Alexander, 2008; Gee, 2007; Kress, 2003).

## **Transliteracy**

Transliteracy is the ability to read, write and interact across a range of platforms, tools and media from signing and orality through handwriting, print, TV, radio and film, to digital social networks (Thomas, 2005).

## ***Area specific literacies***

Several literacies are “area specific” and at the same time they may belong to more than one of the five main categories of literacy. Advertising literacy, aesthetic literacy, agricultural literacy, cultural literacy, diaspora literacy, ecological literacy, ecoliteracy, environmental literacy, health literacy, information literacy, informational literacy, media literacy, mental health literacy, mental literacy, political literacy, promotional literacy, rhetorical literacy, scientific literacy, social literacy, technological literacy, and television literacy all belong in this category.

## **Advertising literacy**

With respect to media education and research advertising literacy is an analytical concept (Malmelin, 2010, p.132). From the consumer point of view, advertising literacy is the individual’s ability and skill of observation, recognition and understanding commercial messages. For the communicator advertising literacy provides directions for planning of advertising.

The elements of an advertising message are graphic design, music, pictures, sounds, structure, words, and the action itself. The structure is the way the elements are combined to create an effect of a coherent message. In order to influence others, the senders must exchange information, accurately transmit their messages and intentions, and identify and understand the habits of the intended receivers. The more often a message is

sent, the more familiar it becomes and the more likely it is to be remembered.

### **Aesthetic literacy**

Aesthetic literacy refers to interpreting and understanding of advertisements as a source of aesthetic pleasure and entertainment (Malmelin, 2010, p. 134). Aesthetic literacy includes the possibility of valuing the artistry and understanding the elegance of decisions in design, execution and production.

### **Agricultural literacy**

Agricultural literacy is a phrase being used to describe programs to promote the understanding and knowledge necessary to synthesize, analyze, and communicate basic information about agriculture to students, producers, consumers, and the public (Wikipedia, 2012).

### **Cultural literacy**

Cultural literacy is the ability to fluently participate in and understand a given culture. A culturally literate person knows the signs and symbols in a culture. This includes culturally-conditioned allusions, dialectic stories, entertainment, idiomatic expressions, idioms, idiosyncrasies, jokes, names, and places. A culturally literate person is able to talk to and understand others of that culture. (See Gee, 2007; Hirsch Jr., 1987; Kellner, 1998; Kress, 2003).

### **Diaspora literacy**

Diaspora literacy is the ability to understand and/or interpret the multi-layered meanings of stories, words, and other folk sayings within any given community of the African diaspora. These meanings go beyond literal or typical literary interpretation into an area of folk understanding (Wikipedia, 2012).

## **Ecological literacy**

Ecological literacy, or *ecoliteracy*, is the ability to understand the natural systems that make life on earth possible (Orr, 1992).

## **Environmental literacy**

Environmental literacy is essentially the capacity to perceive and interpret the relative health of environmental systems and take appropriate action to maintain, restore, or improve the health of those systems (Roth, 1992). Levels of literacy are generally assumed to exist but are not often defined. With respect to environmental literacy, Roth proposed the identification of three levels:

- Nominal, indicating ability to recognize many of the basic terms used in communicating about the environment and to provide rough, if unsophisticated, working definitions of their meanings.
- Functional, indicating a broader knowledge and understanding of the nature and interactions between human social systems and other natural systems.
- Operational, indicating progress beyond functional literacy in both the breadth and depth of understandings and skills.

These three levels of literacy; nominal, functional, and operational, could also be used in other literacies.

## **Health literacy**

Health literacy is an individual's ability to obtain, read, understand and use healthcare information to make decisions and follow instructions for treatment. There are, however, multiple definitions of health literacy. Up to half of patients cannot understand basic healthcare information. (See Nutbeam, 2000; Wikipedia, 2012; Zarcadoolas, Pleasant and Greer, 2005).

## **Information literacy**

There are many definitions of information literacy. Doyle (1994) defined information literacy as “the ability to access, evaluate, and use information from a variety of sources.” She created a list of characteristics of an information literate person. He or she has *information competence*, and recognizes the need for information, identifies potential sources of information, develops successful search strategies, evaluates and uses information in a qualified way, and rejects inaccurate and misleading information. (See the section *Information literacy* in the book *Information Design 1–Message Design*.)

## **Media literacy**

Media literacy is the ability to access, analyze, create, evaluate, experience, and produce messages in a wide variety of media forms (Aufderheide, 1993). Educators and scholars use the term media literacy to refer to the process of critically analyzing and learning to create one's own messages in audio, multimedia, print and video. (See the section *Media literacy theories* later in the book *Information Design 1–Message Design*.)

## **Mental health literacy**

Mental health literacy has been defined as “knowledge and beliefs about mental disorders that aid their recognition, management or prevention.” Members of the public need to have some knowledge to allow them to recognise prevent and seek early help for mental disorders (Wikipedia, 2012).

## **Mental literacy**

Mental literacy is a metaphor for the use of the brain as a computer (Buzan & Buzan, 1994).

## **Metaliteracy**

Mackey and Jacobson (2011) used the term *metaliteracy* in order to encompass the range of information formats that they felt should be included within the overarching concept of information literacy.

## **Multicultural literacy**

We live in multicultural societies. We often interact with people from different countries around the world, and with different experiences. Multicultural literature describes how people live in different parts of the world. It includes knowledge of cultures and languages, as well as the ways graphics, text, and sound may introduce bias into language, generalizations, perspective, stereotypes, subject matter, and visual content.

## **Political literacy**

Political literacy is a set of abilities necessary for citizens to participate in a society's government. It includes an understanding of how government works and of the important issues facing society, as well as the critical thinking skills to evaluate different points of view (Wikipedia, 2012).

## **Promotional literacy**

Promotional literacy is the aspect of advertising literacy that helps consumers weigh and evaluate the commercial forms, functions and objectives of media in general (Malmelin, 2010, p. 137).

## **Rhetorical literacy**

Rhetorical literacy is the ability to understanding the means of persuasion used in advertising and marketing communications in general (Malmelin, 2010, p. 136). It is an awareness of who is being targeted in a certain advertisement.

### **Scientific literacy**

Scientific literacy is the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. A scientifically literate person is able to describe, explain, and predict natural phenomena (National Academy of Sciences, 1996).

### **Social literacy**

Social literacy includes the ability to acquire and develop knowledge and understanding of responsible social behaviour and positive human values. A socially literate person is able to act positively and responsibly in complex social settings. (See Gee, 2007; Kellner, 1998; Kress, 2003).

### **Technological literacy**

Technological literacy has a variety of meanings worldwide from skilled use of computers, to the ability to assess, know, manage, understand and use the technical language for a technological genre. It complements *technological competency*, which is the ability to create, repair, or operate specific technologies (Pearson & Young, 2002; Spalter & van Dam, 2008). Technological literacy should not be confused with *technacy*, which is the ability to understand, apply and communicate creative and 'balanced' technological solutions that are based on understanding the contextual factors involved.

### **Television literacy**

In accordance with Gray (1989), the Department of Education in the USA has defined CTVVS, Critical Television Viewing Skills, as “those factors which enable persons to distinguish among a wide range of programme elements so they can make

judicious use of their viewing time.” Gray concluded that programmes for critical television viewing skills can successfully be integrated into the elementary and secondary school curricula. In accordance with Gray, it would be possible for the teachers to educate critical consumers of television, as well as critical consumers of literature.

In Sweden Findahl and Höijer (1979, 1980, 1984) demonstrated that radio listeners and television viewers sometimes had great difficulties in comprehending broadcasted news. The news content was badly organised, and the language was complicated. Critical television viewing skills could also be called “television literacy.”

Buckingham (1993b) argued that the notion of television literacy is far from straightforward in the present discussion. Television literacy begs many theoretical questions, and can be defined in many ways. Buckingham sees television literacy mainly as a powerful metaphor.

### *Another literacy?*

Is there is a need for another literacy encompassing reading and creating combined messages? Most messages in various media include different kinds of representations like words, graphic symbols and visuals.

*Message literacy* is the ability to access, analyze, evaluate, interpret, create, produce and distribute messages that are conveyed by words, visuals, forms, music, and numeric data etcetera. Message literacy helps the intended receivers to read, recognize, comprehend, experience, and understand message contents, whether conveyed to them through print media or other media formats. Depending on the different objectives of the messages we can see different “message design genera.” These

groups are graphic design, information design, instruction design, mass design, and persuasion design.

## **Reading objectives**

Reading is a very important means of learning about our environment. The more a person reads, the more the reading skills improve. Depending on the purpose, we can read a text in several ways. An active reader makes good use of the structure embedded in the book and in the text. The preface, the table of contents, the headings, as well as the captions and the illustrations provide an overview of the content in the whole book. Gunnarsson (1982) discussed five different categories of reading objectives. What differentiates them is the kind of stored knowledge that must be invoked before any understanding takes place. These five categories are not distinctly delimited; they partly overlap:

- In memorization of the textual surface, the objective is to create a visual memory of the surface of the text.
- In registration of the content as such of the text, the objective is to understand the structural and conventional importance of the written message.
- In comprehension of the sender's description of reality, the objective is to understand what the sender means by the text.
- In integration of the text into one's perception of one's own surroundings, the objective is to integrate the text into one's own earlier experiences and observations.
- In direct, action-related comprehension, the objective is to know how one should behave in different situations, based on what the text says.

The first objective involves reading in order to recognize each word and memorize the text surface, while the second requires us to read and understand the words in the text. With objectives three to five, reading is directed towards individual sentences, parts and the whole of the text, and other proficiencies and ideas are brought to bear on the material. Objective three, for example, obliges the readers to interpret the text in terms of the sender's situation. Objectives four and five require that they interpret the text in terms of their own surroundings and worldview.

Möijer (1987) stated that we read in different ways, depending on the purpose of our reading:

- We *read intensively*, every word and line, when our purpose demands it.
- We *skim* if we only wish to quickly get some idea of the material.
- We *read to orient* ourselves if we want to know where some particular information is to be found in a text.
- We *read to inform* ourselves when we need certain limited information.

In each of these cases, we leave out anything that does not satisfy the purpose of our reading directly. Different reading objectives (Gunnarsson) or purposes (Möijer) attached to reading give rise, therefore, to different reading purposes. These purposes differ in terms of the level of text on which the reader focuses, and in terms of how the material is processed.

An active reader is skilled in skimming the text. Skimming enables the reader to pick out key words and main ideas in the text and, thereby, obtain a great deal of information. Some texts contain so little new information that skimming is all that is

required. Before reading a chapter in a textbook, it is helpful to skim the material to identify key topics and to gain a general idea of the structure of the chapter. Difficult material, however, cannot be fully comprehended by skimming or by speed reading (Atkinson et al. 1990).

### *Reading text*

Both the reading and the listening process require decoding of symbols, pre-understanding of words, phrases and pictures, and, finally, comprehension of the content of the information. Furthermore, as we mentioned before, the legibility, readability and reading value of the written message influence the reading process. In the case of the spoken message, the message's audibility, distinctness and listening value influence the hearing process. As far as the receiver of the message is concerned, the following are some of the factors that greatly influence his or her intake of information:

- Earlier experiences and observations.
- Perception.
- Learning.
- Memory.
- The reading objective.
- The reading procedure.
- Pre-understanding.

Gunnarsson (1982) discussed specific reader characteristics from the perspective of the “schemata theory,” which is based on the premise that we store our impressions of our surroundings in the form of schemata. The theory postulates that we have different partial impressions, such as, general knowledge about different types of text, and different whole impressions of

reality. The schemata that we use when we read influence our deeper understanding of a text.

The reading procedure is of great importance to the reader's capacity for understanding a text (Gunnarsson, 1982). In "normal reading," we direct our attention towards how we shall interpret the meaning of a sentence. Studying the syntax becomes subordinate to orienting our thoughts amid the semantic and pragmatic relationships that form the text's warp and woof. When we read long continuous texts, we process separate sentences with an eye to their integration into the material's entirety. This takes place gradually, with the text that we have already read providing the framework. The connection makes sense of the text. Text comprehension is a constructive process, in which the readers build their perception of the whole by integrating the text with their own experiences.

An important step in the reading process is called pre-understanding (Pettersson, 1989). As I mentioned before, the graphical form of a text creates expectations in the reader regarding its content. We expect certain types of documents to look a particular way; contrarily, when we see a document of a certain type we expect a particular type of text and pictures to accompany it. Thus, it is in the light of these expectations that we activate the cognitive processes needed to interpret the message. The reader develops his own methods for predicting what a text will be about. Introductions, abstracts, tables of contents, summaries, illustrations and tables all have important functions to fill.

Language that is rich in similes and metaphors makes it easier for the reader to paint his own inner pictures. A well constructed text with clear, distinct arrangement and lucid para-

graph disposition, organised under well formulated headings and captions, affords the best reading experience.

Reading texts and pictures, and actively listening, are dependent on our short-term memory, as is all mental activity. Only a certain limited amount of information can be contained in the short-term memory at any time. A new information crowd out information that is older than about a second, and the older information easily disappears if we are not prepared to store it in our long-term memory. If we repeat the information a few times, we increase our chances of remembering it. Long, complex words and sentences are difficult to understand. If the functions of the individual words in a text are not immediately apparent to us, our short-term memory becomes overloaded with long chains of words that cannot be directly put into a meaningful context.

(See the chapter *Learning from representations* in *Information Design 5–Cognition* for further information.)

### *Learning from text*

We learn to sequence information, and as a consequence, to think in linear, sequential ways. In accordance with Perfetti (1977) and Sinatra (1986), perception of text means a sequential, slow processing to compose and comprehend the contents (“left brain activity”). Retrieval from verbal memory is a serial integration and sequential processing of auditory-motor perception systems (Sinatra, 1986). One of the best-known techniques for improving memory from reading is called the PQRS method (Preview, Question, Read, Self-Recitation, and Test). The method is intended to improve students’ abilities to study and remember material presented in textbooks. In the first step, the reader previews the chapter at hand to get an idea of its top-

ics and sections, reading the chapter outlines, the section headings, and the summary. The second, third, and fourth stages apply to each section.

(See the chapter *Learning from representations* in *Information Design 5–Cognition* for further information.)

# Language theories

The group “*language disciplines*” includes disciplines such as drama, lexicography, lexicology, linguistic development, linguistic philosophy, linguistic theory, linguistic, literacy, psycholinguistics, rhetoric, semiotics, socio-linguistics, terminology, visual literacy, and writing.

At present the *language theory for ID* includes, but is not limited to, the following six fields of knowledge: 1) plain language, 2) terminology theory, 3) rhetorical theory, 4) semiotic studies, 5) pattern languages, and 6) visual languages.

## Plain language

Languages differ in their ability to express concepts with precision and flexibility. Physics, chemistry, and mathematics, for example, employ non-ambiguous symbol and equation languages. In verbal and technical descriptions, the language of specialists must be as unambiguous as possible. Only people with the appropriate specialized knowledge may understand languages such as these. Often normal prose is open to multiple interpretations, namely, it is ambiguous. Pictures are often ambiguous too.

According to Cooper (1989) plain language is clear with succinct writing designed to ensure that the reader understands the message as quickly and completely as possible. According to Garner (2009) plain language strives to be easy to read, understand, and use. Plain language avoids convoluted language and jargon.

## *Literacy*

Today authors write about a large number of different *literacies*. In my view a number of literacies are assigned to five main categories of literacy: 1) literacy, 2) musicacy, 3) numeracy, 4) visuacy, and 5) electracacy/mediacy. A sixth literacy category is called “area specific literacies.” See the previous sections on literacies.

## *Clarity of documents*

According to Evans (2011) a number of organisations have published criteria for evaluating the *clarity of documents*. The Simplification Centre, at the University of Reading, has collected such criteria from ten clarity organisations across the English-speaking world. When these criteria were analysed Evans found that they varied in approach, in breadth of coverage, and in degree of details (p. 1):

Some try only to cover the use of appropriate plain words; others try to cover more or all the factors that make for an effective clear document. Some are detailed and specific; others broad and general. Which work best will depend on your purpose and the skill with which they are interpreted.

In many countries, laws mandate that public agencies use plain language to increase access to programs and services. The United Nations Convention on the Rights of Persons with Disabilities includes plain language as one of the “modes, means and formats of communication” (United Nations General Assembly, 2006).

## *Plain Writing Act*

In the USA the *Plain Language Action and Information Network* (PLAIN) is a group of federal employees from different agencies and specialties who support the use of clear communication in government writing. PLAIN (2010) provided guidance to federal executive agencies.

In 2010 President Barack Obama has signed the *Plain Writing Act of 2010*, which requires federal executive agencies to put all new and revised covered documents into plain language. The purpose of this Act is defined in Section 2: “The purpose of this Act is to improve the effectiveness and accountability of Federal agencies to the public by promoting clear Government communication that the public can understand and use.”

In Section 3 3) the term “plain writing” is defined in the following way:

The term ‘plain writing’ means writing that is clear, concise, well-organised, and follows other best practices appropriate to the subject or field and intended audience.

When using plain language the intended audience will understand the message the first time they read or hear it. However, language that is “plain” to one group of readers may not at all be easy to understand for other audiences. This means that in material written in plain language the intended audience can:

- Find what they need.
- Understand what they find.
- Use what they find to meet their needs.

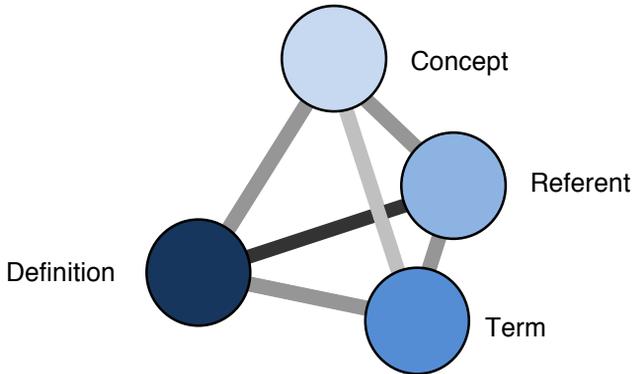
There are many writing techniques that can help you achieve this goal. Such writing techniques include active voice, easy-to-read design features, everyday words, and short sentences.

In *plain language* the message has a high degree of *readability*. As previously noted a message has *good readability* when it is easy to understand. Many authors have stressed the importance of good readability (e.g. Kirkman, 2003, 2005; Klare, 1985; Lipton, 2007; Mackiewicz, 2004; Pettersson, 1989; Young, 1989).

## **Terminology theory**

The increasing complexity of modern society, as well as the interlinking and overlapping of subject fields make great demands on the accuracy of communication. Every subject field needs its own terminology. A *terminology* is a structured set of concepts and the terms used to represent them in a specific subject field. A terminology is also the study of the relationships between concepts and terms. The study of terminology encompasses study of concepts, conceptual models, definitions, idioms, referents, semantics, and terms.

According to terminology theory a *concept* is an idea of something formed by mentally combining all its characteristics or particulars, a mental notion of a referent. A concept is not bound to any particular language. For concepts to be represented verbally and in writing, they must be given denominative and descriptive linguistic expressions. Man is the only terrestrial species to acquire a language in the true sense of the word. However, the ability to form concepts is not unique to the human brain. Primates and several lower animals are capable of entertaining general, picture-based concepts.



*A connection model, shaped like a regular tetrahedron, illustrates the connections between concept, referent, term, and definition placed on the four corners.*

A *term*, or a *technical expression*, is the linguistic representation of a concept in a given subject field. It is often a single word, but the term may also consist of a few words. A term can be regarded as a “label” and need not be exhaustively explanatory.

A *subject field* is a field of human knowledge to which a terminological record is assigned.

A *referent* is an object linked to a specific concept, and explained by a specific term. The object can be abstract or concrete.

A *definition* is a linguistic description of a concept. It is based on a number of characteristics of the concepts. It should be short, precise and stylistically homogeneous. A definition must not contain words like “often” and “sometimes.” Normally it is possible to replace a term in a text with its definition.

An *idiom* is a fixed expression whose meaning is not discernible from the definitions of the individual words of which the expression is made up.

A *conceptual model* is a systematic description of the relationships between concepts in a subject field, a particular area of thought. Conceptual models are also called conceptual hierarchies or concept systems.

*Semantics* is the study of the meaning of verbal expressions and the implications of combinations of words.

*Terminology work* stands for defining concepts of a special field. The final terminology should always be user oriented for the intended audience, such as staff in an organisation. Terminology work involves continuous collection, review, description, definition, and presentation of new concepts and their terms and agreeing on recommended term equivalents in various languages. These terms should be made available as soon as possible to the people who need to have access to them in their daily work. This may be done as printed or electronic documents.

ISO/TC 37 is a technical committee within the International Organization for Standardization (ISO) that prepares standards and other documents concerning methodology and principles for terminology and language resources in the contexts of multilingual communication and cultural diversity. ISO 704:2009 is an ISO standard. This standard establishes the basic principles and methods for preparing and compiling terminologies. It describes the links between objects, concepts, and their terminological representations. Another important ISO standard is ISO 860:2007. This standard specifies a methodological approach to the harmonization of concepts, concept systems, definitions and terms.

*Lexicology* deals with the structure of vocabulary. It is the part of linguistics that studies words, their function as symbols, meanings, the rules of their compositions, and relations between words. *Lexicography* also studies words, but primarily in relation with dictionaries. *Theoretical lexicography* is a scholarly discipline of analyzing and describing different relationships within a language (Bergenholtz et al., 2009). *Practical lexicography* is the actual process of compiling, writing, and editing dictionaries. A person devoted to lexicography is called a *lexicographer*. There are general dictionaries, as well as a number of specialized dictionaries. Specialized dictionaries are multi-field, single-field or sub-field dictionaries (Nielsen, 1994).

## **Rhetorical theory**

Classical rhetorical theory was the first of all communication theories. All effective use of language comprises an element of persuasion. The classical rhetoric theory was to understand how language works and how to best use it for argumentation and persuasion. Ancient Greek scholars, like Socrates, Plato, and Aristotle noticed that spoken or written text could influence and persuade listeners and readers in different ways. The primary political skill was the ability to speak effectively (Hellspong, 1992).

### *Aristotle*

The Greek philosopher and scientist Aristotle (384 – 322 BC) wrote about many subjects, such as aesthetics, biology, ethics, government, linguistics, logic, metaphysics, music, physics, poetry, politics, rhetoric, theatre, and zoology. His views on natural sciences represent the groundwork underlying many of his

writings. Aristotle provided the first comprehensive system of Western philosophy.

Aristotle is considered the most important thinker in the rhetorical tradition. Aristotle wrote the textbook *Rhetoric*, and he laid the foundations for the theory of rhetoric. He believed that all knowledge was based on perception, and that imitation is natural to mankind. Aristotle identified three elements for effective communication: (a) The speaker, (b) the speech, and (c) the listener.

### **Ethos, logos and pathos**

Aristotle argued that rhetoric could follow laws, similar to laws in logic. The rhetorical arguments were based on human experiences. Aristotle suggested that there are three main types of rhetorical appeal: 1) Ethos, 2) Logos and 3) Pathos.

*Ethos* refers to how the senders represent themselves through their messages and how the receivers can trust that the messages are correct. It is about character and moral.

*Logos* is a Greek everyday word. It has become one of the most ambiguous, important and difficult terms in Greek philosophy. Logos refers to the rational aspect and content of the messages. Within rhetoric, the term logos refer to rational arguments. Our sense accepts what sounds sensible and value arguments based on experiences and thoughts about the real world.

*Pathos* refers to the emotional appeal and content of the messages: what kinds of feelings do the senders want to evoke in the receivers? Many believe that images mainly appeals to us through the pathos. Pictures give rise to emotions. This is often used in advertising and propaganda. Rhetorical appeal refers to

various ways in which the sender may describe, explain, or persuade the receiver to interpret a message in a specific way..

Socrates, Plato, and Aristotle saw rhetoric and poetry as tools that were too often used to manipulate others by manipulating emotion and omitting facts. According to Aristotle rhetoric as one of the three key elements of philosophy. The other two key elements are dialectic and logic.

### **A skill and craft**

Aristotle argued that rhetoric is *techné*, a skill and craft. The principles of rhetoric can be studied and taught (Lindqvist Grinde, 2008, p. 31). Rhetoric is a tool for practical debate. It is a means for persuading a general audience using probable knowledge to resolve practical issues. Aristotle wanted to make rhetoric a science.

Dialectic and rhetoric are concerned with probability and are best suited to human affairs and philosophical debate. Dialectic and rhetoric create a partnership for a system of persuasion based on knowledge instead of upon manipulation and omission. Logic is concerned with reasoning in order to reach scientific certainty. In order to learn skilled audiences can test probable knowledge.

The sum of his work's influence often ranks him among the world's top personalities of all time with the greatest influence, along with his teacher Plato, and his pupil Alexander the Great.

### *Visual rhetoric*

Rhetoric is not only used for text, but also for images and pictures. There are different relationships between news images, journalism and rhetoric. Images can convey strong arguments and make us make decisions. In the news media photojour-

nalism may arouse emotions, control our perceptions, engage, and make us take sides in conflicts and crises (Mral & Olinder, 2011). A rhetoric analysis of images includes the study of allegories, doxa (assumptions, beliefs, and opinions), ethos (character and credibility), evidentialia (clarity through concrete visual descriptions), logos (rational arguments and information value), metaphors, metonymies, pathos (the emotions of the audience), means for influencing (colour, layout, typography, etc.), and symbols. By drawing on principles of information design technical communicators can design more rhetorically effective communications (Schriver, 2012).

Texts and pictures represent different languages that complement each other when they are used at the same time (Pettersson, 1989; Melin, 1999). Both can be designed, presented, perceived and interpreted in many different ways. The possibilities for using typography and layout, and for combining texts and pictures are virtually unlimited. There are always several opportunities to convey a message. Text-relevant pictures facilitate learning from reading prose (Levin et al., 1987). Most pictures are capable of several interpretations until anchored to one by a caption (Barthes, 1977).

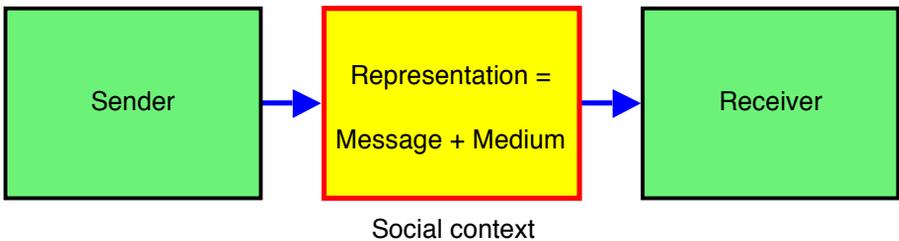
Pictures can have a positive, a neutral, and also a negative effect on learning (Evans, Watson & Willows, 1987; Furnham & Williams, 1987; Gunter, 1980; Levie & Lentz, 1982; Levin et al., 1987; Massoumian, 1989; Melin, 1999; Pettersson, 1989, 1993; Rieber, 1994; Sims-Knight, 1992; Sung-Hee & Boling, 2010; Winn, 1993).

### *Medium and message*

The media theorist Marshall McLuhan's famous phrase "the medium is the message" highlights the significance of the me-

dium itself (McLuhan, 1964; McLuhan & Fiore 1967). The medium itself affects the society, and it influences how the message is perceived. Thus the medium itself, not the actual message, should be the focus of study. Western society was shaped by the alphabet. Media is powerful and an extension of man. Writing and reading allowed people to forget, and the alphabet changed the way our memory works. Education must shift from instruction to discovery, and to the recognition of the language of forms.

The expression “The medium is the message” has given rise to considerable confusion. In the 1980s it was often said: “The message is the medium.” Technology is the servant, and the message, the idea, is the master. However, the medium is not the message. A medium is an aid used in the transfer of a message from a sender to a receiver. The term aid is used here as a collective designation for the channel, or message carrier, and the processor/equipment required for encoding and decoding of the message.



*A representation (or a re-presentation) is a medium plus its message. The (active) sender transfers a message to the (passive) receiver with the help of a medium.*

An *information carrier* is the material that carries the information, such as paper, plastic, film, electromagnetic waves

and magnetic tape. The term information refers to content, message and knowledge. Information can be moved from one place to another and stored in analogue or digital form. There are different types of media. Each has its own particular properties, advantages, and disadvantages. Our existing media may be classified according to several different kinds of criteria.

## **Semiotic studies**

The development of *semiotics*, at the start of the twentieth century, was consistent with avant-garde art and design efforts to challenge prevailing ideas about the structural relationships between form and meaning (Davis, 2012, p. 131). Eco (1971, 1976) explained that semiotics studies all cultural processes as processes of communication. Thus, there are different languages, such as spoken, written, and visual languages. Lotman (1973) suggested that *any system* used as a means of communications between people might be regarded as a language. Eco (1976) explained that semiotics “studies all cultural processes as processes of communication” (p. 8).

Cochran (1987) concluded that humans can't transfer ideas whole and intact from one person to another. Human communication depends upon an interactive series of successive approximations presented in metaphors. She found “languaging” useful in directing attention to the actions of people as they share their own ideas, listen to others, or learn from technologically produced sights and sounds.

## ***Study of signs***

Semiotics is the theory of signs (Eco, 1971). A sign means nothing in itself. A sign can be a word, a sound, or a visual image. Signs are assigned meaning based on historic patterns of use

that are recognized within cultural and social groups. Semiotics is an approach to study signs like the study of languages (Hall, 1997).

### **Meaning of signs**

A sign means anything in itself. A sign can be a word, a sound, or a visual image. The concept of sign contains two aspects: 1) *signifier*, which is the word-sound-image, and 2) *signified*, which is the concept and message. These patterns of use are called codes. People have to agree on the meaning of signs.

A sign comprises two types of meanings: 1) syntagmatic meanings, and 2) paradigmatic meanings. *Syntagmatic meaning* refers to the meaning that is assigned based on syntax, or based on the relationships among signs. *Paradigmatic meaning* is derived from other systems or codes. *Connotation* is the associated meanings of a word or a visual. *Denotation* is the basic descriptive level of that word or visual.

According to Charles Sanders Peirce (Wikipedia, 2014) it is not possible for a sign to consist only of two parts in a two-sided paradigm. His “semiosis” is an action, or influence, which is, or involves, a cooperation of three parts in a three-sided paradigm, or triadic model. These three semiotic elements are 1) sign, 2) object, and 3) interpretant. A *sign* (or *representamen*) represents the denoted object. An *object* (or *semiotic object*) is that which the sign represents. An object can actually be anything at all. An *interpretant* (or *interpretant sign*) is the perceived meaning of a sign.

A language’s smallest meaningful grammatical unit is referred to as a morpheme. Morphemes are combined to form syntagms, i.e., words, phrases, sentences, and complete texts. Spoken and written languages are formed from a limited num-

ber of phonemes (usually 20-40). These phonemes can be inter-combined in a limited number of ways.

### **Visual semiotics**

Semiotics has expanded in a number of directions. Regardless of the medium semiotics can be used for the analysis of written texts as well as pictures. Pictorial semiotics is connected to art history and art theory, and visual literacy. All meanings are heavily culturally dependent.

DeVaney's model for semiotic analysis of educational television (1991, p. 268) consists of five analysis phases: 1) format identification, 2) segment identification, 3) elements of construction identification, 4) quantitative analysis, and 5) qualitative analysis. *Formats* may be comedy, dramatic narrative, etc. *Segments* may be the beginning, the climax, or the end of a program. *Elements of construction* may include the syntax in the visual track, such as frame, shot, and sequence. The fourth and fifth phases are analysis of the form and meaning of the media.

Media carry myths that flourish in different cultures (Piette & Giroux, 1998). Contemporary media messages are characterized by a high degree of semiotic complexity and combine various modes.

### **Multimodal messages**

Multimodal messages combine various modes of representation and the interplay between these (Griffin, 1992; Kress & Van Leeuwen, 2006). According to Jewitt (2009, p. 14) "multimodality" describes approaches that understand communication and representation to be more than about language. Thus multimodality attend to the full range of communicational forms people use, such as body language, gaze, gesture, image, posture, sound, speech, and so on, and the relationships be-

tween them. Multimodality can be analyzed from both *production* and *reception* perspectives (Holsanova, 1999).

### *The unified theory of ID*

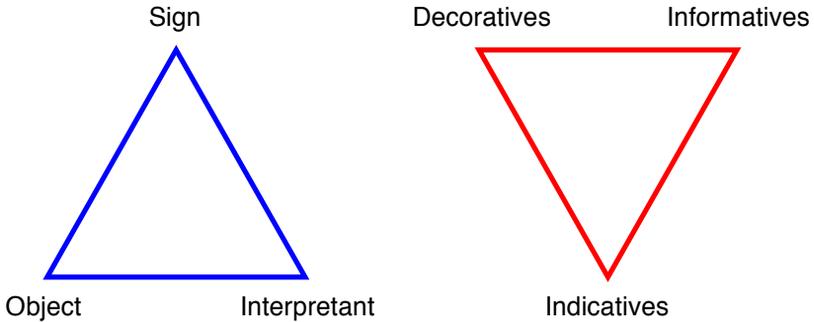
Based on Peirce's triadic model Amare and Manning (2013) discussed a "unified theory of information design." The three corners in their triangular model of this theory represent the primary categories of visual-communication goals: 1) to evoke *feeling* (decoratives), 2) to provoke *action* (indicatives), and 3) to promote *understanding* (informatives). All kinds of visual artefacts and purposes of communication, including printed/written text, fit in this model. Amare and Manning have used three working definitions (p. 2):

1. An *effective, ethical* visual is one that serves attainable, sustainable purposes, purposes shared jointly by both the creator and the viewers of that visual.
2. An *ineffective* visual lacks the form that is adequate for its chosen purpose.
3. An *unethical* visual serves purposes of its creator that are not jointly shared by viewers, or serves purposes, even if jointly shared, that are not attainable or sustainable.

According to Amare and Manning (p. 26) Peirce was correct in his claim that the meaning of any textual information, if it is understood, has to be transformed through the mediation of diagrammatic forms into both perception (i.e., what we would see, hear, or feel if the information were true) and action (i.e., how we would act if the information were true).

Amare and Manning identify connections between visual design elements and the grammar of language. They offer aesthetic, and ethical aspects of communication artefacts. In this

book practice and theory is mainly related to technical writing. In my view this approach is far too narrow to constitute a “unified theory of information design.” We need to consider many more aspects than semiotic concepts.



*Based on semiotics and Charles Sanders Peirce’s triadic model (left) Amare and Manning (2013) discussed a “unified theory of information design” (right).*

## **Pattern languages**

Recognition of patterns is as old as man. Prehistoric people had to learn to recognise plants and animal species and they needed to know which ones they could eat. Even today a biologist can recognize a plant or an animal species on its *habitus*, that is, the general appearance. One magpie looks like another magpie, whenever we see them. Similarly, people know their daily newspaper among many newspapers, even though the content itself varies from day to day.

Since the Neolithic period (approximately 10,000-2,000 BC) people have communicated not only through gestures and sounds, but also by means of visual language (de Jong, 2010, p. 7). In Neolithic communities people were familiar with the

shape and size of their vessels, and they know the *decorations* with specific *patterns* on their pottery. Today archaeologists have named “archaeological cultures” based on these characteristic ceramics.

Until the Renaissance, artists had not many possibilities to work freely according to their own ideas (Perrig, 1995, p 422). They usually worked after very detailed orders. It was common for masters to use “pattern books” where clients could choose among different models for different types of subjects, both religious and secular.

After his theoretical studies of architecture, central perspective, and sculpture Leon Battista Alberti (1404-1472) concluded that *beauty and harmony* of a building is more important than the actual purpose with the building and the resulting demands of suitable materials for the building. Alberti was very influential and his line of thought that “function follows form” became a leading doctrine in architecture and aesthetics for several hundreds of years. As previously noted today’s design motto is very much: “function can take any form.”

In many fields experienced practitioners are often able to recognise problems they have met before. They remember possible solutions and they may use them again. The French sculptor *Auguste Rodin* (1840-1917) was a pioneer in modern sculpture. He worked in clay in an object-oriented manner and used the same form elements in several sculptures. He modelled the human body with realism and departed from traditional decorative tradition. The original sculpture *The Thinker* is 71.5 cm high (1888). Later a large number of bronze versions were made in various sizes. During the peak of his career Rodin had up to 50 assistants.

It seems that the idea of patterns is fundamental to human thought. In architecture Alexander, Ishikawa, and Silverstein (1977) collected a series of 253 patterns of successful environments. The book creates a new language, what the authors call a *pattern language* derived from timeless entities called patterns. It is a structured method of describing good design practices within a field of expertise. Patterns describe a problem and then offer a solution. The patterns were presented systematically in a *pattern library*. Pattern libraries have been a common way to share design solutions in architecture. Today pattern libraries are often used in computer science, interaction design, and in software engineering to share best practice.

Waller and Delin (2010) discussed the use of a “pattern language approach” in the layout and typography of functional texts. Here *pattern* refers to configurations consistently found within recurring design solutions to common problems. Today many organisations use guidelines, or even distinct rules, for the use of layout and typography in their documents. For example many insurance companies set up standard styles for customer communications, and textbooks in a series all “look” the same. Different style manuals have different recommendations for when italic and bold type versions should and shouldn’t be used (Samara, 2007).

In particular Waller and Delin (2010) wanted to demonstrate the frequency of patterns within financial services documents, and test how users with different levels of experience could use such documents. They wanted to place patterns in the context of genres and established reading strategies. According to Waller and Delin (2010) a pattern language approach is attractive for information designers. This approach corresponds closely to how design is traditionally taught and practised. A

documented pattern should explain why that solution is good in the pattern's contexts.

## **Visual languages**

Several researchers have agreed that visual language or visual languages exist (Avgerinou & Pettersson, 2011). As in the case of verbal language, visual grammar, syntax and vocabulary have been ascribed to visual language, while their particular functions have by and large been identified.

### *Visual messages*

Visual languages attempt equivalence with reality. Visuals are iconic and they often resemble the thing they represent. Images speak directly to us in the same way experience speaks to us, that is, emotionally and holistically (Barry, 1998).

Since the beginning of mankind we have been using body languages and different kinds of signs for communication. Visuals are cultural products shared by individuals (Griffin et al., 1996; Moriarty and Rohe, 1992), as such, they are understood within individual people's frames of reference (Kovalik, 2005; Singer, 2010). Visual messages are superior to verbal messages when content is emotional, holistic, immediate, spatial and visual (Boeren, 1994; Brouwer, 1995; Hugo, 1996). Meaning is immediately apparent on a basic level, but the visual language must be learned for true comprehension (Barry, 1998; Pettersson, 1993).

There is often a considerable disparity between the sender's "intended message" and the receiver's "perceived message." Indeed, it is sometimes doubtful whether the receiver has understood anything at all of what the sender wants to convey. Listeners and readers create their own associations and chains of

associations. As far as ambiguous pictures are concerned there is often a major difference between their *denotation*, i.e., their literal meaning, and various *connotations*, i.e., their associative meanings and private associations (Pettersson, 1995a). Most people believe that pictures tell the truth (Lefferts, 1982). However few realize that what they think they see in pictures depends on what they expect to see in them (Berthoz, 2010), and are expected to learn from them (Singer, 2010).

We cannot understand pragmatics, semantics, and syntax of visual languages by using only the linguistic concepts developed to analyze spoken languages. In verbal languages, *syntax* is the study of the rules for combining words into grammatical phrases, clauses, sentences and paragraphs. In visual languages, *syntax* depends upon the spatial arrangements of the visual elements on a page (Horn, 1998, p. 75). Our ideas about good arrangements depend on how our perceptual system works. Many ideas are best expressed by visual language, and others can only be expressed by visual language (Horn, 1999, p. 28).

Using a large number of visual examples Malamed (2009) offers designers six principles for creating graphics and *visual language* that people may understand. These principles are called: 1) Organize for perception. 2) Direct the eyes. 3) Reduce realism. 4) Make the abstract concrete. 5) Clarify complexity. 6) Charge it up.

### *Visual literacy*

Visual literacy, or *visuacy*, is a broad concept with bits and pieces from several areas of knowledge. Although the term may be modern, it is not a new idea. Ancient philosophers used images for visual communication.

There has been, and there still are major disagreements among researchers and practitioners concerning a precise definition of visual literacy. The best definitions of visual literacy contain “both an interpretative and a productive component” (Brumberger, 2011, p. 21). In my view Heinich, Molenda, and Rusell (1982, p. 62) have provided the best definition of visual literacy. They wrote: “Visual literacy is the learned ability to interpret visual messages accurately and to create such messages. Thus interpretation and creation in visual literacy can be said to parallel reading and writing in print literacy.”

Moore and Dwyer (1994) noted that visuals may be the main source for information and communication in many cases today. Visual literacy may be applied in almost all areas, such as advertising, anatomy, art, biology, business presentations, communication, education, engineering, etc. Contrary to widespread misconceptions, being visually literate does not at all require a person to be skilled in any area of artistic visual work.

According to Avgerinou (2003) *visual literacy ability* has been specified as to read/decode/interpret visual statements, and to write/encode/create visual statements. A third visual literacy ability is to think visually, although it could be argued that it has been implied in most definitions, has been added to and explicitly stated in more recent definitions. It's not enough to simply receive a message in a passive manner. A truly visually literate person must be able to construct meaning out of the images that are shown (Felten, 2008).

*Visual literacy skills* range from the ability to distinguish light from dark to the ability to read and express a sequence of body language arranged to express a personal emotion. The visual literacy skills are learnable, teachable, and capable of development and improvement (Avgerinou, 2003). According to

McKenzie (2008, p. 1) the ability to create and interpret information from a multiplicity of visual sources is becoming a ‘survival skill’ in today’s schools.

Instructional illustrations have good readability when: 1) the subject matter is familiar to the audience; 2) the subject matter is depicted in a realistic manner; 3) they lack excessive image detail that may distract from the main message; and, 4) the pictorial conventions are familiar to the audience (Boeren, 1994; Brouwer, 1995; Colle & Glass, 1986; Hugo, 1996; Lent, 1980; Van Aswegen & Steyn, 1987; Zimmermann & Perkin, 1982).

Having considered a vast literature on visual literacy, Avgerinou and Pettersson (2011) proposed that a *theory of visual literacy* should be grounded on the following conceptual components: 1) visual perception, 2) visual language, 3) visual learning, 4) visual thinking, and 5) visual communication.

However, a number of researchers have practically rejected the whole concept of “visual literacy” (Braden, 1996) and they search for something else, like communication design, information design, or message design.

(See the section *Visual literacy* in the book *Image Design*.)

## **Contributions for ID**

The *language theory for ID* contributes to information design with valuable facts, practices, principles, and theoretical approaches. Some examples of important concepts are: active voice, associations, body languages, concept, conceptual model, connotation, denotation, effective communication, idiom, lexicology, lexicography, literacy, morpheme, multimodal messages, pattern language, persuasion, phoneme, plain language, plain writing, print literacy, prose content, prose learning,

readability, reading, reading value, referent, rhetorical theory, semiotic studies, semiotics, syntagm, term, terminology, understanding, verbal representation, visual language, visual learning, visual literacy, and visual representation. Here are some facts, hypotheses, and postulates based on the language theory for ID.

- In many countries, laws mandate that public agencies use plain language to increase access to programs and services.
- Many writing techniques that can achieve plain language.
- Rhetoric is not only used for text, but also for images and pictures.
- Text, visuals, and graphic form should always work together to fulfil information design objectives.
- The interplay between text, visuals, and graphic form needs to be studied and tested thoroughly before optimal combinations can be found.
- Illustrations in textbooks must be relevant to the prose contents.
- New information is mentally integrated into an existing body of knowledge.
- Nonverbal signs can produce many symbols with different meanings.
- In any culture people have to agree on the meaning of signs.
- Colour coding is a good way to show that something is connected, or especially important.
- Visual messages are superior to verbal messages when content is emotional, holistic, immediate, spatial and visual.
- Usually receivers are capable of interpreting far more content in a given picture than the designer had in mind.

- Interpretation and creation in visual literacy can be said to parallel reading and writing in print literacy.
- Visual communication, visual language, visual learning, visual perception, and visual thinking are inextricably linked to visual literacy.
- People have used general appearance and pattern recognition since ancient times.

# Comprehensibility

Some people are continuously in the process of creating documents, such as PMs, messages, instructions, reports, descriptions and course literature. Some of these documents are meant only for distribution within rather limited groups, while others will be spread to many different readers both inside and outside the company. However, because different readers may interpret any author's intended message in different ways, problems arise. In some cases, readers do not understand the documentation at all.

Comprehensibility deals with structural qualities of a document and how information is arranged. Two principles are much related to text design. Guidelines that are based on the principles *Providing structure* and *Providing simplicity* will assist the information designer to work with words and texts in information materials. (See *Information design 1–Message design* for information about other message design principles.

## Providing structure

Areas of knowledge may be divided in sub-areas, which in turn may be divided in groups and subgroups, and so on. These sub-areas and subgroups may have many different kinds of relationships to one another. Before we can create an information material or a learning material it is important that we decide which area and which sub-areas as well as which kind of relationships we need to describe for the intended audience. There may be different kinds of relationships between the whole and the parts within an area of knowledge, and between the individual parts of that area. In my experience subject matter experts often spend far too much time and effort describing very small, and

for them, “interesting” details because they happen to have easy access to information about these details. However, these details may be of no interest at all to the intended audience. Before starting to write or draw, it is important to decide which level of detail we need to work on.

We can view a specific area of art, science, technology, a product, or a system from different perspectives. Depending on our choices our impressions will be different. A manufacturer, a sales person, and a user will need different types of documentation, with different texts and different illustrations. Before starting to write or draw, it is important to decide which perspective we need to provide. It is important that it is easy to gain a general understanding of every topic.

A well-structured printed learning material is divided into chapters and sections that work well together as a whole. A well laid-out *table of contents* gives the reader a quick and thorough idea of the whole document. A well worked-through *index* and clear page numbering make it easier for the reader to find the information. In a document stored in a computer it is possible to use automatic *search functions*. In some documents it is possible to use *hypertext links* for quick jumps between different parts of the material, and even between different documents.

The physical act of writing and drawing one's thoughts with the help of a pen and paper, a keyboard, or a mouse and a computer, does not usually require a great deal of time. It generally takes more time to work out what the text and the pictures should consist of than to formulate the contents. Thus, the writing and drawing processes encompass much more than merely writing and drawing, and they are relatively independent of the language used. It is important to arrange information from the most important to the least important (Lipton, 2007). The in-

formation designer should limit the content and the elements in the design to what the intended audience needs and group related information to show that it is related. Elements should be aligned with others to help the audience navigate through them.

At the beginning of a book the list of contents provides the intended reader with an easy overview of the different parts of the book. The author develops the structure of the book. Later the editor, or the graphic designer, makes the structure clearly visible for the reader using typography and layout with distinct types of headings for each level. A clear and obvious structure will facilitate perception, interpretation, understanding, learning and memory of the information content. Therefore the information designer will have to:

- Develop and maintain a clear structure for the content.
- Limit the number of levels in the structure.
- Show the hierarchy and the structure of the content in the graphic design.

Subject matter experts often spend far too much time and effort describing very small, and for them, “interesting” details because they happen to have easy access to information about these details. However, these details may be of no interest at all to the audience. Before starting to draw or write, it is important to decide which level of detail we need to work on. It is often quite important to avoid too many details.

The structure of the text is very important for readability, and a structured text is much easier to read and comprehend than a text without any distinct structure. The structure should be as clear as possible. The structure of a text can be divided into internal and external textual structure (Hartley, 1987; Jonassen, 1982; Jonassen & Kirschener, 1982).

## *Internal textual structure*

Internal textual structure is built into the text itself. It refers to the techniques used to organize, sequence, and provide an internal framework for helping readers understand the prose content. These techniques include signalling the text structure by using organization, verbal cueing, introductions, topic sentences, transitions, pointer words, and summaries.

How the content is grouped may influence the readers' first impressions of the content (Lindgaard et al., 2006) and it may trigger emotions about the message and setting in motion positive or negative attitudes about particular aspects of the message (Schriver, 1997). Readers have difficulty understanding the organisation and structure of text when there are three levels, or even or fewer levels (Lang, 1987; Miles, 1987). Usually four levels are too much (Misanchuk, 1992). However, in scientific and technical documentation more levels may often be required.

Waller (1987) pointed out that the writer's text is different from the reader's text. In traditional systems for book-publishing, the writer deals with a document that becomes progressively more formal as production processes develop: rough notes become typescript, typescript become galleys, galleys become pages, pages become chapters, and chapters become a book. Traditional printing methods require the writer to make most significant decisions in relation to a manuscript and type specification. The reader, on the other hand, sees only a finished product, which is expected to betray little of the complexity and the difficulties of the writing process.

Communication is vastly more efficient and effective if it follows a plan instead of being a miscellaneous list of sentences or paragraphs. People remember more and read information more quickly when it is logically organized with a plan than they

do when the same information is presented in a disorganized, random fashion. Text structure is important, even at the sentence level. Traditionally, most texts are presented in a linear or rather in an interrupted linear fashion. Thus, the writer exercises strong control over the reader's use of a document. The readers have few alternatives. They will basically have to accept the way the content is presented. Non-linear presentations represent much weaker control of the reading process from the writer. Examples of non-linear presentations are lists, tables, linear branching, matrixes, and, of course, all kinds of visuals.

### *External textual structure*

External textual structuring refers to the techniques used to structure text with linguistic, spatial, and typographic cues. The techniques include the use of blocked text, horizontal lines to divide blocks, italicized text, and bold text. To avoid too large masses of text, it is a good idea to divide the text into sections and subsections.

Usually printed texts vary a great deal from their original manuscripts with respect to letter-forms, line length, line endings, page breaks, page size, spelling, spacing, punctuation, etc., and even in the use of words. Often the printed text has illustrations. There may be drawings as well as photographs in the final product. As desktop publishing systems have become more common, this situation has changed a great deal. In personal publishing the writer is responsible not only for the content of the text and pictures but also for the editing and the graphic design. The writer's text and the reader's text will be the same. The writer may very well know his or her own subject matter but will have to also learn at least some of the traditional skills of the editor and of the graphic designer.

Graphic design for information can and should be used to facilitate the reader's ability to find the desired information quickly, easily, effectively, and reliably. Thus it is possible to use the various "perception laws" to create guidelines for graphic design. Verbal languages have "digital coding" using combinations of letters, marks, and numerals to represent content. There is no direct correspondence between groups of letters, words, and reality. Each meaning is defined and must be learned (Elkind, 1975). In English we use 26 letters in two versions. In a plain, running text most letters are in lower case: abcdefghijklmnopqrstuvwxyz, but all letters also appear in upper case: ABCDEFGHIJKLMNOPQRSTUVWXYZ. We use punctuation marks like these: ,.:;!?"( )/&%+ -=\* , and numerals like these: 1234567890. This small number of individual characters can be combined in almost infinite numbers of meaningful permutations. Many words can be formed and arrayed in sentences and texts with completely different meanings. There is a wide carry-over of letter shapes and typefaces from one language to another. Thus the same letters can be used to form meaningful words in many different languages. Elkind (op. cit.) points out that the properties of letters are limited. A letter has a given position in an alphabet, it has a name, it is represented by one or more sounds, and it is used in a context.

To achieve optimum legibility it is known that the technical quality of type should be high. Letters can be hand-written or they can be created on machines such as typewriters, dot-matrix impact printers, laser printers, or typesetters. Machine-created characters, type, are well formed, and consistent in their size and style. Traditionally, type was the old wooden or metal cast of letterforms. The individual pieces of type were put together and locked up into forms. Then the type was coated with ink.

Sheets of paper were placed on the type, pressed with a roller, and then removed. Each sheet of paper then contained an impression, an image, made from the real type. The use of physical letterforms was replaced by a system that used photographs of the letters' images. Today photo-typesetting machines work with digital images of characters. They work with a good resolution and create high quality typography.

Laser printers use digital image or type that is stored in the memory of the machine. An image of a completed page is built up on a photosensitive drum, using a laser beam, and transferred to a piece of paper passing through the machine. Laser printers work with much better resolution than dot-matrix printers but with much lower resolution than photo-typesetters. They are, however, easy to handle for the layman and relatively cheap. The purpose of page assembly software is to allow the desktop or personal publisher to assemble a publication in much the same manner as in traditional production. This kind of software allows you to move elements such as texts, images, and lines about on a page and paste them almost anywhere.

Colour can be used to clarify the structure of a text. Certain parts of the text may be printed with colours or printed on top of backgrounds in different colours (Pettersson, 1989, 1993). The use of colour should be *consistent*.

## Providing simplicity

The subject matter in technical and scientific texts is often complex and may be difficult to grasp. But what makes a text difficult to read is not as often the subject matter or the combination of spelling, grammar, and syntax as the style. The choice of words, expressions, symbols, and picture elements creates the style. A writing style that includes abstract words, acronyms, long and complex sentences, stilted language, jargon, and passive constructions may obstruct the reading of the text. Long and complex sentences require more cognitive capacity to process than short and simple sentences. It takes time to read a difficult text. We have to decode words, and maintain new concepts in working memory (Petros et al., 1990).

Readability refers and to the ease with which language can be understood. Today readability of a message involves the reader's ability to understand the style of text, the style of pictures and the style of graphical form. The choice of words, symbols, and picture elements creates the style. The readability is determined by content and formulations, and how well the language and style are adapted to the intended readers.

There is a close relationship between guidelines that are aimed at providing *simplicity* and guidelines that are aimed at *facilitating perception, processing and memory*. Simplicity in a message will result in easier and more efficient perception, processing and memory of that message. The information designer has to consider the readability of text, the readability of pictures, as well as the readability of graphical form. Providing simplicity in text, illustrations, and graphical form is probably one of the most important principles in information design. It should be a priority for the information designer to make use of the guidelines related to these areas.

## *Readability of text*

Research into readability has been directed towards finding the characteristics that make texts easy or difficult to understand. However, Gunnarsson (1982) pointed out that the psychological equivalent to readability is merely superficial understanding. Therefore, she prefers to use comprehensibility as the term for characteristics that are related to deeper, specific text understanding. Gunnarsson's theory of comprehensibility is based partly on the correlation between the level of understanding and the level of the text, and partly on the premise that what is read influences the reading process.

Originally the concept readability stems from education research concerned with the selection of reading material for children of different age groups (Severin and Tankard, 1988, p. 70). One view is that readability refers to the “visual comfort” of the text (Mackiewicz, 2004, p. 118). An information design view is that readability refers to the ease of understanding due to the construction of the text, including the length of words, sentences, paragraphs and the “style of writing” (Lipton, 2007, p. 10; Pettersson, 1989, p. 166, 268).

The *style of text* is decided by the specific choice of words, consistency, and expressions. Abstract words, jargon, long and complex sentences, passive constructions, and stilted language may obstruct reading and understanding of the text content. Furthermore readability refers to the reader's reading skill and interest and how easy it is to read long passages of text (Williams, 1994; Williams & Tollet, 1998, p. 214).

Long words and long sentences make a text difficult to read. The number of words in a sentence appears to exert the strongest effect on reading rate and reading comprehension (Catalano, 1990; Newell, 1990).

An easily comprehensible text is characterized by short sentences, short words, and simple sentence structure. Text should be concise, consistent and precise. Other variables which affect the comprehensibility of text are the vocabulary's degree of abstraction, the number of syllables in words, the commonness of words used, the choice of subject, the subdivision into paragraphs, the prevalence of clauses, headings and sub-headings, line length, inter-line distance, illustrations, the size of letters, the relevance of the text to the reader, and the page size. Readability in the written word is comparable to *distinctness* in the spoken word.

According to Klare (1963, p. 1) readability in the general sense refers to the "ease of understanding due to style of writing" as opposed to *legibility*, which refers to a text's external properties. These are properties such as letter size, inter-line distance, line length, the distance between letters, the number of letters per line, the distance between words, the typographic style, the subdivision into paragraphs, headings, headings in the margin, the layout, colour of the printing ink and paper, the paper quality, etc. These different external properties have not been found to have a drastic effect on legibility as long as the text is presented within the framework of variation normally found in contemporary books. Legibility in the written word is comparable to *audibility* in the spoken word. (See *Information Design 4-Graphic Design* for discussions about legibility.)

The concept of *reading value* refers to the receiver's subjective evaluation of the content of the text and pictures. Each group of readers selects information material on the basis of her or his personal preferences. Another may deem what is interesting to one person boring and dull. The same message may be interesting at one instance but uninteresting at another occa-

sion. We must therefore adapt text as well as pictures to be palatable to any given target group. Reading value in the written word is comparable to *listening value* in the spoken word.

### **Readability of print media**

Texts for information materials must have good readability. Language as well as the style should be correct to avoid distracting the readers. The information designer will have to:

- Use an active voice and avoid too many details.
- Use a style guide and make the message comprehensible for the intended receivers.
- Make an overall check of language, writing style and terminology before the script can be confirmed as an original.

Active, affirmative, clear, declarative, essential and short words in simple, short and precise sentences are the most readable (Klare, 1985; Lipton, 2007). People may avoid materials that they find difficult and pompous. Readers prefer small text paragraphs to big ones. Often it is quite easy to divide the text in hierarchic and natural parts, portions, or sections. Natural breaks emphasized by typography are helpful. Providing “white space” between portions of the text provides cues to the learners that a new section or a new type of activity follows. The end of a sentence should be determined by syntax rather than by a set width of a line (Bork, 1982; Hartley, 1980).

There are a large number of style guides and publication manuals available. Usually such documents outline standards for design and writing for a specific publication or organization. For example all *journalists* working at *The Economist* are given a stylebook (The Economist, 2003). A condensed version is available on the Internet. Many *editors* may use other well-

known style guides like *The Elements of Style* (Strunk and White, 2000), *The Chicago Manual of Style* (2003), *Fowler's Modern English Usage* (2004). *The Chicago Manual of Style Online* is an online style guide. *Technical writers* have several sources for good advice (Kirkman; 2003, 2005; Klare, 1985; Young, 1989). Like language itself, many style guides change with time. Therefore they are updated on a regular basis. *Researchers* in human centred areas of research may consult the *Publication Manual of the American Psychological Association* (American Psychological Association, 2001) for valuable advice when they want to publish their results in academic journals and conference proceedings.

All those who want to make a contribution to *Wikipedia*, a free online encyclopaedia, can find advice in the *Manual of Style*, a style guide that aims to make the encyclopaedia easy to read, write, and to understand (Wikipedia, 2007). There is probably a suitable style guide available for everyone. However, it should be noted that there are some style guides that focus on clarity and legibility with guidelines on typography and layout rather than on readability. Furthermore web site style guides focus on a publication's visual and technical aspects, best usage, grammar, prose style, punctuation, and spelling.

When we design information and learning materials, it is very important that the materials are reviewed and approved by people with expert knowledge in the appropriate fields. The effort put into training and learning may actually give a negative result, and the learner may end up less competent than before the learning experience. This may happen when he or she uses information and learning materials that has poor readability of text and pictures, and therefore is hard to understand.

The structure of text should be as clear as possible. Structure can be divided into internal and external textual structure. Internal structure is built into the text itself. External textual structure relates to the embedded strategies, which focus a learner's attention on particular parts of the text (Jonassen & Kirschener, 1982). In many scientific and technical reports it is a good idea to put series items in bulleted lists rather than in paragraphs.

### **Readability of text on wall charts**

A wall chart must have good readability. The information designer should:

- Edit the text into sections that are easily read.
- Check the spelling!
- Use headings and other text elements in a consistent way.

General design rules should be employed also in the design of text on wall charts. These guidelines are similar to those for readability of text on screens and readability of projected texts. Wall charts used to be a fine complement to textbooks. During the 20th century filmstrips, slides, overhead transparencies superseded wall charts. Later computer assisted presentations superseded these AV-media. Compared with traditional graphic presentations, a presentation of information on wall charts is very limited. Usually people are not willing to read long text passages.

### **Readability of text on screens**

For graphic presentations on visual displays such as television sets and computer terminals the information designer should:

- Display data so that it is easy to read.

- Recognize cultural differences.
- Use a “normal” combination of upper and lower case letters.

General design rules should be employed also in the design of text on screen displays. These guidelines are similar to those for readability of text on wall charts and readability of projected texts. Design may vary with respect to headings, length of lines, justification, spacing and number of columns. Colour as well as blank space on a visual display are essentially free and might be used to increase legibility and readability. All capital letters, *caps*, are harder to read than a “normal” combination of upper and lower case letters (Henney, 1981; Kinney & Showman, 1967; Poulton & Brown, 1968; Tinker, 1965). Words become difficult to read which will reduce the speed of reading.

When viewing a new page online, people don’t read—they scan and jump around, clicking and scrolling (McGovern, Norton & O’Dowd, 2002). McCall (2012) concluded that the use of headings and subheadings could be even more important in an online version of an informational or instructional work than in a printed work.

### **Readability of projected texts**

In verbal presentations, many of the overhead transparencies, slides, filmstrips, and projected computer presentations consist mainly, or sometimes only of text. In preparing the material the information designer should:

- Consider the use of lists.
- Be careful in the use of acronyms.
- Restrict stylized and fancy typefaces to opening frames.

General design rules should be employed also in the design of projected texts. These guidelines are similar to those for reada-

bility of text on wall charts and readability of text on screens. We should not display frames longer than it takes to explain the contents. Always restrict the number of words. Text transparencies are useful for the speaker but may be very boring to the audience. It is also very boring when there simply are too many spelling mistakes. Check the spelling once more. It is a good idea to put the necessary identifications data on each transparency, each slide and each computer file.

### **A readability example**

The writer needs to take into account the reader's knowledge, interests, and needs in order to compile, sort, and structure the material. This is also true for pictures. This is an example of a text with very poor readability:

It actually has been seen to be well established, in several separate contexts, in several different experiments, that it is of a not obscure, but rather a question of completely decisive significance how we converse with different people, whom we happen to meet in our environment, and how we formulate our way of writing to, or for, these personages, in all varieties of contexts and scenarios that we feel may be important at the time. That information always should be correct is obviously something that we, generally speaking, can contemplate as to be a truism for us all, just as we can easily observe that each discrete piece of information should be clear and unequivocal so that the reader or listener or watcher does not, either wholly or to some part, misunderstand what we actually mean when we will convey a specific message. But that the said information should also be understandable, and therefore easy to understand for everyone in the designated target audience or receiver

audience, is unfortunately not yet for all, or even a majority, of our different colleagues, or other persons on whom we can be dependent, in one way or another, understood to its fullest extent.

Unfortunately, this kind of blown up and pompous text is far too common in technical and in scientific documentation. In the following example the above text has been edited. This new text version has good readability and it still retains the main message: “How we speak with and write to each other is very important. It is obvious that information must be correct, just as it must be clear and unambiguous. But that it should be understandable is something that not everyone understands.”

People may simply avoid materials that they find difficult and pompous. Klare (1985) concluded that simple, active, affirmative, and declarative sentences are the most readable. In most cases improved readability results in greater reading efficiency, increased reader acceptability and better comprehension. Also in oral presentations it is important that the listeners understands the words.

### *Readability of numerical values*

Numerical data and information can be presented in tables and in graphs. A table in an information material must have good readability. Therefore the information designer should:

- Provide all the information the learner will need in the table.
- Group items in a clear way.
- Put target entries to the left of the answers.

Wright and Fox (1972, p. 241) made recommendations regarding design of tables in texts for the general public and other

non-professional audiences. Some of the recommendations concern readability:

- All the information the learner will need should be presented in the table. That is, the learner should not be required to interpolate, combine entries, draw inferences, or otherwise manipulate the contents of the table in order to determine the correct answer. Rather, the learner should only be required to scan the list to find the correct target entry.
- Items within columns should be grouped and separated from other groups by either white space or rules (lines) in order to facilitate reading without accidentally moving to another row. Groups should contain no more than five items.
- Redundant abbreviations of units should not be included within the table entries [although they should be included in the column or row headings].
- Whenever possible, columns should be arranged so that the target entries are to the left of the answers.

Also Ehrenberg (1977) provided guidelines for the construction of tables for the general public and other non-professional audiences:

- Numbers should be rounded off to no more than two significant figures to facilitate learners' making comparisons.
- Averages of rows and columns (as appropriate) should be given to facilitate learners' making comparisons of individual cell entries to them.
- Put the most important comparisons into columns (rather than rows), as columns make for the easiest comparisons.

- Numbers in rows or columns should be arranged in some meaningful order whenever possible (e.g., increasing or decreasing).

### *Readability of layout*

The style of the graphical form is decided by the specific choices of typefaces for headings, running text, captions, and also the use of justification, number and placement of columns, number and placement of pictures and tables, the use of colour cues, et cetera. All informative layouts must have good readability. Therefore the information designer should:

- Create standard pages for different information materials.
- Avoid dull, exciting, provocative, or too uncommon graphical designs.
- Review typography and layout for consistency of readability.

A written text works well when the content of the message is analytical, detailed, logical, narrative, theoretical, and sequential. Visual messages work well when content is emotional, holistic, immediate, spatial and visual. However, combined verbal and visual representations may be the best choice for complex messages. Here the layout is very important.

### *Simplification*

Waller (2011) discussed the concept of “simplification” and concluded that “simplification can be quite a complex business – there are bold choices to be made, risks to be taken, and difficult technical processes to control.” Simplification does not necessarily result in documents that are shorter or visually simpler. Waller distinguished between five ways of simplifying

documents: amplification, personalisation, reduction, reframing, and stratification.

By *amplification strategies* the designer add things that help readers to understand the document. The additions may consist of alternative versions. Answers to anticipated questions, and complicated terms, may be explained in footnotes, side-notes in printed documents, or popup boxes in digital documents. Simplified documents often use diagrams to explain difficult concepts.

By *reduction strategies* the designer simplify the reader's task by presenting less information. In *abstraction* a subset of essential information is repackaged in an easily accessible form. In *distillation* the information is rewritten, to contain only its essence. In *omission* less important parts are omitted.

By *reframing strategies* the designer sometimes may be able to deconstruct a document and use some parts to reconstruct a new document. However, some documents are beyond rescue. Then the only option is to start from the beginning.

By *personalisation strategies* the designer may design systems to combine data from various sources into personal documents for individual customers.

By *stratification strategies* the designer may make clear distinctions between different types of content. The designer may use clear typography to bring some content to the foreground, and may effectively hide other content in small print.

## **Esoteric jargon**

It is difficult to create easily understood information. On the other hand, it is simple enough to require ease of comprehension. But what is actually implied when we say that a message is comprehensible? To someone working with information, it is not sufficient that a message be produced and transmitted, as in radio and TV, nor is it sufficient that a message be produced, transmitted and received by an audience. The act of communicating is not complete until our message has been both received and understood by the audience. In other words, our messages must always be comprehensible; otherwise they will have no effect.

## ***Technical and scientific language***

Because technical and scientific language must be capable of effectively conveying as much information as possible to a certain group of readers, it is characterised in its ideal form by brevity, clarity, and precision. Melin (1992) noted that comprehensibility in a text depends on perspective, abstraction, context, complexity, and redundancy. These qualities are themselves difficult to describe; small wonder, then, that the comprehensibility of text defies assessment. A message is comprehensible if the receiver can grasp it without difficulty.

Squires and Ross (1990) found that in one industry sample 56 percent of the documents that workers were required to understand were above their level of comprehension. Thiel (1985) found that 30 percent of secretaries had difficulty reading at the levels required by their jobs, and 50 percent of the managers and supervisors were unable to write paragraphs free of mechanical error. It is obvious that communication does not always function as anticipated. The following sentence is cited

as a warning in *The Technical Writer's Handbook* by Young (1989:206): “Conditional symbolic modified single-digit arithmetic using optical content-addressable memory logic elements: Conditional symbolic modified signed-digit arithmetic operators.”

Esoteric and impenetrable jargon like this can be perceived as incomprehensible by the uninitiated. Since readers who do not know the code are left out, its use poses the risk of “one-way only” communication, and has no value outside of initiated circles. We find it unsettling when experts speak down to us; it puts us into a defensive frame of mind, and may even cause us to become obstinate. Interaction analysts describe this as a “You're OK, I'm not OK” reaction. However, what we should be striving for is a “You're OK, I'm OK” situation.

In an experiment, Kirkman (1992) allowed a group of people to rate six different versions of four technical and scientific texts. In terms of content, the texts were equal to each other, but they varied in their style of language. Some three thousand people took part in the experiment. In the case of all four texts, the test group rated the versions that were written in an active, direct and personal style as being the most easy to read and understand. Contrarily, the versions written in a passive, indirect and neutral style, with complicated sentence structure, were judged by the test group as being the most difficult to read and understand.

It seems as though arcane, abstruse texts have become a global problem in technical and scientific documentation. Kirkman opens the first chapter of his book “Good Style” with the following two paragraphs (p. 2):

It is surely axiomatic that the aim of technical writing is to transmit information accurately, quickly and economically from one person to another. Then why do so many scientists and engineers make their writing so heavily unreadable?

Obviously, their subject matter is sometimes complex and conceptually difficult; but frequently the 'un-readability' stems from the use of a style that makes the reader's task much heavier than it need be.

*A classical riddle.*

*A man shows a picture and says:*

*“The father of this man is  
the only son of my father.”*

*Who is the man on the picture?*

*This is a less complicated text:*

*“This is my son!”*



### *Good information quality?*

When a document is to be read and understood by several people, there is reason to expend effort on achieving information of good quality. When this is achieved, we can discern the information's aesthetic, informative, pedagogical, and technical qualities, and sometimes even its entertainment value.

*Good information quality* can be defined as the degree of congruity between the sender's and the receiver's subjective perceptions of the information, as well as of the reality that the information represents. By investing resources in improving the

quality of information, we can achieve better product and project quality, while, at the same time making large cost savings.

Good documentation implies very good comprehensibility and low cost, as well as ready accessibility when it is needed, and only then in fact. Poor comprehensibility diminishes the receiver's confidence in the sender of the documentation, and heightens the risk of unsound decisions. Many good suggestions may be rejected because the people who determine their practical merit simply do not understand what the suggestions call for.

Cotton (1995) noted six barriers to understanding of a verbal message. These barriers are:

1. You may not know the meaning of the word that is being used.
2. There can be different meanings of the same word.
3. There can be a misunderstanding of English grammar.
4. There can be a misunderstanding because of context.
5. Sometimes you do not understand the inference.
6. Personal but erroneous explanations.

### *Poor information quality?*

In the USA, there is an increasing incidence of law suits being brought against manufacturers. These law suits claim damages as a result of accidents occurring, or products breaking because of poor quality in the language of instruction manuals (Helyar, 1992). The courts are demanding that technical manuals, brochures, information sheets, and labels be written in comprehensible language, and that descriptions and instructions be *readable and legible*. Everywhere, plaintiffs' counsels are searching frenetically for sections of text and parts of pictures that might

be interpreted in conflicting ways. If a manufacturer's technical documentation is difficult to understand, he can lose a lawsuit and then have to pay large sums of money.

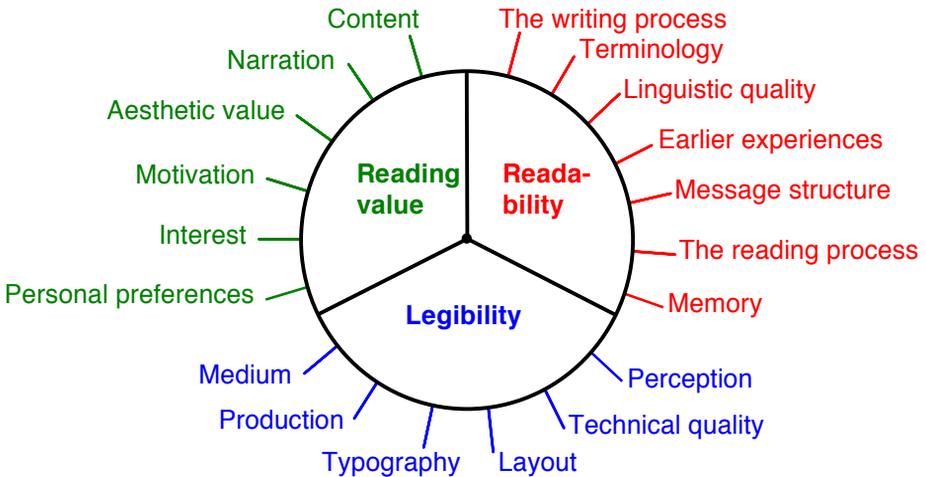
Drew and Grimes (1985) found that background or adjunct information is needed to fully understand any text. Explanatory information that is easily reachable places a text within a realm of understanding, as opposed to information without any additional easily accessible references. According to Brown and Bookman (1997) all documents face the following challenges:

- Does the audience truly know the meaning of all terminology used in any specific field?
- Does everyone reading the documents have precisely the same command of English?
- How quickly can students, users, and readers assimilate then actually use the information they are given?
- Does all of the publication's intended audience have the same background, or do some people need a little brushing up before they see the whole picture?
- Does the learning process need to be accelerated for employees, readers, or students?
- How certain is it that everyone a document reaches truly understands that document in the same way?

## Quality of language

*Speaking* and *writing* are language-related activities performed by the sender. These activities are influenced by the sender's earlier observations, and by the terminology and the language he or she uses. Besides being active, the sender is in charge of encoding the message, that is, its production and distribution.

*Listening* and *reading* are language-related activities performed by the receiver. As is the case with the sender, the receiver's activities are influenced by his or her earlier observations, as well as by the terminology and the language he or she uses. Besides being relatively passive, the receiver is in charge of accepting and decoding the message.



*Comprehensibility* is influenced by *readability*, *legibility* and *reading value*.

The *readability*, *legibility*, and *reading value* of the graphic message are of decisive importance to the receiver's ability to understand the content. Moreover, these factors – besides being

influenced by the writing process – are all prerequisites for the reading process. The “reading value” of a message is the receiver’s subjective evaluation of the contents. However, what is interesting to one person may be dull to another, and the same message may be interesting at one instance but uninteresting at another occasion. We have to adapt text and pictures to the target group. Reading value in the written word is comparable to “listening value” in the spoken word.

There are several different subheadings under the general heading “quality of language,” among them, phonology, morphology, syntax, style, pragmatics and infology.

- *Phonology* is the study of phonemes, i.e., the smallest units of semantic differentiation found in spoken language, and combinations of these units. The smallest written unit that fills a semantically differentiating function is called a grapheme.
- *Morphology*, the study of form or structure, deals with how words are formed and inflected.
- *Syntax* is the study of the rules for combining words into grammatical phrases, clauses, sentences and paragraphs.
- *Style* is the way of expressing thought in writing or speaking by selecting and arranging words for clarity, effectiveness and ease of reading.
- *Pragmatics* is, in linguistics, the study of the causal and other relations between words and how we connect words to express ourselves correctly.
- *Infology* is the study of how verbal and visual information is presented and read.

The way in which good quality of language is defined is, to some extent, dependent upon the purpose of the text. Technical writ-

ers, for example, are more consciously concentrated on getting results than other writers. Because technical language must be capable of effectively conveying as much information as possible to a certain group of readers, it is characterised in its ideal form by brevity, clarity and precision. To describe the properties of text, the linguist works with advanced text analysis. However, it is relatively easy to describe a text's readability by using a readability index, a character index, and a nominal quotient.

# Spoken and written messages

An essential difference between the spoken and the written message is the time available for transmitting them. The speaker and his or her listeners communicate in real time. On the other hand, the writer and his reader can take the time they need. In the written message, legibility, readability and reading value are vitally important to the message's comprehensibility.

In oral presentations it is important that it is easy to *clearly hear* the individual words and sentences. Legibility in the written message is comparable to *audibility* in the spoken message. It is important that the listeners *clearly understand* the words in oral presentations. Readability in the written message is comparable to *distinctness* in the spoken message. Reading value in the written word is comparable to *listening value* in the spoken word.

## Oral presentations

We can speak because we have a specially constructed vocal apparatus with which to make appropriate sounds, and because we also have areas of the cortex of the left hemisphere in the brain that is dedicated to producing language. Broca's area, an anterior zone in the left frontal cortex, is thought to articulate speech. A posterior zone called Wernicke's area is thought to be the repository for the ideas to be articulated. The two areas are connected so that this expression of ideas through speech can take place.

## *Verbal communication*

Usually we understand what we are saying. We know what we mean. However, we can never be sure that other people perceive

our verbal messages as we have intended. On the contrary, people perceive and depict a given message in widely differing ways (Pettersson, 1987). Many animal species are capable of communicating with the aid of sounds. The messages they convey often express simple concepts, such as hunger or repletion. These acoustic messages are usually sent to individual(s) of the same species. However, the noisy cries emitted by a crow to “warn” the flock are actually a form of “mass communication” rather than personal messages.

One of the simplest forms of communication between humans, the crying of an infant, is to some degree specific for that special individual. Parents often quickly learn how to understand the meaning of some different kinds of acoustically similar crying. They can also distinguish their own child’s crying from the crying of other infants. After some time the child acquires linguistic facility, enabling it to express a wide range of needs and emotions. More than 2,000 languages and countless dialects have long been said to exist. However, Gunnemark and Kenrick (1985) claim that there are probably 5,200 living languages, certainly no less than 4,500 and possibly as many as 6,000. Tens of thousands of years ago, our ancestors were able to communicate with one another by means of some linguistic expressions. Over the millennia, language ultimately evolved into Man’s most important means of expression.

Man is the only terrestrial species to acquire a language in the true sense of the word. However, the ability to form concepts is not unique to the human brain. Primates and several lower animals are capable of entertaining general, picture-based concepts. Concepts probably form in their brains in a similar way as in Man’s brain. Several scientists in the U.S. have succeeded in teaching chimpanzees to communicate by means of

visual sign language. Chimpanzees can deal with more than 100 words and display linguistic creativity, i.e., they are independently able to form new, logical word combinations. To a certain extent, their language has a grammatical structure. Previous attempts to teach apes to learn a language probably failed because they involved efforts to teach apes to speak, despite their anatomical inability to produce human language sounds. Even very primitive societies often have advanced languages providing scope for great expressiveness. These languages sometimes contain many subtle terms for concrete concepts.

A pioneer in the field of semiotics, Ferdinand Saussure, divided the phonologic components of language into their smallest, non-meaningful parts, i.e., phonemes. *Phonemes* are basic units of sound. When combined, they form units with meaning. A language's smallest meaningful grammatical unit is referred to as a morpheme. *Morphemes* are combined to form syntagms (Fredriksson, 1979), i.e., words, phrases, sentences, and complete texts. Spoken and written languages are formed from a limited number of phonemes (usually 20–40). These phonemes can be inter-combined in a limited number of ways. We can make a distinction between individual language, i.e., speech, and super-individual language, i.e., the language itself. When we speak and write, the phonemes, morphemes, and syntagms we use must follow one another in a particular sequence if our messages are to be understood. Language is consequently hierarchic and linear.

The term “spoken language” is almost always taken to mean direct, informal verbal language. A sender and a receiver share a highly interactive communications situation. This situation offers immediate feedback and opportunities for explanations and corrections. However, the situation is highly transient and im-

possible to re-hear/re-see. On the other hand, the spoken word in technical media lacks any interactive component to facilitate communications. TV, though, does have limited, sender-controlled or simulated interaction. These media all lack immediate feedback but are non-transient, at least in principle, and their messages can be played back. Speech conveyed by technical devices depends on the quality of the reproduction technology employed and even on factors such as cost. Speech reproduction devices often clip higher frequencies, thereby impairing reception conditions for the listener and conveying speech less adequately than direct conversation.

This all means that the reception conditions of the spoken word conveyed by technical media are similar to the reception conditions of the printed word. The sender must plan her/his message carefully. She/he must practice cognitive clarity and avoid ambiguity – both acoustically and optically. As is the case for the printed word, the language used by broadcast media for recurrent messages, such as weather forecasts, can be rationalized and formalized.

Dahlstedt (1979) predicted that the verbal language used in media would not only develop on its own terms but also even exert an impact on the spoken language as a whole. The media probably do have a levelling effect on the spoken language and thereby contribute to the disappearance of dialects. As a result of its wide-ranging coverage, the language of broadcast media tends to become a national standard to a greater extent than direct conversation. As is the case for the written language, the language of broadcast media is tailored to be understood by a wide range of listeners/viewers with widely varying backgrounds. This development is bound to retard new language development, since the use by message senders of old and fa-

miliar phraseology maximizes the likelihood of message comprehension by receivers.

Visuals designed to complement oral instruction does not always automatically improve the achievement of the learners (Dwyer, 1978). For certain types of educational objectives and for certain types of learners, oral instruction without visualization is as effective as visualized instruction. All types of cueing techniques do not equally facilitate the instructional effectiveness of different types of visual illustrations in oral instruction.

### *Assessments of speakers*

Oral presentations include the use of speech and pictures in lectures and in business presentations and. Areas of special interest include speech and body language, speech and demonstrations, speech and still pictures, speech and moving pictures.

### **Schools**

Many teachers in different countries spend most of their time in the classrooms *talking* to their classes (Ferrington, 1994; Gustafsson, 1980a, 1980b; Pettersson, 1991; Sigurgeirsson, 1990). It appears that teachers generally teach the way they were taught, following the traditional approach to education, providing pre-packaged information to students.

Heinich et al. (1982) noted that students must be able to analyse the structure of a lecture to distinguish between relevant and irrelevant information. Students must be information literate to be able to learn effectively.

In a cross-cultural study (Pettersson et al., 1993) geography teachers in Australia, Greece, Japan, Sweden, and the United States were asked to what extent they were using different media as well as different types of pictures in their teaching. The

total average media usage in schools was surprisingly similar in Japan (37), Australia (32), Sweden (32), and the USA (30). In Greece (18), teachers were more conservative in their use of media in teaching than the teachers in the other countries in the study. From this study, it is quite clear that teaching is very much a “chalk talk” in all of these countries. The geography teachers used maps, word visuals, tables, and formulas every week, while other pictures were used less frequently.

When students have difficulty in using their knowledge in an independent and active way this reflects the school's way of teaching (Lundgren in Ljunghill, 1993). Most teachers have access to different media. However, media is not widely used in teaching. Despite the fact that we live in the information society, and are witnessing rapid technological development, it is still “chalk talk” to a large extent that counts in the school environment.

## **University**

At the beginning of 1991, students in the faculties of Art and of Social Sciences at Stockholm University, were asked to what degree their teachers used various media and different types of pictures in their teaching during the previous semester (Pettersson, 1991). To compare the use of each medium, an index of utilization was calculated as follows: The frequency of use was multiplied by 0 for “Never,” by 1 for “At least once every semester,” by 2 for “At least once every month,” by 4 for “At least once every week,” and by 8 for “At least once every lesson.” These values are added and the sums divided by 8.

If the teachers never utilized a specific medium, the index of utilization is 0. If all the teachers in a sample utilized a medium every lesson, the index of utilization is 100. An index value

of 50 means that the medium, on average, was used every week. An index value of 25 means that the medium, on average, was used every month. An index value of 12.5 means that the medium, on average, was used once during the semester. Findings indicate that university teachers clearly differ in their use of media compared to business people who make business presentations. Teachers usually use the blackboard and textbooks in their teaching. During everyday-lectures, use of other media is rare. Several media are never used at all, or are used only a few times during a whole semester.

### **Business presentations**

Griffin (1989) attended 32 business and engineering presentations in which the presenters used a total of 610 visuals. He defined four categories of visuals used in business presentations: word visuals, graphs, diagrams, and maps.

*Word visuals* are predominantly lists of words that provide textual support to the presentation. In some cases pictures or other icons may accompany the word visuals.

*Graphs* are defined as numerical arrays in pictorial form. They consist of line, column, bar, or pie graphs as well as a variety of special-purpose graphs.

*Diagrams* are defined as visual representations of flow, direction, or procedure to be followed in the completion of a process.

*Maps* are defined as diagrammatic representations of geographic area. Maps represent a growing category of visualization because new computer graphic software is available to produce several types of maps.

Griffin found similar relationships among types of visual content: word visuals (54%), diagrams (15%), graphs (11%), and

maps (1%). A category "Other" (19%) was an inclusive category including pictures of products, people etc., roughly equivalent to the "pictorial images" in this study. Griffin concluded that presenters appear to over-use the technique of word visuals and clog the visual communication channel with excessive information.

Griffin (1990) asked 272 managers, attending Penn State University's Executive Management Program, to make assessments of their own performances. Speakers were given printed forms with questions. For each question each speaker marked one of several alternative answers.

I repeated this study with 70 subjects in Europe and in the US, but now with the *focus on the listeners*, the "receivers" in the communications process, and the questionnaire was edited to fit the new group of subjects. Apart from personal information about the listener, the questions covered the following topics:

- What is the "average" length of the presentations you listen to?
- Do the speakers normally use visuals (visual support) when they make their presentations?
- What visual medium do speakers rely on most frequently when they make their presentations?
- Who prepares the visuals?
- What appear to be the most frequent purpose for the presentations?

In the following discussion, results from the study of speakers' assessments and the study of listeners' assessments are compared. There were 272 subjects in the first study (Griffin, 1990) and 70 subjects in the last study.

### *Length of presentations*

There is a difference between the speakers and the listeners with respect to the assessments of the average length of presentations. The listeners say that they have listened to many more long presentations (38%) than the speakers say they have delivered (13%). The listeners say that they have listened to fewer short presentations (10%) than the speakers say they have delivered (16%). This may indicate that listeners have a feeling that presentations tend to last long. Speakers, however, quite often declare that they need much more time to explain what they want to say. Thus, it is possible that speakers underestimate and listeners overestimate the average length of a presentation.

### *Use of visual support*

When speakers were asked if they normally use visual support when they make their presentations more than a third of them answered “always.” Listeners expressed a different opinion: Less than one-tenth of the listeners gave the same answer, and many more listeners (67%) than speakers (38%) answered “sometimes.” This is in close agreement with a study of the use of visuals in textbooks and teaching aids (Pettersson, 1990), wherein far more teachers (28%) than students (5%) answered “always” to similar questions. Obviously, presenters have a tendency to overestimate their own use of visuals.

### *Medium and purpose*

Overhead transparencies were the most frequent visual medium, followed by slides. In this case, speakers and listeners expressed the same opinions. Most visuals were prepared by the speakers or by their office staffs. Here, speakers and listeners

expressed the same opinions. The most common purpose of the presentations was “to inform.” Again, speakers and listeners expressed similar opinions.

### *Use of PowerPoint and video*

Tufte (2003, 2006) argued that people strongly overused all kinds of PowerPoint-visuals in their presentations. He adamantly stated that improper visual design was responsible for the Columbia Space Shuttle disaster that occurred in 2003. The visual presentations were too complex and also inconsistent.

In 2007 Griffin (2010) repeated his study on the use of images in presentations, this time with data from the 2007 American Telemedicine Association national conference. In previous studies presenters had used slides and overhead transparencies. This time PowerPoint had been available for a few years. So all speakers used PowerPoint. The 21 presenters used a total number of 359 images with the following distribution: tables 5%, graphs 6%, diagrams 7 %, photos 15%, word visuals 65%, and video 2%.

Griffin concluded that the use of word visuals in presentations has reached alarming proportions. This is an acute problem in medical presentations. Griffin argues that the overuse of word visuals actually hinders audience comprehension of the message.

### **International conferences**

In the spring of 1990 I attended several international conferences in Europe as well as in the USA. Several aspects regarding the actual presentations were noted on specially designed forms with questions covering the following topics, partly corresponding with the study by Griffin (1989).

- Length of presentation.
- Visual medium used.
- Number of visuals for each medium and type of content.
- Average quality of execution of visuals.
- Average legibility of words on visuals.
- Average quality of actual presentation, AV-showmanship.
- What appears to be the purpose of the presentation?

### *Length of presentations*

A total of 114 presentations lasted for about 46 hours. No less than 83% of the speakers used some kind of visuals in their presentations. On average, these speakers used .62 pictures per minute, for a total of 1,464 pictures. Most of the speakers (57%) needed about half an hour for their presentations. The second length category was 15 minutes (26%). Only a few presentations were shorter than 15 minutes or longer than 45 minutes.

### *Use of visual support*

59 speakers (56+3) used overhead transparencies and 31 speakers (28+3) used slides. These speakers used a total of 810 overhead transparencies and 612 slides. Thus, it is clear that, on average, speakers used far more slides (19.7) than overhead transparencies (13.7) in their presentations. In the two previous studies, overhead transparencies were also the most common visual medium.

### *Medium and content*

By far the most common type of content was word visuals (52%), followed by diagrams (23%) and graphs (14%). On average, pictorial images were not used as often (9%). However, a clear distinction can be seen between slides and overhead transparencies. In both categories, word visuals were the most

common type (44% and 59%), followed by diagrams (24% and 22%). Pictorial images (16%) were the third group in the slides category, and the sixth group (2%) in the overhead transparencies category. Graphs (16%) were the third group in the overhead transparencies category, and the fourth group in the slides category (13%). In both categories, maps and cartoons were seldom used, and film and film and television were never used.

### *Quality of execution*

With respect to the average quality of execution of visuals used in presentations, about a third (32%) were considered good or very good, and roughly two-thirds (68%) were judged not acceptable. With respect to the average quality of the actual presentation (AV showmanship), about a fourth of all the presentations (27%) were considered good or very good. Most presentations were judged not acceptable (73%). Quite often, it is obvious that speakers are aware of the poor quality of their visuals. Comments such as the following are not at all unusual in presentations:

- “I know that you can not read this text ....”
- “Unfortunately you may not be able to see this ....”
- “I will read the text for you, since it is too small/blurred/in-distinct.”
- “You do not have to read this ....”
- “The copying machine is in poor condition ....”
- “Please excuse my handwriting ....”

It would appear that business presenters use the same types of pictures as do teachers. It is, however, more and more common that speakers just ignore the poor quality of their visual materials.

## Summary

Given the framework for interpreting verbal and visual messages, the results from these studies may be summarized as follows.

- It is possible that speakers underestimate and listeners overestimate the average length of a presentation.
- Presenters have a tendency to overestimate their own use of visuals.
- Speakers who use slides in a presentation tend to use more visuals than speakers who use overhead transparencies.
- Speakers appear to overuse word visuals.
- Speakers appear to overuse PowerPoint.
- Quite often it is obvious that speakers are aware of the poor quality of their visuals.
- University teachers usually use the blackboard and textbooks in their teaching. During everyday lectures, use of other media is rare.
- It is possible for listeners to assess speakers and their achievements with respect to different criteria.
- Teaching is very much a “chalk talk” activity.

It may be concluded that a widespread use of visuals in oral presentations is evident, as is the need to improve the quality of such presentations in a variety of dimensions.

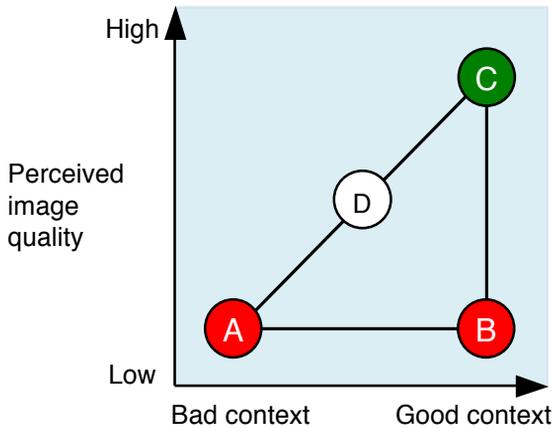
### *Audio-visual representations*

An oral presentation may last from a few minutes to several hours. The amount of time spent on preparations may range from nothing to weeks or months. A speaker or teacher usually employs some kind of aid, such as a chalkboard, a flip chart, an

overhead projector, a slide projector, a film projector, a VCR, or a computer based presentation system.

In oral presentations it is not enough that a slide or an overhead transparency has an interesting content and is well executed with a high technical quality. The slide must also be used under optimal conditions. A poor slide will always give a poor projected image that will be perceived as having low quality. A good slide with high quality contents and execution may be perceived as having anything between low and high quality. When a medium good slide is projected under optimal conditions that image may be perceived as better than a good picture that is projected under bad conditions. Poorly executed and poorly presented slides and overhead transparencies will influence the understandings of the whole oral presentation. Good projected images are needed to achieve a good oral presentation. For this we need to have good quality slides, a good projector, a good quality screen, perfect lighting conditions and no disturbances like irritating sounds.

The speaker/teacher must arouse the listeners'/students' interest and curiosity, capture and retain their attention and prevent the development of undesirable situations. An oral presentation may consist solely of speech, but this is usually not sufficient for achieving the best possible communications. One basic condition essential to all oral communication is the ability of listeners to hear what is said. So one or more microphones and suitable loudspeakers may be needed in a large auditorium. Ensuring that all technical equipment really is in good working order before the presentation is important.



*A “poor” slide will always give a poor projected image that will be perceived as having low quality (A). A “good” slide with high-quality content and execution may be perceived as having anything between low (B) and high (C) image quality. A “medium good” slide projected under optimal conditions (D) may be perceived as better than a “good” picture that is projected under bad conditions.*

When information or teaching is the purpose of a presentation, the speaker/teacher should present facts, principles and arguments in a clear, easily grasped manner, combined (when possible) with amusing, memorable examples. She/he should speak naturally and distinctly with only a moderate amount of vocal tension. Voice pitch and volume affect the credibility of a message. A low pitch is more credible than a high pitch. Both a high and a low vocal volume lend credibility to a message. Brief pauses can be used as commas, longer pauses as periods and a change in intonation as question marks. Listeners need time to absorb conveyed information.

Voice volume and pitch can be used to emphasize certain words or phrases. A varied voice is more interesting to listen to than a monotonous, colourless voice. Distinct pronunciation is also important. Many listeners have impaired hearing and read lips. Try to speak naturally and comprehensibly. Avoid needless technical jargon and don't forget to explain any technical terms you can't dispense with!

Speakers who wish to make propaganda on behalf of some cause, such as a religious or political standpoint, usually convey their message in another way. Speaking calmly and in a clear voice, they usually begin with their best arguments, making it easy for listeners to concur. Listeners ultimately begin feeling that they are part of some common group. Once the speaker's authority has been established, her/his vocal pitch and tempo tend to rise successively. The speaker then creates a strong sense of uneasiness, anxiety or guilt in her/his audience. At this point, the skilled speaker offers examples of how this uneasiness, anxiety and sense of guilt will be dispelled if the audience behaves in a particular way. Any objections are quickly and smoothly transformed into recommendations on the way the group should act.

When information is the objective, the oral presentation should not be too comprehensive. One of the most common errors in a verbal information presentation is for the speaker to supply too much information. Limiting the information to its essentials may prove to be difficult but is usually necessary. A presentation is often enhanced if the speaker uses the actual objects (or pictures of it) to which she/he refers. Speech and visuals can complement and reinforce one another in an effective manner. Informative words need visuals, and informative visuals need words. A summary or more detailed information

should often be supplied as written documentation after an address. If documentation is distributed before an address, the audience could lose interest in the oral presentation.

But in some instances, listeners could also make personal notes on documentation handed out in advance, thereby improving their ability to remember the content of the oral presentation. Being well prepared in terms of both the presentation and in purely practical respects is important to the attainment of good results. So always ensure in advance that any A-V equipment to be used is working properly and that curtains for room darkening are also in working order. Also find out how to turn the lights on and off. The design of the room as well as the surrounding areas will influence the possibilities for a good presentation. Noise from fans, drills, radio and television in rooms nearby will easily distract the speaker as well as the audience.

## *Listening*

Speech does not come to us as a series of individual words. As noted hearing a sentence, a word, or even a syllable requires the listener to integrate a changing pattern of auditory stimulation. This integration demands some form of short, temporary buffer storage, and it is likely that perception relies heavily on such temporary sensory memory stores that holds a representation of the initial sounds until the entire word has been heard. Thus we must extract the words from a stream of speech. The recognition of words in continuous speech is a complex process. Phonemes are recognized even though their pronunciation is affected by neighbouring sounds and by individual accents. Carlson (1993) noted that our recognition of words in continuous speech is far superior to our ability to recognize them when they have

been isolated. We use contextual information in recognizing what we hear.

Pressley and Miller (1987) reviewed experiments concerning children's listening comprehension and oral prose memory. They concluded the following ordering of conditions with respect to their potency for affecting children's learning of prose:

1. Sentences + complete pictures sentences + two incomplete pictures.
2. Sentences + two incomplete pictures (that is, partial picture) sentences + single incomplete picture.
3. Sentences + single incomplete picture sentences only.

Pressley and Miller (1987) have written their review as a reflection of Paivio's dual-coding approach to memory (Paivio, 1971, 1983, 1986, 1991). Memory is greater when a verbal and a visual code are activated at the same time, rather than only one of them. After reviewing picture effects on children's learning Pressley (1977) concluded that enough research evidence already had been gathered regarding illustrated text. Pressley wrote (p. 613): "No more experiments are required to substantiate the positive effect of pictures on children's learning."

Cotton (1995b) defined four major levels of listening skills when a teacher is talking or instructing. These levels are: 1) Skim listening. 2) Surveying listening. 3) Search listening. 4) Study listening.

Most people listen only intermittently and select only things of personal interest. When we study, we take an active part in the content of the material. We read texts, we listen to music, and we read pictures. This consciously perceived information is processed, sorted, and stored in parts of our long-term memory. In the case of a picture, we may need to focus on

different portions of it a number of times (so-called “eye fixations”) to be able to describe it later on.

### *Speech and body language*

The speaker must constantly strive to maintain close contact with individual listeners in order to insure that the information is reaching the mark and being understood. Listeners cannot back up and review oral information in the same way that they can with printed information. So every presentation should commence with an overview of the content to be discussed and conclude with a summary of the content. This will enable readers to obtain the best possible grasp of the total message. Including time for questions is also appropriate.

Speakers transmit visual impressions. For students, teachers constitute “living pictures.” This is because speakers employ body language in addition to oral language. Continuous contact between teacher and students can be sustained solely with the “speech” of body language. Body language reflects a person’s emotional state, attitudes, and personality. It discloses whether a speaker is happy, pleased, angry, annoyed, confident, uncertain, truthful, or lying.

Children, and even adults, are often highly sensitive to messages conveyed with body language. So a speaker’s glances, gestures, mimicry, posture, arm and leg movements, and presentation method can serve to reject or confirm her/his oral message. Some experts claim that body language is often more important than the words in an oral presentation. Ringom (1988) wrote as follows (p. 29, in translation): “Most of the research reports I have studied indicate that words only account for about 10%, intonation about 17%, and body language (i.e., mimicry, eye,

ear, and leg movements, and posture) about 73% in a communications process.”

Body language is both instinctive and something we mimic and learn. A given gesture often means different things in different cultures. We convey facts with words but emotions and values with our bodies. So people are usually unable to “lie” with their body language. We listen more emotionally than intellectually.

Keller and Burkman (1993) noted that the enthusiasm of an instructor or speaker might stimulate positive motivation among students. A sensitive speaker can learn to use her/his gestures, movements, facial expressions, and articulation for punctuating, underlining, clarifying, and enhancing the vitality of her/his words. The choice of clothing can also convey fairly detailed information. This is especially the case for markers and symbols associated with particular groups of people.

A speaker must always be easily visible. So a speaker should avoid being hidden behind a rostrum so only her/his face and part of the trunk are visible. The ability of a speaker to move freely in front of her/his audience is also an advantage. A speaker must be able to see listeners in order to maintain contact with them. So making an effective presentation in a dark room in which the speaker is standing in a spotlight is extremely difficult.

Exemplification of an oral presentation with demonstrations using relevant objects or events is almost always beneficial to audience comprehension of a speaker’s message. Demonstrations can arouse the audience’s interest, reinforce message perception, and improve audience ability to comprehend a message. Giving the audience a chance to examine and touch an object or experiment with and influence a course of events is

even better. The playback of brief, authentic sound illustrations can easily enhance a sense of reality or create a particular mood.

### *Speech and stills*

A speaker unable to exemplify her/his message with real objects should employ visuals instead. Stills can be used to supply structure and an overview, provide concrete examples, approach reality more closely, show what something really looks like, create interest, reinforce a message, or summarize a presentation. We should use visuals as actively as possible. People remember things they've seen more readily than things they've heard. Speakers should describe, explain, and ask questions about visuals. It is not enough just to show the pictures in a rapid pace without any comments.

Stills can comprise text, tables, graphics, and maps, different kinds of diagrams, and, naturally, drawings and photographs. We should avoid visuals containing excessive detail. Do not use visuals needlessly! The visuals used should be relevant to the context and make a genuine contribution. They should also be easily grasped. In an oral presentation, listeners have few opportunities for detailed study of a visual at a comfortable pace. The visual is usually displayed at a considerable distance and at a point in time selected by the speaker. So a visual employed in an oral presentation should be designed differently than a printed picture in a book. In oral presentations, each visual should only depict a single object, idea, or trend. Multiple visuals should only be displayed simultaneously in direct comparisons, e.g., of different objects or events. When a series of pictures is used, it is important for the subjects to be depicted on the same scale to prevent viewer confusion.

Wileman (1993) showed a way to organize the relationship of verbal and visual images along a continuum, the verbal/visual continuum, or the degrees of visualization. Seven types of visuals, ranging from purely verbal to purely visual represent the continuum. The seven types are:

1. Reader Frame (pure verbal).
2. Emphasized Reader Frame.
3. Reader Frame with Visual Cues to Meaning.
4. Verbal/Visual Balanced Frame.
5. Pictorial or Graphic Symbol Frame with Verbal Cues to Meaning.
6. Emphasized Pictorial or Graphic Symbol Frame.
7. Pictorial or Graphic Symbol Frame (pure visual).

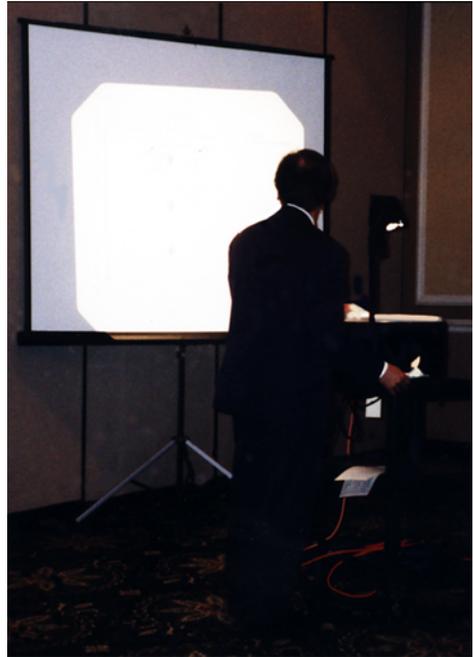
Whenever visuals are displayed, the speaker always runs the risk of losing contact with the audience. Suggestive visuals can easily create a number of associations that deflect the audience's thoughts away from the subject of the presentation. However, the speaker can pave the way for improved audience comprehension of a subsequent visual by disclosing in advance what the visual depicts. The audience will then find it easier to identify important picture content and select a relevant interpretation. When a picture is shown, viewers need some time to interpret and understand its contents.

The speaker must never be positioned so she/he blocks the audience's view of a visual. It is always important that projectors are placed in stable positions. Small movements of the projector will cause large "jumps" of the projected image.

For more information about legibility and typography of projected images see *Information Design 4-Graphic design*.

## Overhead transparencies

Overhead (OH) transparencies can only be projected with an overhead projector, and room illumination (at least illumination near the screen) must be reduced. To prevent image distortion, the top of the screen must usually be tilted forward. The projector should be put at such a distance from the display screen that the complete image is projected on the screen. If parts of the image fall on the wall, outside the screen, this may be quite disturbing. It is also very important that the whole image is in focus. Dirt on the transparency, on the lenses, or on the screen is also disturbing and makes the image less effective.



*Many speakers talk to the projected image and not to the audience.*

The overhead projector should only be on while projecting a transparency. A visual should not be displayed any longer than

it takes to explain its contents. A composite overhead can be formed with a basic transparency and add-on transparencies prepared in advance. However, successively exposing parts of a transparency by removing, e.g., obscuring pieces of paper, is usually unsatisfactory (although a common practice, even by many visual experts). Adult viewers could be distracted by the picture's dark areas and begin wondering about the hidden information instead of giving their full attention to the presentation.

Many speakers use text transparencies, or "word-visuals," containing key words in attempting to supply an overview, clarify, reinforce, and summarize complicated arguments. These texts must then be brief and concise. They must also be easy to read. For good legibility, characters should be large, distinct, and boldface, never less than 5–6 mm high when projected in a room the size of a normal classroom. Larger rooms require larger character sizes.

Normal text, containing both uppercase and lowercase letters, is easier to read than texts using only uppercase letters. Overhead transparency texts should usually consist of black characters on a light background. Text transparencies are useful adjunct speakers but are sometimes very boring to an audience.

### **Slides and PPP**

It is not enough that a slide be well designed and has a high technical quality. It should also be projected and used in a correct way. A room must be properly darkened for the most advantageous projection of mounted slides and filmstrips, unless equipment is available for back projection, i.e., projection from the rear onto a matte-glass screen. A slide's subject should appear against a black background.

Text slides should only be used to a limited degree. Texts should be light (white or yellow) on a dark background (e.g., black or dark blue). Many colour combinations are hard or even impossible to read.

Today many series of overhead transparencies and slides have been replaced by PPP, Power Point Presentations. Here all illustrations are stored in computer programs and projected with a data-projection. New series of illustrations still follow the verbal/visual continuum, ranging from purely verbal to purely visual, developed by Wileman (1993).

As previously noted there is a clear risk of overusing word visuals, especially in Power Point presentations. According to Tufte (2003) PowerPoint is a competent slide manager and projector. But rather than supplementing a presentation, it has become a substitute for it. Such misuse ignores the most important rule of speaking: “Respect your audience.”

### **Wall charts and other pictures**

Wall charts, mounted photographs, some posters, picture collages, wall maps, and roller blind-type maps are usually excellent teaching aids, provided they are relevant to the context and large enough for the audience to see distinctly. These visuals can be mounted on a wall or, for small groups, placed on a table. Only use one visual at a time unless different visuals are to be compared. Remove any unneeded visuals so they do not distract the audience. Using a flannel board and flannel board visuals always demands preparations. But this presentation form can be rather effective, especially when the audience consists of children.

An episcopes, i.e., a device capable of projecting opaque originals, such as text and visuals on paper, or small objects, is

used sometimes, although not very often anymore. The episcopes can be used for projecting any kind of text or visual, such as material printed in books and newspapers. There is then no need for special overhead transparencies or slides. A room must be very dark for effective projection of episcopes images. Speakers can write or make simple drawings on a conventional blackboard (although not often black anymore) or a more modern version, the flip-chart, in a small locale with full room lighting. Complex drawings should be prepared in advance of the oral presentation.

### **Total information material**

A speaker usually employs an audio-visual presentation such as a chalkboard, flipchart, overhead projector, slide projector, film projector, or a VCR. In multi-visual representations there is interplay between lexi-visual and audio-visual presentations.

Systems for computer-generated visuals are being used to an increasing degree for presentations. Computer-generated visuals can be displayed with the aid of a TV projector or with an overhead projector accessory. Computer-controlled, interactive programs or databases designed for information and education can be used “interactively.” We are already able to create a “total information material.” This material comprises text, sound, visuals, numerical information, and facilities for processing the information in different ways.

A “total information material” is a multi-representational database offering the user complete freedom in shifting back and forth between verbal, numeric, visual, and audio information. A computer program sometimes controls film projectors, VCR’s, videodisc players, or other technical equipment. This then becomes a multimedia presentation worthy of the name.

Total information material offers people with all kinds of modalities, i.e., verbal, visual, kinaesthetic, or mixed, to perform their own active searches for information that, when found, can be actively transformed into experience and knowledge. For example, students can easily access the background information needed for a school assignment or paper. They can even retrieve and “cut out” appropriate examples, such as “extracts” from individual databases, and “paste” and incorporate them into their own presentations. The text and picture extracts can then be edited. (See the section *Modalities* in Book 5.)

Numerical information in tables can be processed and presented as bar diagrams, curves, or pie charts supplying a better overview. In a redundant relationship, similar information is conveyed via words, sound, and visuals. For example, subtitles can be added to a television programme, so that the action displayed on the screen is described by words. This greatly enhances the educational impact of the programme.

A redundant relationship should be used in instructional message design. The justification for using redundant information in print or oral (or both) and visual channels is to provide the learner with the opportunity to receive information alternatively from either channel, and to help the person short-circuit any dependence on printed or oral instruction (or both). Properly used educational technology can drastically reduce the time it takes to create meaningful knowledge out of information. In a relevant relationship, the information presented via a text or sound supplements the information supplied in the visual. Visuals with relevant relationships to a spoken or printed text can greatly enhance the text’s informative effect, and vice versa.

In an irrelevant relationship, the pieces of information presented in various channels are completely independent of one

another. In television programmes, for example, the picture sometimes deals with one aspect, the text with another, and the sound with a third. This makes it very hard for viewers to make the most out of the programme. Conflicts readily arise between a concrete visual event and abstract verbal information. When this ever happens, the concrete and readily accessible information assumes priority over the abstract information. A contradictory relationship exists when the information in various channels conflicts. This is disastrous for any informative programme and any learning material.

### *Speech and moving pictures*

As a rule, the content of films and television programs is presented in a preordained fashion, which tends to encourage relative passivity in viewers. The same is true of prepared oral presentations. The reader of a book digests textual and pictorial information at his own pace. If the information presented in the book has a structured surface, i.e., one in which the information is integrated into a single context, the reader can focus his attention relatively freely. The experience is akin to the way we take in information in real-life situations.

Interactive video programs make it possible to combine sound and moving pictures. They can arouse considerable activity and commitment in the user. Because an interactive video program can stimulate the user to perform at a high cognitive level, it has the potential to function well, both as a conveyor of information and as a teaching aid.

Events that are hard to illustrate with stills and difficult or hazardous experiments can be depicted with the aid of moving pictures, i.e., film, video, computer animation, or TV. A brief example only lasting a minute or two may suffice. Video is an

excellent aid. A speaker can conveniently introduce the appropriate moving sequence at exactly the moment when it has the maximum impact. Sequences can also be repeated one or more times if necessary. Various combinations of different audio-visual presentations, i.e., words and text, audio illustrations and sound effects, stills and moving images in colour or black and white, convey information in pre-recorded presentations, such as film.

All “traditional” information and teaching programs can be used in a “linear” way. Programs can be produced using cinematic or video techniques. They can be distributed as film prints, videocassettes, or video discs in various formats. Programs can also be distributed as broadcast TV programs or as satellite and/or cable TV transmissions.

The power of visual images is well illustrated by the film *Precious Images*. Commissioned by the Director's Guild in 1986 in honour of its 50th anniversary, the film was a gift to the American movie audiences. It consists of a 6 1/2 minute assemblage of classic moments from 469 favourite movies, past and present. Some moments linger for a few seconds, but many are as short as eight frames (1/3 of a second). The average is 20 frames (less than a second). Viewing this film is a strange experience. The carefully chosen images retain their meaning and emotional impact and trigger one's memory of these classic motion pictures.

As another example, when people flip through 15 to 20 television channels in less than a minute (Matsushita, 1988) to decide which programme they want to see, they do not take the time to actually listen to the sound. Thus, decisions are based on the pictorial style of content.

## **Written presentations**

To be considered verbally literate, one must learn the basic components of a written language: the letters, words, spelling, grammar, and syntax. Just a few basic elements and a set of principles are actually enough to create an almost infinite number of expressions. Most people can learn to communicate with written language. Many develop their own personal styles.

### *Signs and words*

Man's ability to communicate was greatly enhanced when knowledge and information began to be stored with the aid of simple pictures and, subsequently, symbolic characters a few thousand years ago. Pictographic languages ultimately evolved in different cultures. They initially depicted objects and events as realistically as possible. These early pictograms were drawn with a stick in sand or clay, or on the wall of a cave with a piece of charred wood or bone. Ultimately, people began depicting abstract concepts, largely religious or magic in nature, using pictograms to represent concrete objects. Pictograms of concrete objects were often combined to designate some abstract concept or thought. The pictograms became increasingly stylized and evolved into simple symbols or characters. Each character was equivalent to one or more concepts and came to represent a word.

The Chinese language is an example of a living pictographic (ideographic) language in which each character represents one or more words. Other pictographic languages have developed in other ways. Alphabetic languages and alphabets evolved when characters designating words began to be used to represent the initial sounds of words.

Written languages, composed of individual letters, provide the bases for mass storage of knowledge and information and for communications between people at a great distance from one another in terms of both time and space. Most alphabetic written languages evolved from the Phoenician language that appeared around 1200 B.C. The wide-ranging sea voyages undertaken by the Phoenicians spread their language to many places. It reached the Greeks in 800–900 B.C. They added vowels to the Phoenician alphabet, which only consisted of consonants, and began writing from left to right instead of right to left. Many languages have alphabets based on the Greek alphabet, including the Latin of the Romans. Latin, in turn, has given rise to the alphabets employed in most modern written languages in Western countries. They use only a few dozen characters to represent thousands of words and concepts. The English language is said to contain as many as 615,000) but the average person only uses a small fraction of them (Nagy & Herman, 1987). Many languages are closely related with respect to number of words.

However, Japanese is an example of an interesting and extremely complicated language that is probably unrelated to any other tongue. Words borrowed relatively recently from Chinese and European languages (English in particular) have been adapted to the Japanese phonetic system, but many of them remain recognizable. In Japanese many inflections share the same explicit significance but differ in implicit meaning, depending on the prevailing social and other circumstances.

Japanese script is highly complex. It is said to comprise about 48,000 different characters, kanji, designating different words. Each kanji character can be written in three different fonts and has two or often more meanings, sometimes as many

as 15–20. Combining different kanji characters can create a large number of new words and concepts. In elementary school, children learn the 996 most important kanji characters. About 1,850 kanji characters are used in the basic set employed in daily newspapers. A few thousand more are used on special occasions. Few people in Japan are able to read and write more than 10,000 kanji characters. The older generation frequently complain that “the schools just aren’t teaching children to read well anymore.” This might be true, but Japanese children must spend a lot of time and effort on learning to read and write, since their language is so difficult. In addition to kanji, Japanese has kana, a 48-character syllabic language. These characters are used in two versions, katakana and hiragana. Kana writing is used for various inflective elements and for the phonetic writing of, e.g., borrowed words.

Teleman (1991) pointed out that the systems of rules that govern spoken and written language are similar in many ways. Originally, writing was a way of depicting speech, but the two coded systems later went their separate ways. The most tangible feature of the rules for written language is their standardisation. In most western countries, the written language is comprehensible throughout the country and does not reflect differences in dialect.

In *The Medium is the Massage* McLuhan and Fiore (1967) perceived media as powerful. According to the *alphabet theory* western society was shaped by the alphabet. Media is an extension of man. Writing and reading allowed people to forget, and the alphabet changed the way our memory works. Education must shift from instruction to discovery, and to the recognition of the language of forms.

## *Begin writing*

We write information and learning materials in order to be read. The basis for all writing is to consider the reader and his or her actual situation. We need to define the purpose of any text, to define who the reader is, and how we want him or her to change after having read the text. A good starting-point is to consider what the reader may misunderstand in what we are about to write, and then actively prevent these misunderstandings. The more complicated a subject matter, the more important that we make the text comprehensible and manageable for our readers. This means working with the structure, the linguistic usage, and the writing style.

The physical act of writing down one's thoughts with the help of a pen or a keyboard may not require much time. It generally takes longer to think of what the text should consist of than to formulate it. The writing process encompasses much more than merely writing, and it is relatively independent of the language used.

Before we begin our writing, we need to identify the subject matter and define the purpose of the message. This always requires analysis of the target group or the receivers. A receiver analysis might contain evaluation of the receivers' basic understanding of the subject matter, their trade knowledge, experiences, skills, comprehensive capacity, attitudes, prejudices, motivation, linguistic competence, social background and vocation, as well as their age and the various groups that they may belong to or identify with.

Because all of these factors influence how the receiver understands a message, they are decisive for text formulation. We need to gather and sort our material, as well as plan and outline our presentation. We need to choose the typeface,

graphical form and medium. It may be possible to use fixed writing patterns, established models and templates. When we have formulated the text, we will need to process it and adapt it, so that it will suit our readers.

Writing in information design is functional, and differ from creative writing in the same way as graphic design differs from fine arts. We may have to rewrite the text many times before it is finally right. Although it may be true that even the most complicated texts can be presented in a comprehensible form, all writers need practice, practice, and still more practice. A number of authors offer hints on how to write effective texts. Rown-tree (1966) offered the following twelve guidelines:

1. Write as you talk.
2. Use the first person.
3. Use contractions.
4. Talk directly to the reader.
5. Write about people, things and facts.
6. Use active verbs and personal subjects.
7. Use verbs rather than nouns and adjectives.
8. Use short sentences.
9. Use short paragraphs.
10. Use rhetorical questions.
11. Dramatize whenever possible.
12. Use illustrations, examples, and case studies.

Liljestrand and Arwidsson (1979, p. 15) asserted the following (in translation):

Complicated texts are often defended on the grounds that their subject matter is complicated. In reality, however, the more difficult the subject is, the more one must attempt to

express it in a comprehensible way. It is surely more reasonable to expect that someone who is writing for several people expend effort on the writing of his text, than that the various receivers be obliged, each on his own, to expend effort interpreting it!

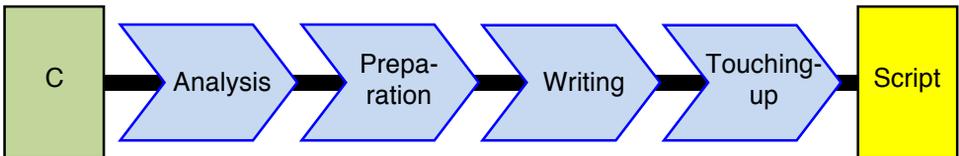
Also Strömquist (1991) maintained that everyone must practice writing to become good at it. Writing is a skill that we can learn. She wrote the following (p. 35, in translation): “It is only by writing oneself that one can fully understand the complicated writing process; it is only by writing oneself that one discovers where the problem lies.” Bergquist (1991) gave textbook authors five terse, vigorous instructions in the form of “commandments” (in translation):

1. The first commandment: Don't write! Even if the author's first impulse is to start to write at once, it is essential to begin with an outline.
2. The second commandment: Use pictures! Get a picture to illustrate each section; wait with your text.
3. The third commandment: Write captions for each picture! Each picture should have a relevant text, which may even have a heading.
4. The fourth commandment: Talk to your editor! Together, the writer and the editor can expand a factual outline into a detailed outline for each layout. The outline contains room for both text and pictures.
5. The fifth commandment: Write in a structured manner! The text should complement the pictures. Therefore, write in the space between the pictures. The editor provides the author with exact data about the number of strokes each line of text may fill.

The actual process of designing and creating integrated verbo-visual information is called “infography.” When text, picture and graphic form are integrated into a fully delimited, structured surface (a functioning whole), the result is a graphical information entity, usually known as information graphics that can be interwoven with texts and pictures in an information layout.

### *Writing strategy*

In the following sections, there are some suggestions on a good basic “general writing process” or “general writing strategy” as the key to good comprehensibility of a verbal and visual message. Use the “message design and information design model” for professional communication and professional writing. The main difference is the clear use of review activities related to each sub process.



*Writing is much more than “writing.” There are four sub-processes between the Commission (C) and the final Script in the “general writing process.” These sub-processes are Analysis, Preparation, Writing the text, and Doing the touching-up.*

Unlike rules of grammar, the following suggestions will change as new research conclusions supplant the old knowledge base in this area.

## **Analysis**

- Define the purpose of the intended message. Are there any specific requirements?
- Define the receiver of the intended message.
- Define the type of representation that will be needed.
- What characteristics do the readers have? Note important facts.
- Are the readers positively or negatively disposed to your message? What are their expectations?
- What external factors can influence how the readers will interpret your message?
- What financial conditions or limitations apply?

## **Preparation**

- When you create a message, proceed from what you know about the readers. What are the readers' levels of knowledge?
- Make a preliminary writing plan. Allot sufficient time. Preliminary planning may take up the bulk of a writer's time.
- Study the subject matter. Gather material by reading, interviewing experts, making observations, and performing experiments.
- Sort out the material that will be included with your text. Proceed from what you know about the readers' potential for understanding it. Focus on the most important aspects.
- Structure the material. This is more important than the actual writing. Make an outline of your subject matter; you can refine it and go into details later on. A technical report should have a title, a table of contents, an abstract or summary, an introduction, a description and an analysis, a conclusion (including your own viewpoints), and a list of sour-

ces or references. Avoid footnotes and appendices, since they are seldom read.

- Plan for the use of pictures. We can use pictures to make it easy for the reader to understand a message. Pictures and text must interact to produce unity. Place texts and pictures that belong together as close to each other as possible.
- There are different types of outlines, for example, narrative and logical outlines. Do not switch between different types in the same document. Emphasize main points.
- Start with the known; proceed to the unknown.
- Write brief and interesting titles and headings.
- When necessary, provide the text with a document number, a security classification, date and other administrative information.
- Choose a graphical form that suits the material and the selected medium. It will make things easier for the readers if information of the same kind is presented in a similar way. A well-thought-out graphical form contributes to the readers' interpretation and understanding of the message content.
- Plan for reviews. Documentation that is not technically correct must not be used as learning support or course material. The documentation must be re-edited until it receives approval.

### **Writing the text**

- Let your writing be simple, clear, and concise. Express yourself in specific rather than unspecific terms. Use a consistent terminology. See sub-section *Text standards*.
- Analyse, argue, describe, compare, refer, make associations, all according to what you understand is needed.

- Use a style that is natural for you. Avoid both colloquial language and excessively formal constructions.
- Avoid writing in a style that is too laconic or sterile, but do not allow yourself to become “chatty.” Sentences that are too dense, that is, sentences in which too many ideas are concentrated and presented, will make your text a tedious reading.
- Use paragraphs to break up the text and make it more readable. Let every paragraph encompass a single unit of content. See sub-section *Text standards*.
- Avoid long, convoluted paragraphs that meander in all directions.
- Sentences should say one thing at a time. Do not cram them with ideas. In general, try to vary the length of your sentences to increase reading ease, but avoid sentences that are too short or too long. See sub-section *Text standards*.
- Simple, active, affirmative, and declarative sentences are the most readable. Be consistent throughout the document.
- Use short familiar words and a defined and established terminology. See sub-section *Text standards*.
- Try not to insinuate subjective values into your text. If it is your own opinion you are expressing, make this clear. Avoid sexism and gender stereotyping.
- Use aids, such as dictionaries and encyclopaedias.
- There should be a theme running through the text. Try to find an unifying principle. Clearly show what you want to express.
- If the subject is on a high plane of abstraction, use concrete examples that illustrate the principles.
- You may use similes and metaphors. They make it possible for readers to create their own inner, mental pictures.

- If the text shows a high degree of specification and examines several separate details, you should summarise every now and then and draw the possible conclusions.
- Sometimes you may find it necessary to write your foreword, introduction, and summary after the body of the piece is written.
- List your references clearly.

### **Doing the touching-up**

- Let your text “rest” for a couple of days or so, then read it from the reader's point of view. Make the necessary amendments.
- Check that the finished text corresponds to the planned text in accordance with the requirements.
- Edit your text! Polish it. Trim away unnecessary bulk. Iron out inconsistencies. Simplify the language. Clean up the punctuation. Every single sentence should be easy to read!
- Check the style and grammar. Discrepancies hinder the reader's progress and make the writer less credible in the reader's eyes.
- Check the spelling and word division at the end of lines. In some cases your word processing program can help you with this.
- Check references and other formal aspects of your text.
- Refine the typography and layout so that the headings, tables, and pictures are presented in a lucid, aesthetically pleasing graphical form. Make optimal use of the possibilities that typography offers.
- Make sure that text and pictures are reviewed before production and publishing. Use a consistent typographic style.
- Produce and distribute the text.

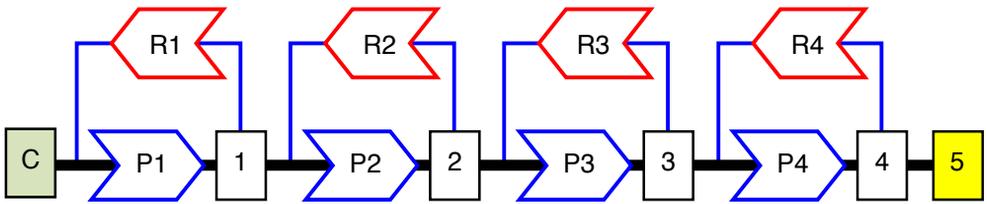
- Store the text for future use.

### *Professional writing*

Professional communication is an umbrella term for the creative activities that adults engage in as they compose purpose-driven communications on the job. It encompasses the range of advanced writing and visual design activity in workplace settings and includes information, instructions, manuals, presentations, and proposals, reports etcetera. Schriver (2011) made substantial literature reviews of the concept “expertise” and “writing” and their implications for “professional writing.” Surveys of adults in the workplace suggest that professionals spend on average 24% of their workweek writing. Existing literature suggests that experts in professional communication and information design need not only schematic and tacit knowledge, but also extensive rhetorical, social, and cultural skills.

My own “message design and information design model” include the following four process activities: analysis and synopsis, production of draft, production of script, and production of original and master. Each activity includes a design sub-process, activity documentation, and a review process. Main message design tools will include text (printed and spoken), symbols, pictures (drawings and photos), typography and layout, light and light effects, sound and sound effects.

The “general writing process” may be used when writing for non-professional audiences.



*The creative message and information design processes include four different production (P) and review activities (R). The production activities are analysis and synopsis (P1) and synopsis (1), production (P2) of draft (2), production (P3) of script (3), and production (P4) of original (4) and master (5). C = commission.*

### **Cultural skills**

As a rule the information designer *must respect copyright* as well as other laws and regulations that are related to design, production, distribution, storage, and use of information materials. This concerns the use of artwork, illustrations, logos, lyrics, music, photographs, specific sounds, symbols, text, and trademarks. It is also very important to respect different ethical rules, media-specific ethical guidelines, and honour all business agreements. Experienced information designers know the applicable legislation, the existing conventions and standards in different countries and in different cultures.

### **Design skills**

Any graphic message should be legible, readable, and well worth reading for the intended audience and any audio message should be audible, distinct, and well worth listening to.

## **Knowledge skills**

According to Schriver (2011) professional communicators possess rich schematic and tacit knowledge about genres, processes, stakeholders, symbols, and tools. Professional communicators are meta-cognitively aware of what they need to know and have strategies for getting that knowledge. They acquire rich knowledge of verbal, visual, and typographic text features and are skilled in combining visual and verbal resources.

## **Rhetorical skills**

Professional communicators are comfortable with displacing one form (e.g., text) with another form (e.g., visual). When they work with design they can coordinate their representations of personal knowledge, the text they have produced so far, the needs of the stakeholders, and the context. They are able to fuse disparate items of content into a coherent whole. They need to decide what to say, how much to say, how to say it and why they make specific choices in particular rhetorical situations. Expert communicators strive to provide the “right” content at an appropriate level of detail in the most suitable media for the audience.

## **Social skills**

According to Schriver (2011) professional communicators are able to *read the context* and scope out cultural and social resources. They are strategic in building alliances with others who may help them to achieve long-term goals for design processes and products.

## ***Text standards***

To avoid distracting the readers, the linguistic usage as well as the style should be correct. There are several good books avail-

able for British as well as American English. See The Publication Manual of the American Psychological Association (2001); and also Kirkman (2003, 2005); Klare (1985), Strunk and White (1979), The Economist (1991), and Young (1989). However, the following sections provide some summary advice on text standards for British English.

### **Linguistic usage**

Any language has rules spelling, grammar and punctuation. It is necessary for communication.

#### *Spelling*

For non-native English speakers it is often hard to distinguish between British and American English. For information on these differences see, for example, *Appendix 3* in Kirkman's *Full Marks* (2003). There is a variety of usage between the suffixes -ise and -ize in verbs (and in nouns that end with -isation or -ization). The source of the suffix is Greek (-izo), a suffix that has been added to Greek, Latin, French, and English words. The American convention is to use -ize; in Britain both spellings prevail.

#### *Syntax*

There are differences between the syntax in different languages. It may be hard for non-native speakers to think in a foreign language. They will easily create texts that are not trustworthy. Write in your mother tongue instead, and let a professional translator adapt the text to the other language. A so called false friend is a word that looks almost the same in two languages, but has different meanings.

### *Abbreviations and acronyms*

Avoid using abbreviations and acronyms. The term abbreviation includes both normal abbreviations and acronyms. An acronym is a pronounceable word formed from the first letter or letters of the significant words of a descriptive phrase, as in LASER (Light Amplification by Stimulated Emission of Radiation). The letters forming an *acronym* are always capitalised and have no punctuation between them. Define abbreviations and acronyms in full the first time they appear in the text. Sometimes abbreviations and acronyms may be defined in a special list.

### *Agreement between subject and predicate*

The predicate (verb) in any sentence must agree in number with the subject. Words that come between subject and predicate do not affect the number of the predicate.

### *Adverbs*

We should link sentences and paragraphs with conjunctions and/or adverbs (*although, and, because, but, even, however, moreover, nevertheless, or, since, therefore, thus*), making sure at the same time that the things linked together bear a logical relationship to each other.

### *Prepositions*

Use the correct preposition for a verb or an expression. If you are not sure which preposition to choose, check in a dictionary.

### *Pronouns*

Remember that the relative pronoun *which* refers only to things. The relative pronoun *who* refers only to persons, and *that* to either persons or things. Pronouns (*it, they*) and the pronominal adjectives (*its, theirs*) cannot be orphans; they must

always have a parent noun close by. You will confuse the readers if you talk about *it* without revealing until later what *it* represents. When writing technical English repeat the important terms to avoid uncertainty.

### *Punctuation*

A colon (:) tells the readers that what follows is closely related to the preceding clause. There are several ways of using the colon. One is to show that a list will follow. You can also use a colon to show that further information is to follow. A third way of using the colon is to introduce an example of what you have said in the first part of a sentence.

*Commas* (,) can help the readers pick out the intended meaning easily. Reading aloud a sentence you have written can help you decide if a comma is necessary. Use commas to avoid ambiguity:

- When you want to comment on an earlier part of the statement.
- When you use the adverb however.
- When you have a compound sentence made up of two independent clauses joined by a conjunction.
- When you have a series of three or more terms with a single conjunction.
- Before and as well as or when you write a list of three or more items in a sentence. Kirkman (2003) stated that a comma before the final and ensures that the itemisation is always absolutely clear.
- To set off introductory words and phrases.
- To set off explanatory information.

- Before and after that is, for example, and similar expressions.
- To clarify long and complicated sentences. (If possible, rewrite these sentences instead.)

*Full stops* (.) can mark the end of a complete sentence. If the whole sentence is in parentheses, the full stop should come before the closing bracket. If only the last part of the sentence is in parentheses, the full stop should be outside the last bracket.

*Hyphens* (-) clarify your meaning when you are using two or more words to form a compound adjective. Using hyphens is a way of making expressions with three or more nouns in a row more precise. Use hyphens after certain prefixes: not normally after Latin and Greek prefixes, but often after English.

*Semicolon* (;) join two grammatically complete, independent clauses to form a single, compound sentence.

## **Writing style**

The subject matter in technical and scientific texts is often complex and may be difficult to grasp. But what makes a text difficult to read is not as often the subject matter or the combination of spelling, grammar, and syntax as the style. The choice of words, expressions, symbols, and picture elements creates the style. A writing style that includes abstract words, long and complex sentences, stilted language, jargon, and passive constructions may obstruct the reading of the text. A drawing style that includes many different kinds of patterns, shadings, and lines, and inconsistent use of symbols may obstruct the reading of the pictures. A few guidelines may be used to enhance *readability* of text and pictures.

### *Keep it simple!*

Leave out needless words and needless pictures and picture elements. This does not mean that all your sentences have to be short, or that you have to avoid all detail.

- Do not state the obvious.
- Explain new terms in ordinary words.
- Avoid grandiose and pompous words as well as jargon.
- Avoid long, polysyllabic, complicated words.
- Avoid buzzwords, slang, and expert jargon.
- Avoid superfluous intensifiers (for example, *very*, *rather*, *quite*, and *much*) and tautologies that are saying the same thing twice.

### *Be clear!*

Put yourself in your readers' situation. Structure the text and try to be as clear as possible. Avoid strange and foreign words. Express one idea per sentence. Keep to a simple word order and avoid long-winded expressions.

### *Be precise!*

Choose your words carefully. Avoid vague and imprecise words. Prefer the direct and concrete to the indirect and abstract. Do not use an abstract noun when a straightforward active verb is better. Do not pile up adjectives or words you want to use adjectivally, in front of a single noun. Avoid three or more nouns in a row.

### *Be consistent!*

Inconsistencies will confuse the readers. Always use the same words for the same concepts. Do not mix the tenses. Avoid formal language. Do not write contracted forms, for example, *it's*,

*he's, wouldn't.* Instead, use the expanded forms, *it is, he is or he has, would not.*

### *Active versus passive*

Avoid complicated word order and subordinated clauses. Use the active voice. It is usually more direct than the passive; it tells the readers exactly who or what is performing the action. Constant use of the passive voice can make your writing imprecise and difficult to follow.

### *Personal versus impersonal*

In technical and scientific descriptions we want to focus on the subject matter. Here, the third-person point of view, or the impersonal style, is the most appropriate. In instructions and rules, the informal you is often the most effective form of address. Non-fiction is a text where the author has the intention to tell us about something that is real. In non-fiction books we may want to discuss a topic with the readers. Here a personal style may be the most appropriate.

### *Effective headings*

Well-written headings help the readers to quickly find the information they want. Headings show the readers how you have structured your text. Never end a heading with a full stop. However, a question is followed by a question mark (?), and an exclamation is followed by an exclamation mark (!).

### *Capitalisation*

Internationally, there are several conventions for how to capitalise titles, chapter headings, section headings, and concepts in body text. The conventions differ between the USA and Britain.

They also differ within each country, between different publishing firms and between companies.

### *Use captions*

Always write captions to explain the intended meaning of pictures.

### *Use lists*

Lists are an efficient way of presenting a number of related items.

- As few as two items, if they are long or complex, can be presented in a list. A single item should never be presented in a list.
- Three or fewer simple items can be listed within a sentence.
- Four or more items are best presented as a bullet list (like this one) or as a numbered list.
- Each item in your list must have the same general form and use the same syntax.
- Each item in your list must begin with a capital letter. If your list item is a complete sentence then it must also end with a full stop. Do not use commas or full stops at the end of list items that are not complete sentences.
- Use a bullet list when the information you are itemising does not have to be considered in a particular sequence.
- If the information you are presenting does have a particular sequence or a priority order, then use a numbered list. If possible, avoid using sublevels within your list. Sometimes, however, it is necessary to use a secondary list within a primary list.
  - A secondary list starts with a hyphen.
  - There should be at least two items in any list.

## *Emphasise*

Italics give emphasis to a word or a group of words. In order not to confuse the readers, it is important to establish a consistent system for how to signal emphasis. Use italics for emphasis sparingly; too many italicised words may reduce the emphasis. Use italic as follows:

- To mark titles of books.
- To show that it is a single word, not the whole phrase, that contains the point.
- When a word is in sharp contrast to the expected word.
- To show contrast between words.
- To mark a word that would have been stressed if spoken.

## *Write correct references!*

Write references in accordance with international conventions. There are different conventions. Pick one!

## *Captions*

In 1982 Jonassen (p. 305) noted that: “It is well established that picture interpretation is closely tied to individual experiences and expectations; even students with similar backgrounds and abilities do not always interpret a picture in the same manner.” We need to (p. 307): “simply and directly inform the learner of picture content and purpose ... in a separate caption, adjacent to the picture.”

It is possible to interpret most pictures in several different ways until they are “anchored” to one interpretation by a caption (Barthes, 1977; Pettersson, 1988, 1990). The only way to assure that information conveyed by pictures in information materials is clear and unambiguous is to write captions (or *le-*

*gends* as they sometimes are called) for each picture and tell the reader what to see (Zimmermann and Perkin, 1982; Bernard, 1990). This will increase the readability of the pictures.

In one study Pettersson (1990) presented views expressed by teachers and students in Sweden. A total of 164 subjects made 1,938 statements regarding the use of pictures in teaching. One of the findings stated that captions are needed to explain what is important and to indicate how pictures should be interpreted since visuals always can be interpreted in multiple ways.

Melin and Pettersson (1991) studied how captions and illustrations co-operated in three textbooks for junior high school. The captions did not fill the purpose they could have filled. Captions were seldom the “bridges” between illustrations and text that would ease the understanding of the text as well as of the pictures.

Winn (1993) noted that students often need specific instructions regarding how to look at and interpret a picture. Captions can effectively direct attention where the designer wishes it to be directed within the picture. In information design the main function of captions is to help the reader select the intended content in the picture.

### **Content of caption**

Pictures that will be used for information purposes should always be supplied with captions. This is the only way to assure that information conveyed by these pictures is clear and unambiguous. The caption and the visual should interact as parts of a whole and integrated message. A caption should describe image contents and govern the way a picture is read: a picture pro-

ducer's intentions about what the reader is supposed to see and learn from each illustration should be as clear as possible.

Captions can tell the reader what pictures can't. They can convey non-visual senses more effectively than photos. They can tell time, temperature and size. Captions can explain the causes of what a photo shows. They can also explain the consequences that may follow.

Captions can call attention to what readers may overlook in a picture. We should use captions also in order to explain any techniques that may have been used to create special effects in pictures. A photographer may use filters, special lenses, double exposure and special processing in order to achieve unusual effects. In a similar way a fine artist may use a variety of special drawing techniques.

To a large degree readers see what they are told to see in an image. To get maximum impact from a visual we should introduce the visuals before presenting it. We create a "pre-understanding" of how a picture may be interpreted, based on the context in which the picture is shown (Pettersson, 1989).

### **Form of caption**

A caption should be edited to fit different reader categories, such as general readers (children, teenagers, adults...), technical readers, and specialist readers. McDougall and Hampton (1990, p. 134) remarked that a printed photo is, in fact, past tense but captions are usually written in present tense to immediacy. However, when an activity must be explained, present tense and active verbs are appropriate. The caption should be brief and easy to understand. A general reader knows little, if anything, about the subject matter. The captions and the pictures are kept simple, attractive, and informative. They should not be too

complicated and, thus, distracting to the reader. A technical reader will understand technical concepts but may not be familiar with special terminology. A specialist reader has a good understanding of the subject matter. Both the text and illustrations, which may consist of detailed drawings, graphs, technical photographs, ultra-sonograms, or other realistic pictures or symbols, may be detailed.

According to McDougall and Hampton (1990, p. 150) good captions, like swimsuits, should cover the essentials, yet be brief enough to remain interesting. An excessively long caption diverts the reader's attention from the main thread in the overall text. Just as it is natural for the main text to refer to the caption, it is equally important for the reader to be able to make her/his way with ease from the caption to the main text – not merely the readers who shift back and forth between the main text and the caption! This also applies to an equal degree to the many readers who begin with the pictures and captions without any intention of reading the entire main text and who are only interested in obtaining detailed information on a particular illustrated section.

A caption can have a *heading* as an additional link between the picture and the caption. A good *caption title* provides a short summary of the combined information. The title of a caption should be short and distinct. Quite often one word is enough. It could give answers to questions like these: Who? What? When? Where? Why? and How?

### **Caption–picture relationships**

We need to tell the reader or viewer what we want her or him to see and learn from the illustration (Pettersson, 1989, 1993; Winn, 1993). We need to explain the pictures. Photographs

nearly always need a partnership with words that will confirm, clarify and reinforce their messages (McDougall and Hampton, 1990, p. ix). However, we may also find captions with several apparently different functions. Sometimes captions are used just as labels. They may convey factual content, or information about events. The captions may function as “bridges” between the main text and the various illustrations. Captions may also evoke emotions in the viewer.

A picture without a caption has limited informational value. A picture is usually too ambiguous on its own. A picture caption must describe the picture and guide the reader to the specific interpretation that the information designer wanted to convey to the reader. Captions and pictures can have different kinds of relationships, such as redundant, relevant, irrelevant, contradictory, positive, and negative relationships.

In a *redundant relationship*, similar information is conveyed via words, sound, and visuals. For example, subtitles can be added to a television program, so that the action displayed on the screen is described by words.

In a *relevant relationship*, the information presented via a text or sound supplements the information supplied in the visual. Visuals with relevant relationships to a spoken or printed text can greatly enhance the text’s informative effect, and vice versa. Captions should be redundant or relevant to the picture. Then the reader will be able to process the information effectively and create necessary mental representations and reach an understanding of the intended content.

In an *irrelevant relationship*, pieces of information presented in various channels are independent of one another. In television programs the picture sometimes deals with one aspect, the text with another, and the sound with a third.

A *contradictory relationship* exists when the information in various channels conflicts. This is disastrous for any informative program and any learning material.

A *positive* and redundant caption will influence our perception of the content in the picture in a positive way.

A *negative* and redundant caption will influence our perception of the content in the picture in a negative way.



*This is a photograph from Yellowstone National Park. Tourists are looking at the hot springs. We can use positive as well as negative captions to describe any picture. The content in the caption will influence our perception of the picture. Consider the following two alternative captions to this picture.*

1. Already in 1872 the authorities managed to preserve a large area in the western part of USA for all people to enjoy. Thus the marvellous Yellowstone National Park is the oldest Park in the world. This picture shows how easy it is for visitors to access the hot springs and enjoy the wonders of nature. Various minerals create an “artistic” and colourful environment.
2. Already in 1872 the authorities regulated our possibilities to move around at our own will in the western part of USA. This

picture shows an area with hot springs in the Yellowstone National Park. The steam has a nasty smell and it may cause serious illness. It is a very dangerous surrounding. Take a step in the wrong place and you may disappear forever.

Schraver (1997) discussed five kinds of relationships between texts and visuals: (a) Redundant, (b) complementary, (c) supplementary, (d) juxtapositional, and (e) stage-setting. In her system a *redundant relationship* allows the viewer to see identical information in both text and picture. In a *complementary relationship* words and pictures complement each other. In a *supplementary relationship* one format dominates the other. In a *juxtapositional relationship* texts and visuals are presented at the same time. In the *stage-setting relationship* one format provides the context by forecasting upcoming themes. It may be an illustration at the beginning of a chapter.

(See the book *Information Design 4—Graphic Design* for information about graphic design aspects related to captions.)

## **Infodidactics**

From time to time new areas of knowledge emerge. At the same time established areas of knowledge become less important. Some areas disappear. Today there may be many thousands of academic disciplines. Information design is a fairly young academic discipline (Pettersson, 2009, p. 39).

Infodidactics is an umbrella term for the methods used for teaching various aspects of information design. The huge spread among the different disciplines makes information design an interesting, but also a complex area of research and teaching. This is discussed later.

## *Successful teaching*

Whereas an individual can learn without a teacher, a person cannot teach without a student. There is some debate among teachers as to whether teaching also implies learning. Does a student have to learn for teaching to have taken place? This is certainly not always the case. In most situations, students are responsible for their own learning. However, some definitions of teaching now imply that students actually have to learn something as a result of teaching. Dryden and Vos (1994) noted that (p. 222): “Youngsters are their own best educators, parents their best teachers. Our homes, beaches, forests, playgrounds, zoos, museums and adventure areas are the world’s best schools.”

The school and the teachers used to have a monopoly on the transfer of information to students. Today, children and youth get information from many different sources. Mellander (1993) made a bold statement with respect to learning, teaching, and studying. Mellander put it this way (p. 2): “Actually, learning is only difficult in connection with teaching and studying! Otherwise people seem to learn without much effort. How else could we have assimilated the enormous amount of knowledge that we possess?”

Kemp and Cochern (1994) provided some generally accepted principles and practices for successful learning in traditional training situations. The following twelve guidelines are based on a summary chapter made by Kemp and Cochern (p. 135 - 136):

1. Students should have satisfactorily achieved a level that is necessary before starting present training.

Successful learning is more likely when students are informed of the specific objectives to be achieved.

Learning can be improved when content and procedures are organized into meaningful sequences. The size of each segment depends on logical divisions, complexity, and difficulty.

Present new information in a meaningful order and in manageable “chunks” for students to learn during a single study interval. Then by combining chunks, reviewing, and using the information, it can pass to permanent learning.

Since students learn at different rates and in different ways a variety of instructional procedures should be considered.

A person must be motivated to want to learn.

Instructional resources should be carefully selected and integrated to support learning activities.

Active participation by students is preferable to lengthy periods of passive listening and viewing in a classroom.

For satisfactory learning, there is a close connection between feedback and reinforcement.

To ensure that the results of learning will be retained for a long period of time, provision should be made for students to review the information or practice the skill as soon as possible after instruction.

Provide opportunities for students to apply new learning to a variety of realistic tasks.

A positive attitude shown by the instructor can influence motivation and attitudes of students.

Cotton (1995) noted that recent work on the understanding of science has shown that some teaching leaves school children more confused than they were without science lessons. According to Cotton this research is well documented and it is difficult

for science teachers to accept these results. Dryden and Vos (1994, p.267) noted that the best systems in the world are programmed to succeed. The world's airlines plan to land their planes with 100% safety every time. A one-in-a-million failure rate would rightly be regarded as a tragedy. The world's top car companies spend a fortune to reduce their manufacturing fault-rates from 2% to 1%. But most school systems actually expect and plan for a reject rate that would send any business bankrupt. Most current educational systems are programmed to fail a large percentage of students; in some cases up to 50%.

Dryden and Vos presented several examples of drastically improved learning. They concluded that a learning revolution would take place outside the traditional classrooms and without traditional teachers. They challenge the idea that traditional classrooms with traditional teaching will remain as the main medium of education. Dryden and Vos argued that most of the learning breakthroughs have already been made. Several breakthroughs have come from able teachers, from business, from sports psychology and coaching techniques, and from research into the human brain. Some breakthroughs have come from studies in nutrition, and some from health programmes. Many breakthroughs have come from linking communities, schools, and businesses together to re-plan the way ahead. For teachers to be successful, Dryden and Vos recommended the following six steps "to teach anything" (p. 294):

1. The right "state"
  - Orchestrating the environment.
  - Positive mood of teacher, student.
  - Affirming, anchoring and focusing.
  - Outcome and goal-setting: What's In It For Me?

- Visualize your goals.
  - Regard mistakes as feedback.
  - Peripheral posters.
2. The right presentation
    - Getting the Big Picture first, including field trips.
    - Using all learning styles and all 7 intelligences.
    - Drawing, Mind Mapping, visualisations.
    - Active and passive music concerts.
  3. Think about it
    - Creative thinking.
    - Critical thinking-conceptual, analytical, reflective.
    - Creative problem solving.
    - Deep memory techniques for permanent storage.
    - Thinking about your thinking.
  4. Activate to draw out
    - To access material and bring out of storage.
    - Games, skits, discussions, and plays, including all learning styles and all 7 intelligences.
  5. Apply it
    - Use it.
    - Do it.
    - Mind Map it.
    - Combine it with what you already know.
  6. Review and evaluate
    - Know that I know.
    - Self/peer/instructor evaluation.
    - Ongoing review.

Reinhardt (1995) concluded that applying technology to the learning processes can result in (p. 70):

- Boosting of curiosity, creativity, and teamwork.

- Changed role of the teacher.
- Re-emergence of the apprenticeship model.
- Reduced intimidation and frustration among students.
- Reduced behavioural problems and improved concentration and self-image.
- Access to more information (i.e., background on demand)
- Richer information environment to penetrate “media overload.”
- Breaking down the walls of the classroom, integrating home, town, and world.

### *Practice and theory*

Architecture, dance, economics, education, engineering, fine arts, journalism, medicine, music and theatre, and also information design, are all examples of academic disciplines that have a practical as well as a theoretical component. When studying such disciplines it is important for the students to work with theoretical as well as practical assignments.

We may see information design as a “theoretical practice” or as a “practical theory.” Thus it is a complex area of research and study. Nordegren (2004, p. 23–24) noted that adding a theoretical view to the practice of design is to reflect on the methods, aims and the results of this practice. In order to perform sound reflections, and do a qualified reflection, we need concepts both to structure thoughts and to describe them verbally. And in order to do that we need to engage in discussions meet with other researchers who are interested in working on the same or in similar research areas and issues.

In practical disciplines students need to develop practical experience and vocationally oriented skills and craftsmanship. They need to work with practical exercises and learn how to

execute different tasks in the best economical, practical and safe way.

In theoretical disciplines students need to develop their theoretical skills. They need to work with theoretical assignments, and exercise their analytical and logical skills.

Although information design theories frequently refer to descriptive theory and propositions, the main functions are to guide the information designers in how to actually design, present and produce information sets. In order to do this, it is important to work with problem-oriented learning in realistic projects, with existing and true problems, with regular “senders” or “information providers,” with actual information materials, and with real “receivers” or “information interpreters” that need the information. This also provides realistic experience with budget and time limits.

### *Work range*

There are many information professions. Groups which mainly work with information, such as e.g. editors, information providers, journalists and marketers, all have similar knowledge of Man and knowledge of information and communications as starting points. They basically utilize the same methods and techniques in their jobs. However, their roles differ in society. Professional roles give each group a special identity and make different demands on loyalty, experience and know-how. The loyalty of an information-provider is to her/his employer. The loyalty of a journalist should be to her/his readers, listeners and viewers rather than to her/his employer.

Information designers work in a range of activities: form and document design; “way showing systems”; interactive and time-based infographics; digital content management; devel-

opment of knowledge structure and management systems; product and instructional design; technical writing and publications; and information architecture. Their work ranges from overall strategies for information formation and transfer, to specific solutions for data clarification and transfer. The main goal of information designers is to provide user-centred solutions, making the complex clear and relevant, and adding value to data and information.

Around the world academic programs in information design vary according to emphasis placed by faculty on areas that contribute to the overall program, including graphic design, interface/interaction design, technical communication, communication models, linguistics, accessibility/usability, cognitive and social sciences, statistics, computer science, network systems, and business. Programs are both intra-disciplinary within art and design, and interdisciplinary, based on specific goals and objectives of the program.

### *A pedagogical model*

This section presents the pedagogical model that we have used in several information design classes, in traditional teaching as well as in distance classes with e learning. We have had very positive responses from the students. However, since people are different it should be noted that this pedagogical model does not work for all students. It has not been possible to adjust the pedagogical model for students with different learning styles. Furthermore many students have usually been highly motivated. Maybe highly motivated students will learn regardless of the system used.

This model is based on the theories of combined learning, with strong influences from areas like constructivism, learning

from analysis and problem solving, and cooperative learning. As previously noted we may assume that, in many situations, several learning processes are involved while we are learning. The goal is to work with methods creating commitment, motivation and learning. The teacher becomes a supervisor and a co-worker rather than a traditional lecturer. The students' study of carefully selected literature is a base for discussions and understanding of the subject matter.

### **Students work together**

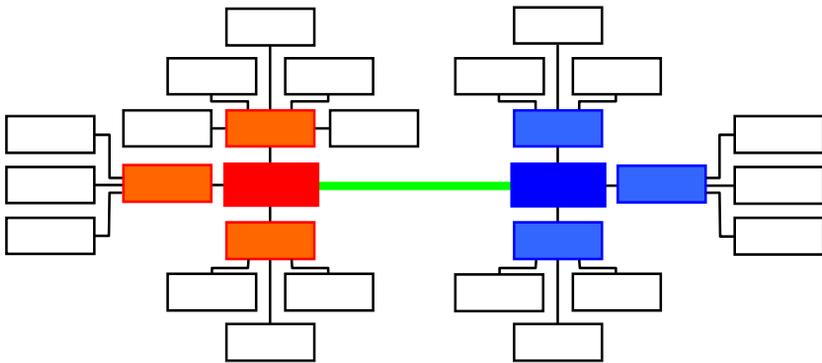
Learners work together in a cooperative learning environment. Thus they support one another when they learn. Since each mind develops different symbol structures, each mind perceives reality as well as all kinds of information materials differently, although common understandings may occur.

Cooperative learning consists of instructional techniques that require positive interdependence between learners in order for learning to occur (Funderstanding, 2005). In cooperative learning the dialogue is primarily between students, not with the teacher or with traditional teaching materials. However, a continuous dialogue with the teacher is desirable to secure understanding of the subject matter content. According to Kristiansen et al. (1994), the ideal learning situation includes (p. 23):

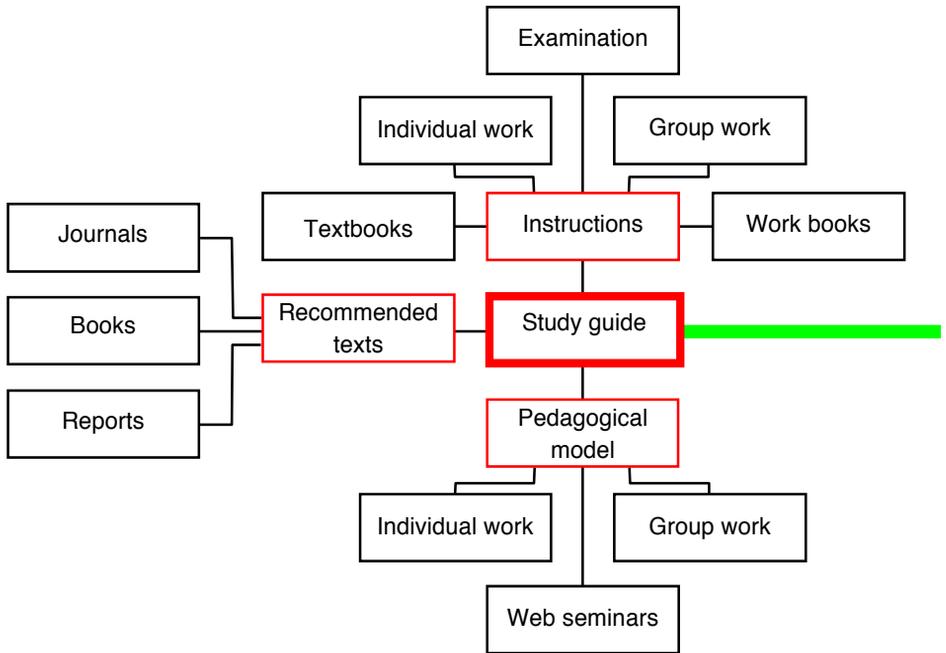
... the best possible contact with the fact about which one is to learn using the senses, the possibility of contact with people of the same ability who can create a good learning environment and with whom one can discuss, the best possible professional and pedagogical preparation with a view to learning and the opportunity for dialogue with helpers. And the most important; a learner who is knowledgeable

about the learning process and his own role in it, who is motivated for the learning work and who believes in himself.

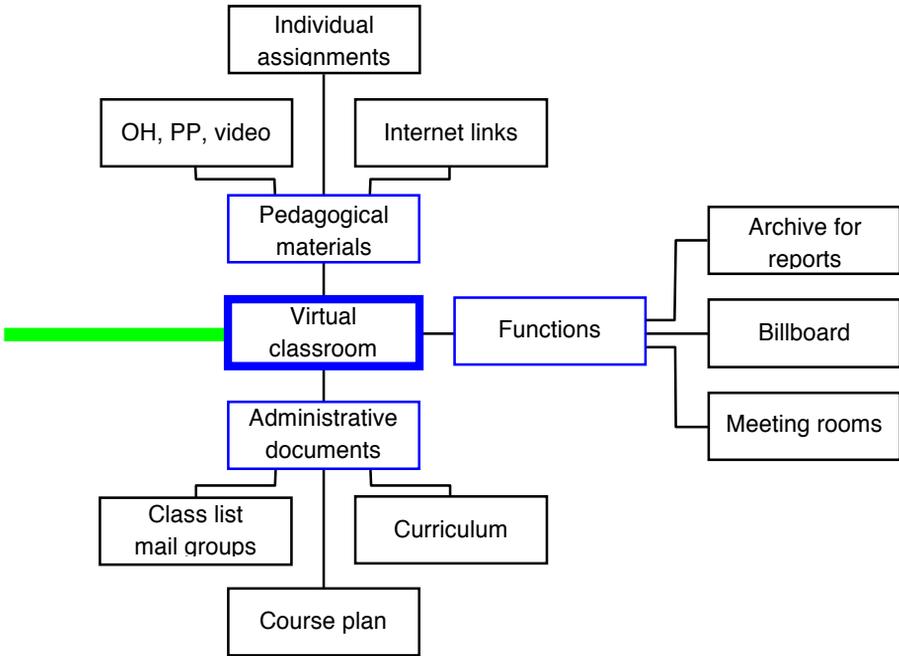
Cooperative learning is effective for developing problem solving skills in various content areas and grade levels (Johnson & Johnson, 1999). From a teaching philosophy perspective, cooperative learning is consistent with constructivism primarily due to the role of social interaction. According to some researchers learners who work together in a group co-construct more powerful understandings than individual learners can construct alone (Eggen & Kauchak, 2001). It should, however, be noted that there are different styles of learning, and cooperative learning does not work well for all students.



*The “pedagogical model” for information design. Please see the following two enlargements for the details.*



*According to the “pedagogical model” students must have access to a comprehensive Study guide with information about the course. Students have easy access to instructions and to some of the recommended texts.*



*During the course all students may use a virtual classroom when they work together with group assignments. Here they can upload their own individual assignments. In this way all assignments are available for all students in the class.*

In this pedagogical model the emphasis is on the learner, not on the teacher or the technology. Students have access to a *Study guide* with important information. They use a *Virtual classroom* when they work together with group assignments. Students also have individual assignments.

### **Forum discussions**

In each module all students will reflect on the readings and participate in the asynchronous module forum discussions. Post your views in the discussion forum and respond to at least two of your peers.

## **Assignments**

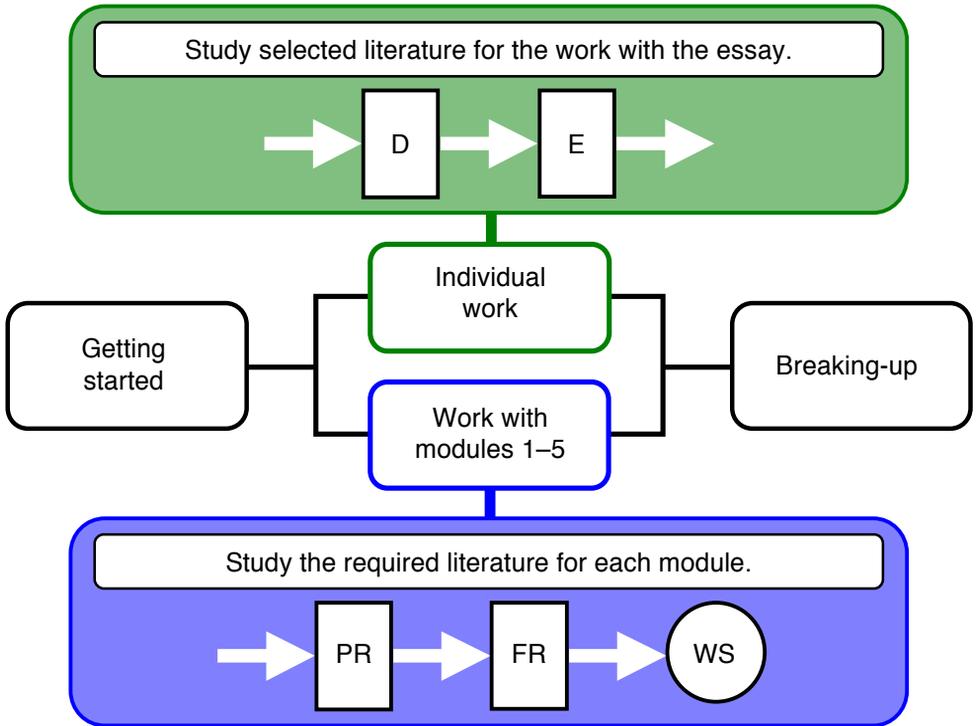
When working on group assignments students need to have continuous contact with each other. This can happen with personal meetings or by means of electronic mail, electronic meetings in “virtual group rooms” or on an “electronic billboard.” Members of each group will decide how they want to work together.

The group assignments are concentrated on analyses, discussions and reflections of questions within each of the five modules of the course. Each group of students makes a joint presentation of the compulsory assignments within each course module. When necessary the groups may get guidance during the work with the different assignments. The module reports are examined and corrected within each group before they are uploaded in the virtual classroom. Then the module reports are automatically available for the rest of the students in the class.

## **Web seminars**

In a virtual web seminar, a web meeting, a “webinar,” or a “chat,” the groups have the chance to have direct contacts to discuss problems related to the contents in the module. It is important that some students from each group participate in the web seminar representing the group.

According to this pedagogical model each student must take an active part in work with all group reports, all discussions and all reviews of reports from other groups, and also write an individual essay. This is important for grading.



*Work with the individual examination paper includes selection of a topic, studies of literature, producing a draft (D), review and editing this until you have a final essay (E), which you can distribute at the end of the course. Each course module include study of the required texts, participating in the forum discussion, work with assignments, writing provisional module report (PR) and a final module report (FR), distributing this and reading the module reports from the other groups, and finally participating in the concluding web seminar for the course module (WS).*

## Conclusions

It may be possible to create valuable courses and programs in information design if we consider these conclusions:

1. Information design students have different backgrounds and they use different learning strategies. We should plan teaching in such a way that a large part of the students actually learn what they are expected to learn.
2. Information design has a practical as well as a theoretical component. Main areas are language disciplines, art and aesthetics disciplines, information disciplines, communication disciplines, behaviour and cognition disciplines, business and law, and media production technologies.
3. An information designer needs to develop skills in writing comprehensible, clear and consistent texts, in creating clear illustrations, and in creating a clear, transparent typography and layout that aids understanding and learning. The main goal in information design should always be clarity of communication.
4. When students like to work together they may take part in and benefit from a cooperative learning process. In this case the teacher becomes a supervisor and a co-worker rather than a traditional lecturer.
5. The context in which a specific message is presented has a major impact on the way that the message is perceived. We need to take into consideration that even when we follow all information design principles the individual “information interpreter” may conceive or misconceive the information, may use or not use it, may use or misuse it.
6. Regardless of the selected medium, a well-designed information material will satisfy aesthetic, economic, ergonomic, as

well as subject matter requirements. A well-designed information material makes everyday life easier for people, and it grants good credibility to the senders or sources.

This discussion concerns the design of courses and programs as well as teaching of information design. However, these findings may probably also be of value for design of courses and programs, as well as teaching, of communication design, educational technology, interaction design, instructional design, instructional message design, and other related areas.

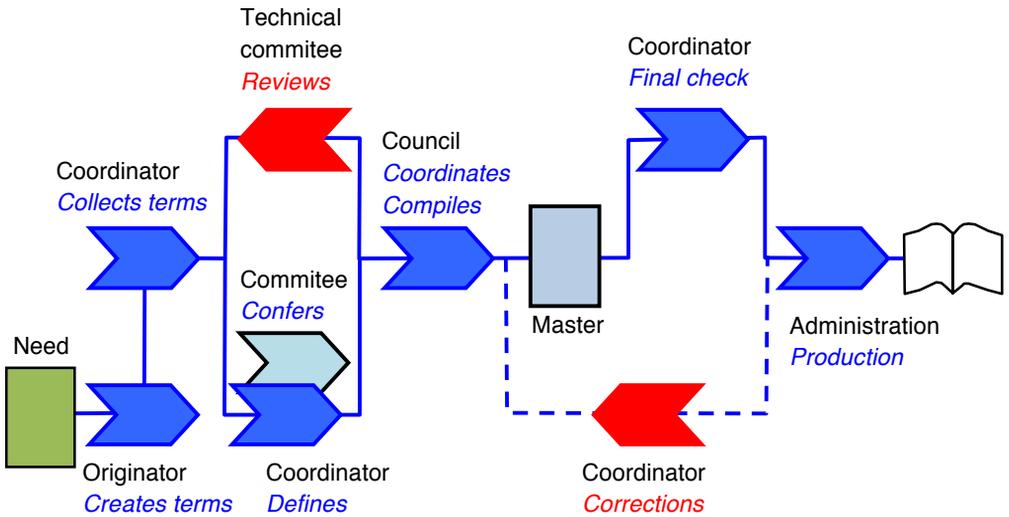
## Terminology work

To make information exchange efficient, all staff in any major R&D project must use terms and concepts that are not misunderstood. Research and development is generating a never-ceasing flow of new concepts and new terms. In pioneering technologies, clear-cut definitions and descriptions of concepts, processes, products, and services are particularly important. Simultaneous development in different parts of the world involves the risk of similar terms being used with different meanings, or – vice versa – dissimilar concepts being given identical terms. As a result, coordination in some form or other is needed.

To make information exchange efficient, all the staff members in any major R&D project must understand new concepts and use terms that are not misunderstood. In order to ensure good quality of glossaries, encyclopaedias, and other information materials it may be a good idea to follow a standardized process for terminology work. Without a defined process it is always a major risk that some important aspects are forgotten from time to time. At the Swedish R&D-company *Ellemtel*, working in the field of telecommunications, we developed and used such a process for terminology work (Pettersson, 1995b).

One effect of research and development is the generating a never-ceasing flow of new concepts, and new required terms. Some concepts may be common to more than one field and may thus acquire more than one corresponding term. Each term considered separately is seen to be appropriate and may be ratified; but synonyms are thereby created which may cause a great deal of trouble later. It is necessary therefore to look at times outside the narrow limits of the field in question and see if some

concepts occur in other fields where they may have already proper terms.



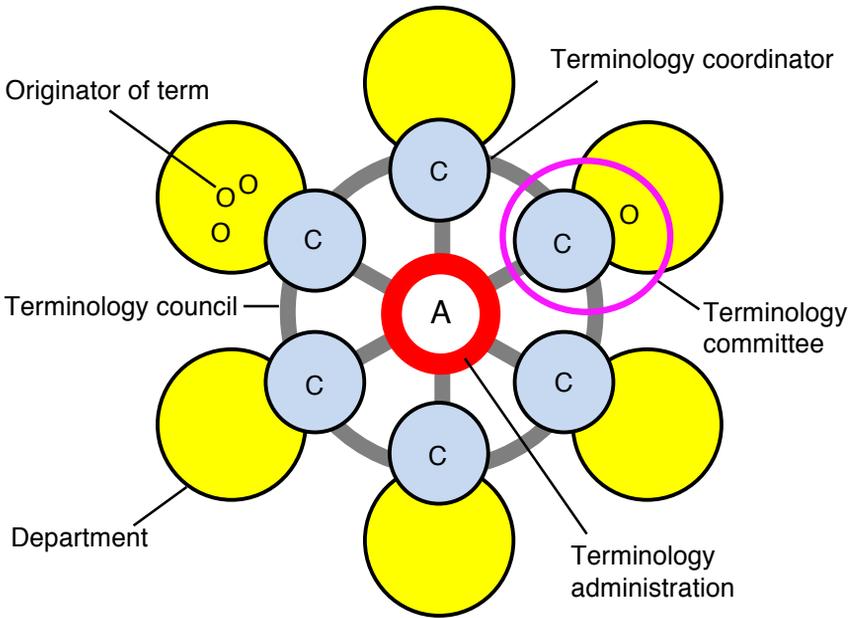
*The terminology process at Ellementel 1990–1995 looked like this, from definition of the needs to the complete terminology.*

In pioneering technologies, clear-cut descriptions and definitions of concepts, processes, products, and services are particularly important. Simultaneous development in different parts of the world involves the risk of similar terms being used with different meanings, or – vice versa – dissimilar concepts being given identical terms. As a result, coordination in some form or other is needed within any major project for research or development.

Terminology work involves continuous collection, review, description, definition, and presentation of new concepts and their terms. These terms should be made available as soon as possible to the people who need to have access to them in their

daily work. This may be done as printed or electronic documents. Individual staff members or groups of staff create new concepts and new terms. This means that there will be a number of “originators” of “preliminary terms” or “working terms,” and their corresponding descriptions and definitions. The people who create concepts and terms may be called “originators of terms.” They should get into contact with the “terminology coordinators,” who continuously collect new terms and concepts related to their own field of activities and expertise, and compile their department or project glossaries.

The terminology coordinators may organise one or more – temporary or permanent – “terminology committees.” Concepts and terms of importance to several staff members in one or a few groups should be discussed in these committees, which may occasionally include a representative of the terminology administration, with a chairperson and a secretary, should maintain contact with the terminology coordinators and they convene the “terminology council.” The terminology council may discuss problems of common interest and then make the necessary decisions. The terminology administration's tasks may also include successively making a list of terms, or a combined glossary, from those locally compiled by the terminology coordinators.



*The organisation of the terminology work at Ellemtel 1990–1995 looked like this.*

The tangible results of the terminology work may be a glossary and an encyclopaedia. The glossary usually contains brief explanations of terms. The encyclopaedia describes terms in more detail and may also include symbols, illustrations, and conceptual models. The glossary and the encyclopaedia may be stored in a common database in order to be accessed by all staff over an internal computer network or over Internet. In accordance with a publishing schedule, the terminology council may also chose to produce books or booklets. Most of the work on single concepts is done in preparation for, and to follow up, the meetings of the terminology-council.

ISO/TC 37 is a technical committee within the International Organization for Standardization (ISO) that prepares

standards and other documents concerning methodology and principles for terminology and language resources in the contexts of multilingual communication and cultural diversity. ISO 704:2009 is an ISO standard. This standard establishes the basic principles and methods for preparing and compiling terminologies. It describes the links between objects, concepts, and their terminological representations. Another important ISO standard is ISO 860:2007. This standard specifies a methodological approach to the harmonization of concepts, concept systems, definitions and terms.

## **Concepts and terms**

When we develop a terminology with concepts and terms within a specific area it is important to set up some terminology requirements, such as the following examples:

1. Terms should be linguistically effective. We should avoid synonyms and technical terms that are misleading.
2. Terms should be precise. Example: opening button is better than opener. We should write clearly, avoid too narrow definitions, too wide definitions, as well as circular definitions.
3. Definitions and descriptions should be easy to understand, short and correct, and have good readability and legibility.
4. Terms should be compatible with the language system in which they are used (which means that the introduction and use of loan words is a difficult and delicate matter). We should use positive terms instead of negating their opposites. Writers of descriptions in English will find good and easily comprehensible advice in John Kirkman's book *Good Style* (2005).

5. Terms should be generative and derivable. Example: desk-topper instead of desktop publisher.
6. Terms should be “transparent.” Example: line reader.
7. A term may be an acronym. Example: *LASER* (Light Amplification by Stimulated Emission of Radiation). Acronyms should be pronounceable, and written with capital letters. After some time, an acronym may become an “ordinary” word in the vocabulary of a language and should then be written with lower-case letters (laser).
8. People within the specific area, even internationally, should accept terms. Example: chip. We should not establish new terms that are unnecessary.

Most terms are nouns, verbs, or adjectives. Nouns account for about 90% of all terms. We can create terms in the following ways (in alphabetical order):

- *Abbreviations* need to be explained. There are several kinds of abbreviations:
  - Bracket forms. Examples: a nuclear/-powered/ submarine, a /tele/phone call.
  - Initialisms. Examples: DP, HDTV, ACTV, laser, modem, and radar.
  - Short forms. Examples: ad(vertisement), (motor)car.
  - Portmanteau words. Examples: bit (binary digit), and positron (positive electron).
- *Compounds* (written as one or more words, or joined by a hyphen). Examples: mainframe, and stand-alone modem. We should avoid long compounds.
- *Derivations*. Examples: computerised, computer-based, and telephonist.

- *Loans*. In many languages, words are borrowed from other languages. English words like layout and feedback are used in Swedish.
- *Multi-word terms*. Examples: external storage, liquid crystal, and liquid-crystal display.
- *Single words*. Examples: computer, telephone, and switch.
- *Symbols*. Examples: m (meter), O (oxygen).
- *“Vacant” words*. There are a large number of letter combinations not yet used as words. Examples: *gemo*, *gnut*, and *grif*.

Terminology should be based on standards and standardisation work. New terms must be defined as exactly as possible, and their meaning must be established. We can define words in the following different ways (in alphabetical order):

- *Content*. Some terms can be defined by using super-ordinate concepts and a sufficient number of limiting characteristics. Some terms can be defined by successively including subordinate terms.
- *Context*. Some terms can be defined by being used in such a way, and in such contexts, that they cannot be misunderstood. Technical terms should have a reference to the source document, to enable people that are interested to read more about the terms and to obtain complete background information.
- *Extent*. Some terms can be defined by listing phenomena, sub-concepts, or rules.
- *Operation*. Some terms can be defined through a definition of the manner in which the result of a specific measurement is obtained.

The principles that guide the selection of terms and concepts within a project may be summarised as follows:

1. Define and describe concepts and terms that are specific to the project.
2. Concepts and terms must be relevant and suited to their purpose. Often they need to be adapted to the most important markets. A “market adaptation” may be particularly important when products and services are to be named.
3. If possible, concepts and terms should be created early in the development phase. Terms with several different meanings may crop up, but avoid using them.
4. We should use words that convey a positive message and avoid ambiguous words. Terms and concepts must not have any unfortunate connotations.
5. Be careful with acronyms. Avoid acronyms that are used by competitors, as names, products or services.

### *A glossary*

The contents of a glossary within a specific organization may be summarised as follows:

- A glossary should contain explanations of all terms (including abbreviations and acronyms) that are to be defined, in accordance with general rules or guidelines for the selection of terms.
- Explanations of terms are short and distinct; at the most eight lines.
- The first word, abbreviation or words in an entry is an *entry term* or a *headword*.

- Every entry, or article, with its entry term, explanation and reference to “owner” or “originator” may be seen as a separate “information element” or “lexical unit.”
- Usually a glossary does not contain any pictures.
- Concepts that require a full presentation should be described in more detail in an encyclopaedia, often with both text and pictures.
- A symbol in a glossary, immediately after the explanation of a word, may refer to the corresponding entry term in an encyclopaedia.
- The symbol may also be placed after an entry word that refers to another word in the glossary. The reader can then choose either to look up that term or to turn to the encyclopaedia.
- Thus, a glossary may function as an index to an encyclopaedia.

Many entry terms consist of just an abbreviation and refer to an article, in which the concept is described. An individual concept may have up to four entry terms: an English denomination, an English abbreviation, a national (for example, Swedish) denomination, and, in some cases, a national abbreviation. National abbreviations should be avoided, though.

Entry terms may be set with a typeface like bold Helvetica, and letterpress with a typeface like regular Palatino. With the exception of names and abbreviations, entry terms are always set in lower case initial letter. Abbreviations are usually capitalised. Notes in parenthesis refer to the department where the concept has been created and to the system it belongs to. A symbol, such as is a reference: “see this word”.

Concepts are always defined in English, in connection with the English denomination. The first line, the “header” line, also includes the English abbreviation (if any), the national denomination, the name of the concept owner, and the system that the concept belongs to. Consequently, an article in the glossary consists of up to six information elements. To give the main text good legibility, it should be written with a 6 mm indentation in a column of 76 mm width, and with double columns in the layout. This will make it easier to look up entry terms. Words should be divided, if necessary, so that “white rivers” in the columns are avoided. When the need arises, the Swedish text in the glossary can be translated into French, German, and Spanish, for example. Translated versions will always include the English descriptions. The different language versions must be sorted in the proper alphabetical order. In a few isolated instances, the English and national denominations are identical.

The date when a concept is created, and later revision dates, should be indicated (although no final decision to that effect has been made). Names and abbreviations previously used should also be indicated, possibly in the form of a note and a special symbol. Terminology work presupposes active participation by professional translators. We shall also offer our terminology coordinators further training, so that they will become better and better technical writers.

### *An encyclopaedia*

The typography of an encyclopaedia can differ somewhat from that of a glossary. An entry term, which forms a heading on a line of its own, may be set with a typeface like bold Helvetica. Letterpress may be set in full column width, without indentation, with a typeface like regular Palatino. Level 1 subheadings

may be set with Palatino, 10 pt, bold, italics; level 2 subheadings with Palatino, 10 pt, regular, italics. Captions and text in pictures may be set with Helvetica, 9 pt, and regular. The contents of an encyclopaedia can be summarily described as follows:

- The encyclopaedia contains concepts that require detailed descriptions, for example, descriptions comprising more than six to seven lines.
- Descriptions are presented in alphabetical order.
- The encyclopaedia contains many pictures.
- A symbol + document number can show that more information is available in the original document.
- Abbreviations used in pictures are explained in their proper context, preferably in captions.
- The encyclopaedia contains an overview of the symbols and picture elements that are used in pictorial descriptions within the project.
- Symbols are stored in a symbol library.
- The encyclopaedia contains systems of concepts related to specific subject areas. It should be easy to get an overview of relationships between different entry terms.
- The encyclopaedia also contains summaries in the form of thematic descriptions or “feature articles,” sometimes extending over one or two pages.

## **Conceptual models**

The definition of individual concept's super ordinate, subordinate, and collateral relationships is an important part of the terminology work. An associative concept system shows relations, that is, functional relations, between different concepts. A partitive concept system shows the different parts that together

form a super ordinate concept. A generic concept system shows different types of hierarchical concepts. The same concept can be included in the different types of conceptual systems. A pedagogical example of concepts with several different meanings is presented below: the concept *perspective*.

In his book on photography Freeman (1988) provides the following broad definition of the word *perspective* (p. 156): “Perspective is the appearance of objects in space, and their relationships to each other and the viewer.”

*The Longman Dictionary of Contemporary English* (Longman, 1990) has three definitions of the word *perspective* (p. 767):

- ... the art of drawing solid objects on a flat surface so that they give a natural effect of depth, distance, and solidity
- ... the way in which a situation or problem is judged, so that (proper) consideration and importance is given to each part
- ... a view, esp. one stretching far into the distance.

*The New Websters Dictionary and Thesaurus* (Ottenheimer, 1991) provides the following two definitions of the word *perspective* (p. 282): “... the art of drawing objects on a plane surface to give the impression of the relative distance of objects, indicated by the convergence of their receding lines; relation of parts of the problem, etc. in the mind.”

According to *The Oxford Dictionary and Thesaurus* (Tulloch, 1995) the word *perspective* has five different meanings (p. 136): “1a the art of drawing solid objects on a two-dimensional surface so as to give the right impression on relative positions, size, etc. 1b a picture drawn in this way. 2 the apparent relation between visible objects as to position, distance, etc. 3 a mental

view of the relative importance of things (keep the right perspective). 4 a geographical or imaginary prospect.”

According to Wikipedia (2012) the word *perspective* is defined in the following way: “Perspective, in context of vision and visual perception, is the way in which objects appear to the eye based on their spatial attributes; or their dimensions and the position of the eye relative to the objects. There are two main meanings of the term: linear perspective and aerial perspective.”

Different types of perspectives are listed below in alphabetical order:

- *Aerial perspective* is a phenomenon related to the clearness of the atmosphere. Objects viewed from a long distance are indistinct. This is because the air is never absolutely clear but filled with a grey or greyish blue haze, which makes distant objects seem wrapped in mist and partly hidden.
- A *bird's-eye view* of an object means that it is viewed from a high position.
- In a *central perspective*, lines in the picture converge at a common point of intersection – the limit or main point – even though they are parallel in reality.
- In a *colour perspective*, colours and hues gradually change from being clear in the picture's foreground into being blurred in its background.
- Perspective based on *contents*: synonymous with perspective based on meaning (below).
- The *cropping perspective* – certain objects placed in front of others – is used to enhance the impression of depth in a picture.

- A “normal” way of viewing could be said to represent the *eye-level perspective* or *normal perspective*.
- A *forced perspective* can be used in film and television production in order to misrepresent the size of an object. In the picture a large distant building in the background may in fact only be a very small cardboard model that is held close to the camera. This is a form of optical illusion.
- The *gentleman's perspective* is higher than the eye-level perspective
- The placement of objects within a picture is important in *geometrical perspective*. This is common among traditional Japanese and Mayan artwork.
- During the Baroque era, perspective was used in pictorial art and architecture for the purpose of creating illusionistic effects, or *imaginary perspectives*.
- In a *line perspective*, objects are conceived as being placed behind a picture plane onto which straight beams of light (so-called straight lines) are projected.
- In art of more ancient date, and even in primitive art, there are many examples of perspective based on *meaning, contents, and value*. The significance, rank, status, or value of depicted objects is evident from the objects' size in the picture.
- Several historical paintings of troops and battles show a *military perspective*. Higher than the eye-level perspective, this was perfect to see the different groups of soldiers on the battlefield.
- In *multi-view perspectives* several different views appear at the same time in a picture.
- When certain objects are placed in front of other objects this will enhance the impression of depth in a picture. The *over-*

*lapping perspective, cropping perspective, or playing-card perspective* should always be used with cautiousness.

- In a *parallel perspective*, the distance is endless, and parallel lines of an object are parallel in the picture too.
- Positional perspective is based on the fact that objects seem smaller and less distinct the further they are from the viewer.
- In a *reversed line perspective*, the foreground seems to be “smaller” than the background. The straight lines converge in the direction of the viewer. This perspective is frequent in Japanese and Chinese art.
- In a *shadow perspective*, projected shadows are sharply accentuated, as a means of displaying the location of different objects and their spatial relations to each other.
- In the *medieval simultaneous perspective*, time is a spatial dimension.
- A *time perspective* with a “time-line” is a simple one-dimensional scale with markings for important events. This is often used in graphics and schematic pictures to visualize the relationships between different historical events.
- Light tones appear to advance and dark tones appear to recede. A light object against a dark background will normally stand forward, with a strong sense of depth. This phenomenon is called *tonal perspective*.
- *Value perspective* is synonymous with perspective based on meaning (above).
- The concept “perspective” is often used figuratively and in transferred senses: *verbal-linguistic perspectives*. In a situational context, for example, we may say that someone “sees reality from a child's perspective.”

- A *worm's-eye view* of an object means that it is viewed from below.

Obviously, some of the perspectives we have mentioned are related to each other in various ways. When we group the different meanings systematically, it becomes evident that a number of concepts are missing. Undeniably, it is easier to survey the interrelationships between concepts when they are systematically arranged. As is evident from the hierarchy below, most perspectives are pictorial spatial perspectives related to our perception of depth. However, the term “perspective” also carries other meanings, not related to depth. Psychological perspectives are visualisations of psychological and social, subjective values. Verbal-linguistic perspectives are used figuratively and in transferred senses. An aural perspective is an apparent spatial distribution in perceived sounds. See the hierarchical structure on the next page:

## **Perspectives**

### *Pictorial perspectives*

#### *Spatial perspectives*

##### *Line-based positional perspectives*

###### Line perspectives

###### Central perspective

###### Worm's-eye perspective

###### Eye-level perspective

###### Gentleman's perspective

###### Military perspective

###### Bird's-eye perspective

###### Time perspective

###### Forced perspective

###### Curvilinear perspective

###### Parallel perspective

###### Reversed line perspective

##### *Area-based positional perspectives*

###### Aerial perspective

###### Colour perspective

###### Tonal perspective

###### Overlapping perspective

###### Shadow perspective

##### *Other positional perspectives*

###### Geometrical perspective

###### Multi-view-perspective

#### *Psychological perspectives*

##### Imaginary perspective

##### Simultaneous perspective

##### Value perspective

### *Verbal-linguistic perspectives*

#### *Aural perspectives*

## **Pictorial perspectives**

The word *perspective* usually refers to a reproduction, on a plane surface, of a three-dimensional object, which conveys to the human eye the same impression of depth as that of the real object. Obviously, it is a matter of creating an illusion of depth; on a paper surface, for example. As is evident from the above examples, most perspectives are *spatial perspectives*. But the term “perspective” also carries other meanings. *Psychological perspectives* are visualisations of psychological, subjective values. (See *Information Design 2–Image Design* for discussions about *Pictorial perspectives*.)

## **Verbal-linguistic perspectives**

The concept “perspective” is also used figuratively and in transferred senses: *verbal-linguistic perspectives*. In a situational context, for example, we may say that someone “sees reality from a child's perspective” (viewpoint). We “put a thing in its proper perspective” (approach), and sometimes it is important to be able to “view things in different perspectives” (views), and “keep the right perspective.” We create a mental view of the relative importance of relationships or aspects of a matter or problem.

The concept also applies to the manner in which we survey an area, a field of interest. We may, for example, “get the supply and demand of a product into perspective” (general view). In the programme for the “6th European Conference for Research on Learning and Instruction” (EARLI, 1995) it is noted that (page 20-21): “Symposia should provide an opportunity to examine specific problems or topics from a variety of perspectives. ... Thus, individuals with diverse views can interact on a topic of sufficient scope and importance.”

Critics throughout the history of art and literature have used many methods to analyse works created by others. Lodge (1984) gave the following fourteen examples of analytical perspectives: allegorical, archetypal, biographical, Christian, ethical, existentialist, Freudian, historical, Jungian, Marxist, mythical, phenomenological, rhetorical, and structural. In his book *“Visual Communication. Images with Messages”* Lester (1995) emphasized six perspectives for analysing images in the media through which we see. These perspectives are: personal, historical, technical, ethical, cultural, and critical.

### **Aural perspectives**

The ear is efficient in receiving and localizing sound within our environment. Our ears bring us a world of sound that has depth and distance. Schwartz (1973) noted that any “soundscape” has three layers, or planes, of acoustical information. There are foreground sounds, context sounds, and background sounds. According to Wenzel (1992) people have a natural ability to isolate sounds in relationship to their approximate positions; behind, above, below, to the sides, or in front of the head. Ferrington (1994) defined aural perspective with respect to distant sounds, intimate sounds, and moving sounds. Distant sounds are far away from us. Intimate sounds are close-up. Moving sounds move in juxtaposition to the listener. Although sound is three-dimensional it is the sound generated by moving objects, or the movement of the listener in relationship to a sound, that strengthens the perception of three-dimensionality.

# Credibility and persuasion

According to Doblin (1980, p. 104) the goal of credibility, to persuade, leads to intended behaviour such as voting, buying, loving, giving, and so forth. A message that is not believed cannot persuade. A crude presentation (like a typewritten letterhead) or a hucksterish presentation (like the TV ads of auto dealers) may not be believed. Careful presentation may be required to overcome prejudices held by decoders.

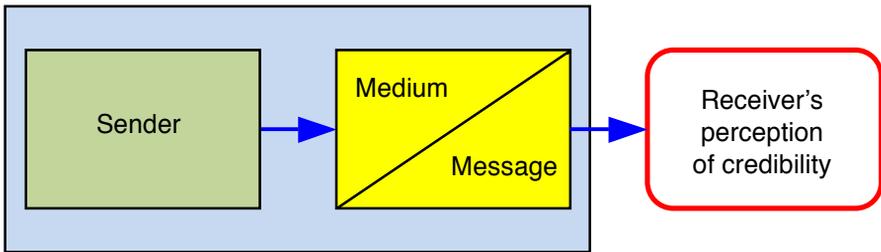
One visual ploy to gain credibility is to use elaborate borders, similar to those on bonds or banknotes, for other displays. Arvidson (1977, 1980) discussed early research on credibility with respect to mass media and defined four credibility concepts: 1) confidence, 2) credibility, 3) believability and 4) accuracy. According to Arvidson confidence and believability are properties of the public, while credibility and accuracy are properties of the mass media. Confidence, credibility, believability and accuracy are all important aspects of persuasion.

Bettinghaus and Cody (1987) noted, "There are a number of early studies that clearly establish credibility as an important factor in persuasion" (p. 84). Thus, sources possessing more credibility for a given audience are more effective in persuasion. What makes a picture credible? What does it mean that a picture has high credibility? What does a high credibility picture look like? What is the actual meaning with the concepts credible and credibility?

Dictionaries (such as *The Random House Dictionary of the English Language* (Berg Flexner, 1987); *The Longman Dictionary of Contemporary English* (Longman, 1990); *The new shorter Oxford English Dictionary*, (Brown, 1993); *Webster's New Encyclopaedic Dictionary* (Webster's, 1993); and *The Ox-*

ford Dictionary and Thesaurus (Tulloch, 1995) all have different definitions.

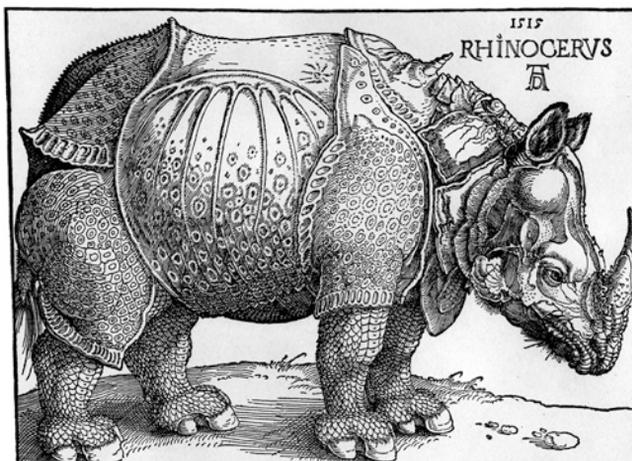
One of the three words believe, believable and belief are used in most of the definitions. It is obvious that in communication the receiver of a message believe in a sender with high credibility. However the sender, the message and the receiver may not be the only properties of credibility. In my view 1) the sender or the source, 2) the message, 3) the medium, and also 4) the specific context may be important components or parts in the perception of credibility. These four components all influence each other and they also influence our overall notion or understanding of credibility.



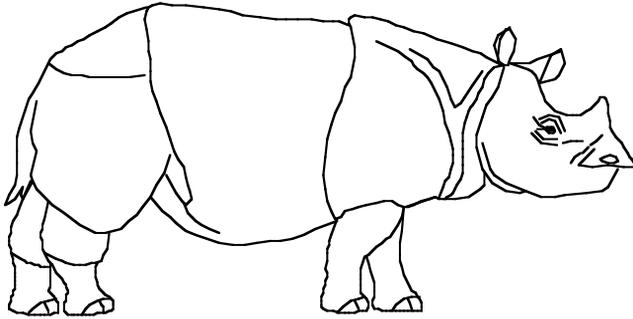
*The sender transfers a message to the receiver with the help of a medium. A medium with a specific message is a “representation” (Pettersson, 1989, 1993, 1996). The sender, the message, the medium, and the specific context are important factors in the perception of credibility.*



*Natural credibility 1. Today ordinary photos employ a natural credibility. This picture was taken close to Jackson Hole in Wyoming, USA.*



*Natural credibility 2. For centuries people considered this woodcut from 1515 by Albrecht Dürer to be a true representation of reality. Several artists used this picture as a master model.*



*This simple line drawing is drawn from photographs of the rhinoceros in India. The picture shows the accurate proportions of this magnificent animal.*

## **Credibility of the sender**

Fleming and Levie (1978) noted, “The credibility of a source is an attribution that is conferred upon the source by the receiver” (p. 199). Tedeschi and Rosenfeld (1980) stated, “Credibility refers to the truthfulness of the source over the occasions when his or her communication can be checked for accuracy” (p. 234). Simons (1986) argued that credibility is a complex notion (p. 130): “Credibility, it turns out, is a complex notion consisting, essentially, of 1) respect variables (e.g., perceived intelligence, knowledge of subject); 2) trust variables (e.g., perceived objectivity, fairness); and 3) attraction variables (e.g., perceived warmth, dynamism, interest in audience).” Bettinghaus and Cody (1987) defined credibility in the following way, “Credibility is a set of perceptions about sources held by receivers” (p. 85). Thus, when we want to find out if a source is credible, we should ask potential receivers about their opinions on the matter. The source or the sender may be an “institution” such as a broad-

casting company or a newspaper. The sender may also be an individual person.



*Albertus Pictor (c 1445 – 1507) used the woodcuts in Biblia Pauperum, as masters and models for many of his paintings in churches. These pictures probably gave high credibility to the ministers. This painting can still be seen in Härkeberga church in Sweden. To the right we can see how the whale eats Jona and then, to the left, spits him out.*

In information materials photographs and bright, warm colours give credibility to the organization behind the message (Kensicki, 2003). Frequent use of archive pictures may cause quality problems. In many situations it may be better not to have any pictures at all than employing pictures of poor quality.

According to Bettinghaus and Cody (1987), almost every study on “source credibility” seems to agree on the existence of both an expertise or a competence factor, and also a trustworthiness or a safety factor. There are obviously various levels of credibility. At least we can distinguish between high and low

levels. A source with a high degree of *trustworthiness* may be described with words like *agreeable, calm, congenial, ethical, fair, forgiving, friendly, gentle, honest, hospitable, just, kind, nice, patient, pleasant, sociable, unselfish, and warm*. The opposite words would describe a source with a low degree of trustworthiness. A source with a high degree of *expertise* may be described with words like *able, accurate, authoritative, experienced, informed, intelligent, knowledgeable, skilful, and trained*. In this case the opposite words would describe a source with a low degree of expertise.

High-credibility sources exert a more persuasive influence on the receivers than low-credibility sources. Thus, for the sender it may be very important that receivers are informed about the level of expertise of a high quality source. And this is often seen in advertisements where selected experts give their “expert opinions” on the quality of a specific product or a certain service.

Linderholm (1997) argued that messages with logical arguments based on facts are useful tools when the goal is to change an attitude. Furthermore such messages may also increase the credibility of the sender. However, the sender must also provide evidence against an undesired attitude, otherwise the sender will lose credibility.

Hovland, Janis and Kelley (1953) stated that people who show high acceptance of a message from a high credibility source may show less acceptance later on, after a few weeks. They called this the sleeper effect. Through the 1950s and 1960s the sleeper effect had a firm place in the persuasion literature. However, later Cook and Flay (1978) demonstrated that the sleeper effect could not be reliably demonstrated without very specific conditions.

According to Fleming and Levie (1978, p. 225) the adverse effects of a low credibility source can be lessened if the source is identified after, rather than before the message is presented to the audience. Once people have made up their minds and formed their opinions they are not always inclined to change these opinions easily.

Hovland, Janis and Kelley (1953) also argued that people who receive a message from a source with low credibility may show an increase in acceptance of the message after some time has passed. The negative influence from the source diminishes.

Kouzes and Posner (1993) studied the credibility of leaders, and how leaders in business may gain and may lose their credibility. They found that most people appreciate leaders with high credibility. Above all such leaders are honest, foresighted, inspiring, and competent. They are also just, fair, supporting, liberal and broad-minded. According to Kouzes and Posner a credible source is reliable, objective and dynamic.

Simons (1986) discussed the images of us as senders in the communication process. He concluded (p. 96) that a credible image helps make one's ideas more credible, and vice versa. Ehrenborg (1984) declared that the credibility of a speaker is very much influenced by his or her actual performance in front of the live audience. Any message must always be in close agreement with the body language. A speaker that is lying will usually be exposed by his or her body language. An audience will believe what they see much more than what they hear. Thus it is also very important for the speaker to use slides, overhead transparencies and other visual support of high quality.

When a speaker uses visual aids of poor quality this will influence the receiver's perception of the credibility of the speaker. The use of inferior overhead transparencies and slides

may actually be devastating for the credibility and image of the speaker as well as the credibility of the message.

In connection with accidents, crimes, and verdicts several researchers have discussed the *credibility of eyewitnesses*. Eyewitness identification has been cited as the single most persuasive source of all kinds of evidence that can be used in a court of law (Loftus 1996; Woocher, 1977;), but also as the most frequent cause of wrongful convictions (Rattner, 1988). The reliability of testimony depends on many factors, including circumstances at the time of an event, the witness's emotional state and memory function, etc.

According to Lindsay (1994) eyewitnesses are generally considered by jurors to be highly credible sources of evidence. However, many factors can intervene and create inaccurate testimonies. Memory can be radically altered by the way an eyewitness is questioned, new memories can be implanted and old ones altered in subtle ways (Loftus, 1996). Some witnesses find it easy to remember events accurately and in great detail. The memory of other witnesses may be faulty. They sometimes fill in memory blanks unconsciously so a memory still seems correct to them. Witnesses such as this might then be convinced that she or he is supplying highly accurate information, even when it is highly inaccurate.

According to Christianson (1990), witnesses often change their recollections to conform to descriptions supplied by other witnesses or information in the media. This is a subconscious process that is independent of whether an event was emotionally charged or banal.

After a series of experiments with mock jury studies Lindsay (1994) found that witness confidence consistently influenced juror verdicts and perceptions of witness accuracy,

whereas a variety of other factors had little or no effect on the verdicts. Jurors actually made a determination of guilt or innocence by distorting the evidence to conform their decisions. Lindsay concluded that the most important contributions that psychologists can make in the eyewitness area will result from developing techniques that increase the accuracy of eyewitness reports, or the accuracy of eyewitness identifications.

Leippe (1994) discussed the appraisal of eyewitness testimonies. In three experiments credibility judgements of witnesses' memory reports included ratings of believability, confidence, consistency, estimate of cued recall, and confidence in identification accuracy. Leippe views eyewitness testimony as "persuasive communication" whereby the witness attempts to persuade the jury that his or her testimony is accurate. A variety of factors influence the believability of eyewitness testimony. Leippe concluded that a thorough understanding of eyewitness persuasion is an important theoretical and practical goal. This is an area where a lot of work remains to be done.

## **Credibility of the medium**

Communication takes place when a sender successfully manages to convey a message to a receiver. The sender transfers his or her message to the receiver with the help of different media. A medium with a specific message is a representation (Pettersson, 1989, 1993, 1996). All representations are the result of biological, cultural, economical, emotional, historical, political, religious, social, and subject matter factors. Actually, all we have got to communicate with are various kinds of representations. Obviously, the sender wants the chosen representations to have high credibility.

According to Becker, Martino, and Towers (1976) the credibility of a medium depends on a number of variables, including receiver characteristics such as age, gender and level of education. The National Swedish Psychological Defence Planning Committee has carried out comprehensive studies of the credibility of various media (Arvidsson, 1977, 1980, 1981a, 1981b; Törnqvist, 1974). At the end of the 1960s, television was considered superior in credibility, although by the beginning of the 1970s, radio was considered most credible.

During the 1980s, radio and television were felt to be equal in credibility; fully 80% of those questioned were in accord with this. It does not seem as though all people in Sweden trust the information found in newspapers. In the autumn of 1981, slightly more than 10% judged the morning papers to be “most credible,” while only 1-2% made that assessment of the information in the evening papers. It is primarily the younger generation who have the most faith in television. The older we are, the more credible we find the morning papers. Furthermore, trust in the morning papers increases with our level of education.

According to Keller and Burkman (1993) learners will be more motivated to learn if they believe in the truth and appropriateness of the materials presented to them. In science, the goal has always been to present physical phenomena in an objective manner. However, in reality it is impossible to present the real thing in a book. Tønnesson (2012, p. 25) defined the intention to portray reality as a characteristic of non-fiction literature.

The credibility of an instructor or a set of course materials is influenced by several factors concerning the qualifications of the instructor, the reputation of the publisher, the quality and structure of the arguments in a message, and the correspond-

ence of values and beliefs between the learners and the source of materials. Thus Keller and Burkman formulated the following principle of motivation: “Learner confidence and efforts to succeed are increased in proportion to the perceived credibility of the source” (p. 22).

Keller and Burkman (1993) also noted that commercial producers have found that users’ first impressions of a media product are very important to getting them to adopt (buy) it. Consequently, they spend a lot of time and money in giving their products a favourable feel or image.

An information material with a (sufficiently) pleasing aesthetic form has greater potential for conveying a particular message than does non aesthetic information material. The sender’s choice of graphical form will generate either positive or negative expectations in the receiver, while the choice of typography and layout may often give the reader a specific pre-understanding of the content of a message. In other words, it is always important that an information material exhibit good legibility, and, if it is a spoken message, distinctness. The message may be aesthetically pleasing, but its content is more important than its form.

## **Credibility of the message**

It is quite obvious that different specimens within a medium, such as individual newspapers, books, television programmes, movies, records etcetera will differ widely in their credibility depending on the contents of the various messages. Thus the credibility of the message is influenced by the credibility of the specific medium; and the credibility of the medium is influenced by the credibility of the message. The same message will be perceived in different ways in different representations. And

the same kind of interactive influence can be seen between the representation and the sender.

Fleming and Levie (1978) noted that: “The receiver’s evaluation of the message will affect the receiver’s evaluation of the source” (p. 203). Thus an effective message has to be both credible and to merit credibility. To a similar effect Bettinghaus and Cody (1987) stated: “What sources say is extremely important, but how they say it and how they behave while saying it does dramatically affect the receiver’s perceptions of the source, thus influencing the extent of attitude change the receiver is likely to experience” (p. 100).

What is typical for a message with high credibility? In my opinion it must be possible to understand the message and to be able to believe that the information is correct. The information can’t be too divergent from the usual situations. Furthermore a high credibility message has a good structure, convincing arguments, proper references, and relevant examples. It is also a major advantage if text and pictures have good legibility as well as good readability. A picture used in information materials should depict reality in a manner appropriate to the content, and be as relevant and credible as possible.

However, many pictures in textbooks and newspapers have been selected and then edited in order to change their importance and impact. The pictures can easily be enlarged or reduced in size, which will influence readability. It is often very easy to crop the original picture. However, cropping is not merely an aid to art or to journalism; it may also be a tool for unscrupulous editors. Many photographs lend themselves to manipulation of the representation of the truth. They are susceptible to different crops to support different meanings and various ideas.

It is also possible to expand the original picture. Parts of the picture can be deleted, added, altered, moved or changed in shape. A colour can be changed, removed or added. This practice of editing is often unlawful. The picture's expressiveness can also be altered by the choice of method for reproduction and printing and the choice of paper or other materials.

Becker (1996, p. 184) argued that the introduction of digital imagery and the electronic transfer of images have had a profound effect on the ways photographs are handled and thought about. These technological developments have raised the prospect of images that are no longer anchored to their photographic, film-based original. In principle changes in the image can now occur at any point in the chain of events from the taking of the picture to its publication. There is no way for the reader to detect this. How can we know that the picture is "true"? The answer is that we can't any more know that the picture is "true"? When the photographic "original" is an electronic image, there is no longer a negative to refer back to.

Digitally manipulated journalistic photographs emerged in the press in the mid-1980s. Often digital re-touching had significantly altered the photographic messages (Alling-Ode & Tubin, 1993; Ritchin, 1990). According to Becker (1996) controversy over these cases of image manipulation centred on the control of the image – whether it should be in the hands of the photographers, the editors, or the printers and the technicians. The debate focused on the question of the photograph's journalistic credibility. The credibility of the press photograph was reasserted as central to the authority of the journalistic event, accompanied by urgent warnings about the dangers in uncontrolled applications of new technology. Still as well as moving photographic images are not always imprints of what actually

was in front of the camera. Movie productions often use special effect scenes created with a blend of techniques. Digital manipulation of images has now reached a point where it is often impossible for viewers to see what has been altered and what has not.

Fetveit (1997) suggested that our trust in film images will be a product of institutional warrant rather than blind faith in the documentary power of photography. To some extent trust will pass from the photographic technology to the institutions and to the discourses where the images are used. When people view movies like *Jurassic Park*, *Independence Day* and *King Kong* they are not likely to believe that these actually are true stories. Here the purpose is entertainment and not information. The intention is not to present a representation of the “real world” but to present a representation of an “imagined world,” a fantasy or a dream. In such a situation a manipulated image may employ high credibility.

McDougall and Hampton (1990, p. ix) argued that in journalism, a photograph should reflect reality without distortion. According to McDougall and Hampton credibility is the quality most desired. There should be no room on the printed page for a deliberately dishonest picture. Smith (1998) cited Scherer (1975) who contended that there are at least six criteria a researcher should answer before attaching any authenticity to photographic meaning: Who took the photograph? When was it taken? Why was it taken? What were the photographer’s intentions and motivations? What type of photographic equipment was used? What were the feelings of the subject toward being photographed?

According to O’Keefe (1990) the use of visuals is always more persuasive than the use of statistics. This is true for all

kinds of receivers. The use of misleading illustrations in comparisons and statistics reduces the credibility of the message itself. According to Tufte (1983), misleading or lying graphics cheapen the graphical art everywhere.

When a chart on television lies, it lies tens of millions of times over; when a major newspaper chart lies, it lies hundreds of thousands of times over to a great many important and influential readers. Tufte (1983) offers six principles that will result in graphical integrity (p. 77):

- The representation of numbers, as physically measured on the surface of the graphic itself, should be directly proportional to the numerical quantities represented.
- Clear, detailed, and thorough labelling should be used to defeat graphical distortion and ambiguity. Write out explanations of the data on the graphic itself. Label important events in the data.
- Show data variation, not design variation.
- In time-series displays of money, deflated and standardized units of monetary measurements are nearly always better than nominal units.
- The number of information-carrying (variable) dimensions depicted should not exceed the number of dimensions in the data.
- Graphics must not quote data out of context.

Good designs are intriguing and curiosity provoking, drawing the viewer into the wonder of the data. Tufte (1983) noted that graphical competence demands three quite different skills: the substantive, statistical, and artistic (p. 87). Yet most graphical work today, particularly in news publications, is under the direction of but a single expertise – the artistic. Allowing artist-

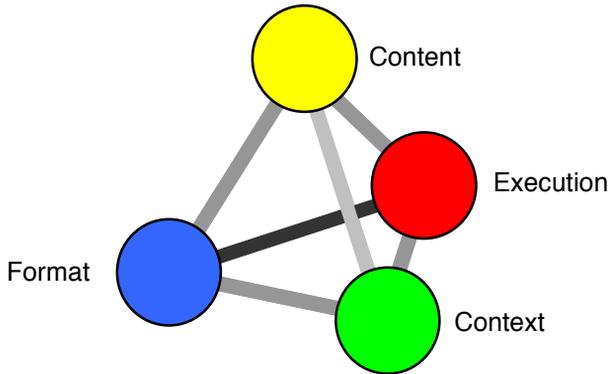
illustrators to control the design and content of statistical graphics is almost like allowing typographers to control the content, style, and editing of prose. Substantive and quantitative expertise must also participate in the design of data graphics, at least if statistical integrity and graphical sophistication are to be achieved.

## **Credibility of the context**

In the receiving of a verbal and visual message, all receiver processes are influenced by prior experience in relation to age and gender, as well as by cultural, economical, historical, political, religious, and social factors. Such experiences in the social context will influence our individual selection processes, our mental processes, and our response processes. The influence of these factors have a major influence on how various receivers relate to verbal and visual messages of different kinds, and on how meaning is subsequently constructed (Pettersson, 1996). Photographers documenting the horrors, violence and disaster of war have sometimes been rejected because their photos “can not be true.” And it is not possible for ordinary people to believe in them. It is clear that the context in which a message is received will influence the credibility of the message as well as the medium and the sender, and vice versa.

There is also an internal context. Within a medium credibility may be influenced with the help of typography, layout, sound and sound effects. For example, different placements of a message within a newspaper may influence the credibility of that specific message. For many people textbook authors are “high-credibility” sources. People believe in them. However, throughout history the use of pictures in various media has always been highly subjective. Many readers and viewers may not

understand that all pictures that are used in various media often have been subject to selection, sometimes several times.



*Credibility can be related to source, medium, message content, and context. These components all influence one another.*

In the production of pictures in a textbook the author produces a manuscript and often also ideas for illustrations. The editor develops some ideas to picture descriptions and orders drawings and photographs. Artists deliver the drawings. Photographs are delivered by photographers and from picture archives. Pictures are selected, edited and produced. The readers make the final selections in the printed book. In the production of pictures in a paper a specific event is presented with text and pictures and cause individual interpretations. The photographers selects among various possible motives and, later among the prints. Editorial staff makes a selection among the prints, and produces text. The readers make their selections among the printed information.

Evans (1978) noted that a sequence of photographs may add credibility to a central picture (p. 175). One way of “manipu-

lating” and effecting the interpretation of image content is the careful writing of captions (Pettersson, 1987). Views expressed in the captions regarding the messages in the pictures may vary from very negative to very positive. Thus the captions will influence what the readers actually select to “see,” or rather “interpret” from the contents in the images. Lidman and Lund (1972, p. 30) claimed that a combination of a drawing and a photo would aid credibility. They wrote (in translation): “Through the drawing we understand the photo, through the photo we believe the drawing.”

Thus the drawing would influence our perception of the photo, and vice versa. This may very well be true in some situations. The context may also be external, directly outside the medium, i.e. the communication situation. Here different situations may influence the credibility of the message.

It may be concluded that the credibility of pictures are dependent on the perceptions and interpretations of the receivers, and not necessarily on any actual characteristics of the senders or sources. People do not seem to realize that pictures seen in media are selected and edited, and only represent a “fragment” of reality. It is possible that people often believe that image content is “true.” The credibility of a picture is influenced by the credibility of the source, the message, the medium, and the specific context.

# Language theory for ID

The group “*language disciplines*” includes disciplines such as drama, lexicography, lexicology, linguistic development, linguistic philosophy, linguistic theory, linguistic, literacy, psycholinguistics, rhetoric, semiotics, socio-linguistics, terminology, visual literacy, and writing.

At present this theory includes, but is not limited to, the following five branches of knowledge: 1) Pattern language. 2) Plain language. 3) Rhetorical theory. 4) Semiotic studies. 5) Terminology theory. 6) Visual languages.

The *language theory for ID* contributes to information design with valuable facts, practices, principles, and theoretical approaches. Some examples of important concepts are: active voice, associations, body languages, concept, conceptual model, connotation, denotation, effective communication, idiom, lexicology, lexicography, literacy, morpheme, multimodal messages, pattern language, persuasion, phoneme, plain language, plain writing, print literacy, prose content, prose learning, readability, reading, reading value, referent, rhetorical theory, semiotic studies, semiotics, syntagm, term, terminology, understanding, verbal representation, visual language, visual learning, visual literacy, and visual representation.

Here are some facts, hypotheses, and postulates based on the language theory for ID.

- In many countries, laws mandate that public agencies use plain language to increase access to programs and services.
- Many writing techniques that can achieve plain language.
- Rhetoric is not only used for text, but also for images and pictures.

- Text, visuals, and graphic form should always work together to fulfil information design objectives.
- The interplay between text, visuals, and graphic form needs to be studied and tested thoroughly before optimal combinations can be found.
- Illustrations in textbooks must be relevant to the prose contents.
- New information is mentally integrated into an existing body of knowledge.
- Nonverbal signs can produce many symbols with different meanings.
- In any culture people have to agree on the meaning of signs.
- Colour coding is a good way to show that something is connected, or especially important.
- Visual messages are superior to verbal messages when content is emotional, holistic, immediate, spatial and visual.
- Usually receivers are capable of interpreting far more content in a given picture than the designer had in mind.
- Interpretation and creation in visual literacy can be said to parallel reading and writing in print literacy.
- Visual communication, visual language, visual learning, visual perception, and visual thinking are inextricably linked to visual literacy.
- People have used general appearance and pattern recognition since ancient times.

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