EU Project „visuaLearning"

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Reader
"Visual Learning"
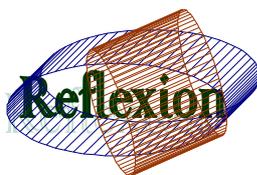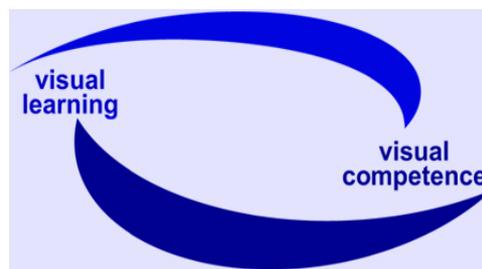
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The Reader "Visual Learning" based on a document which was presented by Prof. Dr. Franz Josef Röll on behalf of the German Institute for Adult Education (DIE) in conjunction with the EU-Projects "visuaLearning".

The following additional chapters were incorporated by Dirk Stüber

2.5   psychological Learning aspects

3.2.2   Elements and principles of image design
3.2.2.1   The dot as most simple design element
3.2.2.2   Lines
3.2.2.3   Surface / pithiness (good shape)
3.2.2.4   simplicity
3.2.2.5   Continuity
3.2.2.6   Similarity
3.2.2.7   Focus
3.2.2.8   Colour
3.2.2.9   Text and image

6.   In search of the free image: Creative commons
                and cost-free clipart

Chapter 5 "Learning preferences" was modified by Dirk Stüber

Edited by Dirk Stüber and Monika Tröster

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Content

1. Workshop „visuaLearning"

1.1 Programme

9:00 – 9:15 am	Welcome, introduction to the events of the day
9:15 – 10:15 am	Visual start by example of a "picture database file" practical application, slide technique, exercise
10:15 – 10:45 am	Visual competence of learners Presentation and discussion of some results of the group discussions [1] with learners concerning visual learning, input, exchange of experiences, discussion with the entire group
10:45 – 11:00 am	Break
11:00 – 11:45 am	Regarding the relevance and significance of visual thinking, theory fragments - Symbolic thinking (Ernst Cassirer) - Illustrative thinking (Rudolf Arnheim) - Findings of brain hemisphere research - Neurobiological aspects Theoretical Input with presentation
11:45 – 12:30 pm	The power of Images Perception of pictures, image processing and image design - principles of image design - Practical hints regarding visualization - Presentation with examples, exercises
12:30 – 1:30 pm	Lunch break
1:30 – 3:00 pm	Methods of visual Learning among other things, mnemo techniques, clustering, mindmap, coaching of ideas, cognitive maps, mindmanager, freemind, storytelling…circle of methods: practical application (as an example), discussion
3:00 – 3:15 pm	Break
3:15 – 4:00 pm	Methods of visual learning Continuation with the circle methods
4:00 – 5:00 pm	Transfer, Evaluation Discussion, individual work & plenum
5:00 pm	Close

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[1] Within the frame work of the EU-Project "visuaLearning" group discussions with learners regarding the subject "Visual Learning" were conducted. For further information please see „Explorative Research: Relevance of Visual Learning for specific target groups".

Programme

1 Introduction
- Welcome
- Practical application "Picture database"
- Exercise "Diapositive-technique"
- Presentation of some results of the group discussions with learners

2 Fragments of theory
- Symbolic thinking (Ernst Cassirer)
- Illustrative thinking (Rudolf Arnheim)
- Findings of the brain hemisphere research
- Learningpsychological aspects

3 The power of images
- Perception of images
- Processing and image design
- Principles of image design

4 Methods of Visual Learning
- Traditional creative techniques
- Creative techniques with new media

5 Preferences of learning styles

6 Creative Commons Licensing

7 Free clipart

- Transfer, evaluation

1.2 Background and objectives of the workshop:

The EU-Project „visuaLearning" takes place at the *German Institute for Adult Education* (*DIE*). It is a matter of interest as to the meaning of visual learning in today's learning processes – especially related to the field of literacy and basic education in language classes. The project is aimed at more strongly sensitizing towards learning and qualifying tutors in this field. We will develop a further **"Qualification Concept. Guide for Trainer"** with regard to visual learning and an **image gallery** with examples.

You will find more information concerning the EU-Project "visuaLearning" under
www.die-bonn.de/visual

Workshop „visuaLearning":

Each learning process that arises with the help of images, simulations, animations, model constructions, metaphors, allegories or symbols is connected with visual and/or intuitive learning which can also be called image thinking. Image thinking can activate logical and abstract processes. Already in the act of perception sensory data is being interpreted, classified and evaluated. No one actually sees directly because it is not the eye but "we" who see.

During the workshop the following questions shall be investigated, among others:

- **What is the meaning of visual learning?**
- **Which relevance has visual learning for everyday course life ?**
- **How can the findings of image communication and/or visual learning be applied in courses? Which methods are available?**
- **Which general Gestalt principles are helpful in visualizations?**
- **What does visual competence mean?**

On several levels the workshop attempts to explain the potential which capacitates visual learning for learning processes. Visual learning methods shall be presented and applied by using examples. General Gestalt principles of images and/or visualizations for everyday course life are also presented.

The application of relevant methods and Gestalt principles shall serve to develop possibilities of transfer for work in the course; this is also thought to further the exchange of experiences.

2. Theoretical constructs

On several levels the reader attempts to explain the potential that demonstrative thinking has for learning processes. By no means is it intended to deal with the complexity of the subject; By using examples it is rather planned to demonstrate the complex relevance of image thinking. This applies for the theoretical attempts outlined here, the itemized methods of visual learning, the explanation of the power of images, the presented concept of learning preferences and e.g. how project learning can be initiated with new media.

2.1. The Human being as „animal symbolicum" (Ernst Cassirer)

The human being is not capable of facing the physical world directly. The sense-organs of the human being produce filters to the real world. Based on the perceptions seized by the senses, the brain reckons out representatives which are put in relation to the symbolic patterns of perceptions offered by experience. Other filters form language, myth, art and religion. Their meanings lie in the field of relation and not in the field of concrete reality. They are representatives of the things perceived as reality. By forming the attribute, experiencing the "world" by symbolising, the impressions arrives that the real world is vanishing.

For milleniums rites, pictures, symbols and language have been seen as means to explain the world. In the antique symbols were the original unity, which is broken to rebuild it later. Symbols served as an identifying sign of recognition for friends, relatives or lovers. By putting together those signs, the past relationships could be traced back. Later marks out of lead, bones, clay or bronze, which were signs allowing you to visit an assembly, the theatre, the bath etc., were called symbols.

Photo: „Indian brooch" by exfordy published under CC-BY

After Cassirer (1990b, p.51), the classical idea of the human being as "*animal rationale"* is a characteristic of human acting, however the variety and manifoldness of culture can only be perceived "very inappropriate" by the idea of reason. Defining the human being as "*animal symbolicum*" is more appropriate. The entire progress of culture, according to Cassirer, is built on the suppositions of symbolic refection and behaviour and therefore belongs to the characteristic marks of human life. Only the human being has the ability of using and understanding symbolic language, fantasy and intelligence. The rational system of thinking only develops after a complex system of symbols has been established.

Cassirer calls signs facts which have an out conscious event character. Symbol (sensual sign) becomes a fact when it has got a meaning by human beings. Therefore it has become a sustainer of sense. Only then it gets a spiritual existence of meaning. The transformation from signs to symbols are not approachable from the beginning but are structurally set up. The structures are called "*a priori symbolic forms"* by Cassirer.
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For Cassirer, the symbolic forms have an universal and inter subjective validity. They form the basic forms of understanding. Because sensual single parts become sustainers of general spiritual meaning, the human being designs his reality with the help of symbols. Therefore Cassirer understands culture as the way the human being produces sense through

symbols. For him a symbolic form is a spiritual meaning which is linked to a concrete sign. So Cassirer's definition of a symbolic form is: "The "symbolic form" should be understood as every energy of the mind by which a spiritual meaning is linked to a concrete sensual sign and this sign is spiritually appropriated" (Cassirer 1956, p.175).

Cassirer differs symbolic forms in a **function of expression** (a friendly smile takes away fear), a **function of presentation** (a linguistic description of facts pragmatically related to the world) and a **function of meaning** (abstract, relational theories on a logic, mathematical basis).

All symbolic forms can be used on any object. The symbol is marked by diversity and the ability to transform. The symbolic thinking overcomes the natural laziness of human beings and equips the human being with the ability "to transform his universe constantly" (Cassirer 1990b, p.100). The symbolic forms go through an "ideal history", from the mimetic to the analogous and finally to the symbolic form. This corresponds with the orienteering from the object to the subject and finally to the symbol. The number "five" can be understood as a sign for five things, for the activity of counting or as a part of a system of meaning.

Photo: „Medusa Head" by Bruno Girin published under CC-SA-BY

In religion, myth, language, technology, art and science the symbolic forms are linked with each other in an emanation, because the mythical consciousness is capable of deciphering the existence of reality and the existence of meaning of the symbols. While the religious symbols continuously change, the basic principle, the symbol activity remains constant. The myth, according to Cassirer, is the mother ground of all symbolism. "In the myth we come across the first attempts to bring things and event in a chronological order, to develop a cosmology and a genealogy of gods and human beings" (Cassirer 1990, p.264f). The mythical time is an "eternal time", it does not have any solid structure. The past of the mythical consciousness is not over, it is here and now.

The mythical world is no system of dogmas, it is a world of conflicting powers and a world of activity. All creatures and all things are linked with each other in a net of mythical common interests and exclusivities. Cassirer proofs the mythical thinking to be a superstitious thinking. The myth is a son of emotion. "For the mythical and religious sense nature becomes one great society, the *society of life*. In this society the human being has not a leading role. He is just a part of it and is not superior to anything else" (Cassirer 1990b, p.132). There is no hierarchy which is marked, and no highest forms. Plants, animals and human beings have the same dignity and are on the same level. The waking up self-confidence of the human being starts with religious and magical thinking. Because Cassirer understands the ability of discursive thinking as a symbolic form, the symbol, however, has a function of sign. Cassirer understands the idea of the symbol as spiritual manufacture of the visible things and their links. Symbol forms serve the human intellect.

Apart from idea of the symbolic form, Cassirer developed a second idea: "symbolic pithiness". He understands "symbolic pithiness" as the way in which an experienced perception as a sensual experience also contains a concrete sense, which is directly shown to the consciousness. (see Cassirer 1990a, p.274f). This symbolic pithiness has an own and autonomous relationship, which without there is no unity of the object nor an unity of the self. The basic idea is that the perceived experiences as a sensual experience are always sustainers of a sense. The idea of *pithiness* is orientated on the Gestalt Psychology. While, however, the Gestalt Psychology interprets pithiness as the actual way of organising any perception, Cassiers views pithiness as symbolic because the appearance is a totality which is bigger than itself. Cassirer's understanding is based on the image of a link between the human beings, the world and the symbols. He asks about the constitution of sense. For this reason Cassirer is an important producer of ideas because he has made it clear that the perception of pictures and symbols is linked with questions of meaning.

Cassirer has rediscovered the role of mythical thinking for spiritual orientation of the human being. His "theorem of symbolic forms" can be seen as the ground structure of this search for orientation. His conviction that representation does not only copy the world but is a constitutional condition for every single person, is still supported in modern perception research. The language is the most important symbol for Cassirer because it leads to homogeneity.

2.2 Perception and recognition (Rudolf Arnheim)

Gestalt psychology takes a psychophysical approach. This approach is based on the assumption that perception begins with the presentation of the stimulus. The transformation of the stimulus into a perception with content in itself is an achievement. This branch of research puts an emphasis on the activity of the recipient. A supporter of this approach is Rudolf Arnheim. According to him the very perception of a shape in itself constitutes an activity.

"The world surrounding us is not perceived by a meticulously perceiving organ (i.e. the eye). It is rather an act of reaching out for the object when looking at it. We scan our surroundings with an invisible finger, reaching out to places where we can find objects, we touch them, capture them, examine their surface, check out their profile, their composition." (1978, p.46).

Gestalt psychology teaches us that perceiving shapes is more than just perceiving a visual stimulus. It is by structuring our surroundings and making connections that we perceive and recognize objects. In perceiving my environment I separate the shape from the background. While certain elements are interpreted by our visual apparatus as shapes the remaining visual field will be interpreted as background. This ability of the visual apparatus is the precondition for a safe and swift orientation through our world and is called shape-background differentiation (Figur-Grund-Unterscheidung). The distinction between shape and background is dependent on being able to generate (gestalten) Gestaltheory (Max Wertheimer, Ivo Kohler, Wolfgang Köhler and Kurt Kuffka) functions according to the following laws:

1. Factor of the homogeneity and the lowest homogeneity (Group-formation)
2. Factor of the proximity (as small as possible distance between the groups)
3. Factor of the common fate (corresponding behaviour)
4. Factor of the (objective) attitude (former groupings are preferred)
5. Factor of absorbed of rest (Repulsion or supplement)
6. Factor of the non-stop curve (the smooth course)
7. Factor of the unity

There is an underlying tendency to structure our surroundings in the simplest way possible, which is called tendency to good shape (Tendenz zur guten Gestalt - Prägnanzeffekt). When, for example, parts of a pattern are presented on one line or there only is minimal divergence of their direction (or they more or less face the same direction), then we assume a continuation of this pattern. When, however, the direction is suddenly changed, we perceive the contours as segregated. This is how our perceiving apparatus detects objective structures and interrelationships within our surroundings. The most salient features of objects and structures capture our attention (cf. Arnheim 1978, p. 47). Perception is always goal oriented and selective. Perception (Wahrnehmungsgestalt) according to Arnheim is the result of the interplay between the physical object, light as a transmitter of information and the underlying conditions within the nervous system of the observer. The object (Gestalt) is instantly recognized by our visual sense." It perceives the overall structure and it is obvious that primary experiences are features of the overall structure. We perceive complete patterns which are then compared with memories in the brain.
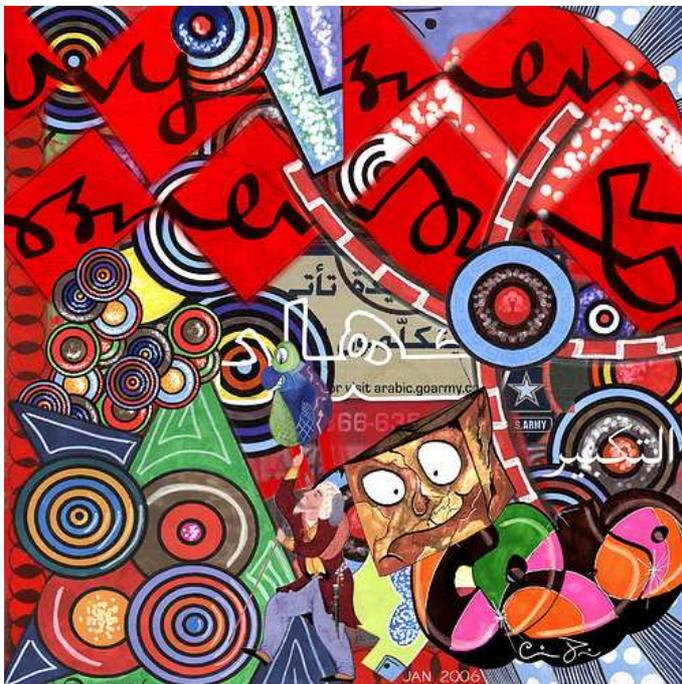

Photo: „Fighting Fire with Fire collage" by Señor Codo
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Hence, perception is not concerned with isolated shapes, but with various types of shape. Concept formation is facilitated by the perception of shapes. The perception of shapes is tantamount to grasping general structural features. Perception, according to Arnheim, also means generating perception-concepts (Wahrnehmungsbegriff). The moment we perceive the world we change the 'raw material' we find in it. An object can only be perceived when its image can be moulded into the form of an already existing image. Perception generates general patterns which can be applied infinitely. Hence, vision is the precondition for concept formation. According to Arnheim, the word 'concept' does not have anything to do with understanding our world. Moreover, the above mentioned activities can be all situated within the realm of vision. The word concept has to do with similarities. "Perception is in a sensual context (Sinnliche Ebene) what in cognition is in understanding. "Just as the artist generates patterns and hence an interpretation of experiences, so does the perceiving individual. To see is to understand" (cf. p.50).

According to Arnheim face recognition also is a function of understanding, as it is an inherent part of understanding, e.g. :

active exploring	sort out	grasp the essential
simplify	abstract	analysis and synthesis
supplement	correct	compare
combine	distinguish	bring in context
solve a problem (task)	categorize	convert
choose	generalize	

Recognition refers to all activities of the mind which are involved in receiving, storing and processing data/factual information (Tatsachenmaterial), i.e. the sensory perceptions, the memory, cognition and learning (cf. p. S.24). Perception and cognition are closely entwined when works of art are created (cf. p. 9). According to Arnheim perception and cognition are one entity. Facial recognition already is an act of recognition in itself, facial recognition being the most competent organ (vehicle) of human understanding (1980, p.9). Productive thinking is initiated by our imagination. He is in keeping with the tradition of the sensualists when he claims that nothing can be part of our intellect, which has not previously been processed by our senses. Thus, all philosophical and economical creative thinking is done with the help of (graphic) images. "There don't seem to be any thinking processes which can't be found within the realm of perception. Seeing is imagining (anschauliches Denken)" (cf. p. 24) .
One of the main achievements of Gestaltpsychology is to have discovered the importance of visualization/ seeing for all human thinking processes.

2.2.1 Laws of Gestalt

The process of seeing begins with scanning our surroundings for differences and similarities. In doing so, we strive for clarity, regularity, simplicity and order. We will only notice an object if it stands in contrast with its surroundings. The external gestalt is set in relation to the difference between object and background. The phenomenon shape and background serves to understand why our perceptual senses interpret one part of the picture as being the background and the other part as being in front (and hence as an object).
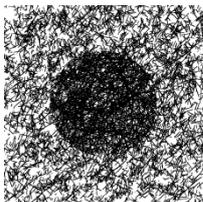

Photo: DIE, Bonn

While it is easy to recognize the ball on the right, it is only possible to see the ball on the left if you slightly shut your eyes.

The figure and its background must be in contrast with each other. The relation between object and background corresponds to a visual appraisal system, differentiating what is significant from what is insignificant. The sharper the contrasts are between object and background (e.g. light and dark), the easier it is to differentiate between object and background.

Sometimes our visual appraisal system interprets all parts of a picture as having the same significance. This happens when we use subjective (social and biographical) factors to decide which part of a picture is interpreted as being the object and which as being the background.

On the basis of Aubrey Beardsleys drawing you can see the figure-background-relationship. Madame Réjane looks like ambiguous.

Usually smaller areas are interpreted as objects. The greater the expanse of an area the more likely it will be seen as the background. Mostly, an encompassed area is seen as an object, the encompassing area as its background.

The image of a vase, first published in 1915 by Edgar Rubin shows by the double contour line how complicated the assignment is .
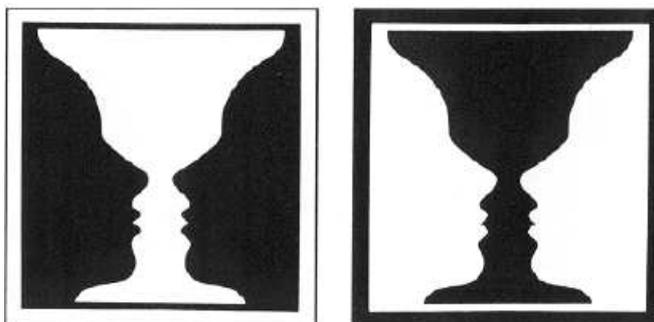
It is not possible to see both the faces and the vase(s) at the same time. One part of the picture is always interpreted as being in front of the other and hence as object, while the other is forced back to become the background. As our visual apparatus identifies objects according to their contours, object and background overlap in this picture. A line of contour can simultaneously function as a boundary line encompassing an area from the right or the left.
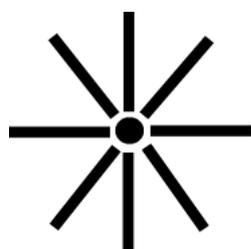

Without a background we cannot recognize objects. We prefer to see geometrical patterns and shapes as a whole. The closer the visual elements are to each other, the more likely they are to be interpreted as belonging to one object.

Closed and symmetrical shapes are usually seen as one object. Images with a symmetrical order have a salient gestalt and seem to be more balanced. However, it is because of this regularity that these images seem to be redundant.
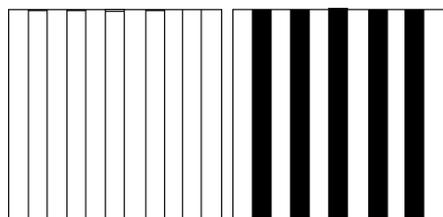
Photo: DIE, Bonn

Our brain forms parallel lines into a figure as the filled out bars may demonstrate. The contrast and the figure ground relationship is enhanced.

Photo: DIE, Bonn

Irradiation or over-radiation: Bright forms on a dark background appear bigger than darker forms on a bright ground. This also applies for written script.
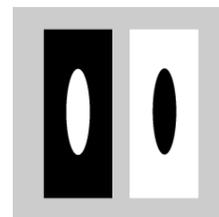

Photo: DIE, Bonn

Contrast- and compensation deception: A form changes its apparent size conversely to that of the surrounding elements.
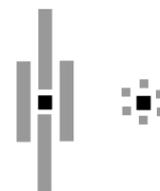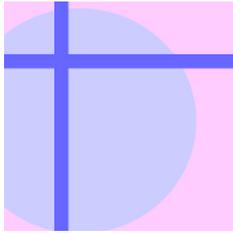

Photo: DIE, Bonn

The so-called "golden section" divides surfaces and lines in relation to approx. 3:5. This ratio is generally perceived by the viewer as pleasant. Presumably this is so because it frequently appears in nature (e.g. in flower blossoms). An orientation towards the "golden" section is also advantageous in website designs. Axially symmetrical designs often appear awkward and tired.

Photo: DIE, Bonn

2.3 Perception and cognition

Within the cognitive - psychological research of perception, perception is seen as a means of recognition. Perception and memory are closely linked to each other. Perception precedes action and is used to orientate in a meaningful environment.

"Perception is directly related to the controlling of attention processes, whereas previous experiences play a major role every time we make new perceptions. "(Kebeck 1994, p.123). The perception process begins with the selection of information we choose to process, as we

focus our attention on certain information. Attention is seen as the directed selection of information, the precursor for conscious perception. It is assumed that our sensory organs are constantly subjected to an information overflow. Systematical search- and control pro-cesses reduce the amount of incoming information.

The control processes do not happen haphazardly. The **'bottleneck-model'** assumes that the number of transmitting channels are narrowed down to just a few.

The transmittance of information is constricted by a filter. Every span of attention is preceded by preconscious processes. According to the **'capacity model'** our ca-pacity to process information also is limited. The sensory input is usually much higher than the existing capacity to process information. However, incoming information can be distributed to different processing tasks. A decision process prioritizes which information to process and which not.

We talk about selective attention when parts of incoming information are filtered out. It is by means of this selective perception (selektive Wahrnehmungsweise) that we can consciously perceive information (Wahrnehmungsinhalte). We are able to shift the focus of our attention (Cocktail-Party-Effect).

Our attention is closely linked with motor functions. The incoming information perceived by our senses leads to the focusing of our attention. This effect is called 'orientating reaction' (Orientierungreaktion). With our eyes we always focus our attention on what has been selected as relevant. The information is processed by the foveal system (small angles, sharp eyesight). This orientating function is best triggered by tones.

The selected information undergoes 'positive' corrections. It is the aim of these corrections to keep the objects of attention as original as possible, i.e. to keep them in their original condition. Our attention aims to identify real features and characteristics, irrespective of errors and deceptions. If it is known, for example, that tomatoes are round, red and have an average diameter of five cm, then all these features will be ascribed to all other perceptions identified as tomatoes (cf. Kebeck 1994, p. 139)

One of the most central correction mechanisms is the perception of our world as 'upright'. Our 'orientation consistency' (Orientierungskonstanz) enables us to turn the image on our retina, which is physically seen upside down, upright. Research has shown, that test persons wearing a set of glasses which turn the world upside down, quickly adjust to their new visual world. (cf. Kobler 1951, p.15ff) It seems that humans allocate most information along the horizontal axis. Also, kinaesthetics plays a major role. Another outcome of research was that humans also adapt their perceptions when other kinds of manipulations take place (manipulation of colour, size, shape, brightness).

According to Richard L. Gregory the attention process is controlled by concepts. (1966, p.12) Existing hypothesis are compared with sensory input. Previous knowledge, expectations and contextual information serve as a starting basis for all subsequently incoming detailed sensory data. Hypotheses are either confirmed or abolished on this basis. Previous experiences, which manifest themselves in memories form the bases of these hypotheses. All sensory input is compared with these hypotheses, this comparison happening subconsciously and randomly. During this process we scan the data for features which match the activated concept (hypothesis). If necessary the test persons will solve the task by using their own conceptual schemes, strategies or frames. (cf. Gardner 1992, p. 110). This process is called the *top-down-strategy*. We talk about *bottom-up-strategy* when actual details of a concrete situation or task have a bigger influence on the activity of the test person.

The schemata have the function to form hypotheses, i.e to anticipate perception contents with the help of primary sensory information, to test hypotheses and to control the selection and processing of information. According to Ulric Neisser the implementation of a certain scheme leads to our seeking for certain information. (1979, p. 48ff). Information that does not match the activated schemata is often ignored. Sometimes the schemata is completed or revised. Perception, according to Neisser's model; is a cyclical, repetitive process, consisting of exploring, storing new information and the influence on memory schemata. Perception is not possible without the help of the memory. Memory is seen as an active ordering structure for the organization of knowledge. It supplies our perception with an anticipated schemata, which controls discovery processes and controls interpretations of the incoming information.

With every fresh experience we fall back on previously existing schemata, which can then be revised or completed by an activated schemata. Hence, schemata are not rigid but changeable and the perception process can easily be adapted to the existing conditions of our environment. According to Neisser's approach some basic structures are inborn. However, perception is basically seen as an interaction between the active person and her environment. This is why he calls it the 'cycle between schemata and information input (Informationsaufnahme) (cf. p. 8).

According to this model, socio-cultural and biographic experiences can mould the autonomy of perception as well the schemata. Our brain organizes perception stimuli. It makes

assumptions, which are either changed consciously or subconsciously by our experiments. Individual perception can be influenced by individual needs, interests, attitudes and interests. Selective processes specific to the individuals (Individuumsspezifische Selektionen) determine the sensibility with which we react to different stimuli. Our reactions hint at our needs and attitudes towards the stimuli. Objects of perception which are connected with our needs, are perceived more intensively.

This is called accentuation (Accentuation). Within this approach of research the term fixation (Fixation) is applied to the tendency to utilize certain patterns of interpretation time and again. Objects are always perceived in a certain way – independently from sensory input. Even ambiguous information is set in relation to the prevailing needs of the person.

Witkin (1954) also emphasis the individual mode (Modus) of processing stimuli. He assumes that stable, long lasting characteristics and dispositions of a person influence the way he perceives his surroundings. This individual mode of processing stimuli remains stable over time and does not depend on momentarily needs and emotions. According to this approach the individual perception of our surroundings can be compared with our personality, similar to our body language. The **cognitive style** determines how we organize our perception and, especially, how we interpret ambiguous stimuli.

2.4 Cognitive neuroscience

The field of cognitive neuroscience concerns the scientific study of the neural mechanisms underlying cognition, e.g. the neural mechanisms of learning and memory. From a neuro-scientific point of view, it is of particular interest how visual learning works.

Apart from being the main organ to process information, our brain also simultaneously controls manifold cognitive regulatory processes, as e.g. the recognition of objects, the search for problem solving strategies as well as understanding and producing language. (Here) the reaction is not solely determined by the stimulus. Our reaction is also influenced by the mental state of our organism, as e.g. our knowledge, (previous?) perceptions, imagination, motives, intentions or attention. We do not see with our eyes, but with our brain. Our brain merely receives tiny electrochemical signal impulses of various frequencies. In order to be able to make sense of these signals, they have to be read according to certain rules and with certain knowledge.

Visual perception enables us to recognize three dimensional objects, our visual brain being responsible for this. The most important sensory organ involved in humanmachine-communication is the eye (80% of all sensory input is registered by the eye) The eye transforms the optical image of our surroundings within our visual field into nervous excitation (Nervenerregung). These are transported to the brain via nerve cells and processed there. Our perceptual system is based on a modular work mode. Colour, shape and depth, motion and localisation are processed simultaneously in three different channels/pathways. The Parvo-system is responsible for colour and spatial resolution (recognition of details). Temporal properties as well as light/ dark properties are processed by the Magnocells. They are also responsible for the spatial resolution; however their vision is poor.

Hence, the brain processes visual properties in specialized modes (pathways). It seems that the brain has many different modes (Modul) with self-adapting neural connections. The more the nerve cells are stimulated the more active and conductive they become. Permanent activation can lead to 'hidden entities' and thus to the development of hidden inner patterns. These hidden entities can learn to make abstractions, discoveries and generalizations. They can recognize patterns, even when only a small fraction of them is visible.

"The important point with self adapting networks is that, analogue interactive systems from sequential presentations of faces, letters or phonemes are able to recognize new objects of the same class. Also they are able to develop new categories or situations.

When we look at the moon our visual brain will conclude that it is only a few hundred meters away. This perception contradicts our knowledge, that the moon actually is 400.000 m away. Thus, there often is a discrepancy or even contradiction between our perceptions and our knowledge. Both perceptive systems are used by the brain to process all incoming input/stimuli.

Our existing conceptual and perceptual knowledge help develop new hypotheses. The closer the two systems are linked with each other, the better we can learn. The development of our perceptual and conceptual skills can be boosted by using objects in correlation with each other (interactively). 'Handson' learning and being able to 'grasp` learning contents hence optimize the learning process.
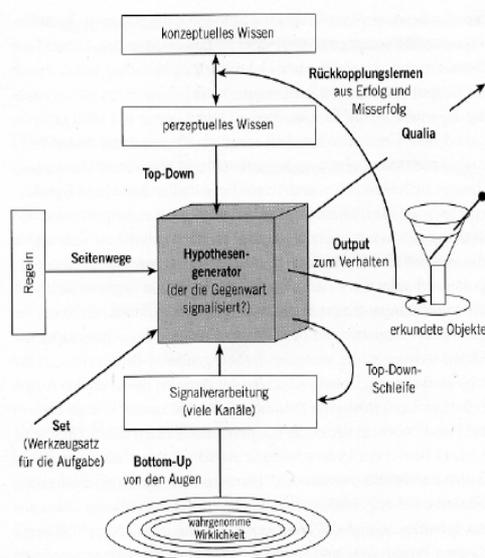
"Speculative spirit-design of the process of seeing. Bottom-Up-signals from the eyes and other senses are processed by means of object-knowledge (Top-Down) and general rules (byways). These signals were processed physiologically and red or interpreted by cognition. The general rules form the syntax (how perspectives and shape-laws (Gestaltgesetze) the organization); the object-knowledge forms an implicit semantic. Feedbacks, that based on successes as well as failures of actions, could correct develop the knowledge. (Therefore results the relevance of practical learning.) It is assumed that sensory signals signal the present in real time - possibly with help of Qualia (sensations)" (Gregory 2001, p305).

Photo: Gregory, p. 2001, p. 305

Irvin Rock (1985, p.3f) concludes from this research that perception has to be seen as a constructive process. There is a difference in quality between how we perceive our world and the stimuli our world presents us. Perceptions takes place on all levels of processes similar to thoughts. According to Rock all perceptions are intelligent, or at least they seem to be. Although perceptions and consciousness are separate entities there are quite a few processes which are typical of thinking, such as describing, drawing conclusions and problem solving. "Describing" is an abstract analysis of the geometry and the orientation of an object. When he talks about 'conclusions' he is referring to a subconscious process which takes place when scan sensory input for certain attributes.

Problem solving involves a creative process of generating hypotheses. When internally constructing processes or objects four different processes take place:

1. shape construction (perception of a gestalt)
2. problem solving (generating and testing hypothesis)
3. relational definition (interpretation of stimulus input)
4. drawing conclusions

The various kinds of input are not processed by the brain at the same time and in the same way. According to brain research the various sensory, sensomotoric and physical functions can only be boosted during specific sensitive periods. The brain has to be stimulated so that

the nerve cells can be optimally connected with each other. Without any stimulation during language learning or the attachment period the various functions can not be developed. Furthermore, 'neural patterns' are developed during the first months of our life which stay static all our life and determine our bio-psychological development. Hence all interaction, communication all information processing as well as all learning processes are determined by this 'architecture of the cerebral cortex' we acquired so early in life (Singer 2003, p.70).

From this research Singer draws the conclusion that it is necessary to use means of expression which are not rational. He puts emphasis on the fact that apart from the all dominating rational language there are other means of communication, e.g. mimics, body language, dancing. As our environment is highly dominated by visual images one can conclude that children are dominated by patterns of 'hidden entities', which help them to deal optimally with audiovisual communication. Presentive thinking and perception are hence particularly suited to initiate learning processes. From this we can conclude that in a society dominated by the media it is of paramount importance to foster the audiovisual and alphanumerical competencies of our children. It is interesting, that in spite of these social necessities, neurobiological research findings are being discussed (in Germany) that very young children are be spared from being subjected to the media.

2.5. Psychological learning aspects

Information about brain hemisphere research

The hemisphere research deals with the different functions of the right and the left brain-halves. (hemispheres)

The left side of the brain (also termed the verbal system) builds the centre of human rationality and allows the ability to think abstractly. It is responsible for logical thinking as well as for a sequential work out of figures and for processing linguistic information (c.f. Edelman 2000, p. 8f).

The right brain hemisphere (the non-verbal system) is the centre of emotionalism and impulsiveness as well as that where processing visual, vivid and musical impressions occur. It is however also responsible for the synthesis and the integral aspect of viewing things. In this way, different dimensions of impulse are simultaneously available (e.g. colour, size and form). With the help of the non-verbal

system, different dimensions of an impulse can be taken in at the same time. Thus processing a picture more likely occurs as an integral whole rather than in sequence.
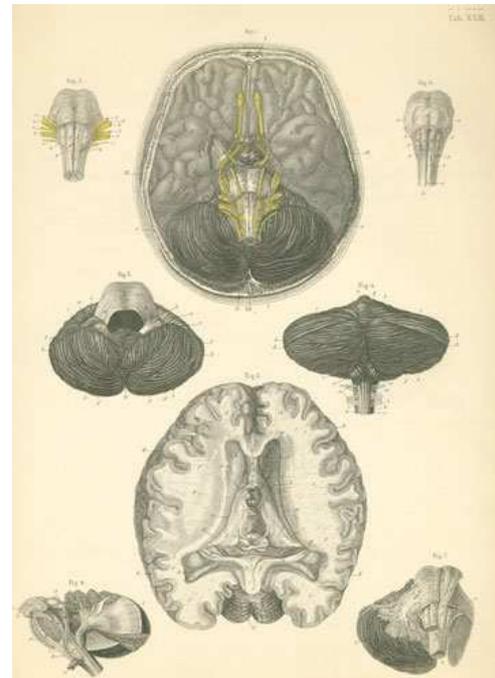
Different side views and sections of the brain *Handbuch der Anatomie des Menschen* of Professor Dr. Carl Ernest Bock (1809-1874), published 1841 in Leipzig

The theoretical reason for the impact of *pictures* was supplied by the cognition psychologist Paivio in 1971 in *concept of double coding*. Hemisphere research also supports this impact theory.

According to Paivio, it depends on the kind of stimulation as to which one of the systems is activated (ibid, p. 152f). Each system is respectively activated, depending on the importance of the particular impulse. For example, the term "dog" initially activates the verbal system, though it also causes a vivid imagination. The opposite happens if the picture of a dog is shown. According to Paivio, a coding in both of the systems enhances the probability that the stimulation can be more easily recorded and remembered later on.

Both hemispheres are in a complementary ratio to each other and they balance each other with their specific faculties. Language is not just worked out in the left hemisphere but also in the right hemisphere. For example, decoding words and understanding syntactic structures are attributed to tasks of the left brain-half; among others the right brain-half is responsible for painting emotional terms. Both hemispheres are also involved in processing pictures. However, it is supposed that processing pictures mainly takes place in the right brain side (cf. Kroeber-Riel, 1996, p. 23). Thus, hemisphere research acknowledges the concept of double coding

Pedagogic questions:
Despite the fundamental point of view regarding brain functioning with the two highly specialized hemispheres there are numerous indications that human beings differ in dimension of activation of either of these hemispheres. In some human beings the activities of the right brain-half dominate – they are right dominant, with others the left brain-half is dominant – they are left dominant.
Some authors suppose that the prevailing syllabi in schools are especially focused on analytical and conceptual thinking of the left hemisphere. To this end it is often stipulated that a more intense involvement with the right hemisphere with its nature of intuitive and illustrative thinking could lead to an improvement in learning potential.

The mental representation of knowledge

Mental knowledge can be represented differently in one's memory. Here, it is possible to distinguish between the following methods.

- verbal representation
- analogous representation
- and action-oriented representation of mental knowledge.

Unlike analogue representation the verbal form is there where language meaning and images are internally stored in an abstract form. An example of this is how linguistic messages are transformed point by point into the smallest definition units (propositions) which are afterwards linked to a definition network. In this way linguistic understanding yields a summation of meaningful elements. The term "proposition" derives from logic and linguistics and describes the smallest unit of meaning which stands as an independent assertion and which can appropriately be judged as true or false. In the so-called proposition process human beings fragment a complex sentence into single propositions (cf. Edelmann 2000, p. 146f).
Through networks, it is hereby possible to differentiate between so-called *incidental networks* and *definition networks*. With the incidental networks one can deduce a connection between definition elements as these also build a complex network. Definition networks are equipped as definition hierarchies. They describe the semantic memory content (memory for definitions which are no longer immediately available as single incidents). The most important feature of these networks is the hierarchical structure i.e. a hierarchy contained of persons and definitions in which each standing is subordinated to the next highest (c.f. Edelmann 2000, p.146f). An illustrative example is the military hierarchy.

Analogue representation includes many details of perceived incidents. This condition is characterized through clarity. The term analogue indicates that there is a certain resemblance between outer appearance and the inner representation.
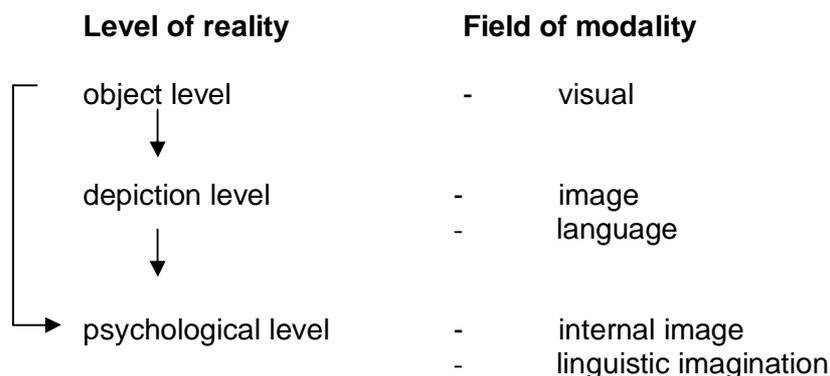
The most important external representation-systems are image and language i.e. one can see or hear through a particular thing. Internally, a thing can be represented analogue or verbally i.e. we record a relatively clear image or a relatively abstract definition (ibid, p.151).

Envisioned images are always interpreted information. One can distinguish 3-dimensional imagined pictures (e.g. a book on a table) or linear structures (e.g. pearls on a string). With regard to objects in a spacious or linear range (e.g. simultaneous perception of quantity as of four served breakfast menus or imagining a trajectory of a football) analogue representation is very much superior to a linguistic one – in terms of content.

Photo: „Bus icon" by IaRuth published under CC–BY

To better understand the relation between reality, image and language it is useful to distinguish the following "reality levels" (c.f. Kroeber-Riel p. 1096, 37f):

Level of reality	Field of modality
object level	- visual
depiction level	- image - language
psychological level	- internal image - linguistic imagination

On the object level we refer to concrete visual appearances. Concrete facts can be transported onto the depiction level via picture and language. On the psychological level figurative or linguistic imaginations will be evoked in the viewer. Even non-real facts can be made perceptible by image and language e.g. "Batman flies over the city". Thus, regarding fictional facts internal pictures can occur in memory banks which have the same quality of perception as internal pictures of real facts.

Internal images with the character of perception are called eidetic phenomena. Here the ideas are very clear. Sharp contours and colours are visible. This ability is especially well-developed in children and young persons. However, in contrast to eidetic performances, meanings of pictures remain vivid. Concrete details pertaining to form and colour are hardly present in memory. Here a parallel to linguistic learning can be drawn. Not the exact wording of a sentence is recorded but mostly just its content.

In many cases the memory seems to have a greater capacity for visual content than for verbal content. In numerous cases this has been confirmed by surveys. This is made clear by a classical experiment of Paivio which explains the memory performance of images and words.
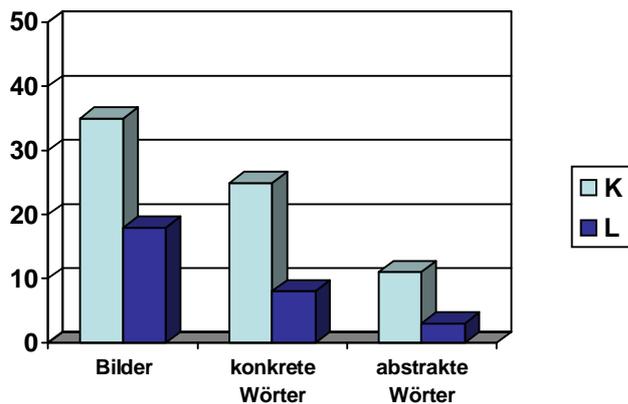
Memory performance for images and words: briefly 5 minutes after performance (K) and after one week (L) measured recall of images and words

Diagram: According to classical experiment of Paivio from 1971 (c.f. ibid, p. 27).

Activity-oriented representation remains relatively unnoticed in research so far. This kind of representation can mean motor coding such as steering a vehicle or handling a tool. Here it is about motor abilities. Furthermore this kind or representation is especially important for processing the depth of employing learning material. Linguistic representation as well as additional image demonstration often cannot substitute active use of learning material. Example: practical course during academic study or in dealing with the subject of "vegetables". In primary school a vegetable patch is cultivated (cultivation, plant care, harvesting, cooking etc.). It is presumed that by simultaneous and/or successive multiple coding, an object is more precisely entirely understood and is also better registered. (c.f. Edelmann, p. 152f).

Multiple Representation and knowledge networking

Multiple representation is the result of dual coding. Learners hereby acquire selective verbal (abstract meaning) as well as analogue knowledge (concrete demonstrative thinking). This multiple processing is called multiple representation. Hemisphere research holds the view that the left and the right brain-halves are specifically involved. There are probably relatively few learning processes in which one kind of information processing exclusively occurs. It is apparent that there can hardly be any doubt that eye viewing makes it easier to learn content with relative abstract contents and meanings (ibid, p.153f).

Multiple representation

verbal   analogue

abstract meaning   concrete-demonstrative thinking
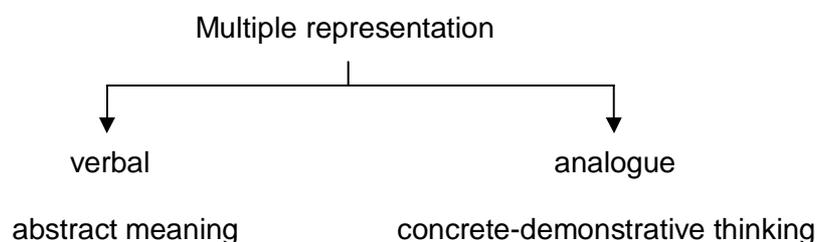
As a rule, complex networks occur in larger fields of knowledge. The opinion that knowledge is linked up and is frequently stored in verbal and analogue form is the most important point of view regarding the understanding and retaining of greater subject matter. The attempt to sequentially remember complex subject material in a continual list is in all likelihood doomed

to failure. In communication based on linked knowledge both the entire system and the single elements are to be structured appropriately. Linked knowledge always has a surface structure and different depths of layers. For some time the term "hypertext" was established. Computing brought this realisation to light due to free navigation which has become significantly easier than is the case with conventional texts. Here one can however attempt to build a network of knowledge using cross-references. The learners can thereby build bridges between single terminologies and contents.

Internally, human beings build up mental models, especially with regard to relatively complex facts of a given case. They integrate linguistic, graphic and activity related knowledge in which an entirely analogue form of representation takes centre position. Mental models allow inner simulation of external processes and they determine thinking and activity of the respective persons. They enable one to cope with tasks and problems (ibid. p.156f).

Visual creative methods such as mindmapping or clustering are very well suited to make e.g. mental models visible, to structure knowledge; to prepare lessons, lectures and to illustratively present subject material. Because of the ever expanding associations it is possible to achieve an extraordinary storage capacity.

3. The power of images

In modern day society it is almost impossible for a politician to manage without a "spin doctor". Political stage performance is part of everyday-life. Politicians have been trying for a long time now not to convince with arguments but primarily with image messages. They believe in the power of suggestion coupled with the emotional impact of imagery. The necessity for an effective demonstration of politics is by no means new. For generations religion and state exploited those who believe in the effect of images. They benefit from the power which images produce. What is now new is the complexity which is used to exert influence through images.

The advertising industry is also occupied with the power of images. In order to anchor advertisement in the memory of the consumer, the communicator has to react to the variety of circulating information, if he does not want to be overlooked. Consequently there is a spiral of activation. Three forms of attraction are used to encourage the consumer to buy some kind of commodity.

1. *Activation* –The frequency of the advertising message is accelerated.
2. *Emotionalization* – The advertisement becomes more erotic and aggressive.
3. Esthetization – The advertisement becomes more sensually animating.

These "requirements" are best matched by image communication, which is related to the following image functions:

- Images have a direct impact
- Images have an activation function
- Images have a porter function
- Images are understood in their entirety
- Images enhance memory impact
- Images transport emotions
- Images activate associations
- Images evade rational control.

There is however, no cause-and-effect relation concerning the use of images. Image communication can only be argued with the term "probability". The image code offers "only" a preferential reading direction. Whether this is recognized by the recipient depends on the different factors.

3.1. Image perception

Images are allegories. They can detach from the original, become independent and earn their own value. The recipient can interpret their codes in different ways depending upon his personal and social experiences. Hence, there are no determinants but rather probabilities. At best we can assume preferential forms of de-codifying. We have developed the following framework to raise awareness of the multiple meaning of images (Doelker 1991, Röll 1998).

3.1.1. Images as "Wesen" (soul, character)

Photo: "Headless Lenin" by terren in Virginia published under CC-BY

In earlier times of humanity mankind did not distinguish between the image and its allegory. Image and allegory were perceived as identical in character. Images were as nature and its forces presumed to have an anima. The real world, the inner world and the allegorised world were thought to be identical. Image and "wesen" were one and the same thing. *And images served man for his orientation in the real world. This is the first step towards image orientation.*

This idea about image can still be found in pictures of monarchs, on posters of pop stars, photos of statesmen. During change of power and office, statues and symbols of the former heads of power are symbolically destroyed. as getting rid of the old. Such scenarios could very recently been witnessed (statues of Lenin, Stalin, Saddam Hussein). Those who destroy images, young pop fans as well as professional advertisers who want to suggest that their own product is "real", are both dedicated to the same magical thinking (immanentism).

3.1.2. Image as shadow

The second stage of image perception conveys the image as not identical with the "wesen", it however, takes part of it. The image contains traces of the "wesen". There is no substantial identity between the images themselves and the entity its expresses, yet the image can participate and impact what it allegorises. This is the understanding according to methexis. In his theory on methexis, Plato outlined that properties can be assigned to images of the objects they are portraying. A photo contains traces

Photo: „Place de l'Alma, Paris "by Foraggio published under CC-BY-ND

of the real object and therefore of its real "wesen" or character so as smoke alludes to fire.

3.1.3. The deconstruction of images

The third stage of perception deals with creative processes with their own dynamics, i.e. the "Eigenwert"(ownvalue) of the image. At this stage the image has become detached from the reality of its referent. In their subculture the youth often use self created and interpreted systems of signs that represent a common code of their inner circle and which confine the sub-culture against the outer environment. This form can also be added to this third stage of images perception.

Youth tend to integrate symbolic with historical value into a new context and dynamics into a juvenile style-war. They reshape their codes into bricolage forms assigning new meaning to the original one or developing a completely new significance on the whole. Not every swastika, Christian cross or satanic symbol that young people wear as emblems contains and transport the meaning and values assigned to these signs. With perception producer and recipient are autonomous in lending significance to images codes.

3.1.4. Re-mythisizing the image

The fourth stage deals with re-mystification of the image, since now a magical component comes about. It is not about confounding or confusing image and allegory as it happens at the first stage. This is about uploading the significance of images now; that images get an additional meaning, a new symbolic subtext that endorses the object they are allegorising. Such subtexts are not directed towards rational consciousness, but towards phylo and ontogenetic experiences (normally aesthetics, archaic symbols, archetypes). It is unclear whether reanimism leads to perception-relevant behaviour. It is though; undeniable that such images are appearing in masses.

3.2. Developing a grammar of images

The continuous almost intrusive, repeating of basic rules regarding aesthetics in advertisement, in video clips and films indicates that being in command of a "visual grammar" is advantageous if trying to deal and cope with the image world. I have learned by experience in formation and education that the impact visual aesthetical schemes makes on perception should not be undervalued. The recipient can deal with the worlds of imagery in a constructive and conscious way only if he notices these. Such schemes impact areas that are rarely consciously noticed. Only a person who has learned to recognize and reflect on such a world of images can detach himself from the suggestive image power. In view of the dominance of images, image competence has become a key qualification factor.

At least six visual impact factors can be identified (Röll/Wolf 1993/94). The first is about the power of centre orientation, the second one about image margins, the third one deals with rules to create harmony and tension, the fourth one is about space and perspective, the fifth concentrates on the abolition of form, and the sixth one refers to the significance of colour. Differentiation can be made between archetypical, social-psychological and artistic aspects. Outlining the aesthetical rules we reference media pedagogical practice, and given the limits of space, we focus on one example (the power of centre orientation) in order to explain what can be understood by means of image grammar. General elements and principles of image design are subsequently presented.

3.2.1. The power of the centre

When people who are inexperienced in photography are requested to take a portrait of a person, they will almost always put the eyes (of the subject) into the centre cross. Such first shots that are taken without any idea of grammar indicate a sort of natural tendency towards centre orientation. Newcomer photographers define their own position as the centre and create a self-related correlation to the centre of the object, focusing the image and assigning the centre balance. This occurs contrary to what never similarly happens in professional photography, neither in TV nor in cinematic films. Inexperienced people adapt to the high value demand that eyes and the visual have in present culture.

Photo: "Window at the Münster in Freiburg" by Curnen published under CC-BY

3.2.1.1 The archetypical level

A circle defines inside and outside. In early cultures of the megalith era the circle of the ellipse confined the area of the Holy region. The circle was a symbol of mythical understanding about the recurrence of the same thing. It was a symbol of understanding the time element and was considered the image of the cosmos and eternity. The first known of the early mythologies assume that the world is concentric, defined by a circle. Horizons give

reference to local environments and apply to tribe reasoning. In the centre there was the tribe, the people chosen by the gods. Tribe myths are unexceptionally ethnocentric. The centre was not only associated with being the central place (the sanctuary, the temple), but also to the tribe, the folk.

In the self perception of the Yurok-Indians the "We" of the tribe is in the centre of the world view. In a map from the 13th century Jerusalem is shown as the middle of the world and the centre of the earth. In the maps of the ancient Greeks, land maps painted by the American pupils of today and in children's drawings one can see that searching for the centre and by locating it (inside-outside / belonging or not) appear to be something deeply essential.

3.2.1.2 The social-psychological level

The surface of a circle is symbolic of infinity and of closeness. Female and mother symbolism is part of the symbolic circle of the rotund. The cupola of the Hagia Sophia in Istanbul indicates this meaning. Also as far as we know the first human housing was erected on a circular ground layout.

As for the human development process the circle is the first experience level of man. Earliest exploring experience of a small child is a circle experience. The first attempts at walking and crawling happen in circles. Further exploration of the environment is also concentric. Starting from the centre of the house the child gets an idea about the world by enlarging the circles of his observations. Most of the early child plays are circle plays. Children try to find out about the relation between centre and periphery as our ancestors have probably done through ritual dancing.

Family and friends' circles also remind us of the significance of circle metaphor. In a circle the human feels like part of an entity. The personal micro-cosmos is embedded in the macro-cosmos of the globe. The circle forms a clear centre, it surrounds and protects. All points in the periphery are of the same distance from the centre. The centre line declines towards itself. The circle is the only form that our brain retains continued memory of even if the circle line is interrupted.

3.2.1.3 The level of creating an image

A centre can be expressed by two forms by the circle or by symmetry.

A surface expresses calm, contemplation and a feeling of ethnocentric security. The psychological effects of centre can be expressed at best or most intensively by the square. In such a format, embedding and protecting a circle can be most felt.
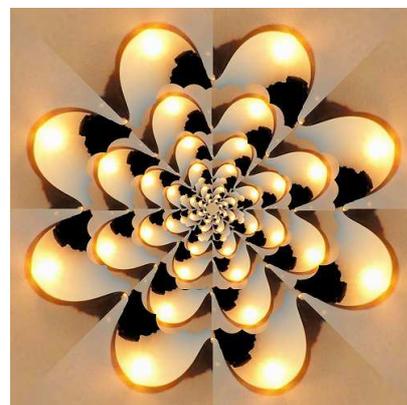
As can be seen in the two examples above the image centre can be starting point for circular movements from the inner to the outer side (above left) or the circle stabilizes the homogeneous form of objects (above right).

The graphics outline that structural form is of outstanding importance. The image is structured or composed by structural lines in an image field.

The longing for a centre is not only referred by the circle. It is also referred by symmetry. The classical ancient idea of symmetry was the constitutional aesthetic perfection. During the Renaissance the cosmological idea was substituted by the normative-aesthetic idea. Symmetry was reduced to an aggregation of "number" and "order". Idealistic aesthetics referred the symmetry term to reaching a sort of inner balance (longing for the centre). In current times art theory considers symmetry to be an immanent correspondence of balanced forms.

Mirror-image photos as well as photos that try to evoke a proportional harmony are classified as symmetry.

The "Buddha1" image (left) corresponds to a mirror symmetry. The nose is the centre cross. The right half of the image is almost identical with the left one. The bright face inspires a circle idea; and the aspects of security and belonging are evident signs of harmony. The effects are intensified through the dispersion of brightness in the picture. The face is accentuated by light.

Photo: "Maitreya Buddha: the next Buddha" by ReefRaff published under CC-BY

"Buddha2"- (below) is an example of creating symmetry by immanent correspondence of balanced forms. The vertical cross centre, the axe, is empty (motiveless). The contradiction culture (Buddha) and nature (plants) causes a particular tension. Since the shot is taken from behind, the person watching this experiences this as an intimate observer of meditative situation. The sensation is transmitted to the observer. The composition (structure) of the image and its content (image information) merge with each other.
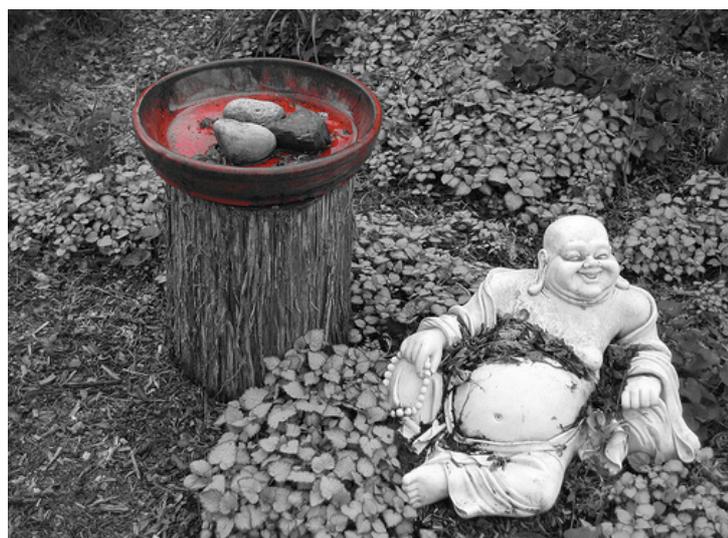
Photo: "buddha" by madaise published under cc-by

3.2.2 Elements and principles of visual design

Apart from the design of letters and texts there are some basic design elements like dot, line, surface and room. Included will be features on colour, form, position, size, number etc. (c.f. Radke et al. 2004). Following is a selection of basic elements and principles of visual design that will be presented.

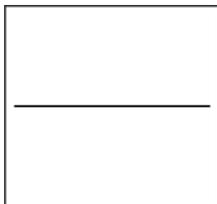### 3.2.2.1 The dot as the simplest design-element ●
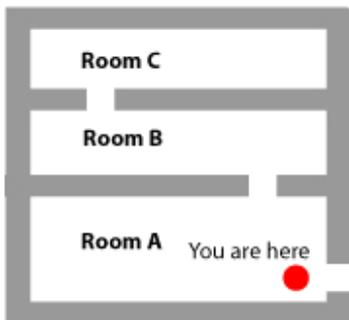
Example of application:

Dots can be used in image design in many different ways. Here an example referring to the visualization of a certain position.
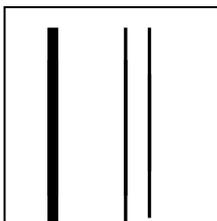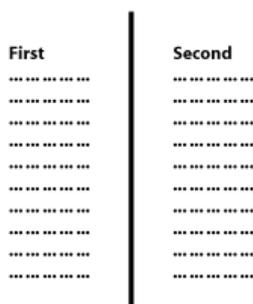
Photo: DIE, Bonn

3.2.2.2 Lines

Over-rating horizontal lines: The visual acuity is better developed in the horizontal direction. Geometric squares therefore subjectively appear to be too low. The optical centre is almost above the geometric centre which can be seen on this picture.

Photo: DIE, Bonn

Vertical lines interrupt the eye movement and/or can stop it.

Photo: DIE, Bonn

Application example: Vertical lines can limit ideas and thoughts and provide clarity.

Photo: DIE, Bonn

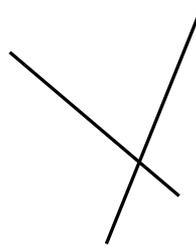Diagonal lines give a sensation of movement and dynamism.

Photo: "Bandai. Jumping experiment" by pasotraspaso published under CC-BY

3.2.2.3 Surface / Pithiness (good shape)

Often different figures can be cut out of the background and also the arrangement can take place for the same demonstration in a different way. The law of pithiness – also called the law of good shape – refers to the tendency of human perception to depict the optical stimulus in a simple way - if possible. The image to the right shows, in all likelihood an overlapped triangle and rectangle and no abstract polygon.
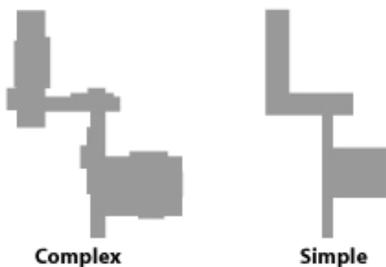

Photo: DIE, Bonn

Photo: DIE, Bonn

Good shapes take the perception of simplicity, symmetry, regularity and continuity into consideration. Well known and memorable logos, those which are easy to remember generally meet the criteria of this picture. For the design of visual teaching material this means that they should have simple structures and a symmetrical lay out. This style enables concentration on the essential contents.

3.2.2.4 Simplicity

Photo: DIE, Bonn

The law of simplicity follows the human mechanism of perception to simplify visual impressions in a way that the observer is unconsciously able to understand. This mechanism works very well if the graphic message is kept simple (example shown above: simple and playful depiction). Complex and overornated learning material lay-outs not only hinders the learners' concentration but also has a

Photo: DIE, Bonn

real counterproductive effect. In the process of simplification ambiguous elements can lead to completely unintentional conclusions. Hence, simple pictures are more useful than those ones overloaded with unnecessary information.
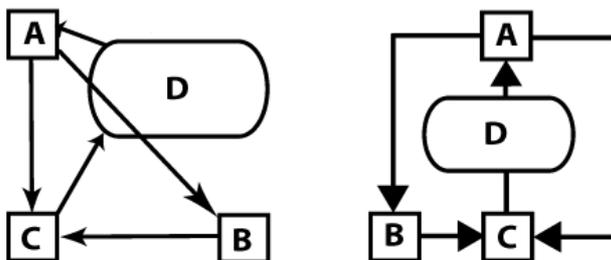
3.2.2.5 Continuity
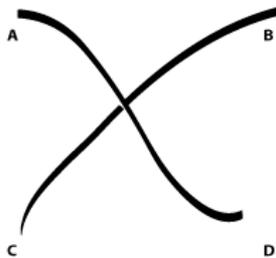
The human eye always tries to continue on a path if it receives a direction-stimulus. In the left image we perceive two lines (from A to D and from C to B). The law of smooth course is closely connected with the law of continuity. We tend to follow on contours which have smooth transitions, i.e. which do not have abrupt changes of direction. Since the line from A to D is smoother than from A to B we see it as such. These two laws can help to see objects apart and/or together in a right way.

Photo: DIE, Bonn

Examples of good and bad lay-out:

In which diagram (left) was the law of continuity being observed?

Photo: DIE, Bonn

3.2.2.6 Similarity

According to the law of similarity, optical stimuli of similar structure can be closely grouped together. In the following example proximity and similarity arrange information in a meaningful thematic connection.

|	

Methods of visual learning
 Traditional creative techniques
 Creative techniques with new media
 Clustering
 Mind-Mapping
 Coaching of ideas
 Storytelling
 MindManager
 FreeMind
 Open Mind
 Mediator
	Methods of visual learning
	
	 Traditional creative techniques
	    Clustering
	    Mind-Mapping
	    Coaching of Ideas
	    Storytelling
	
	 Creative techniques with new media
	    MindManager
	    FreeMind
	    Open Mind
	    Mediator

The lay-out of this at the top right side enables the learners to see coherent things in a coherent manner. According to the law of proximity aspects regarding subject matter were grouped closely together. The structure laid out according to the law of simplicity supports the immediate visual orientation within the group.

In static depictions the similarity can be expressed by form, colour, texture, position, orientation and size. Visual similarity is a sign of factual connections therefore similar elements should be marked. Objects of one class can appear within one graphic, e.g. in the same form. Different fields of content can be enclosed by a different kind of colouring. For positive and negative values in one table different formatting can be used.

3.2.2.7 Focus

Photo: DIE, Bonn
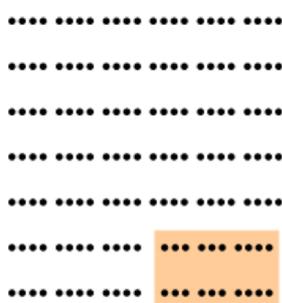
To the contrary - the wilful violation of the law of similarity – can be used to draw the attention of the learners specifically. The law says that elements which are arranged for focus form the base of the centre of perception. The graphic (left) demonstrates this where the section significantly stands out. It takes on the function of the "eye catcher" and draws the attention of the observer onto it. It is advisable to make clear visual accents in presentations so as to structure a recognizable learning path in advance. Keywords can also be visually stressed whereas sound and animation can be used for the focusing on interactive media. It is however, advisable to use them sparingly because they can cause irritation.

3.2.2.8 Colour

The various discussions about colour models in art and design can be traced back to 1666 when Isaac Newton developed the circular colour diagram. Basically, there are in theory different opinions concerning the application of different colour models. Regarding the lay-out of teaching material a certain selection of colours should be taken into consideration: (cf. Küppers, H., 1987, p 10ff):
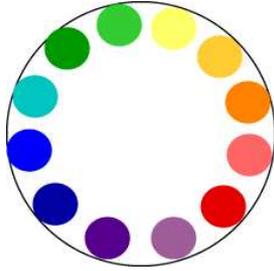
Primary colours: Red, yellow and blue. They cannot be produced by subtractive mixing of other colours. From these any other colour can be mixed.
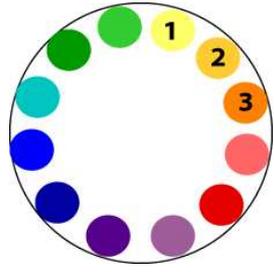
Photo: DIE, Bonn
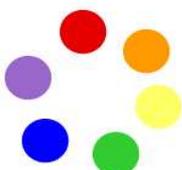
Secondary colours: Green, orange and purple result from the mixture of primary colours.
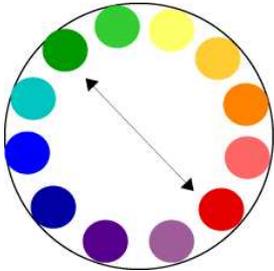
Photo: DIE, Bonn

*Ter*tiary-colours are yellow-orange, red-orange, red-purple, blue-purple, blue-green and yellow-green. These colours result from mixing secondary colours. The so-called colour-circle is thus produced.

Photo: DIE, Bonn

Analogue scheme of colours: Indefinite neighbouring of three colours on a colour circle in twelve parts is termed analogue colours. Generally it is dominated by one of the three corresponding colours.

Photo: DIE, Bonn

Complementary colour (contrast harmony): Complementary colours face towards each other in the colour circle e.g. red and green. These colours have a maximum contrast and a maximum stability

Photo: DIE, Bonn

In visual coherency harmony means balance in visual reception. Extreme homogeneity can cause too less attention whereas extreme complexity can induce too much attention for the learners.
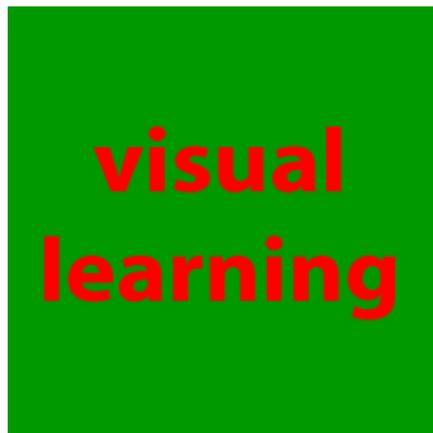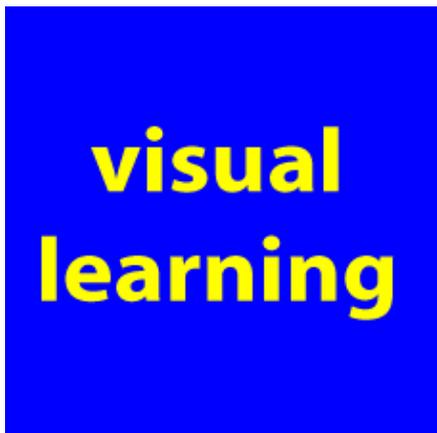
Photos: DIE, Bonn

In the graphic example on the left complementary colours have been used. Due to the extremely strong contrast, viewing will be experienced as strenuous and uncomfortable. In nature harmonious colour schemes occur in such a composition which can not be developed by man-made means alluding to chemical notations of colour harmony

3.2.2.9 Text and image

Images on their own are often ambiguous. Verbal additions serve to limit the ambiguity of images for the recipient and to more precisely state the interpretation. (Kroeber-Riel, 1996, p 136).

Text and picture must bear relation to each other and should complement one another in order to reach a general integrative understanding. Here one should distinguish between three kinds of text-image-connections with regard to content.(Ballstedt, 1997, p. 34f):

- Congruent relations: the text describes what the picture shows.
- Complementary relations: the text has blanks which complete the picture (and vice versa).
- Elaborative relations: The text content extends beyond the image (and vice versa).

The congruent relation supports the acquirement of knowledge by the duplicating information. A complementary lay-out is especially didactically recommendable and this requires the evaluation of both kinds of depiction in order to entirely understand. The elaborative relation only makes sense if adequate background knowledge can be expected (Ballstedt, 1997).

The precondition for understanding an integrative text-image is the spatial vicinity of text and image so that the eyes can jump about. The evaluation of an image can be influenced by verbal or visual clues. Image titles, image writings and image legends can offer verbal advice – arrows and emphasised colour highlights can be used as visual clues. Verbal terms in the text and in the image should always correspond.

4. Methods of visual learning

In the last years many creativity techniques have been developed. They show that learning can happen in a complex way, which should not be reduced on the linear model. Some of these techniques shall be outlined:

- **Brainstorming** means collecting a huge variety of ideas without assessing them. The learners inspire each other by their contributions. Ideas of others can be picked up and used for own inputs. There is no critique, and there are no killer comments (as "What you say is excellent, but unfortunately …"). At the end the ideas are collected and arranged.

- **Brainwriting** is the written form of brainstorming. The topic written on several flip chart sheets. Participants form sub-groups and add something to the ideas which are put down on the sheets under the topic.

- The **Method 635** (6 participants, 3 ideas, 5 minutes per turn) allows for a special type of collaboration. Every participant puts down 3 ideas. The neighbour proposes solutions. The next neighbour takes these proposals and enriches by three further solutions. Method 423 has 4 participants working with 2 ideas each in 3 minutes per turn.

- **Synektik**, developed by William Gordon, is the best known analogy technique. The basic idea is trying to comprehend or retrace consciously the mostly unconscious sequence of creative processes. Structures alien to the problem are transferred to or

combined with pieces of non-adhesive knowledge. Creating analogies means distancing from the problem. Problem contexts of technical fields are, for instance, affiliated to analogies from nature (parachute – blowball). Synektik wants to reorganise different types of knowledge in new patterns (συνεχειν, synechein [greek] = relate to each other).

- **Collective Notebook** means that each participant gets a booklet with the problem definition. All can then take notes. This is a method that has proved to work excellently in newsgroups and bulletin boards (internet). There is no time pressure, no idea gets lost and if new ideas show up (- are noted) the problem can be approached from another point of view.
- The **Morphological Box** is a morphologic-analytical creativity technique (morphology = the science of organized thinking) developed by Fritz Zwicky for exploring all possible solutions to a multi-dimensional, non-quantified problem complex by cross consistency assessment.

- **Cognitive maps** are graphic representations of theoretical concepts of a man, a group or a part of an organisation and of the relations between these concepts. They evidence the individual, team- and organisational knowledge basis. Cognitive maps affiliate knowledge concepts that have not been interconnected before. They put forth structural knowledge and combine the given knowledge. This generates new knowledge. Gaps in knowledge become evident as well as mistakes; and new possibilities for using the given knowledge can be discovered. Compiling a cognitive map of the knowledge of an individual / a collaborator is also possible.

- **Concept mapping** is an instrument for creating a cognitive map that has been invented by Dietmar Graf. A topic is put down on a sheet. Then terms relating to this topic are subordinated hierarchically below: Abstract terms above, the concrete ones towards the lower side. At the end examples are given. Terms are connected by relations of double or multi value. Terms at the same level and at different levels are connected by lines if they are related directly. Linking words on connection lines evidence the nature of relation between two terms. Concept maps resemble a hierarchic hypertext.

All learning techniques described here, also called creative methods, help activating the complexity of thinking. Other methods used in science and further education are the Walt-Disney-method, the Antagonistic Word Analysis, the Superposition, the Delphimethod, the RTSC-conference, Open Space and the Future Conference.
In the following, examples of creative techniques are given that can be implemented or by traditional means or by means of new media.

4.1. Traditional creative techniques

4.1.1. Mnemo techniques

In ancient times it was already known that memory performance can be increased by linking up text and imagination. The mnemo technique, a sort of memory technical deviation, shows that targets can sometimes better be reached by deviation than by the direct way. The mnemo technique is based upon the principle of an associated conjunction of two "things". Surprisingly, the success of mnemo techniques is based upon the fact that information is brought together that has, indeed, nothing to do with each other, neither in a logical, nor in a natural sense. Learning is induced by deviation. Images, rhyme and rhythm impact on

memory performance, since they address potentials of the right brain in addition to the left one (rational mode). This is multichannel learning. Linear (time and language related) processes and nonlinear processes (space and image related) run at the same time.

4.1.1.1. Association technique

Association technique, mostly pictorial, is the basis of all mnemo techniques.
"A twobone sat on a threebone and ate an onebone. Suddenly came a fourbone and stole the twobone the onebone. Thereupon the twobone took the threebone and threw it to the fourbone".
If you change twobone with "man", threebone with "stool", onebone with "chicken leg" and fourbone with "dog" it is very easy to memorise the text.
"A man (twobone) sat on a stool (threebone) and ate a "chicken leg" (onebone). Suddenly came a dog (fourbone) and stole the man (twobone) the "chicken leg" (onebone). Thereupon the man (twobone) took the stool (threebone) and threw it to the dog (fourbone)".

4.1.1.2. Story technique

Stories that are easy to remember are used to enhance the capability to recall in-formation. The basic principle is: Learn stories and pictures instead of bulky terms. If all countries of Central and South America are embedded in a fantasy story and words or names used in this story are similar to the names that must be learned – as Honda – Honduras, for instance – efficient learning is highly probable. The same success is guaranteed if easily remembered "transport sentences" can be created as in this example:

- **Cardinal Points N**ot **E**ating **S**habby **W**alnuts
- **Planets M**y **V**ery **E**ngaged **M**an **J**umped **S**uddenly **U**nder **N**egation **P**erfection
- **Musical scale: C**hange **D**irectory **E**ven **F**ollowing **G**uide **A**llows **B**reakup

4.1.1.3. The loci method

Photo: "Christians Wohnzimmer" by **okreitz** published under CC-BY-ND

The Loci Method (method of location; Latin locus = location, place) is based upon the fact that our brain anchors locations and series of locations particularly well (as for instance the way to the bakery, the own room). The learning material is linked with to a well known route. You walk along this well known route in your mind. The material to be memorised is linked to specific points on this way. This is an imaginary connection between known loci / places and the subjects to be learned: complex and abstract contents are reduced to core information.

By means of the method to use words as an alternative the association were "packaged". In turn the associations were connected with a location. While the memorising process is happening in your brain you walk along the locations and you can remember with the help of the associations. This method helps "to build" virtual buildings and streets. Afterwards you can walk along the virtual objects, but it doesn't mater which sequence you use.

4.1.1.4 Space system

Using the space system visual representatives are the main point of this method. An individually arranged room is kept in memory. The content of learning will be connected with places of the room.
You are interested in buying water, eggs and oranges. You will be able to remember the items you want to buy better, if you use following strategy:

You are going through the individual arranged room watering the flowers. While you are going to the plants you step on an egg which is lying on the floor. The egg breaks on a carpet. The motive of the carpet is an image showing fruits. The oranges get very dirty.

4.1.1.5 Rhyme method

Rhymes can help enhance the performance of your memory. Look to the internet, especially (http://www. Enchan-tedlearning.com/Rhymes.html – It is also a very interesting website for enchanted learning). Here you will find some examples of how to use the rhyme method. In the following there are two examples:

A swarm of bees in May, is worth a load of hay.
A swarm of bees in June, Is worth a silver spoon.
A swarm of bees in July, isn't worth a fly.
A Well As round as an apple, As deep as a cup, And all the king's horses, Can't fill it up.

4.1.1.6 Keyword method

The keyword method, also called word substitution method, helps to learn abstract foreign words and new vocabulary. You have to do two steps:

- The learner connects the new foreign word with a keyword
- The keyword has the function of a bridge to remember the new word

This method is effective if you want to upgrade your vocabulary of a foreign language. A word which sounds similar to the native language can be a key for the word you have to learn.

Segel (German) new word
Sea gull similar sounding word
See gull would be an adequate keyword. Now you have to imagine a sea gull is sitting on a sail. By using images like this you can increase your speed of learning.

4.1.1.7 Number and form

With this method you can make an analogy between numbers and form. A swan looks like the number two. If you imagine "eyeglass" it's very easy to memorize the number eight.

4.1.1.8 Number and word

You can memorize numbers better if you associate them with words representing a similar sound.

One = None
Two = Who
Three = bee
Four = floor
Five = drive
Six = fix
Seven = heaven
Eight = great
Nine = fine
Ten = pen

Numbers in connection with associated words or facts are better to learn. For example you have to learn the word "coffee". You imagine a picture of a tower (1). In this tower a lot of coffee is being stored. If you want to remember the word "coffee" you have only to remember the tower or the number 1. Suddenly the learning object is present. The more the picture-connection is unusual the better the effect.

4.1.2 Clustering

Photo: Example for a clustering: "to go to the restaurant", from the qualification workshop for tutors in Bonn, project „visuaLearning", DIE Bonn

Clustering is a non-linear activity that generates and nets ideas, images and feelings around a stimulus word. Clustering may be a group or an individual activity. Clustering allows you to explore many ideas as soon as they occur to you. Clustering does not take the place of a linear system; but it allows you to explore ideas before committing them to a particular order.

Clustering allows you to begin without clear ideas. All unconscious ideas, images, events and experiences you made before they surface. Clustering raises your awareness of subjects, which do not directly pertain to the issue you are examining. You will find it easy to access a lot of ideas in your memory. Clustering helps to activate the right hemisphere of our brain. The emotional-sensual and associative thought-performance is set free by using clustering, since the emotional overtones of the right brain-half have a primary and organizing realization-function.

Clustering helps overcome mental blocks, rendering it easier to find solutions to a problem. The right hemisphere is the part of our brain which regulates the function of awareness, vitalization, activation and emotional participation. The free flow of ideas opens a subjective point of view and develops the intrinsic motivation. In consequence of that effect you can find unknown and untreated patterns of cognition.

Similar to *brainstorming* you start with free associating. First you write down a word which is central to your task. For example, if you were preparing a report about visual thinking, you might choose the word "visualization" and write that word in the middle of your sheet of paper. Then write words all around this keyword words that occur to you as you think of "visualization." Note down all words that you associate with "visualization" Write all words including the one which at first glance seem to be random. Write quickly and without reflecting the words you can remember. Circle each word and idea and try to group the words around your central word. Connect the new words to the previous ones with lines. Repeat the same procedure at once or later on. Always start with your central word and then follow going on from inside to outside till your associations are finished.
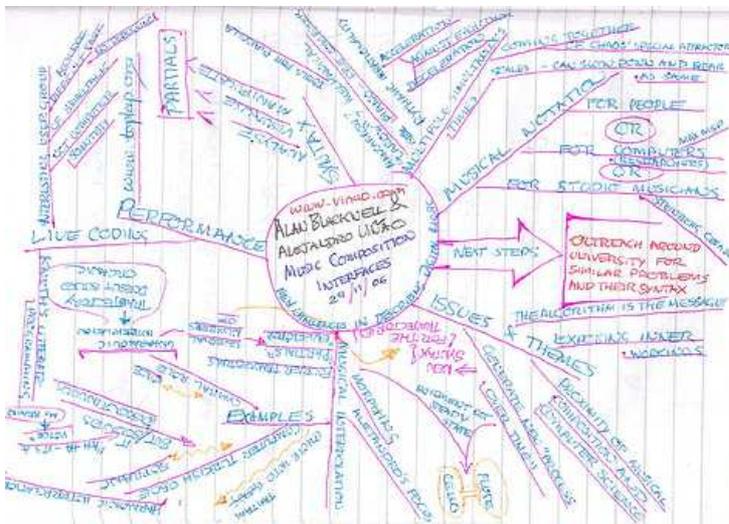
4.1.3 Mind-Mapping

Photo: „ Mindmap from Alan and Alejandro's talk" by dumbledad published under **CC-BY**

A Mind Map is a diagram used to represent tasks, words, ideas or other items linked to and arranged radially around a central key word or idea. With Mind Maps it is possible to visualize, generate, structure and classify ideas. It could be an aid in different situations, e.g. study, organization, problem solving, and decision making. Mind mapping can help you to understand the important issues in your texts or to follow a discussion or a report. Further, useful applications: lecture, speech, catchword slip, moderation, compilation of themes, organization. Learning works very well when both parts of our brain are involved to accommodate and to process incoming information. Associations are the roots for our brain to recognize any information. Mind-Mapping is made for noting associative ideas. It's a method to make individual conjunctions visually. Mind maps are tools which help you not only to learn but also to think. It's possible to arrange ideas very fast and present them clearly. The method is similar to brainstorming and clustering. The base of a Mind-Map is the visualization of an idea. In opposite to the clustering-method there is no free association. The terms and definitions are always correlated. Finally it a visual net of relations will appear. The structure allows us to recognize coherences.

Mind mapping involves writing down a central idea. Related und new ideas were radiated out from the centre. By focussing on key ideas and looking for branches out and connections between the ideas, you will help yourself understand and remember new information. It is a good idea to use colours, branches, lines, arrows, or some other way of showing connections between the ideas. These relationships may be important to understand new information. The structure of a Mind Map is similar to a human neuron or a tree. There are different knots with branches. The knots should help find a better orientation in your train of thoughts. Mind maps have a hierarchical structure evolving into main lines and sidelines.
http://www.buzan.com.au/learning/mindmapgallery.html

4.1.4 Coaching of ideas

Mündemann (2000) created the method „coaching of ideas". This is an instrument to help prepare products and projects. It is also useful to help overcome blockades. New understanding can be developed. Following steps are useful, to plan a task from different angles.
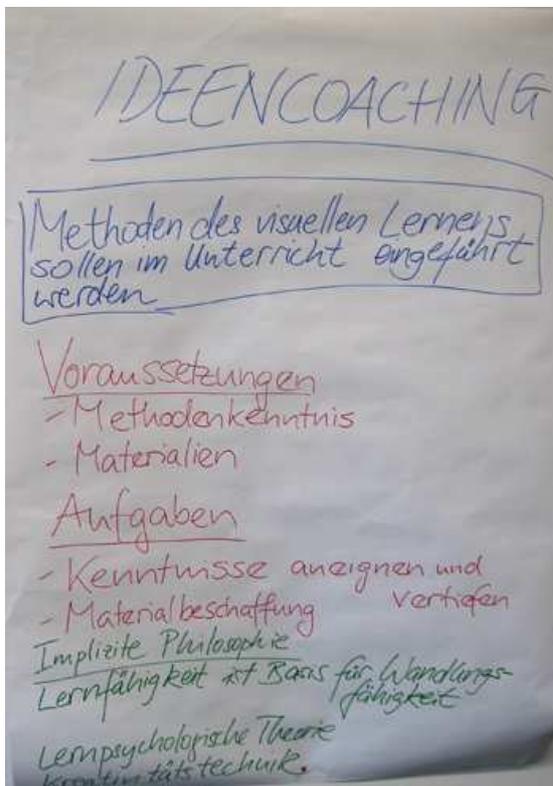
At first you have to clear the way of looking at the problem. Which requests exist? Which conditions have to be met prior to tackling the problems? Which methods for application are known? Afterwards it is useful to define learning targets (self-monitoring, intrinsic motivation, developing of an own perspective). Afterwards, you have to think about if consulting services or additional skills are necessary (input new media, new methods of learning). Learning aptitude is the base for ability to change a position. Creative Thinking is derived from systematically applied curiosity. If you accept this learning philosophy it would be advantageous for the process of learning. The next section deals with the didactics associations (psychology of learning, to keep in mind disturbing influences). The last thought is concentrated to the methodology (techniques of creativity, scenic experiences).

Photo: "Draft of a concept for a coaching of ideas", from the qualification workshop for tutors in Bonn, project „visuaLearning", DIE Bonn

4.1.5 Random access instruction

Random access instruction refers to non-linear learning. Learning with random access instruction might entail making conceptual "jumps" from one text to another. You can visit the related content material in a variety of contexts and sequences. Each revisiting allows a view to an additional aspect of the content complexity. Random access instruction facilitates a mastery of complex bodies of information including hypermedia instruction. All users have access to the complete stored information. Although the programme is flexible it is structured very well.
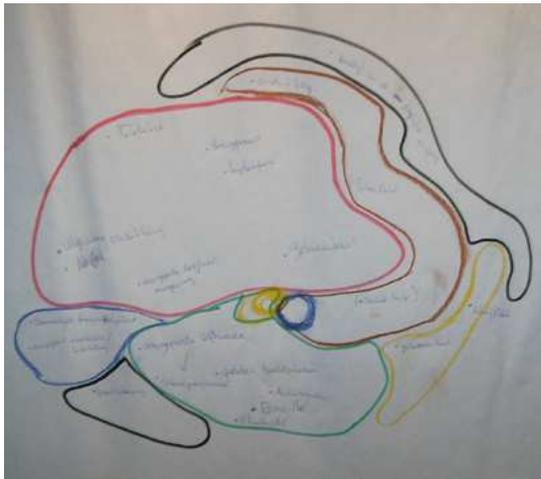
4.1.6 Cognitive maps

The method of cognitive maps (criss-crossing-landscapes) give reference to the philosopher Wittgenstein and it is supposed to solve complex challenges. It works similar to a landscape. In a landscape it is necessary to accept different points of view in order to realize the complexity. The same concept is handled from different points of view at different times in different contexts with a different objective. With this multidirectional and multi-perspective regarding syllabus content, the cognitive flexibility with the syllabus content shall be furthered and this hence ensures that the acquired knowledge is multifaceted. With every new perspective new

Photo: "Cognitive map", from the qualification workshop for tutors in Maastricht, project „visuaLearning", DIE Bonn

details and aspects can be discovered which have been overlooked before. It shall be learned that the learned stuff can be applied flexibly and that inflexible thinking will be avoided.
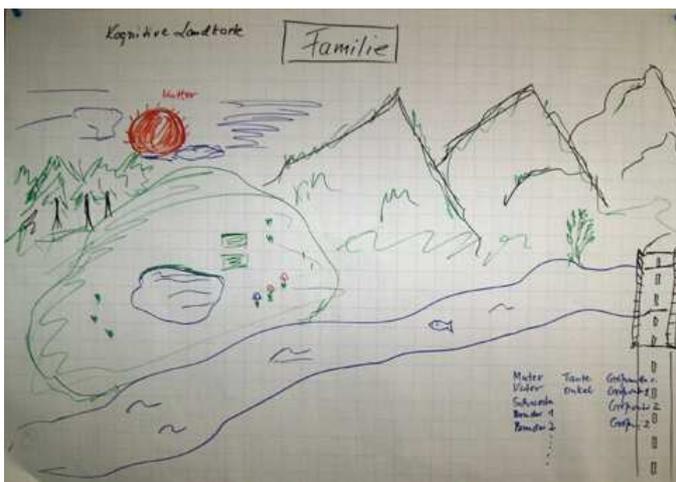

Photo: „Cognitive map of the Family", from the qualification workshop for tutors in Bonn, Project „visuaLearing", DIE Bonn

4.1.7 Storytelling

When using storytelling listening and telling take centre stage to impart knowledge. This technique is well known in the English-spoken part. The main point of storytelling is to involve the auditor in a story. This must be not only an act of hearing but also an act of experience. Learning success and emotional well-being has to be interlinked to ensure enduring success.

Storytelling is one of the earliest forms of traditional culture. Storytelling probably first consisted of simple chants expressing the joy of being alive and were also used to make better the hard work and monotony of laborious tasks.
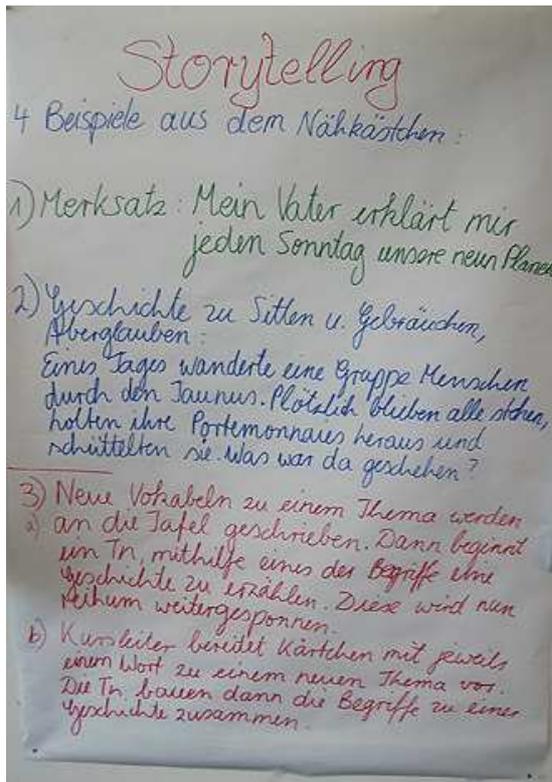
Photo: "Conceptdraft for Storytelling", from: the Qualification workshop for tutors in Frankfurt, Project „visuaLearning", DIE Bonn

Later the storyteller became the community entertainer by combining their stories with dance, music and poetry. Storytelling has evolved over the years and gets also an instru-ment for the group historian. This was the beginning of professional storytelling. By means of storytelling it's possible to understand and to manage the own circumstances and it can help to improve the subjective ken.

Generally storytelling is used to tell stories in English education. It can improve hearing, understanding, social behaviour and linguistic competence. Storytelling is not only used in education. Storytelling is also an implemented procedure quoted by narrative knowledge management increasingly. Also it meets with response as a consulting tool.

Stories are close to the practice and near to the own experience as charts, manuals and data banks. That's why they are successful. Storytelling can concentrate awareness to implicit knowledge, information, values, way of thinking in companies and institutions. Storytelling can help to improve the communication to transport the implicit knowledge for all. With storytelling you can transform the implicit knowledge in explicit knowledge. There is a potential area of application in different convenients:

- *Knowledge management*: appendum to fact oriented instruments
- *Change-processes:* attendance of employees, decision guidance in critical situations
- *Project-debriefing:* standardised collecting of experiences
- *Leaving experts:* saving and documenting the knowledge of leaving employees
- *Cultural analysis:* assessing the (inofficial) business culture
- *Corporate-communications:* developing and distributing of missions
- *Quality management:* finding weak points in the process of working

Look at http://en.wikipedia.org/wiki/Storytelling to find further arguments.

4.2. Creative techniques with new media

4.2.1. MindManager

MindManager (Mindjet) is a commercial software to create mindmaps. It is a software for visualizing and managing information, allowing individuals and teams to more effectively think, plan, and collaborate. Mind Mapping is a powerful technique for quickly generating, capturing, and organizing ideas, tasks, and activities. Mind-Manager ensures success by empowering you to focus on the details, mitigate risks, and exploit opportunities.

With its intuitive, highly interactive interface, a MindManager map is a snap to begin. Click anywhere and type a central topic. From there, the map welcomes as much creative thinking as you and your team can generate. It even pulls in external information from websites, databases, spreadsheets, blogs, and more. Customizable wizards and templates, and a one-stop task pane, streamline and standardize map creation.

Photo: "Evaluation of the method cognitive map by tutors", from the qualification workshop for tutors in Maastricht, projet „visuaLearing", DIE Bonn

MindManager Pro 6 transforms brainstorming ideas, strategic thinking, and business information into blueprints for action, enabling teams and organizations to work faster, smarter, and with greater coordination. It extends core mapping functionality with a host of simple tools–collaboration, distribution, administration–making it easy for business pro-fessionals to quickly deliver bottom–line benefits enterprise–wide. Mindmanager you can connect with MS Office, Project, Visio and Excel. It's in ideal instrument to capture, analyse and organize informations from different data bases.
http://www.mindjet.com/de/

4.2.2. FreeMind

FreeMind is an open source mind mapping software written in Java and at the same time an easy-to-operate hierarchical editor with strong emphasis on folding. These two are not really two different things, just two different descriptions of a single application. Often used for knowledge and content management. It's a simple, productivity tool. It basically allows you to generate a "mind map" document quickly. The tree structure is clearly laid out. FreeMind packs a lot of information into a little bit of space.

FreeMind has an intuitive editor for tree structured data. It features a modular design, and can be used to edit any kind of data, dependent on the current mode. FreeMind enables you to visualize ideas, projects, concepts, brainstorming, internet research or any other task that can benefit from a structured overview. The data is represented as a Mind-Map. You can create nodes and decorate them with icons, child and sibling nodes and add icons, clouds, notes and custom formatting for better presentation. You can also add a hyperlink to the node. The nodes can be expanded or collapsed, or interactively linked to local files, other maps, online resources and more. It features one-click fold, unfold, and "follow link" operations. You can also insert encrypted nodes or create encrypted maps for sensitive projects. Finally you can export the finished maps to HTML, XHTML, PNG, JPEG, SVG, PDF, Flash, Open Office document, image files and other formats.

http://freemind.net/

4.2.3. OpenMind

OpenMind is ideal for visual outlining of written documents, storyboarding, creating websites or presentations and creating timelines. OpenMind 2 from Matchware is the next generation of productivity software for capturing, organizing, developing and presenting information. Visually represent complex ideas or processes to increase understanding, plan more efficiently and turn ideas into action faster. Based on the proven Mind Mapping theory (or visual mapping), OpenMind promotes creativity, clarifies thinking and simplifies decision-making and problem solving.

OpenMind 2´s export capabilities let you capture the full potential of your Mind Map. A simple click of your mouse enables you to generate fully formatted Word documents, professional-looking PowerPoint presentations, dynamic HTML websites and interactive timelines.

MatchWare OpenMind 2 Business Edition simplifies every step of project planning and project management, thereby enhancing teamwork and increasing productivity. Start by brainstorming your project plan in the Mind Map view, include scheduling information and simply switch to the built-in Gantt view to refine your plan and take advantage of the project management features. Manage your projects from start to finish with imports from and exports to Microsoft Project, Outlook and XML.

OpenMind is also an effective way to structure and allocate resources to multimedia projects: When storyboarding presentations, an idea in your Mind Map represents a page or a slide in your presentation, a subidea represents a subpage or subslide and so on. Attach resources to branches (ideas) such as Flash files, pictures, text, sounds and videos. These files are included when you export to Power-Point, HTML and Mediator and are displayed on their respective pages. Create hyperlinks, buttons, branch connections and other interactivity that is also included when exporting. Export to PowerPoint, HTML or Mediator using templates. Export to Word as a linear outline.
http://www.matchware.com/en/products/openmind/default.htm

Example: see programme on page 6 on this reader

4.2.4. Mediator

Mediator 8 Pro offers a complete multimedia and web solution for corporate, educational and designer usage. Operating through a simple, yet highly effective drag and drop interface, Mediator 8 Pro creates HTML, Flash® and CD-Rom Presentations. Work quickly and effectively with text, pictures, video, Flash® movies, animation paths and much more. No programming required!
Mediator works as a four stage process to create compelling and effective multimedia or web pages:

1. Create the pages you need.
2. Add your objects to each page (e.g.: text, backgrounds, videos, images etc.).
3. Create interactivity (e.g.: start video, show/hide objects, go to another page, or insert hyperlinks, etc.).
4. Distribute your project to CD-Rom, HTML or Flash® with a few mouse clicks.

Mediator remains an exceptionally strong multimedia package to work with, with an easy-to-use drag-and-drop interface for creating your presentation's logic, and support for plenty of stylish graphical elements like bump-maps and panoramic images. Mediator defaults to full executable presentations where all these features are available, with the option to export in Flash or HTML format for web use. There's little you can't do, though it's still no match at all for Macromedia's high-end offerings if you want to create fully functional programs rather

than just simple presentations. The package includes more than 1000 copyright-free illustrations, buttons, 3-D objects, and background textures for use in your projects. You can also import your own illustrations, or create them using the built-in drawing tools.

http://www.matchware.com
http://www.pcplus.co.uk/reviews/software_applications/matchware_mediator_8_pro

4.2.5 Storyboard

Originally and actually, storyboards are used before starting film shooting. Storyboards are composed sketches to visualize the film script and help the planning of individual film-scenes. A storyboard is a sequential picture-consequence visualising the setting of a film or a multimedia production. Act-courses are represented pictorially. The storyboard is course-oriented and creates a first impression for the later realization. The storyboard is used for the thought and planning-help. It has the function of a red thread, which leads through the action. Currently, the storyboard finds also attention in the framework of creativity-technologies as an instrument of organisation and it is used for the thematic sorting of contributions on that occasion. It is an outstanding technology to visualise ideas. It can be used also as communication-means to communicate about thoughts visually and to deliver a work basis for projects or production teams. Project-intents can be concretised and obligatory guidelines are made for the project realization for all participants.

There are different technologies to the formation of story-boards. Ideas can draw directly per hand in a prepared form or prepared digitally. Both methods have their pre- and disad-vantages and are to be weighed up according to project.

Storyboards can be produced also with help of software consequently. The storyboard-software delivers already many suggestions for visualisation. Usually, it can be selected from a big offer of figures and characters, backgrounds, props and movement-re-presentations. Whoever is unpractised in drawing finds a big help here. However, own drawings can import and processed additionally as well.

The realization of complex scenes goes faster and more uncomplicated if you use a computer software mostly.
A free Online Storyboard PDF Generator you can find in internet:
http://incompetech.com/beta/linedGraphPaper/ storyboard.html

4.2.6 Goal based scenario

On the demand for a displacement of the learning in the practice and a higher authenticity in the learning process as well as the integration of educational tasks, that gives more area to the own-activity, Roger Schank and his co-workers react und developed the so called Goal Based Scenario (GBS). The GBS itself can characterized as computer-assisted case-been based learning with goals, based on situated hypermedia educational-surroundings. With this model, electronic learning is connected with a variety of other educational-possibilities. The model interleaves Reformpedagogic (Reformpädagogik) bases with an educational-understanding influenced by constructivism. It is one of the most interesting models of the electronic learning.

The learner is actively included in simulated events. He learns through the managing a given goal task. With the GBS, the learners are confronted with a prepared content selected by the teaching (lectures). The paradigm of the learning becomes influence through the target and developed works materials independently or pre-determined scenarios if necessary. The goal bearings are handled very variably on that occasion. Different goals can draft by the lecturers

in order to help beginners with different interests to acquire the same abilities. In some cases, it can be proved as meaningful, giving the learner the decision to decide her goals for the acquiring of the wished abilities independently.

GBS are directed on a concrete productive educational goal. The goal task is put into a situational context. As "knowledge" is acquired, as well also concrete skills are arranged. The learners have to manage a task within an authentic context. It is advantageous if the goals should be developed along the personal interests of the students. An essential aspect is that the learners find the topic as well as the goal interestingly. To process the tasks extensive materials are put to the disposal, in order to become just for this claim. The abilities to be learned are acquired with the solution of the task, with an activity or the striven goal. The components (materials) given for managing the GBS tasks to the disposal, should awaken the interest of the learners. In the centre of the learning stands a goal. This goal can only be reached, if the learners acquire skills (Skills) for itself. With these abilities they can reach the goal (task).
http://mettleweb.unimelb.edu.au/guide/pedagogy2.html

5. Learning preferences

Looking from a practical perspective at the way learning content is presented to a student we need to first realize which areas would usually influence the learning process of a student:

- **Motivation** is a key to support long term storage of information and help to keep focus on a subject so as to overcome potential hurdles along the learning process.
- **Tutors enthusiasm** is important to establish a **learning environment attracting the students' interest.** If a tutor is very engaged with a subject and is able to get this engagement across to the students it can help them to be motivated.
- Provisioning of **background details and examples** to allow the students to find something to associate the new patterns with.
- **Level of content and level of detail do** have a great impact on whether or not the students can follow a course. (if the level is too high) or the students may get bored (if too low or if the level of detail is too low).
- **Interesting presentation of** content ensure a high concentration.
- **Learning preferences** do influence the ability to capture, associate and store information at its best. This concept is not yet widely understood by students and requires further explanation and practical guidance so that students can leverage from their very own learning preferences.
- **Self-controlled learning:** Being able to choose between learning forms, learning material, learning content presentation and how to learn most efficiently, in line with the types of learning preferences self controlled learning is recognized as the best way a learner can capture information, gain experience and capabilities. (However not all students can equally leverage well from self-controlled learning. Some preference types rather require very structured and guided learning processes.)

Students are naturally keen to learn new things. But the current university (and school) system is still set up to more knowledge facts in order to pass an exam rather than to provide problem solving competences. Hence, new learning forms and learning preference types allowing them to realize their own advantages and opportunities by facilitating such new concepts. The listed items above clearly show that there are several elements to optimize learning. The concrete learning environment, the educational and social cultural backgrounds have influence on the learner. Learning preference types and content presentation are just two of them. The other aspects also can significantly influence learning but since they are not directly part of this thesis they will not be included herein. It is important to see them in

conjunction with one another as only a suitable combination can lead to improved learning environments.

Learning types – learning styles – learning style test

In literature there are differing classifications of learning types, e.g. these are found to be dived into "theorists", "application oriented types", "model students", "indifferent types" and "the uncertain type" (Schrader 1994, p. 120f). The term learning type is partly controversial. Due to methodical weakness of some attempts, learning psychology prefers the term learning styles.

A group of models emphasize the sensory impression which is shown to its advantage during the transmission of information. These models may use different names for the same or similar learning styles. Here four basic types are often distinguished. In the following these are only briefly touched upon. (cf. Röll 2003, p. 131):

The visual learning type

The visual learning type learns best by reading information and by observing processes. It is more easy for him to remember content if they are illustrated in the form of diagrams and images. The visual learning type likes reading, watching images illustrations, diagrams, animations and videos in order to understand case facts. Visual learning types like working with images from the board and with written documents. He likes to take notes and take in information through viewing and by demonstration. He especially remembers what has therefore been read and seen.

The auditory learning type

The auditory learning type is able to take in audio information, to remember them and to repeat them easily. He can follow oral explanations and work them out.
The auditory learning type learns best when listening to learning matter (with learning tapes) when he reads the text out loud or when listening to another person in doing so. He is very good at memorizing by speaking the text aloud and has a talent for oral tasks.
Auditory learning types often talk to themselves when learning. Auditory learning types immediately feel disturbed by noise in their surroundings and do not like music in the background.

The kinesthetic learning type

The kinesthetic learning type learns best carrying out processes by himself and understands them this way. It is important for him to directly take part in the learning process and to collect experiences by himself with "learning by doing". He understands explanations they feel right. He scouts out subjects and works them out.
This learning type learns most easily carrying out tasks alone e.g. by attempt, role play and group activities.

The motor learning type

This learning type is a mixed type of the already mentioned forms. The central aspect is that sequence of movements and the own body is in the centre. This learning type is able to learn the learning matter properly by using rhythm, scenic demonstrations, acting with gestures, graphics and models.

On the internet there are numerous online learning style tests. However, there is a lack of background information as to how the presented learning styles were discovered and/or how the respective learning style could be optimized.

A detailed learning style test can be found online at www.lerno.de. It was developed by Prof. Röll and is based on six different learning style preference types. Here it is presumed that every human being has proportions of this learning preferences in his individual learning style, however, with a different emphasis. Learners receive numerous hints regarding what they should take into consideration in the choice of their learning setting concerning their learning preference type in order to achieve good education results. Tutors receive information as to how they shall best delegate different learning preference types in class.

The test is relatively complex and contains 18 questions in six different fields of experience. At present the test is only aimed at adults and is suited as information for tutors as a means of dealing more intensively with the subject pertaining to learning "types ". The test is still in the trial phase

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Gratis Arts: „Creative Commons" give practical advice

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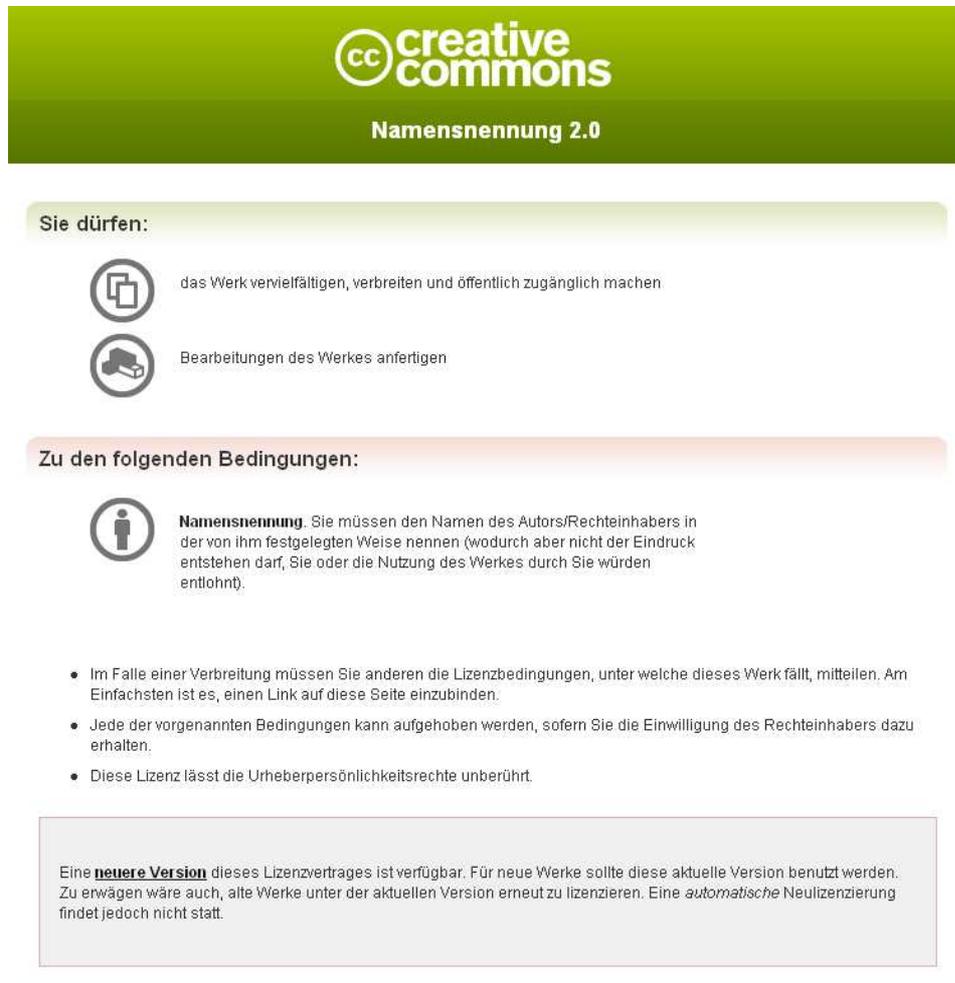
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