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ABSTRACT

This article presents a competence-oriented experiment on the comprehension of ideas in modern literature. Comprehension is defined as being indicative of competence as opposed to qualification. Participants were 117 students from various educational programs in a Swedish gymnasium course on modern literature and society. Students were exposed to three videotaped projections of model societies on two occasions. They then responded to 15 propositions about the quality of life in the proposed societies using an instrument that measured competence of civilization through two factors, eigenvalues (F1) and visibility of social texture (F2). The model societies represent three dimensions of ideas connected to three scientific paradigms: affinity, structure, and process. These dimensions had been related and discussed in conjunction with the literary and cultural concepts of behaviorism, structuralism, and functionalism. Before the participants' second exposure to the video, they were given a recognition test in which they were asked to react to 15 ideas, each of which described an idea discussed. According to the analysis of variance there is a significant degree of difficulty in the ideas but no difference at all between the classes. The degree of difficulty was used to establish a super-ordinal scale that measures comprehension of ideas linked to the cultural dimensions of society. The values on the F1 and F2 competence factors were filtered through the values on the literary scale, making the dimensions of the model societies that describe degrees of competence apparent. These results show that literature is an instrument for perceiving the disparity of a society and for developing competence, provided that its basic idea is transparent. (Contains 6 tables, 3 figures, and 16 references.) (Author/SLD)

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KOGNITIONSVETENSKAPLIG FORSKNING

Cognitive Science Research

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at the Edge of Literature and Society

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Abstract

This article presents a competence-oriented experiment on the comprehension of ideas in modern literature. Comprehension is defined as being indicative of competence as distinct from qualification. 117 students from various educational programs in a Swedish gymnasium participated in a course on modern literature and society. In the process of testing, the students were at two occasions exposed to three videotaped projections of model societies. In this connection they responded to 15 propositional statements on the quality of life in the projected societies. The instrument measures competence of civilisation by two factors, (FI) Eigenvalue and (FII) visibility of social texture. The model societies represent three dimensions of ideas connected to three scientific paradigms, namely affinity, structure, and process. These dimensions were related and discussed in correspondence with the literary and cultural concepts of behaviourism, structuralism, and functionalism. Before the participants' second exposure to the videos they were given a recognition test in which they were asked to react to 15 items each one describing an idea in function. According to the analysis of variance there is a significant difference in degree of difficulty in the ideas but no difference at all between the classes. The degrees of difficulty have been used to establish a super-ordinal evolutionary scale, which measures comprehension of ideas linked to the cultural dimensions of society. The values on the competence factors (FI, FII) were filtered through the values on the literary scale. Thereby those dimensions of the model societies that describe degrees of competence needs became apparent. Thus, it has been shown that literature is a necessary instrument for perceiving the disparity of a society and for developing competence, provided that its basic idea is transparent.

A primary goal for the study of Swedish language and literature at the gymnasium level (comparable to senior high school/secondary school or first year college) is to acquire knowledge of modern literary texts with particular stress on 20th -century ideas related to culture and society. According to this formulation of the national curriculum, it is taken for granted that ideas are transferred through literature. No doubt, our century is now old enough to provide us with a perspective on its development, and the connections that may be made between political and socio-economic growth and the cultural currents of time. However, which those ideas are, and the way they appear in literary texts, are problems to be solved by teachers alone.

In textbooks on the history of literature we frequently find ambitious chapters about modernism in arts and literature. But this coupling often leaves the rest of the society aside, at least in the sense that ideas related to societal events are not presented with conceptual clarity, so that the reader can make the connections himself.

During earlier epochs, evolutionary events were manifested and remembered in literature. This was true also of the last century. Thus it is not at all remarkable that the two world wars, the Cold War, and the east-west conflict as a whole have left a mark in people's thoughts about their existence. Therefore not only modernism but also other literary transformed thinking is relevant to the study of ideas, as for example in novels about the War, the idealised commons, and narratives from the Swedish provinces. The interesting point to examine is the extent to which these genres have properties characteristic of the ideas that can be identified as basic.

It is commonly accepted in the scientific community that there exist two basic models according to which organic systems develop and which therefore are naturally used for the development and design of civilisations. One model builds on (1) affinity (dependency between individual and environment), the other on (2) structure. A third model has been developed, which builds on information and control and is a (3) process model. The three fundamental ideas of affinity, structure, and process may be expressed by other similar concepts depending on the purpose for which they are to be used. The first, for example, is the one used within the S-R theory in behavioural science, that is, behaviourism. The second is sometimes called the theory of Gestalts or fields, which means that it is a model of development and maturity. The third is a communication model, which is technological rather than science oriented. In its basic parts it is a hybrid and is similar to the first model.

Used as model of a civilisation the first could be the model of the totalitarian society, against which we were warned by Huxley, Orwell and others, and which Skinner brought to a head in "Beyond Freedom and Dignity". The ideas of structuralism are to be found in an ecological society, based on wholeness and fated, cyclic development. Consequently, a central concept within Gestalt theory is "common fate". The model is represented in the works of Kafka, who writes about the fields of power that the human being is inexorably exposed to. It exemplifies European structuralism as it relates to Kurt Levin's concept of power vectors defining a life space. The ideas behind the process model have been implemented in terms of growth, that is a linearly progressive development, which requires recurrent regulations in order not to break down. The process model has much in common with behaviourist concepts but also with functionalism. Huxley represents this model in certain respects in his future-oriented novel "Brave New World" but more functionalistic is Margaret Atwood in "The Handmaid's Tale". In general, characteristic of functionalism is its concentration on single-valued functions, that is, authors magnify one human function, such as reproduction.

The aim of this education-oriented experiment was to study the extent to which it is possible for students at the gymnasium level to
(1) learn the conceptual range of modern ideas, and
(2) recognise them when they appear in a non-literary context.

Method

Participating Students

The participating students were around 19 years of age and at the time of the study enrolled at a city gymnasium, situated in the university town of Lund, southern Sweden, in 1996/97. They numbered 117 in all and represented four classes, one from the aesthetics program, two from the natural sciences program and one from the social sciences program. The course on modern literature and society took place as part of the ordinary curriculum during the students' third and final year. The teacher, who was responsible for both the course and the experiment, had known the students in these four classes since their first year.

The preconditions concerning the students' knowledge of literature are the same for all four classes. The stress had continuously been put on quality before quantity and on various forms of testing and accounting for results. From the beginning the teacher had trained the students in reading literary texts analytically and identifying the central idea. The classes had also been used to studying thematically, for example, the saga genre, the narrative technique, the conflict development of the drama, the realism in 19th -century novels, and the feminist movement as reflected in works of Strindberg and Ibsen.

Materials

An idea is an abstraction. When humans are exposed to an idea they capture it intuitively, that is, react immediately and adequately in the situation, provided that the idea is of special import to them. Thus intuition is something a person has after having built up knowledge and experiences into invariants, which, when they are once established, may not easily be broken down into pieces again. Intuition is used especially in situations that are novel to the individual. In the case of grown-ups, an intuitive behaviour is conceived as being equal to competence, at least in those situations which allow no time for analysis or reflection before a decision has to be made.

Nature has equipped us with the ability to build up invariants, which are of immediate importance for our survival as an individual and as a species. Just think of the infant who refuses to crawl over the edge of a cliff, despite the fact that a glass top is covering it, because the eyes tell it not to. The infant can make clear neither to himself nor to others why he is not crossing the glass. He just reacts adequately in relation to what he sees. The experiments on the "visual cliff" in the 1950's and 1960's (Gibson & Walk, 1960) became famous, because the researchers could show that infants differ in expressing an invariant. The visual cliff elicited wonder, frustration, anger, fright, etc, various expressions showing the significance of the established invariant, which may be named by concepts such as "barrier", "separation", "height", and "danger", depending on the degree of intuitive consciousness displayed in the situation. The more adequate the reaction, the greater "power in the system", so to speak. What the researchers of those experiments could not control, however, is the path towards the establishment of the invariant, which had not been equal, in spite of the young age and limited experience of the children.

In an educational situation it is the teacher who is supposed to help the students build up knowledge and offer them possibilities to make experiences. In the case of literature study the teacher should help to identify the various properties that constitute an idea. He/she should draw the borderlines between ideas and test the effect of teaching. In this way, the "power in the system" that has been reached by the path chosen can be controlled. Nevertheless, it is completely impossible for a teacher to control the knowledge creating pathways of every gymnasium student in his establishing of an intellectual invariant of the actual kind. What the teacher can control is the means and materials to which the students had access during the lessons.

Against this background a reasonable method for testing the establishment of an idea was judged to be the "visual cliff" method (Campos, Hiatt, Ramsey, Henderson, & Svejda, 1978). Thus it was decided that invariants should be tested in an immediate manner, in a situation that was new in relation to the instructional situation and the materials used there. This implied at the same time the avoidance of both fact grinding and paper writing. The latter method is usually the preferred one in literature courses but it does not necessarily lead to intuition, or, at least, if it does, this is hard to prove. The selection of texts and structuring of the subject matter was made with the purpose of testing the immediate pick-up of ideas. This step was preceded by intensive and thorough conceptual work, which will be reported in the following section together with the applied materials.

Selection

The textbook used in the history of literature in all four classes was "Dikten och vi"(The Fiction and We) (Brodow, et al., 1987 and 1991). Since not all presented authors can be represented in the same course, it was important to form prototypical groups of similar "members" from whom a selection could be made. All the authors have been listed, who have got a presentation of considerable length and who have been described by means of terminology that refers to a cultural "ism", genre, technique, motif, spirit and the like (ideas are not very tangible in textbooks). The descriptions were used as column notations. Groupings appeared by a so-called cluster analysis, which means that the author names having one or several notations in common were grouped together. By this method certain groups become more homogeneous than others, and it is evident which notations are prototypical of each group, as seen in the following table.

Table 1.

Grouping with Prototypical Content

Author	Idea 1	2	3	4	5	6	7	8	9	10	11	12	13
Orwell	x	x	x										
Golding	x	x	x										
Jersild	x	x		x									
Martinson	x				x	x	x	x	x				
Boye	x				x		x			x	x	x	x

Explanations: 1= future fiction, 2 = civilisation criticism, 3 = symbolism, 4 = documentary report, 5 = modernism, 6 = animation, 7 = poetical innovation, 8 = primitivism, 9 = proletarian, 10 = futurism, 11 = politics, 12 = sensuality, 13 = anxiety

Table 1 gives an example of how groups can be built up and demarcated against each other by means of cluster analysis. The cluster analysis developed in PERTEX was used (Helmersson, 1992). The table shows on which grounds the group has been composed and shows the prototypical authors to be Orwell, Golding, and Jersild. Thus the other two authors have more in common with each other than with the rest of the group, especially because they are characterised in terms of modern poetry. But they also belong to this group because of the space epic "Aniara" (by Martinson) and the novel "Kallocain" (by Boye), which both are "future fictions". Likewise linkages could be made to other groups. For example "civilisation criticism" together with "new realism" would link Solzhenitsyn, Böll, and Lessing. Closely related to this kernel is then Myrdal by "documentary report" and "politics", while Remarque and Linna form a cluster of their own within the group because of the "war" concept. On the whole, this latter conceptual demarcation in its sense of here and now reality differs from the one presented in Table 1, which focuses on properties of fiction.

This kind of study constituted the basis for the selection and presentation of a list of author names to the students. On this list different lines of thought were represented. One part of the course was the choosing of a novel, reading it and presenting in class the way a certain author has implemented a particular idea. Another part was the taking of notes and study of the other students' presentations. Thus the choice of novel had to be made carefully. When the students had made their choices, a list of author names was generated which was the same for all classes. The criterion for selection of a particular name was that it had been chosen by at least two students. By this measure a kernel was specified. Thereafter some additions were made so that every class, by either presenting *or* going through the texts, had prepared the same subject matter. The list finally contained the following 32 names:

Margaret Atwood, Karen Blixen, Michail Bulgakov, Albert Camus, Stig Dagerman, Kerstin Ekman, Joseph Heller, Ernest Hemingway, Hermann Hesse, Aldous Huxley, Eyvind Johnson, James Joyce, Franz Kafka, Pär Lagerkvist, Sara Lidman, Torgny Lindgren, Väinö Linna, Ivar Lo-Johansson, Thomas Mann, Gabriel Garcia Màrquez, Harry Martinson, Moa Martinson, George Orwell, Marcel Proust, Erich Maria Remarque, Aksel Sandemose, Jean-Paul Sartre, Göran Tunström, Agnes von Krusenstierna.

Not only entire novels were included in the course but also sample texts from anthologies (Brodow, et al., 1988 and 1991; Widing, et al., 1990). Texts from the drama genre were not included. A natural part, however, was the lyrical modernism, which was exemplified with the help of symbolism (Verlaine, Rimbaud), expressionism (Lagerkvist, Södergran), futurism (Lundkvist, Diktonius), dadaism (Tzara) and surrealism (Breton, Ekelöf). Those parts of the subject matter that could not be studied in class were expected to be prepared individually.

Video Materials

As well as written texts audio-visual materials produced in the USA were used in the course. In the 1970's, like the present day, the development of society had a direct effect on instruction and matters of civilisation were given a great deal of attention at school. At the University of Boulder, CO, the Biological Science Curriculum Study developed in collaboration with Crystal Productions of Seattle, CA, a material for the study of man in modern society. It consists of slides and films

produced according to the theme "Projections for the future" (Lee & Mayer, 1976). The projections are three, each one building on one of the three basic models mentioned earlier. They are called "behaviour model" "humanist model" and "growth model". Each model is built up by ideas that constitute a whole, an ideology. To illustrate the society in question an episode has been recorded which contains crucial properties of that environment and the prerequisites necessary for individuals to make a living. The episodes were prepared for use at high school level. This is one reason for using the series. The other reason is its background material, which are literary and popular science texts related to contemporary ideas.

For an illustration of the relevance of the material for the study of modern ideas the three sequences will be shortly related together with the constructors' background texts. Many readers will recognise the titles. Anyway, they could serve in giving a view over the sphere of thought that was the starting point for this study.

The Behaviour model concentrates on a young man who is rescued from under-nourishment and taken to hospital: he is suffering from amnesia. A narrative is enacted about a civilisation, which, by means of behaviour modification tries to socialise the young man into a collective.

Background texts:

Gray, F., P.S. Graubard, and H. Rosenberg. 1974. Little Brother is Watching You. *Psychology Today* 7(10):42-50.

Skinner, B.F. 1972. *Beyond Freedom and Dignity.* Bantam, New York.

Skinner, B.F. 1960. *Walden Two.* Macmillan, New York.

The Humanist model is illustrated by a story about a young man who arrives at an ecological tree farm and who gets to know himself with the guidance of people who bring about a feeling for nature and human dignity.

Background texts:

Bateson, G. 1972. *Steps to an Ecology of the Mind.* Ballantine, New York.

Harman, Willis W. 1972. The Nature of Our Changing Society: Implication for Schools. *Curriculum and the Cultural Revolution.* Edited by D.E. Purple and M. Belanger. McCutchan, Berkeley, pp. 4-63.

Schumaker, E. 1973. *Small is Beautiful: Economics as if People Mattered.* Harper & Row, New York.

The Growth model shows a young man on his way into a modern city, but essential functions in the society are out of order and this technical dysfunction becomes a symbol of the limits within interacting systems.

Background texts:

Goldsmith, Edward and *The Ecologist* editors. 1972. *Blueprint for survival.* Houghton Mifflin, Boston.

Hardin, G. 1968. The Tragedy of Commons. *Science* 162(3859):1243-48.

Meadows, Dennis, et al. 1972. *The Limits of Growth.* Universe. New York.

Procedure

The instruction process took place during about 18 hours (2.5 hours a week) in the spring term of 1997. The procedural design was mainly the following:

First week: General introduction to 20th -century literature. List of author names was distributed (see Selection). The names were grouped under some general headings

like "Renewal of prose", etc in order not to bind the names to certain ideas at this stage of the process.

Second week: Display of the video-produced slides (see Video Materials). The slide version was chosen because it had been proved to function better (more information) than the movie version for a focus on certain phenomena. The show lasted for 60 minutes. Lesson on the prerequisites of the three models. A list of concepts and ideas connected to each model grew out of a comparison between the episodes the students had seen. Table 2 gives some examples of this comparative analysis.

Table 2.

Model and Idea: Example of Comparative Analysis

Behaviourism	Structuralism	Process/Functionalism
Scientific	Scientific	Technical-Mathematical
Linear	Non linear	Linear
Causality	Evolution	Steering and Control
Instrumental	Gestalt,	Growth, Feedback
Conditioning	Maturity	
Reward	Understanding	Communication

Third week: Lesson on the cultural "isms", which were illustrated with examples from poetry. Comparison between the isms and the basic models and examples of representatives among novelists. Behaviourism was judged to be very similar to the surrealism (compare automatic writing, freedom from control of sense and morality, primitivism, Freudian positivism, and Joyce's narrative). Structuralism has many more aspects than the model of development conveys but may to a high degree be compared with expressionism (compare its striving toward a conception of the wholeness of man, intensive modes of expression, gestalt formation against background, tension by passing borderlines). In this range of excitement we find similarities between, for example, Lagerkvist, Kafka, Hesse, Mann, and Ekman. The process model, here also called functionalism, is an expression of design as opposed to science. As such it is close to futurism (compare machine cult, violence, devotion to technical inventions, forward movement). In this context the aim was to find similarities between, for example, Lundkvist and Diktonius on the one hand, and between Huxley and Atwood on the other. It was also plausible to explain that Orwell is not a futurist, although he wrote 1984 in 1948, but rather a behaviourist in the way he outlined society in this work. Or, that Hemingway in certain respects is a functionalist linguistically but a behaviourist in his narrative.

The teacher told the students that the course would end with a test and that it was important that everyone did his/her best to present and make clear the ideas of the chosen novel.

Fourth – sixth week: Individual work – study of a novel.

Seventh – ninth week: Presentations. If necessary, a discussion afterwards, notes on ideas and isms together with examples. Issues that turned out to be unclear or misunderstood were explained and the fundamentals underlying a certain

classification elucidated. In cases where various concepts were possible there was a discussion between teacher and class until a consensus was reached concerning the most appropriate analysis of the novel. During the final lesson the teacher informed the students about the test. They were told that it was not going to be composed of fact or knowledge items, but would be a kind of test in which the respondent is able to demonstrate recognition and discrimination of ideas presented in constructed situations. The importance of filling in missing gaps during the coming weeks was stressed, and also of acquiring an overview by systematising and synthesising. The information that both textbook and notes were allowed as means of assistance during the test was meant to be of help in the final preparation. The time span between end of course and test was set at about four weeks.

Results

The three models seen from the reported educational perspective may be characterised as ideas put into operation, that is the event that they portray strictly follows an idea. Elstrup Rasmussen (1997) has analysed the dialogues of every scene, and has shown that this is the case. Thus by means of audio-visual cues, a comprehension of ideas should be mediated immediately to the viewer. In literature, however, the circumstances are different. The descriptions of isms are implicit, which implies that the reader cannot expect an unambiguous and consequent follow-up of a model. Moreover, as was pointed out in the course, a literary work often represents more than one ism, for example structuralism in the content and behaviourism in the technique. Literature is an expression of ideas *in function.*

Consequently, a problem to be solved was the matter of constructing a test instrument, which measures the comprehension of ideas in function. The version finally used consists of textually formulated situations, each of which contains cues to an idea or ism. Since the recognition concerned comprehension and not memory, the situations do not contain explicit cues, such as known words and names from texts that have been read, and are not reformulated from those texts. Comprehension is something abstract and thus the pick-up of the idea shall be made intuitively and not through analysis in the test situation. The test construction is presented in the following section.

Test Construction

Because the aim of the course was to study modern ideas as reflected in authorship, the recognition of an idea should give an author name as response. In the section about selection of materials it was described the way a cluster analysis was used to find the prototypical grouping in a collection of names. Based on the first cluster analysis (Table 1) a second cluster analysis was performed. This one had the task of identifying those concepts that could be associated most unambiguously with the 32 names. In this way 15 concepts were generated thus forming the basis for the construction of the situations making up the test form. For the generation of a proper recognition task the 32 author names were listed with the purpose of facilitating the students' response. Of course even though there is one best name for each situation, alternatives were possible. Just as the infant on the visual cliff explores the glass top before he decides whether to cross over or not, the student needed to compare the situations to put a certain name in the most adequate place. In scoring the test, alternatives were equally weighted.

Testing time was set at 60 minutes, depending on the type of test. A student who has no conception of the kind required and who cannot respond immediately has no need for more time. The 15 situations describe the following ideas, isms and concepts:

Expressionism, futurism, surrealism, behaviourism, Gestalt, war, time, social realism, functionalism, existentialism, idealism of the commons, psychoanalysis, magic realism, romanticism, provincialism.

The test will not be presented in its entirety, since it is still in development, but the principle of the construction is illustrated by a text example so that the reader can put himself into the respondent's place. This is the wording of the instruction:

Instruction
In this booklet you will find some pieces of text. Each of them explains an idea and makes it concrete. To each text belongs a preamble, which puts the text into a situation. You are now asked to gather the idea and to associate it with the name of an author. (List supplied.) This name will be your response. Even if you can think of more than one name as a possible response, you should select only one. As you see, many names will be left.

(Further explanations and answers to questions at the beginning of the test were also given.) The following item will be given as an illustration:

Example Item
At a seminar in Stockholm held sometime during the 1930's, the Swedish masters of social engineering, the Myrdals, invited a certain Dr Watson to give some inspiration. Who could have reproduced his thoughts in literary print?

"Give me a dozen well shaped, healthy children and I guarantee that I can take each one randomly and train it to become just any specialist you like, doctor, lawyer, artist, yes even master thief, totally irrespective of the child's ability, interests, race, or ancestors."

In this example there are several cues to the behaviourism: the art of social engineering and the name Watson, which was included since Skinner as an author was not mentioned in the course. In the words Watson uses it is evident that he is describing instrumental conditioning and associated concepts. The linguistic cues are 'randomly', 'any /.../ you like', and 'irrespective of /.../'. The best response to this item would be Orwell, but characteristics of behaviourism are apparent in Huxley's works as well, so this response is also correct.

The Educational Ground of the Test

As already noted, there are very clear limitations as to what the teacher can control in the learning situation. The classical test type requires a 1-1 relationship between the stimulus situation and the students' responses. Further, all possible answers must be known. This test is not a classical one but adapted to the requirements of the recently reorganised Swedish gymnasium. It follows that, within limits, there is no a priori right or wrong. The student must react adequately to a number of co-operating factors in the test situation and this implies a more dynamic response space. In this connection, the new criterion referenced grading system may be seen as taking the students' competence within a certain area into account. Since

the teacher cannot control the competence building factors – especially those concerned in the reading of literature – the test must be of a kind that considers dynamics outside school. The pupil must prove the level he/she has reached, independent of school.

It is important to note that Swedish curricula have been – and still are – influenced by the US. The American or English word for 'knowledge' is in Swedish 'kunskap' and in German 'Kenntnis'. (Compare Old Norse 'kna' = I can). However, when a Swede or a German talks about 'vetande' and 'Wissen' respectively the American has no word to use. So, when Swedish politicians and educators want to introduce the concept of 'competence' into the new US inspired grading system, it becomes 'knowledge' or 'qualification', in spite of the fact that the new grading system is very well suited to speaking of competence.

Students' Reactions to the Test

After the test had been distributed, several spontaneous reactions came from the students regarding the test items. Despite thorough information given at the end of the course several students thought that the texts had to be recalled from literature. They had obviously prepared using the wrong premises. This mishap strikingly demonstrates the power of fact grinding as learning strategy. These students are highly conservative and cannot adapt to new test situations and demands. That the students felt stress in the examination, because of the short time they had at their disposal, is quite natural.

In discussions after the test some natural science students commented on the items as if they had difficulties in discriminating between textual expressions. "The text could be about practically anything" and " If you had required the name of the ism, it would have been easier" were some reactions. They are obviously not very widely read. Another student was so frustrated that he left the classroom without even making an attempt, because "it is impossible to just guess". That is quite correct, of course. The probability is very low of getting a hit in a dynamic workspace. The respect to which these reactions and commentaries are symptomatic of something crucial will be further examined.

Degree of Difficulty in the Concepts

Against the background that the test is aimed at measuring comprehension, and thus be indicative of competence, an analogy with the situation on the visual cliff can be made. There is a clear parallel to be drawn between the shallow and the deep side and the concepts' surface and depth characteristics. For the sake of the parallel the concepts are called deep and shallow. The shallow concepts appeal to fact- or sensation-based characteristics that can be recognised as known to the perceiver. Thus the shallow or surface side of an idea serves as basis for further exploration into the conceptual depth. The deep concepts require the surface layout as standpoint. Through the perceiver's movements in diverse directions it forms the basis for establishing invariants, that is concepts of a higher order. The difference is the same one that holds for 'knowledge' or 'qualification' versus 'competence'. Knowledge is required in order to attain competence. In an educational setting, a teacher may have augmented the students' knowledge register but whether this knowledge has matured into competence cannot be tested by means of tasks that appeal to known relations. It is therefore crucial to make the distinction between 'understanding' and 'comprehension'. To understand (Old Engl. 'vorstanden' = stand in position of acceptance) means to be subjected to that which is obvious, while to comprehend

means to make new connections out of obviousness. With this distinction the situations of the reported test elicit either understanding or comprehension. When a respondent clings to surface characteristics he may get lost. The more unfamiliar the situation described, that is, the less he understands the text, the greater the chance that he attends to depth phenomena. It is a matter of conceiving the "illusion". Referring to the educational procedure (Table 2) the 15 concepts have been assigned one of the video-displayed models and also a notation on their being shallow or deep. This relation is presented in Table 3 together with weights, which will be further explained.

Table 3.

Degree of Difficulty in Relation to Model and Conceptual Disparity

Concept	Model	Disparity	Weight
Behaviourism	B	S	1
Surrealism	B	S	1
Existentialism	B	D	2
Provincialism	B	D	2
Psychoanalysis	B	D	2
Magic Realism	S	S	3
Romanticism	S	S	3
Social Realism	S	S	3
Expressionism	S	D	6
Gestalt	S	D	6
Idealism of the Commons	S	D	6
War	S	D	6
Futurism	P	S	2
Functionalism	P	D	4
Time	P	D	4

Explanations: Model B = Behaviour, S = Structure, P = Process;
Disparity: S = shallow, D = deep

In the present context it is assumed that many different theoretical schemes exist in the study of literature. For this reason, every author of a comprehensive book on literature presents details of his/her conception in various ways. To generate a common basis for making transparent the underlying paradigmatic information it is assumed that only three models are of relevance, namely the previously mentioned Behaviour, Structure, and Process models. In a different context, B. Bierschenk (1988) has shown that the strength of their associated cue structures differs in the situation of perceiving and judging the videos. Consequently, it may be argued that the Behaviour and Process models have more in common with each other than they both have with the Structure model (see B. Bierschenk, 1988, p 326).

The reaction patterns on the visual cliff were projected against a background of behaviour science and physiological variables. The variables define the basic idea of the experiments. The three civilisation models represent in the present context a basic idea and the concepts are variables, which help to define, at least partly, this idea. Each of the three models comprises a degree of difficulty regarding the comprehension of the relationship between the basic components. With reference to B. Bierschenk's study this scale has been used in a way that the concepts have been

assigned a value which denotes whether they are shallow (value 1) or deep (value 2). They were also assigned a value that denotes the model to which they belong (B = 1, P = 2, S = 3). These two values have been used for multiplication, resulting in a conceptual weight (Table 3). Thus the weight 1 (1x1) denotes the shallowest concept, whereas the weight 6 (2 x 3) denotes the deepest one.

A problem for the visual cliff experimenters was that they could only infer the experiential background of the infants by their behaviour in the situation. This background was supposed to have been governing of which experimental factors attracted the child and became a value in the exposed situation. For example, it was taken for granted that infants who cried and defied the danger to get to their mother on the other side of the cliff were too bound to their mothers and that this binding made them blind to the consequences of the crossing. The experiential background had retarded the development of their competence in reacting adequately in a situation, which, in principle, is a matter of survival or not. In the same way the variables established in the present context will help to indicate whether the students have been able to react to the conceptual disparity that has been built into the test form.

The more specific questions to be studied in relation to the aim of the study can now be formulated more specifically, namely

(1) whether the degree of difficulty can be used to differentiate between the concepts and
(2) whether the classes differ in comprehension.

Table 4 shows the results of an analysis of variance, which has been calculated according to the frequency, with which the concepts have been conceived, seen over all four classes. The statistical package of Minitab (1996) has been applied. The ANOVA for "class" (left side) shows that the four classes NV3a (1), NV3c (2), SP3b (3), and ES3b (4) significantly do not differ in comprehending the concepts when these are grouped according to degree of difficulty. Even though in certain classes there may be students who are highly competent at reading literature, the test shows that this is not associated with a choice of study program.

The verification that the classes are equal is in its turn dependent on the analysis of the degree of difficulty (right side), which shows that the capability

Table 4.

Comprehension of Concepts seen over Class and Degree of Difficulty

Source	DF	SS	MS	F	P	Source	DF	SS	MS	F	P
Class	3	21.2	7.1	0.60	0.617	**Degree**	4	179.1	44.8	4.93	0.002
Error	56	657.7	11.7			Error	55	499.8	09.0		
Total	59	678.9				Total	59	678.9			
Class	N	M	Sdv.			Degree	N	M	Sdv.		
1	15	6.00	3.61			1	8	9.00	2.93		
2	15	5.20	3.26			2	16	4.94	3.32		
3	15	5.00	3.14			3	12	3.00	1.91		
4	15	4.33	3.68			4	8	5.63	2.93		
						6	16	4.75	3.42		

DF= degrees of freedom, SS= sum of squares (cells), MS= cell mean, F= F-quotient (systematic variance/error variance), P= probability for significance

of concepts to differentiate the degree of difficulty is highly significant ($p = 0.002$). The six values form five levels. However, the distance between them is not linear, that is, metrically the step from 1 to 2 is not equal to the step from 2 to 3, etc. (The prerequisite of the test is quality and not quantity). On the other hand, it could be established that the order between the degrees is the correct one, thus implying that concepts of first degree really are easier to comprehend than concepts of second degree, etc. Further, there is no established fifth degree, which means that the sixth degree is most significantly separated from the fourth degree. It is important to note that this order relation has been empirically determined, a very strong foundation for the given theoretical formulation.

Seen in relation to the discussion about the scaling of the models the following step in effect implies a liberation from the uncertainties associated with assigning a unit of measurement to the concepts shown in Table 3. Consequently, the only observation of interest in Table 5 is whether a change can be observed or not. Basically, two observations are needed, namely whether two states or concepts are similar or dissimilar in the transition from one degree of difficulty to the next. The order relation forms a linear, monotonously progressing super-ordinal scale. For its use, see B. Bierschenk (1997b). It is a most peculiar fact that this kind of scale picks up the underlying transformational information, which is non-linear. The next step is to get a conception of how the degrees assemble the characteristics of the concepts in relation to how the classes had comprehended them. For each degree of conceptual difficulty a mean value was calculated for each class. The result is a value that states the relative distance of the class in relation to each degree. Thus comprehension determines whether the concepts of a degree descend (-) or ascend (+) in its direction. Loevinger's index of homogeneity has been used to indicate the quality in the scale. Note that a value above (> .50) is considered to be of high quality (Heidenreich, 1995, p 439). By this measure one can define transition points, that is singular points on the scale where a disparity is apparent, to speak in Gibsonian terms. Table 5 shows the super-ordinal scale analysis. The first letter in the combination stands for model (B,P,S), the second for shallow (S) and deep (D).

The scaling procedure has given five levels, expressed in six degrees, which have been named according to their prototypical properties. The first- and second-degree concepts are related to Behaviourism. The shallow properties have been named

Table 5.

Super-ordinal Relationship between Classes and Degree of Difficulty

	Class			
Degree	1	2	3	4
1	**BS-**	BS+	BS-	BS-
2	**BD-**	BD-	**BD-**	BD-
3	**SS+**	SS-	**SS+**	SS+
4	**PD+**	PD+	PD+	**PD+**
6	SD-	SD-	SD-	**SD+**

Bold = Points of Transition

Loevinger's index of homogeneity ($H_t = .698$)

Sensation and the deep properties Identity. The third-degree concepts are shallow and are related to Structuralism in the sense of Fate. The fourth degree has been named Mastery, while it contains deep Process/Functionalism concepts. In this connection it is interesting to note that Futurism has been comprehended as related to Behaviourism. The prototypical name of the sixth degree concepts is Individualism. For the sake of concretising the relative difficulty in the concepts they will now be related to type of literature.

BS: Sensation
{Behaviourism, Surrealism}

These are easily comprehended concepts on the shallow side, which refer to the action genre, literature dealing with idol making for both sexes. It builds on primitive sensations, that is simple chains of event and means of tension reduction by which the reader puts him/herself into the situation of the main character and lives his/her life. Here and now is all that counts. The events may also take place on an inner level, presupposing that the chain of events can be followed. In this sense, surrealism applies to the naïve and instinct-based behaviour of human beings.

BD: Identity
{Existentialism, Futurism, Provincialism, Psychoanalysis}

The deep side of this degree puts forward an ego-centred literature. Simple relations in the form of if-then logic, that is, thinking in consequences, in relation to the self, are typical. The literature is often emotional in the sense that it portrays man in machine-like situations, as prisoner of his own thoughts and means of expression. Existentialism, much favoured by students at the gymnasium level, is against this background a preliminary stage in the development of logical reasoning. Further, violence always lies in wait within the conceptually immature thoughts.

SS: Fate
{Magic Realism, Romanticism, Social Realism}

This literature is not intended to be either analytical or heavy. This is a kind of literature that often becomes magnificent through the twisting together of the personal history of the author in an idiosyncratic manner with that which is described, be it time, social stratum or cultural anchorage. The authors representative of this degree of difficulty are most often gifted storytellers, who produce novels characterised by a large vocabulary. Fate-bound literature has not sharpened the lens enough, so that the reader may perceive the distance to the fiction.

PD: Mastery
{Functionalism, Time}

The concepts that form this degree have a high level of abstraction and, consequently, the literature is highly stylised. The author acts systematically and logically in relation to a concrete problem. It is not necessarily a matter of pure fiction but the author conscientiously peels the social and emotional cement away from the story. When emotions belong to the problem space, they are intellectually treated, as for example cynicism, a functionalist way of controlling anxiety.

SD: Individualism

{Expressionism, Gestalt, Idealism of the Commons, War}

These concepts refer to a literature that deals with the morality and ethical problems of mankind, reflected in times of breakdown and catastrophe. It elucidates the various stages of maturation in single individuals and entire civilisations. A central concept underlying this degree is pregnancy or character in its concrete and transformed sense. The quality in characterising a human phenomenon is judged from the transparency the author succeeds in giving to his text. The degree of difficulty is based on the fact that this literature is and creates synthesis.

Dimensions in the Comprehension of Ideas

The transition analysis tells something about the reason for the five degrees being established. In the depth dimension of the scale there are four structurally bound super-ordinal steps or cutting edges, which denote evolutionary "jumps". The evolution curve is also known as the S-curve or integral. This natural science oriented method will now be used to manifest the invariants or singularities topologically. Figure 1 is a graphical display of the dimensionality in the comprehension curve. This mode of presentation has been chosen because it is well suited to represent non-linear relations.

The five degrees established are represented as terminal states, that is, along the border of the frame. The curve can be read from left to right, following the order of transition, whose directionality indicates clear stages of development. Bold letters mark the singularities, which are terms, denoting the final point at which the original concepts of the subject matter, the orientation dimension, meet the conception of the participating students, the intentional dimension. Figure 1 will now be explicated with reference to these two dimensions.

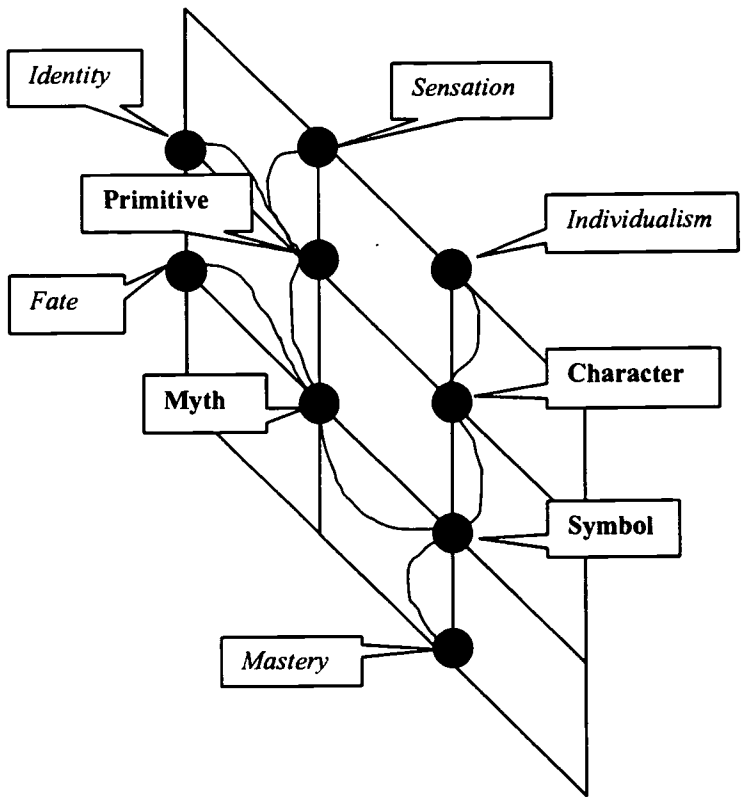
The vertical dimensions visualise the orientation in the subject matter, while the horizontal dimensions visualise the intention. Every term is the result of a movement that involves orientation in some space and the individual mental prerequisites for accomplishment. In this sense **Primitive** is the result of *Sensation* as the space in which the individual searches for *Identity.* When Primitive has been established it orients governed by *Fate* and through this intention the primitive orientation transforms into **Myth.** With *Mastery* there is a turning point in the curve. The functions operate on the myth and transform it into **Symbol**. When this stage has been reached *Individualism* will be the orientation space to finally move to **Character**.

In the two dimensions of orientation there are two distinct levels of literature. The primitive and mythological is characterised by behavioural and mental frames that seem to be determined by culture. The personal and social texture is in focus. The second is independent of culture. Both the symbol and character levels concentrate on analysis and synthesis respectively, to focus on individual growth.

The intentional dimensions also visualise two distinct levels. These characterise the range of comprehensive ability that a single individual may obtain. The upper dimension represents the whole conceptual range of the curve. This means that the individual can make moves adequately on all levels. The lower range has been restricted. This indicates an individual who can master myths and turn them into symbols but is not able to capture the very essence of the modernism. Thus the upper dimension represents a comprehension curve in relation to the subject of study, whereas the lower one does not.

Figure 1.

Holotop of Dimensions in the Comprehension of Ideas



From Comprehension to Competence

As has been shown by the holotop in Figure 1 a comprehension scale has been established. The comprehended ideas have been studied in a literary context. The starting point for the studies, however, were the three basic paradigms whose underlying ideas had been projected into video narratives about a human being's life in a civilisation built on the respective ideas. The students' first exposure to the videos had the purpose of elucidating the basic ideas to facilitate the study of their counterparts in modern literature. Thus it is the comprehension of those ideas in literary function that has been reported so far. In connection with the first and second exposures (after the literature test) to the videos a test form was used consisting of 15 propositional statements on which a participant indicates on a 10 point scale his/her conception of life in the model society in question. This measuring instrument has been developed for studying quality of life over time (B. Bierschenk, 1997a). To have a point of reference the participants also judged Sweden as a model society, using the same items, although unaccompanied by a video projection. Studies based on the complete design will be reported elsewhere.

For the present study it is of interest to reflect the comprehension of ideas in literature against the comprehension of their function in the projected societies.

Because if literature is to have the educational function of preparing the students for civilian life it is fundamental that the comprehension they have arrived at through fiction, that is, culture, can be transformed into adequate strategies of behaviour in real life. It could be argued that the established scale would have captured a general culturally bound comprehension of ideas, which could not be separated from the cue structure inherent in the civilisation models.

Competence should not be regarded as culturally bound. B. Bierschenk (1992, 1995) has presented an empirically based definition of competence, according to which competence is a measure of civilisation. This measure is composed of two basic factors, (FI) the ability to develop Eigenvalue, and (FII) the visibility of social texture. The first factor concerns individuation, the depth of a civilisation, the second concerns selection, the shallowness of a civilisation. Thus, to be able to state whether the degree of comprehension (culture) is indicative of competence (civilisation) we have to know:

What the students perceive in the models, that is, whether the literary cliff can be transformed into the context of civilisation.

A cliff in the sense that it has been discussed here consists of both shallow and deep properties. Both kinds must be perceived in order for an individual to survive (Gibson, 1979). The two factors are effective reflectors of survival competence in civilisation contexts. It follows that when both Eigenvalue and social texture are low in a civilisation no survival competence is required, while high values on both factors mean a clearly perceived depth. Since depth is indicative of the unknown, a high survival competence is required.

An experimental problem encountered by the visual cliff experimenters was the filtering out of those properties of both sides that might be familiar in the infant's perception of distance. Thus the size of the square pattern of the lowered side was adjusted accordingly. In this way the experimenters were able to distinguish something learnt from genuine survival behaviour. Similarly, the literature scale expresses something learnt. So, to be able to deduce anything about the students' competence in perceiving and judging the four civilisations (B, S, P, and Sweden), the civilisation scale should be filtered through the cultural scale. In preparing for an analysis of co-variance the correlation between the dependent variable (FI, FII) and the co-variates (Primitive, Myth, Symbol, and Character) was tested. As shown in Table 6, the correlation is practically zero.

Table 6.

Correlation between Civilisation Measuring Factors And the Cultural Scale

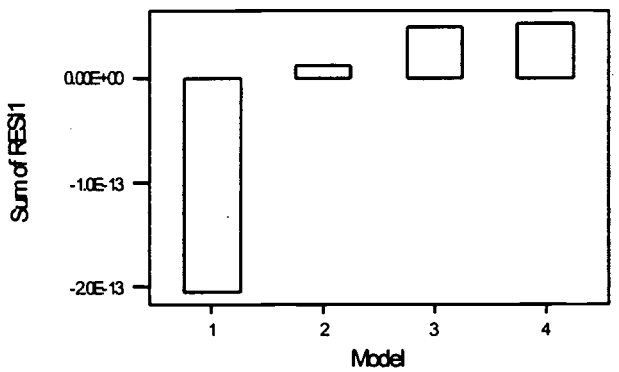
	FI	FII	P	M	S
FII	0.144				
P	-0.004	-0.040			
M	-0.005	-0.023	0.623		
S	-0.016	-0.017	0.521	0.752	
C	-0.020	-0.028	0.445	0.588	0.743

Explanations: Dependent Variables FI = Eigenvalue, FII = Social Texture
Independent Variables: P = Primitive, M = Myth, S = Symbol, C = Character

This means that the students' reactions to the civilisations can now be corrected in relation to their comprehension of the general properties of the models. If no respect is paid to this general knowledge no difference between the models can be proved. However, as a result of the correction a significant difference becomes apparent. Figures 2 and 3 show the perception seen from the Eigenvalue and the social texture perspectives respectively. In the present study the test – retest design has not been of special interest, therefore the two video exposures have been considered in combination.

Figure 2.

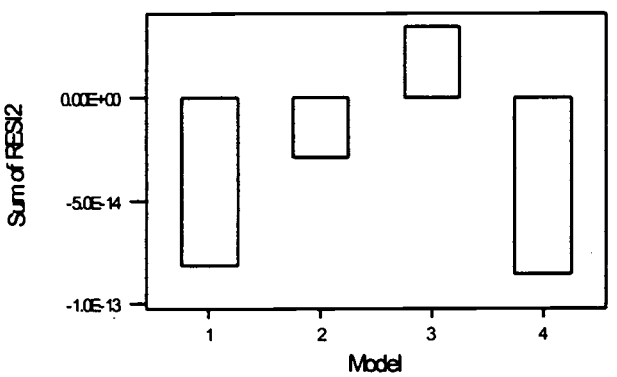
Perception of Depth in Four Civilisation Models



Explanation: Model 1 = Behaviour, 2 = Structure, 3 = Process, 4 = Sweden

Figure 3.

Perception of Shallowness in Four Civilisation Models



It has been shown (B. Bierschenk, 1997a) that the Behaviour model is highly favoured as fundament of the ideal society. However, this result could not be corrected for the participants' judgement of the four models. In the present study a dramatic change with respect to the Behaviour model can be noted. Apart from what is comprehended, the participants' perception of it as a civilisation cliff is extremely negative. There is no possible way of developing Eigenvalue, and the social texture, which should provide for such a development, is virtually non-perceivable. This is a competent judgement because the survival competence in terms of individuation and selection needed in a civilisation founded on behaviourism is in fact none. In the civilisation based on Structure the individual development is not entirely rigid but since the social texture is negatively perceived there are no cliff properties of any significance to the individuals. The Process society has been perceived as requiring competence. It is the only civilisation cliff perceived. The native society (Sweden) is perceived as very similar to a civilisation based on economic and technological growth with respect to its ability to develop individuals, but its selection mechanisms are not perceived at all. To these students the native society is thus ambiguous as to competence survival needs.

Discussion

The infant on the Visual Cliff reacts with behaviour that is necessary for survival. This survival potential is a phenomenon of human nature. However, the reactions are not the same for all children because of individual differences in development and experiential background. Similarly, competence should be conceived of as a mental potential, which encompasses the ability to acquire knowledge, to pick up the invariant information in a situation. One consequence of this outlook for an educational system is that schools cannot, by means of instructional programs, form the students' competence, only provide for its development and structuring. This article is a report on such an effort.

Abilities to analyse and interpret central, structurally embedded ideas through literature study have been exercised and tested during three school years. Thereafter, a test was applied, which measures the students' ability to apprehend ideas in function. It turned out that in this new situation the developed comprehension is equal regardless of aesthetics, natural science, and social science program of study. The empirically defined degrees of difficulty in modern concepts and ideas have been conceived equally in four classes. Since the significance of this grouping according to literary depth is remarkably high, the interpretation is that the students have acquired equal mental potential in perceiving diversification.

Central for a society to survive as civilisation is to develop structures to supply its members with personal and social instruments for organising life and for contributing to growth. Only in this way can trends and directions be known and prospected. Just as the Visual Cliff apparatus could prove direct perception of depth and thus survival competence in infants, the instrument discovered in the present study could point to direct perception of the survival potential of societies. The main results of this experiment could have wide implications theoretically and practically. I would like to pinpoint the following:

The instrument that has been developed has the capacity to reflect literary cliffs, that is, degrees of cultural depth mediated in language. By this comprehension scale, a bridge is established between the perception of ecological depth and depth in

society. Both are independent of culture but the societal depth could until now not be measured. When cultural ambiguity is filtered out this transformed depth is directly perceived provided that the perceiver is able to make adequate judgements. Students with different interests have been given the opportunity to acquire knowledge on equal terms of the social and cultural texture that form the ground of modern society, ground without which its depth would not be perceivable. Consequently, the necessary challenge for an educational system is to place young people at the edge where the disparity between literature and society is provoking to them.

References

Bierschenk, B. (1988). A theoretical basis for estimating quality of life. *European Journal of Political Economy, 4,* 323-332.

Bierschenk, B. (1992). *The synthetic approach to competence.* Lund, Sweden: Lund University, Department of Psychology. (Unpublished manuscript.)

Bierschenk, B. (1995). *Assessment of competence. A new field of research* (Kognitionsvetenskaplig forskning, No. 54.) Lund, Sweden: Lund University.

Bierschenk, B. (1997a). *Informational interaction with model-societies of different theoretical orientation* (Kognitionsvetenskaplig forskning, No. 63). Lund, Sweden: Lund University.

Bierschenk, B. (1997b). *A Topometric Approach to Life Quality across Comparted Time and Projected Societies.* Copenhagen: Copenhagen University, Copenhagen Competence Research Centre. (Unpublished manuscript.)

Brodow, B., Bergström, B., & Nettervik, I. (1987, 1991) *Dikten och vi. Litteraturhistoria för gymnasieskolans teoretiska linjer.* Malmö: Gleerup.

Brodow, B., Bergström, B., & Nettervik, I. (1988, 1991). *Dikten och vi. Antologi för gymnasieskolans teoretiska linjer.* Malmö: Gleerup.

Campos, J. J., Hiatt, S., Ramsay, D., Henderson, C., & Svejda, M. (1978). The emergence of fear on the Visual Cliff. In M. Lewis, & L. Rosenblum (Eds.), The development of affect (pp. 149-182). New York: Plenum Press.

Elstrup Rasmussen, O. (1997). Project materials. Copenhagen: Copenhagen University, Copenhagen Competence Research Center. (Personal communication)

Gibson, E. J., & Walk, D. J. (1960). The "Visual Cliff". *Scientific American, 202,* 64-71.

Gibson, J.J. (1979). *The ecological approach to visual perception.* Boston, MA: Houghton Mifflin.

Heidenreich, K. (1995). Entwicklung von Skalen. In E. Roth (Ed.), *Sozialwissenschaftliche Methoden* (Pp 407-439). Munich: Oldenbourg.

Helmersson, H. (1992). Main principles for perspective text analysis via the PC system PERTEX. (Kognitionsvetenskaplig forskning, No. 41). (ERIC Document Reproduction Service No. ED 352 405, TM 019 324)

Lee, A. E., & Mayer, W.V. (1976). *The program guide to projections for the future.* Boulder, CO: Biological Science Curriculum Study.

Minitab Inc. (1996). *Minitab reference manual.* State College, PA: Minitab.

Widing, D., Rydén, H., Eriksson, D., Lindskog, R., & Stenhag, G. (1990). *Från Gorkij till Sara Lidman. Antologi för gymnasieskolan.* Stockholm: Natur och Kultur.

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