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ABSTRACT

This report details a study performed as an interplay between modeling and reality which was designed to find operators that affect the information organizer of an individual in a social system. The operator is defined as a system element that affects other elements. The information organizer is defined as a coordinating interface between the social environment and the mind. A process model based on the Multiple Classification Analysis of Newcomb et al. was constructed and tested in empirical surroundings using 18 measurements and 20 subjects. When the process model proved to be inadequate, it was revised using 14 measurements and 23 subjects. Three different methods for analyzing the new empirical data were applied. A partial correlation was used for elaborating the direction of the effects of the variables; the coefficient of determination was used to reveal transformations of the variables; and the general distance index was used to map the dynamism of the process. The most significant operators in relation to the information organizer proved to be job experience, self-esteem, university students, and university teachers. The tests of the models were performed during 2 academic years in two student guidance courses at a university. The revised model was converted into a system model and an application was implied. (54 references) (Author/DB)

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MODELING SYSTEM OPERATORS AFFECTING THE INFORMATION ORGANIZER OF AN INDIVIDUAL

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ABSTRACT

The study was performed as an interplay between modeling and reality. A process model was constructed and tested in empirical surroundings. The process model was based on the frame developed by Newcomb et.al. Multiple Classification Analysis and the elaboration approach developed by Rosenberg were applied to analyze the data. There were 18 measurements and 20 subjects. The operators under scrutiny were individual operators functioning on their own level. The process model proved to be inadequate due to the narrow scope of conceptualization. The model was subsequently revised.There were 23 subjects and 14 measurements. Three different methods for analyzing the new empirical data were applied. A partial correlation was used for elaborating the direction of the effects of the variables. The coefficient of determination was used to reveal transformations of the variables, and the general distance index was used to map the dynamism of the process. A vector presentation was applied to the relations of the operators. The most significant operators in relation to the information organizer proved to be job experience, self-esteem, university students, and university teachers. There were three behavioral cycles in the pro-

cess. The empirical tests of the models were performed during two academic years in two student guidance courses at a university. The revised model was converted into a system model and an application was implied.

Key words: modeling, operator, elaboration, transformation, system model

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PREFACE

I would like to express my gratitude especially to Dr. Singa Sandelin, who with a warm heart and a tough touch revealed to me the secrets of the modern way of systems thinking. I would like to thank Dr. Veijo Meisalo, Associate Professor, for his sophisticated criticism and guidance during my work which obliged me to re-evaluate some aspects of it. I also express my gratitude to Dr. Erkki A. Niskanen, Professor, for his teaching of how to do research, during the past years. My gratitude also goes to Dr. Vilmos Csanyi, Professor, for his instruction in how to theorize with essentials. I thank Sirkka Kekki, Librarian, for her immense contribution which made the work worth doing. Last but not least I would like to thank Pearl Lönnfors, MA., for cleaning out the "bugs" in my English text.

CONTENTS

0. INTRODUCTION

The objective of the study is to model and find operators which affect the target variable, the information organizer of an individual in an educational social system. The information organizer can be characterized as an interface between social environment and mind including functional components. The emphasis is on the modeling and on the interplay of the operators. It is somewhat difficult to give an exact definition of the approach, but the most approximating one is a dynamic system where there are time-dependent entities interacting with each other. The elements of the initial model were adopted from Newcomb et. al. and the existence of principal operators which were to affect the information organizer was hypothesized. The model was tested with a questionnaire in an adult further education group during one academic year at a university. Multiple Classification Analysis and partial correlation were applied in the analysis. The results indicated that the hypothesis had to be falsified because all the variables acted on their individual level, and no clear interactions of the operators emerged during the process. That was due to the narrow scope of the model and it had to be revised. Early history, social environment and self-esteem were included in the new model and the model was tested with a questionnaire in circumstances similar to the aforementioned. The subjects were an adult further education group of student guidance counsellors at a university during one academic year. Partial correlation was again used for elaboration, the coefficient of determination was applied to behavioral transformations, and the general distance index was used for the dynamism of the process. It was hypothesized that certain early history variables, as well as the environmental operators, would have an influence through self-esteem on the information organizer. The hy-

pothesis was partially corroborated. In order to have the entire dynamism in sight, derived concepts were constructed and a vectorial presentation was applied in behavioral interpretations, due to the fact that behavior was comprehended as a relation between operators. Three cycles of behavioral sequences were obtained during the dynamism. To give some more extension to the modeling, a system model was constructed and an application was implied.

If we try to locate the study in education, then there is good reason to say that it belongs to the social psychology of education because the problem concerns an individual-level phenomenon in an educational social group. The problems connected with those questions are one of the main focuses in the social psychology of education.

1. THEORY

1. 0. Modeling in Theory Construction

At first it is to be stated that no simple and sovereign principle exists in modeling and theory making. That is due to the differential weighting of values in problem selection in which some problems are preferred, others are not. This especially concerns educational science and its parallel ones sometimes called behavioral sciences. This means that modeling and theory construction are anchored in values and their preferential nature. Thus, objectivity in its strict sense is an ideal which can be approximated more or less succesfully. On the other hand, modeling and theory building are dependent on the concept of truth e. g. correspondence theory which is adopted while learning the basic philosophies in research. So the background of modeling is a complicated matter and not so self-evident as one might expect. The modeling is somewhat dependent on education, methodical training, styles of thinking in research, ways of seeing states of the world, research community, fashions prevailing in research, and habits of proceeding, among other things.

In pondering the differences between theory building and modeling, which are not so clear due to the different chosen aspects in construction, both have varying meanings and definitions. The standpoint chosen in this context is that a theory is an organized whole of explained facts (evidence). The explanations can be structural, functional, causal and probabilistic, or combination of these. That means a theory has both its extensions and intensions. That is not necessarily the case with a model. A model probably has extension, but not intensions or contents, obtained from reality which is called evidence.

Modeling as such can be regarded as a means of obtaining organized knowledge for a theory which again is a means of explaining reality. Regarding a theory as an end is contradictive to the tentative nature of the results. So the theory building can be considered a continuous process which basically does not include anything stable.

Modeling obliges the researcher to employ highly selective thinking and pondering about the matters which are the most relevant in relation to the problem. On the other hand, there is the subjective side of the researcher which brings forth the predictive aspect of modeling. The researcher has his/her values and idiosyncracies which somewhat affect modeling. In principle, the subjectivity can be avoided to some extent by applying the already built models or frames in new situations. In a theory that aspect is minimized due to the evidence obtained and explanations approved among the reseachers in critical scientific discussions.

Summarily, it can be stated that the crucial difference between a theory and a model is a question of means and ends as of well as the nature of concepts and their relations to extension and intension.

1. 1. General Systems Approach

The principal reason for selecting the GSA-approach is that it considers the events of the world to be a dynamic, complex, unified, and organized wholeness. The principles below can be directly derived from the above starting point.

According to Sutherland (1973 pp. 19-20), the epistemological implications of the General Systems Theory (the term theory has been given

up at present and has been replaced by approach connotations which are more flexible) are:

1. A belief in the scientific utility of phenomenal isomorphisms.

2. A belief in the prerequisition nature of proper theory, coupled with the conviction that empirical validation should be the arbitor, of scientific truth.

3. A postulation of the critical role played by analogical models in complex phenomenal domains.

4. A preference for "organic" referents within social and behavioral sciences.

5. A preference for holistic analytical modality as opposed to the reductionist-inductivist modality.

6. A demand that instances of macrodeterminacy among complex "organic" phenomena be fully exploited.

7. The postulation that ideal-type and taxonomic constructs are the most efficient vehicles for phenomenal analysis in the social and behavioral sciences.

In addition, the Society for General Systems Research allocated the following functions to itself in its founding statutes: to investigate the isomorphy of concepts, laws, models in various fields, and to help in useful transfers from one field to another. To encourage the development of adequate theoretical models in fields which lack them. To minimize the duplication of theoretical effort in different fields. To

promote the unity of science through improving communication among specialists (Ibid.).

Bahm (1985 pp. 253-256) differentiates three stages in the development of systems philosophy a) emergentism b) structuralism c) organizism. Emergentism sees the world as a place where new wholes are born from old parts interacting with each other. Structuralists see that wholes and their structures precede the parts and transformations occur among structures into new structures. Organizism contains both aspects explaining wholes as organic entities which include the whole, its parts, causalities, oppositions and interdependencies. In addition, each whole functions as a holon (Koestler 1969) of a larger whole. Analogies, isomorphisms and homologies are essential concepts within the frame of the General Systems Approach. They are searched for across different fields of inquiry. If found, they make scientific action more economical and provide possibilities to construct large scale models and theories. If we assume that an organic system has a structure, function, and dynamism which form a coherent whole not reducible to its constituents, as Bahm proposes (Ibid.), then we can build a general system.

1. 2. Systems Approach

A system is defined as an entity with structure, function and dynamism. Nothing is said about their relations. Jantsch (1980 p. 34) differentiates between structure-preserving and evolving systems behavior, which are inverses. The former maintain equilibrium or try to maintain it. The latter are far from equilibrium, they behave dissipatively producing organization out of the flow of energy in nature. One

thing in the systems approach seems to be a little obscure: the fact that structure is thought to be the primus motor for causalities in systems. As a matter of fact we have seven possibilities with the three elements and two states, has an effect: has not an effect.

The nominalistic row of zeros is excluded because the system concept presumes interchange among the system elements.

STRUCTURE	FUNCTION	DYNAMISM
1	0	0
0	1	0
0	0	1
1	1	0
1	0	1
0	1	1
1	1	1

0= has no effect 1= has an effect

The question is which possibilities will be realized?

The answer is not easy. However, function can affect structure and dynamism. For example, in sports and games training produces growth of muscles and improvement in coordination. So structure and dynamism develop. Dynamism can affect the other two. If your process of reading is not suitable for your learning then structure and function suffer. The corrected reading process will probably improve learning.

Other aspects are also included in systems research. Some, like Cortes (1974), consider the core object of the systems approach as the

changes which take place along time. Others stress interaction which can be seen in their system definitions (Hall, Fagen 1956; Ackoff, Emery 1972; Berrien 1968; Alexander 1974). They define a system as a set of relational elements. But the definitions are too broad and formal to allow intentional adequate evidence. The reason is they do not offer associations with reality such as structure, function, and dynamism, which indicate what to study. The systems way of seeing the world is also a methodological approach where a strong emphasis is on the demand that a theory should produce new theorems which adapt to new phenomena (Laszlo 1975). The former phenomenal complexity and organization are also central concepts in the systems approach, which is an attempt to find lasting regularities in ever-changing turbulent phenomena.

1. 3. Open and Closed Systems

Systems can be divided into two groups roughly, open and closed ones. In this context I shall not deal with closed systems, which have a tendency to maximize entropy or they drift toward chaos. Instead, open systems, which include behavior systems, will be dealt with.

An open system means that the system has exchange relations with the environment, and materially information exchange is always connected with energy. The essential features of open systems are environment, basic units, organization, process, behavior, and segmented regularities (Kli'r 1965). According to Ackoff and Emery (1972), the characteristics of open systems are environment, structure, functions, and reactions. The features peculiar to open systems are functional relations, transformations from input to output (Laszlo, Levine, Milsum 1974).

A system(open) is characterised by early history, input, function, structure, and modifications between input-process-output (Cortes et. al. 1974). According to Vickers (1970), systems can be classified along two dimensions 1) how systems are regulated and 2) what kind of historical processes affect them. Rapoport differentiates between hard and soft systems. When the commonalities of the features of the systems are clustered, we get a list of qualities of open system components: early history, boundary, process (Berrien 1968) including structure, function and dynamism, input, output, environment and transformative relations between an open system and its environment. The relations between a system and its environment can result in positive and negative feedback. The former means that a system is deviating from its equilibrium state such as in growth processes. The latter means that a system maintains an equilibrium state or fluctuates toward it. Equilibrium in open systems means dynamic equilibrium, which is movement taking place within the range of certain tolerances. The range is defined as an equilibrium state. Dynamic equilibrium presumes negative and positive feedback, which produce stability and fluctuation. Learning can be regarded as a variety of negative and positive feedback influences. Negative feedback produces stability or leveling, and positive feedback, brings forth fluctuation or an increase of amplification.

Transformation means that in the processes of open systems onething is becoming something else. The development of a butterfly is a suitable example of that. However, it is not to be assumed that the modifications are maximally entropic, but rather they are rule-governed or transvariant. That means the tranformations follow regular patterns within some probabilities and non-probabilities.

The boundary concept means that there is a region between an open system and its environment which filters information and energy and matter into the system. In other words, the boundary has a selective function in the interplay of a system and its environment. Our senses form a boundary between us and our environment. In the context of open systems the essential point is the relations between systems and environment because the transvariances will be found there to construct general systems if something regular is observed through research.

1. 4. Social Systems

Social systems is a class of human systems, but what is characteristic of a social system? One of the characteristics is that people develop expectancies in relation to the behavior of others. If behavior follows the expectancies, then there emerges roles and the formation of social system sets being mediated by communication. On the other hand, there have to be some common orientations among people in a social system because otherwise people would form a collection of individuals without shared expectations.

Transformations occur in social systems and they follow some rules of conduct. The nature of transformations is plastic, which probably means system behavior is irreversible because time is a one-way continuum. Transformations are also considered relevant by Cowan (1963) and Cortes (1974). - According to Leakey Jr., sharing of prey, labors, places etc. have been a crucial factor survival in the dawn of mankind. Sharing has produced co-operation, negotiations as well as conflicts. The kind of activity where more than one human is involved is called

social behavior. According to Bush and Bush (1987 p. 47), the general systems approach can be a powerful orientation for the theory of social systems but not without further elaboration. If we change the viewpoint and examine the kinds of social systems, we have instead a glimpse through eyeglasses of the systems approach.

The smallest social system is a dyad. Instead of speaking of triads we call the second system a small group. The group, collective and social organization follow. The distinction between the systems is not so clear-cut as one might expect. The reason for this is that the boundaries between human aggregates are more or less dim. What is the boundary of a group? Is it the number of members, shared perception, quantity of cohesion? The next question is:are social systems open? Evidently they are, since "All living systems are open systems." (Ibid.). One of the central events of social systems is social change. Social change is the result of an interacting network of various social tendencies and has relationships of many different kinds (Gharajedaghi 1985-86 p. 143).

From the global perspective, not very much has taken place during the few million years man has existed as an open system. A conflict is assumed to be a necessary and sufficient condition for social change. That is why it is necessary to produce quarrels with the different sides of social milieu. Social dynamics, as, such includes the conception of at least two opposing forces. The vectorial representation seems to originate from the physical interpretation of social dynamics. It is as if some forces make us move and produce social kinestetics. The basic drives may have magnitude and direction. From the other viewpoint, a condition of social change is seeing and insight. If people can be persuaded to believe that they have possibilities to attain maximum gain with a minimum loss, that probably produces social change. Social

change has many obstacles such as beliefs, habits, and values, e. g. religious beliefs may hinder the consumption of beef. For promoting the dynamism of social change it is not enough to influence separate system components, but the social system as an entity. For example, the innovations diffuse well in upper layers of society. but stepping downwards, the magnitude of obstacles increases due to different values and valuations. Educated people are for education. Because of the lack of extension of social change, it might be sensible to construct a continuum of micro-macro changes specified by local environmental conditions. A typical example of a micro-change is the grain store system built by the western world in Africa. No grain lasted in the stores due to the wrong methods of preservation. Then somebody discovered that termite cones have a stable system of ventilation and moisture. The rick was studied and the facts were applied to small mud-madestores and the grain survived. So far the discussion has been on the wide social change. Now it is time to move to a detail, to a subset of social system, group behavior.

1. 5. Group Behavior

It can be said that a group is an open system because a social system is open. One of the facts of social research is that a group is a complex system and complexity forms a hierarchy (Wilson 1969). A reason for the complexity is the interaction of variables where dependency coefficients are not a guarantee of the existence of a relation. In addition, mindscapes of the group members vary at different times of the day, confronting situations vary and the social environment of a group varies, among other things. Thus complexity of the group becomes understandable.

Hierarchy of a group presumes the existence of subsystems. They have their system properties and locate on the different levels during group dynamics, e. g. leader positions, perifery members, social cliques and followers. A subsystem functions as an independent unit interacting with the whole. It is difficult to say what causes the forming of complexity into hierarchy. Human systems are "mehrfach gesichert" or multiple-secured. In a way, a hierarchy allows possibilities for controlling behavior multiples. It may be that hierarchy offers a rather clear division of labor and communication patterns. Leavitt (1958) concludes in his communication study that when centrality and independence are evenly distributed in groups, there will be no leader, many errors occur while high activity, slow organization, and high satisfaction are shown. Hierarchy is the inverse of the above behavior. It offers clear dominance relations and independent decision- making under norms; errors exist but not so much as in the round-table case. There is quick organization and low satisfaction. Maybe hierarchy is relevant in relation to adaptation, at least it seems to be rather efficient. The other question is what kind of "Gemeinschaft" is born in hierarchies when there is low satisfaction. It would be rewarding to study latent organizations compared with the official side in hierarchies. The power use might be different in the organizations. Hierarchy gives chances to regulate group function because the system selectively controls the action of subsystems which control their subsystems selectively etc. In addition, subsystems are under surveillance. Usually decision and action units are separated, which is adequate for group efficiency. However, reorganizing takes place in groups, which is a growth process in nature (Platt 1970). The purpose of reorganizing could be the formation of more relevant relations to attain preset states to adapt better to the environment. Adaptation means that groups move from one

hierarchy to another that better corresponds with the environment of the group.

A part of the total environment is social environment. The difference between the inner and outer environment of a group is seldom made. The inner social environment means a set of relations inside the boundary of the group, where other group members are the environment for a group member. On the individual level, the inner environment is the space behind senses and the outer environment is the inner environment of a group. The outer environment of a group is formed from quantities outside of the boundary of a group. The quantities are filtered into a group by the selective action of the boundary. In that way a group functions in relation to the environments. In addition, events in group functions are self-regulating (Studer 1971) and in close interaction with environments.

It was assumed that system behavior results from structure, function and dynamism. Group dynamics is a multi-event which functions as a coherent and organized entity. That means e. g. the locomotion of a group is regular or invariant. An invariance is a relation with a regular pattern of behavior. However, transformations take place in group dynamics which is the same as saying that environmental information is assimilated into a group system. For example, a member of a group adopts new information from the inner environment, which promotes the member to better understand the behavior of other members, such as their motives. The consequence is that the member changes orientation toward others. It is probable that the member has great difficulties to return to the former conception of others. The information system of the member has been transformed, but the member still has his/her identity. In this case the question was not about invariance but trans-

variance. The transvariance can be defined as modifying patterns of action where systems do not loose their systemness. The development of a butterfly includes a transvariance with modifications and systemness.

Group dynamics includes various kinds of effects that help to understand the "kinematics" of a group. - Trigger-effect is spoken of when a small change can produce cumulative phenomena in a group. A good joke in the right place can produce lively negotiations in a socially tense case. A bandwagon effect means that people join the group and follow the leader without knowing the goals of the group. For example, a group member decides to buy a certain micro-computer. Others follow without critically thinking about the machine and their own needs. A snowball effect means that a certain behavior grows from a minor initial condition to a huge event, e. g. rumors. A boot-trap effect leads to the case where an outsider helps a group to attain its goals, e. g. a mediator in labor market negotiations. A fan-effect means a dispersive affect in a group, e. g. breaking of coalitions. The effects can occur parallel, in series, simultaneously or sequentially. It is comprehensible that group dynamics are complex.

Considering a group as a system, we can discuss structure, function and reaction on the basis of Cortes et. al. (1974). They define structure as an ordered set of functions joining with each other in a system. Functions are defined as transformations of inputs to outputs or as rules which connect inputs with outputs. A reaction is defined as an output of a system that results when an earlier process is fed into a system. Structure and function form the basis of system synchrony. The change of structure is called diachronic which results in an immediate change of a system. Change is considered a variable transforming into

the inner states of a system and an inner state transforming into other states and an inner state transforming into outer states. Two premises underlying the social systems approach:

1. Structure determines univocally the functions of a system.

2. Reaction of a system is determined by its functions and history of inputs (Ibid.).

These premises do not take into account an important concept:the boundary of a system. It has the significant function of selecting input for a system. Boundary can be defined as a region which separates a system from its environment and other systems. The boundary is identified from the basis of the relations which exist in the system and those which cross the boundary (Berrien 1968). The boundary of a group can be defined through its components. The components are the group members who interact with each other. The outer environment consists of people, matter and things complementary to the corresponding ones of the group, which affect the group as an entity or partially. The input of a group includes individuals with their characteristics and case histories. The boundary is a selection process into the group based on the suitability of a future member for division of labor or some other criterium for the membership. When the group situation begins, the structure of a group emerges due to social perception and the evaluation of other members. The dynamism gets going. Transformations take place in a group state. How does that happen without attracting almost no attention? One of the great problems in group dynamics is the lack of mediating theories between the individual level and group level. Nowadays the study has to be made in one or the other way. We know, however, that people behave differently as individuals than in a group.

1. 6. Emergence of the Research Problem

It is probable that people have a need which produces dispositions to gain organization from their environmental information. That is due to the fact that people have to cope with their environment and without organization adaptive responses would not be possible. The need for organizing environmental information is shown in the explanations of the world through centuries as indicated by Gregory (1981). The same urge is shown in Berger and Luckmann (1971).

However, the phenomenon of converting information into organized wholes from the environment is not clear. Otherwise there would be exact methods of education. That much is known that information intake from the environment is not random and information is somehow organized to increase adaptation to variability of situations. If information is organized, then it can be assumed that there is an "apparatus" which performs the job. That can be called and information organizer, defined as a coordinating border area composed of mutually interactive components between social environment and the mind. We are continuously coping with the social environment, and if there is no organization constructed from the flow of information, then relevant behavior would become impossible, e. g. the case of random behavior along time leads to perishing because of the inability to find food. Thus, the organizing of information from the environment has a very central place in human behavior because it makes possible adapative responses and relevance in behavior. Philosophes, for example, have pondered the organization questions (Gregory 1981). In this context, it is necessary to give the reasons for finding operators which are connected with the information organizer.

Information, both extensional and intensional, increases rapidly and man has a limited capacity to absorb it. If we obtain knowledge about the operators that are crucial to the information organizer, then we can invent the means to improve organizing environmental information. Furthermore, we can remove some of the inhibitive effects of the operators and create situations that facilitate the functioning of the information organizer. The resulting advantages for learning are apparent. Instead of sucking encyclopaedic information, a student has an occasion to deal with information, shape entities, sort facts, break down former wholes and create a critical mind for organizing relations. There is another viewpoint to the problem.

An open system, such as a human being, maps environmental information into his/her mindscape. We, however, do not know how and what are the crucial process operators that make it possible (personal information). I see the situation as we not having the necessary means to obtain the mapping information. Something can be done to improve the situation. What kind of information can be obtained with the rough methods we have? An important aspect for adaptation and adequate behavior in relation to the environment, is organizing information in such a way that the environment can be "read" right. That produces behavior which probably maps in the variety of situations and enables adaptation, not conformity. So, obtaining knowledge of the factors, which are essential to the information organizer, results in better guiding and facilitation of learning processes. As for the information organizer it can be thought to be between social environment and the human mind, a kind of coordinating "device" including subparts interplaying with each other. So the information organizer is defined as a coordinating interface with interactive subparts between social environment and the mind.

1. 7. Problem

The purpose of the study is to find operators which affect the information organizer of an individual in a social system. The operator is defined as a system element that has effect(s) on the other elements. The information organizer, the operators and the social system will be specified during the research process which begins from the construction of the process model.

1. 8. Process Model

According to Wilson (1984 p. 7), modeling is crucial to the subsequent application of any methodology, to analyze the situation. He differentiates between conceptual and analytic models (Ibid. pp. 9-18). The same emphasis is made by Quade (1985 p. 192) who stresses that systems analysis needs models to predict consequencies that would follow when an alternative is to be chosen and implemented. He makes a distinction between analytic models, simulation, gaming and judgemental models (Ibid. pp. 195-202). Of course we can classify the outputs of modeling, the models. The primary criterium for models is the purpose of the construction. Many times we confront the situation that modeling has to be processed tailor-made because the circumstances are so specific that no general model can be applied. I agree with the point made by Wilson and Quade that models are useful devices. It holds the aspects of a study together, it directs the attention to the essential aspects and excludes the irrelevant points. As a matter of fact, models provide binoculars for iteration and algorithms to be developed within the focus of a study. The criterium of prediction in human system studies is more or less questionable in modeling. The reason is that e.

g. attitude theories are not able to predict behavior in real situations. If the predictive probabilities of behavioral fluctuations were high, then they would result in deterministic models or mechanisms of behavior. This is not the case e. g. indicated by opinion polls compared with real behavior. Under these circumstances, models are to be considered devices which organize the research entity and give directions worthy of study.

The process model constructed in this context is based on the frame of social behavior by Newcomb et. al. (1965 p. 14). - The reasons for selecting this frame are: 1) It distinguishes between the individual and group characteristics, which are to be included due to the lack of mediating theories pointed out earlier; 2) It includes interaction that is a very essential compound relation in social systems; 3) The frame is easily modified into a system model (a process model) because the elements are ready; 4) The frame has the elements which are necessary for the existence of a social system. However, we have to ignore the sequence of effects of the frame because we do not have ad hoc information about the operators in this case. Transforming the frame into a process model means that the individual characteristics are located input, because they precede the process in time. The proper process includes group characteristics, interaction and situations because they are on the group level, not reducible to the individual level. The individual features are located output because, with possible changes, they are consequences of input and process in time by definition. We have to add boundary into the model because the boundary selects people for the social system. Due to the nature of the social system, we have to have the environment for an open system. The process model can be illustrated by the figure below.

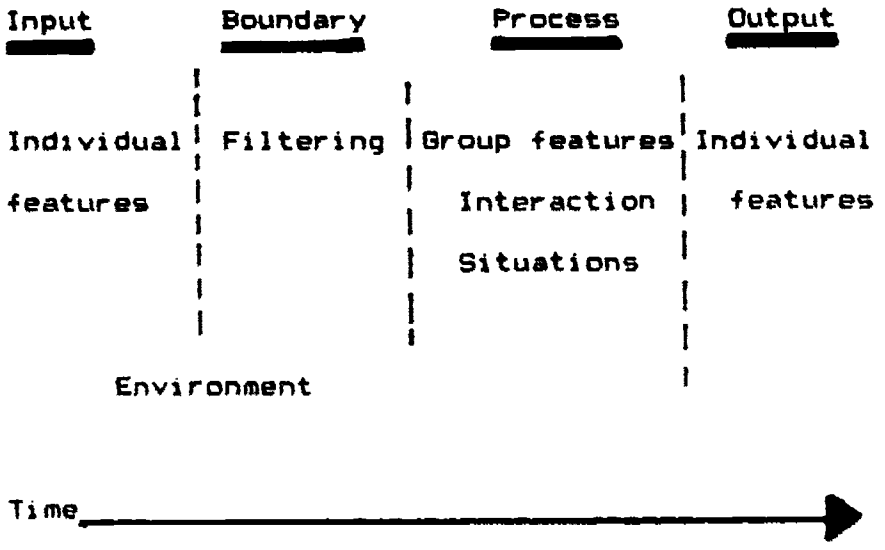


Figure 1. The Process Model

1. 9. Choosing Variables for the Process Model

Due to the fact that the study is looking for operators affecting the information organizer, we must have something that is converted into operators. The variables are the working devices which, during the research process, begin to produce effects. When the variables have turned into operators they cannot be converted back because variables, as such, are mere concepts. As a matter of fact, variables produce nothing, operators do because reality is between the variables and the operators. Thus the process model includes variables chosen, not operators, because we do not know the effects. As a consequence, variables can be considered preliminary degrees of operators.

The main reason for selecting the information organizer as a target variable is its focal position in relation to behavior, because it enables

people to cope, not necessarily optimally, with the environment and adapt to environmental demands. Without the organizing information it would not be possible to make adequate responses in relation to others. However, the mere research of the information organizer is not relevant, because we live among other people and from social psychological studies it is known that people affect each other. Why would the information organizer form an exception?

Milton Rokeach published his dogmatism study in 1960, where he sees dogmatism as a subsystem of cognitive structure, not necessarily bound with a certain value system. He stresses the vigor with which beliefs are defended and supported. The Rokeach study and many others have their roots in "The Authoritarian Personality" by Adorno et. al. (1950). A keener examination of the studies reveals that the phenomena in question are connected with the cognitive functioning of a person. So the functioning seems to have a prominent position in the relations of man and his/her environment. The relations are informational in nature. The bits of information have to be organized to have conceptual and practical significance. The organizing is necessary for the adaptation to the present environmental demands, because the mappings are to be relevant to coping with the social environment in particular. That is why the existence of the information organizer is necessary for the construction of behavioral maps with the environment. It can be thought that the information organizer uses the information of cognitive systems as "stuff" for the relation formation of the mind. Whence the information organizer is an interface between social environment the and mind. By definition, the interface is a border area of contacts and it is very probable that the organizer is not a one-factor operator, but it has many functional elements which together select the mindscape. The information organizer includes components which

shape the orientation to the social environment, such as conservatism, ethnocentrism, intolerance, orthodoxy and patriotism (Kirscht, Dillehay 1967 p. 133). The components are connected with closed mind action, and so-called "tunnel vision" results from a suitable combination of the components. The inverse of the components are associated with open-mind functions. The essential point in this context is that no organization exists if there is not coordination. That is why it is necessary to define the information organizer as a coordinating border area composed of mutual interactive components between the social environment and the mind. Thus the information organizer is assumed to have coordinative characteristics of an interface. On the other hand, a mere structural definition is not enough because people do things. That is why it is necessary to emphazise the functional aspect in the definition. In this context, the information organizer is considered to include as its components conservatism, radicality, antisemitism, ethnocentrism and intolerance. According to the correlations in Table 2, that seems to be the case. Conservatism means supporting traditional ways of behaving. Radicality means reforming ways of behavior. Antisemitism is prejudice towards Jews. Ethnocentrism means that a person regards his race as superior to others. Intolerance means impatience towards the views of other people.

The above reasoning enables us to speak of a mediating device between the social environment and the behavior of individuals. We do not know the operators which control the functioning of the information organizer. That is why we have to select other variables into the model. The target variable information organizer, however, is the output variable because it is an individual characteristic and it has a central position in explaining the man-environment behavior system.

Abilities are individual characteristics and they have associations with many behavioral phenomena. In this context, abilities consist of verbal comprehension, productivity and verbal productivity, that is, the qualities that are in accordance with our cultural conditions, e. g. good language users are regarded as bright. The abilities explain much about the relationship of adaptive behavior to social environment.

Personality is also an individual level phenomenon and it has connections with behaviors such as persistence in work, asceticism. In this context, personality is comprehended through four variables: sociability, emotional balance, courage and radicality. The variables originate from Cattell. The variables of abilities and personality are combined into an abilities variable and a personality variable.

A social group includes various structures from which status structures are essential. Status can be defined as a position in the division of labor (Bredemeier 1970). A distinction can also be made between point-status and compound status (Fararo 1968). Three kinds of point-statuses are applied in this context: status of decision, status of trust and status of dominance.

The status of decision is defined as a position where it is possible to make decisions for the group without resistance. The status of trust is defined as a position where the incumbent of the status can handle the affairs of a group without arousing suspicion in the group. The status of dominance is defined as a position where the status incumbent can control the group without coalition formation. Interaction is assumed as given. Cohesion is a central variable in group studies. It is defined as forces which enable the members to stay in the group (Bany, Johnson 1975). There is a mutual causality between cohesion, success

of the group and internal communication (Deutsch 1968). The input and output variables were already located and the rest of the variables belong to the process part of the model. The status variables were located into the process part because they belong to the group process and form structures which are not necessarily stable because e. g. there are power competitions, changes of friendship relations in group dynamics. In addition, the structures cannot be reduced to the individual level due to the existing relations among the occupants. Thus the variable levels of the model are from left to right:individual level variables, group level variables and an individual level variable.

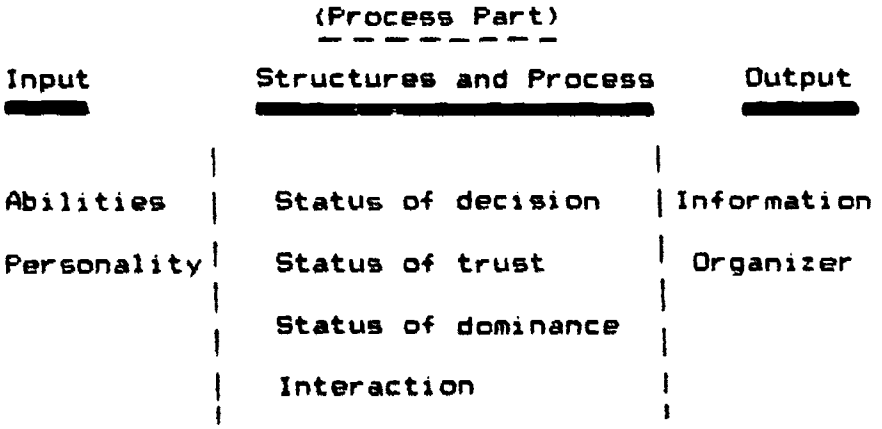


Figure 2. The Variables of the Model

Boundary and environment are left aside because the Newcombian frame does not contain them. I shall return to them if necessary.

1. 10. Hypotheses

If we are not dogmatic then we can take into account the many faces of scientific hypotheses. For example, they can be questions, expectancies, formulated sentences deduced from theory, dim conceptions and intuitive insights. Here the hypothesis is a question: What are the principal operators which affect the information organizer in a social system? The reason for asking this is to have a total picture of operators. The purpose is to eliminate so-called weak connections simultaneously, which means that the main operators that regulate the other effects will remain. An attempt will be made to try to attain the entity of effects.

2. EMPIRICAL TESTING OF THE PROCESS MODEL

2. 1. Measurement

The stimulus heads of the information organizer measures were adopted from Shaw and Wright (1967). They were modified to correspond with the conditions of our country. The ethnic minorities of the country are Lapps, Gypsies and Jews. So there is no sense to ask about Melanesians. The response heads of the measures were Likert-scales. The statuses were measured with the usual forced choice sociometric technique including three preferences. Cohesion was also measured with the Likert-scale. Interaction was measured as an entity of all the choices in sociometry. Ability and personality measures were shortened versions of vocational guidance tests. The stimulus heads are in Appendix 5. The proposition of one week measure interval was accepted by the students of the student guidance counsellor course. All the measures were joined in one questionnaire. About one-half hour was estimated to complete the questionnaire and on the day in question, the most suitable lesson was selected. So the measuring situation varied from time to time. During the academic year no saturation effect was observed because the purpose of the study was carefully explained. It can be mentioned that the rapport of the measurement was rather good. The gathering began at the beginning of October 1975 and continued until spring 1976. Two exceptions existed in the measurement:there were two week intervals between measurements 6 and 7 and three week intervals between measurements 17 and 18, due to excursions and practice training periods. There were 18 measurement times.

The subjects were the persons selected for the student guidance course in 1975-76. Four of them were comprehensive school teachers, seven were elementary school teachers, four were comprehensive school class teachers, two had B. A. 's and one was an instructor in home economics. They had work experience of 1-20 years. The ability factors of the subjects were on the medium level or above. The personalities were rather sociable, emotionally balanced, courageous and somewhat conservative. Their suitability for student guidance was good or superb. The age varied from 25 to 40. There were 20 subjects.

2. 2. Data Analysis

The analysis of the information organizer was performed calculating correlations among the components, as well as correlations to the information organizer or the sum score. It has to be observed that the correlations were calculated from the values at the different points of time. To clear up the mutual associations of the components and their contributions to the sum score, a partial correlation applied in the regression analysis was used. The starting point was the individual partial correlation to the sum score when other components were eliminated simultaneously. After that the partial correlations were calculated in the usual manner, as is done in the regression analysis. That is the same as bringing one component at a time into the analysis, because the starting point was the individual contributions.

In order to examine the effect of every individual variable, Multiple Classification Analysis was applied because it offers three important advantages:

1) Many nominal- scale variables can be dealt with simultaneously. 2) The effect of an individual-explaining variable can be calculated when other variables are held constant. 3) All kinds of designs and data can be analyzed using the MCA-analysis (Miettinen, Laitinen, Sinkko 1975). In this study the essential information that I am after is the overall-influences of the explaining variables in the information organizer. The explained share of variance is not important in this context because the study concentrates on operator effects. The elaboration approach by Rosenberg (1968) was adopted for interaction effects among the variables. The choice is based on the fact that the inference "logic" presented has many sides and it covers a wide range of interaction effects. The other reason for selecting elaboration is that it offers a scope for further development of inference "logic". Maybe it is good to examine the basic ideas of elaboration in this context. The starting point of Rosenberg seems to be a sound one: There is no such thing as a spurious relationship; there are only spurious interpretations (Ibid. p. 28). The basis of elaboration is a triad of variables wherefrom one variable is eliminated at a time. The change of the other two is followed and, depending on the nature of the change, the effect can be classed or typified. The elimination of a variable can be done with the partial correlation or stratification of the variables. The variables are named according to the nature of effects. Elaboration is not a means of releasing us to make fertile and corroborative hypotheses. Rather, it is a device for inquiring about obvious relations to guarantee that obviousness. Examples of elaboration are the following cases. If an original relation between independent and dependent variables is zero and the contingent associations are positive when the test factor is eliminated and a relation emerges, then we are dealing with a suppressor variable. The variable blocks the existence of the original relation. If

all the relations between A, B and C (the dependent variable) are positive, and elimination of B produces no change, then we have an antecedent variable. In the above way we can deduce what kind of effect is involved in the Rosenbergian frame of elaboration. That helps much in making inferences from variable relations which otherwise would have remained undone. There is a similarity between elaboration and experimental designs such as Latin squares. Both are looking for a scientific explanation.

2. 3. Reliability

The Crohnbach's alpha-coefficient was chosen because it is the best measure of internal consistency (Valkonen 1974). In this case it is not possible to speak of internal consistency in its proper meaning because time is involved. Reliability means consistency over a long period. Thus the question is how homogeneously the measure behaves in time. The quick method for calculating the coefficient was applied because there is no need for correlations to the sumscore. The information organizer is an exception because it is a linear combination of the components, due to the positive correlations of the components. The coefficient of linear combinations was applied to the information organizer. The reliabilities of abilities and personality were evaluated by

Table 1. Reliability Coefficients N=20

Variables			
Abilities	.63	Personality	.74
Interaction	.84	Status of trust	.78
Status of decision	.70	Cohesion	.68
Status of dominance	.69	Conservatism	.53
Radicality	.79	Antisemitism	.73
Ethnocentrism	.89	Intolerance	.55
Information organizer	.79		

the coefficient based on the mean correlations, because the measures are cross-section ones. The two latter methods come from Nunnally (1967).

The coefficients are rather satisfactory as an entity.

2. 4. Validity

Three evaluators who knew measurement problems judged the items of cohesion and of the information organizer. They regarded them as proper. The ability and personality items have validity on the basis that they have been applied for years in vocational guidance and have proved adequate.

2. 5. Results

The correlations of the components of the information organizer can be verified in the table below.

Table 2. Correlations of Components of Information Organizer and Correlation to Information Organizer(Sum Score) N=20

	C	R	A	E	I
Conservatism		.09	.14	.19	.14
Radicalism			.10	.84	.00
Antisemitism				.03	.45
Ethnocentrism					.14

	Sum Score
Conservatism	.45
Radicalism	.63
Antisemitism	.51
Ethnocentrism	.73
Intolerance	.40

From the table, one can observe that the values fulfill rather well the componential conditions because the correlations are low, except for two, and the correlations to the sum score are medium or high.

Table 3. Partial Correlations to Information Organizer N=20

	I0
Conservatism	.99
Radicalism	.97
Antisemitism	.98
Ethnocentrism	.99
Intolerance	.99
.....	
Radicalism	.53
and Antisemitism	.79
.....	
Radicalism and	-.76
Antisemitism and	.33
Ethnocentrism	.94
.....	
Radicalism and	-.66
Antisemitism and	.50
Ethnocentrism and	.73
Intolerance	.52
.....	
Conservatism and	.44
Radicalism and	-.63
Antisemitism and	.51
Ethnocentrism and	.73
Intolerance	.40

It can be verified that joining components one at a time to others, causes interactions among the components. That probably means the information organizer weights its function differentially along time, although the totality remains the same.

MCA-analysis gives two coefficients, etas and betas. The etas indicate the capacity of a variable to explain the variance of the target variable. The betas show the capacity of a variable to explain the variance of the target variable when other variables are held constant (Laitinen, Miettinen, Sinkko 1975).

Table 4. Etas and Betas N=20

Table 4.	Etas and Betas		N=20
Abilities	.37	.51	
Personality	.27	.35	
Interaction	.42	.56	R=.82
Status of trust	.12	.36	
Status of decision	.18	.05	
Status of dominance	.05	.41	
Cohesion	.16	.47	

The observation that betas are higher than the etas refers to the fact that there probably are suppression effects among the variables. The reason is when other variables are constant, then the coefficient of an individual variable emerges.

Partial correlation was chosen as a device for elaboration because it enables one to see changes in the relations. Furthermore, partial correlation is suitable for Rosenberg's "logical" frame. One variable at a time was eliminated from the net of correlations and Rosenberg's frame was applied to the changes.

Table 5. Interaction Eliminated N=20

Variables	Correlation	P	P-Correlation	P
Statuses of trust/decision	.77	.001	.63	.01
Statuses of trust/domination	.74	.001	.59	.01
Statuses of decision/dominance	.83	.001	.67	.01

Interaction seems to affect statuses of decision and dominance.

Table 6. Status of Decision eliminated N=20

Variables	Correlation	P	P-Correlation	P
Abilities/status of trust	-.27		-.54	.01

Status of decision joins with abilities.

Table 7. Status of Trust Eliminated N=20

Variables	Correlation	P	P-Correlation	P
Abilities /status of decision	.11		.54	.02
Interaction/status of decision	.74	.001	.56	.02
Interaction/status of dominance	.68	.001	.45	.05
Statuses of decision/dominance	.83	.001	.61	.01

Status of trust is associated with the decision and dominance ones.

The wholeness of the results can be presented as an operator net in the model frame because the changes are known and with it the effects.

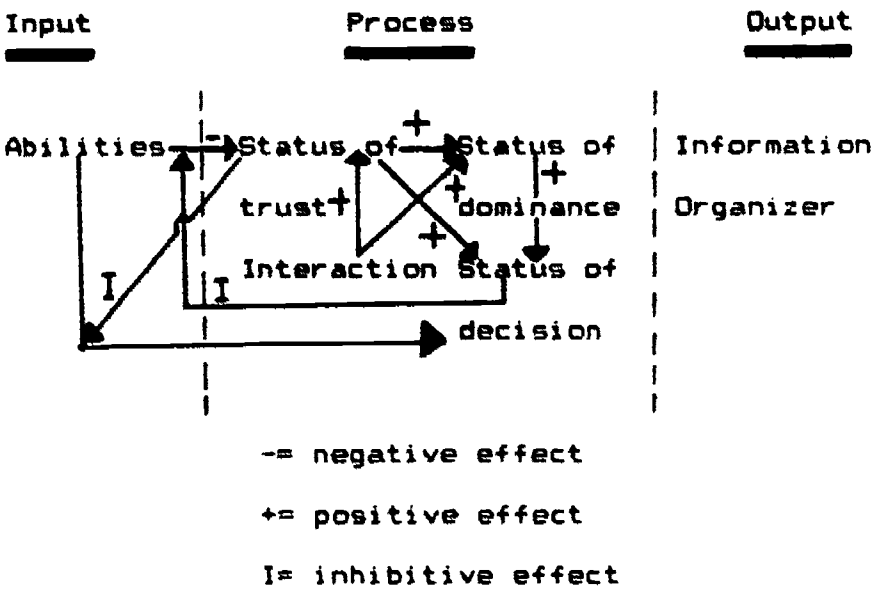


Figure 3. The Operator Net

2. 6. Conclusions and Theoretical Considerations

From Table Two and Three, by juxtapositing the original correlations with the partial correlations in the same order as in Table 3, we can infer:

Radicality suppresses antisemitism to coordinate environmental information and antisemitism weakens the functioning of radicality to organize information. Ethnocentrism inverses functioning of radicality to the interfacial coordination and weakens the functioning of antisemitism. The joint functions of the former two suppress the coordinating function of ethnocentrism. Intolerance weakens the inverse functioning of radicality to the interfacial organizing of information, but it is functioning antecedently to antisemitism and ethnocentrism. The joint

function of the three former are again suppressive. Conservatism also functions antecedently to behavior of the four other components, but they have no back-functions to conservatism.

It seems to be clear that the operators under scrutiny are individual operators functioning on their own level. An individual operator affects the information organizer if other operators are out of order. When the operators act in combination then two operators emerge, trust and decision operators, which inhibit the affect of abilities on each other crosswise. Interaction gives rise to the status operators and after that the interaction operator influences the decision operator through trust and dominance operators, which are conditions for the functioning of a decision operator.

The result of trust and decision operators means that abilities are not an advantage in a group process. On the contrary, it is a disadvantage because abilities do not arouse trust and do not enable decision making in the group. Interaction concentrates on status operators, which means the emergence of a certain kind of status structure and function. Probably the result indicates the development of an inner circle of a small group which regulates the behavior of the members in the group. The control is based on the trust of other members among within inner circle, members that give chances to use power and to make decisions. Thus the members who are not in the trusted and decision-making small group must be content with their lot in spite of their abilities.

3. REVISION OF THE PROCESS MODEL

3. 1. Revised Model

Two important elements were missing in the process model: early history and social environment. Now they have been added. Early history means the composition of case histories of the subjects coming into the group process. Social environment is the dynamic complement of other elements. The revised model can be presented in a pictorial form as below.

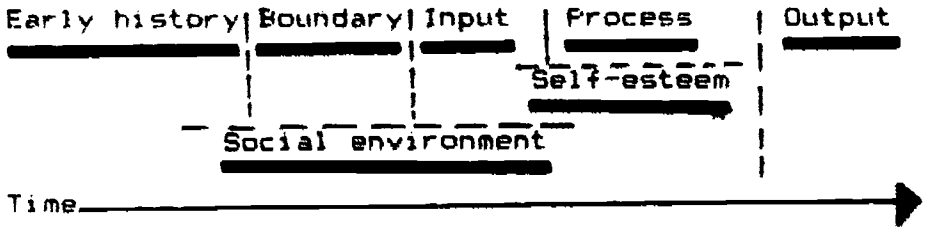


Figure 4. The Revised Model

3. 2. Choosing Variables for the Revised Model

The early history variables were adopted from the lists of merits of the subjects. Eleven variables were selected for the early history of the revised model.

The first variable is Birthplace, for it is the starting point of a person's case history. Human beings usually spend their first years in the neighborhood of their birthplace. Variations in surroundings produce differences in human development. It is also an accepted standpoint that

the first years are crucial for the micro-evolution of an individual. Thus birthplace can be regarded as the kernel of individual evolution.

Basic Education is a variable that affects the opportunities man has for self-actualization and educational growth, because it opens the doors to upper-level education.

School Achievement is another variable that has some predictive power, because it acts as a screening device for entrance to educational institutions. It also indicates an aptitude of a person for prolonged effort where personality factors gradually assume a major role (Niskanen 1968).

Sex is a variable that has effects in many directions, such as the division of labor in different societies.

Cognitive Activity was elected because it is important for the formation of cognitive maps for information organizing. Without cognitive activity, cognitive maps (Kaplan 1973) and the growth of cognitive structure and organizing would not be possible.

*Basic Degree** is probably an indicator of the orientation of the individual's interest. It modifies and binds a person in the direction of achievement. A teaching degree guarantees opportunities to develop occupational skills through summer courses.

Number of Jobs provides opportunities to become acquainted with several social surroundings. This increases a person's behavior repertoire and produces organizable information.

* We use the term Basic Degree to refer to a person's first post-secondary school degree.

Job Experience gives the knowhow to cope with matters which are complex and demand behavioral economy in task performance.

Willingness to Participate in Education is a preceding variable for initiating procurement of knowledge about the environment.

Place of residence has associations with social relations and their quality. It modifies, for example, attitude development in tight social connections such as in rural districts.

Age is a many-sided variable and it relates to almost every action performed by human beings. It is known that value crystalization takes place through age, and people begin to be fond of work they earlier disliked. The general justification for selecting the above variables for the model is that they may reflect important aspects of the emergence of behavior that is significant with respect to other variables in the model.

Self-esteem is a variable that has been added to the model. It is defined by Coopersmith (1967) as evaluative attitudes toward self. The reason for selecting self-esteem is that it has significance for behavior, as shown in Gordon and Gergen (1968). Furthermore, it is a part of self-image which is very closely connected with behavior in social interaction (Turner 1968).

The variables of *Social Environment* were selected because a social system is an open one. Here the social environment is comprehended dynamically to be in a state of continual change.

The first sub-environment, *Childhood Home*, was chosen because it is the nucleus of man's educational development and the foundation of the entire human being.

"Other People" was elected because man maps information into himself from his social environment and forms mental maps which probably control his behavior. Here, however, mankind does not mean any other people than the ones with whom the subjects have had and still have contacts.

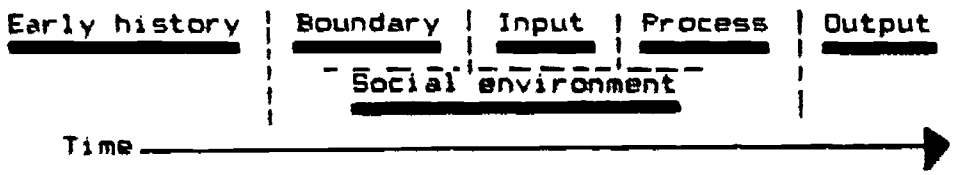
"University Students" was elected because it acts as a reference group, and it is known that the reference group has effects on people, for example through identification.

"University Teachers" was chosen because they influence students. That takes place via leadership functions and through them control functions.

Information organizer was conceptualized in the same way as in the process model, as also statuses, abilities and personality.

3. 3. Hypotheses

Hypotheses will not be made for all the operators. This is because there are 22 variables, and combinations of the relations would exceed the possibilities for testing the hypotheses. Instead, the hypotheses are made intuitively from those operators which are supposed to be essential and necessary for the functioning of the system. Due to the lack of a coherent theory, no strictly deductive hypotheses can be made for theory directs the hypotheses making and that is not the case here. The operators which are not included in the hypotheses act as test factors (Rosenberg 1968), because it is possible that the old operators and the new ones have connections. The priority, however, is on the new oper-



ators. What is left when when the former operators are eliminated? The figure above clarifies the matter.

The early history, environment and self-esteem remain as operators. The most probable early history operators affecting self-esteem, and therefore the information organizer, are basic education, school achievements, cognitive activity, basic degree, number of jobs, job experience and willingness to participate in schooling, because they all join with behavior to be able to do things which naturally are connected with self-esteem. Self-esteem is assumed to be a mediator for the effects of other operators. A firm positive self-esteem, due to performances, probably increases information organizing. The central place of self-esteem is based on the egocentric nature of man and also on the fact that self-esteem is a sub-system of self-image that conveys environmental information.

The environmental operators are assumed to have direct and indirect effects on the information organizer, because social environment is entangled in human behavior in many ways, and an either-or approach is not very fertile in the system-environment relations.

In adition to the above, it is assumed that the operators have interaction effects among themselves. The problem of operator interaction is usually mentioned but not dealt with. According to Blalock (1968), in-

teraction between variables(operators) is conceptually difficult and poses challenges to theory-building. If the objective of the researcher is explanation, then interaction is considered important (Sonquist 1970). The objective of this study is to find soft causalities among the main operators of a social system. Thus, the question of the operator interaction cannot be passed by. Why is the interaction of operators a problem to theory-building? There are many answers. It is easier to apply linear thinking and straightforward solutions than to ponder the complexities of operator changes during the dynamism of phenomena. In this way we get an elegant and simplified construction, but it does not have much to do with real behavior which varies in different directions. Behavioral phenomena may include all the effects contained in the Rosenbergian typology, and that is not little. As a matter of fact, the question is about such kinds of metatheories which include the possibilities of interaction effects as such. Often the basis of explanation refers either to endogenous or exogenous operators, although in many cases it is the boundary between the two which is responsible for behavior. Personality or environment is referred to when a certain kind of behavior emerges, although it is the interface as a boundary which determines behavior, the one which was excluded from the explanation. An example of this would be if we were to assume that the explanation of a certain behavior is due to personality and environment. That sounds sensible but what does it tell us? Nothing more than what it says. But adding the interface to the triangle produces changes in such a way, that the relation between personality and behavior vanishes and the relation between environment and behavior remains the same and the relation between personality and environment vanishes. How should one deal with that kind of situation? The probable explanation can be that the interface is an intervening operator between per-

sonality and environment and behavior, as well as that the interface is an antecedent variable for environmental effects. Thus, the three explanators have a mutual interaction with behavior. For example, a person may be a norm-breaker. After thorough investigations, the blame cannot be put on personality and environment, but rather on the nature of communication with the social environment which reinforces the personality dispositions and simultaneously transfers behavioral control to environment which instigates norm-breaking. So the main purpose of studying operator interaction is to be suspicious of the events of phenomena which seem to be of a certain kind. Many times the matters are not what they seem to be, and for functional theories this aspect cannot be overruled.

4. EMPIRICAL TESTING OF THE REVISED MODEL

4. 1. Measurement

Before transferring to the quantification of the variables, it would be good to examine the system boundary with soft data. In both cases the procedure for selecting the students onto the courses was the same.

The selection process consists of three parts: 1) psychological testing 2) group situation and 3) personal interview. Before the candidates can enter the selection process, there is a legal screening device. It is assumed that people are comprehensive school teachers or have B. A.'s and one year of teaching experience. Those who fulfill the legal conditions are selected as applicants and are summoned to the entrance examination. psychological tests being first. The tests are standardized vocational ones. Verbal abilities, productivity and personality tests are applied. After this testing the candidates are involved in a group situation. The candidates are put into groups of five and given papers describing real school situations. The members have to discuss a given real school situation while evaluators observe behavior in the group and give a general evaluation of the behavior of each member in a numerical form. There are three evaluators, one of them is a vocational psychologist and two are the teachers of the course. The group situation lasts about 25 minutes. After the group situation, the candidates have a personal interview. There are two interviewers, a vocational psychologist and a course teacher. In the interview the general aptitude of a candidate is evaluated for student guidance counselling in the comprehensive school. When all the phases of the selection process are over, the selection board holds a meeting to decide who are the lucky

ones. The interview and the group situation are given priority in the selection. The tests are used in borderline cases. The candidates are ranked in order of superiority. In these studies there were 20 and 23 lucky ones to enter the courses.

Returning to the hard data and to the early history variables results, birthplace divided into four groups: urban, densely populated area, sparsely populated area and rural district, in decreasing order; basic education had four classes: completed elementary school, elementary school plus additional courses, completed junior secondary school and senior secondary school in increasing order; school achievements was the total mean of the leaving certificates; sex was 1 for men 0 for women; cognitive activity was quantified as the number of extra courses a subject had completed while working full-time; basic degree had three classes: MA, BA and comprehensive school teacher in decreasing order; number of jobs was included as such; job experience was the time in years as a teacher; willingness for further education, such as extra university courses e. g. in summer university; place of residence was measured in the same way as birthplace, and age was taken as such in complete years. Self-esteem was measured with the questionnaire of Coopersmith (1967). - The statuses were measured as before, as also the information organizer.

The technique of Osgood's semantic differential was applied to social environment variables. There were five evaluative points in increasing order. In every item, the three scales were united by summing up the values into a total score to indicate evaluation of a sub-environment.

A meeting was held concerning data collecting in the study group. It was agreed that a two week interval is long enough for the collecting.

Fourteen measurements were carried out with the exceptions of excursion and practical training in schools in the academic year 1976-77. The measurement situations were applied in the same way as before and rapport can be characterized as good.

The subjects were the 23 students accepted onto the student guidance course at the university. The subjects were talented and they had coherence in their personalities. Their suitability was evaluated high for their future occupation.

4. 2. Data Analysis

Three different methods for analyzing the data were applied: 1) partial correlation for elaborating the direction of the effects of the variables 2) the coefficient of determination to inquire about transformations among the variables 3) the general distance index for the dynamism of the process.

The coefficient of determination was selected because it shows the variation of a variable explained by another variable. The coefficient can be interpreted as transformation between variables. However, the known direction of an effect is a condition for applying the coefficient (Guilford 1973). The distance function was applied because it is suitable when the correlation between the variables is low (Gottman 1978). The distance index tells the nearness of the variables in the total context of the distances. The formula was adopted from Kruskal (1964). Furthermore, an examination was made of the possibility to construct a way to analyze operator behavior which would include the

three coefficients simultaneously. The reason was to clarify the entire dynamism of the system in a soft causal sense.

4. 3. Reliability

The reliabilities of the early history variables were asessed with a split-half coefficient. The other reliabilities were evaluated with the formula.

$$r = \frac{kr}{1 + (k-1)\, r_{ij}}$$

(Nunnally 1967)

The result is squarerooted. The formula gives the overall reliabilities when the same kind of measure series is applied so that k, which is the number of items, was compensated for by the number of measurements and the mean correlation was calculated Thus the reliabilities were obtained over time.

4. 4. Validity

The term contagion validity was developed to indicate a processual type of validity. The use of a metaphor can be enlightening for the output of the validity construction.

In fishing there are many possibilities when you feel a bite on the hook. It may be a dead branch or the hook may have caught on the bottom or there may be a fish on the hook. I refer here to angling and fishing with a reel, not with a net. The net does not necessarily give opportunities to perceive the existence of a fish until seen. When you get a fish you are almost certain that there is a fish and generally there is. The situation is rather analogical in process studies, but the effect is more complex and it is difficult to verify the very phenomenon under scrutiny to distinguish it from other phenomena that are not so essential to the dynamism. How does the knowledge of the fish originate and develop? How does the probability increase to indicate the fish?

Primarily it is the behavior of the vehicle which tells what is on the hook. If behavior is random, then no deductions can be made. However, the behavior of the fish is not random but constrained, and that indicates the fish. It is the operations of behavior performed by the fish which show, via the vehicle, the existence of the fish. The essential point is the non-randomness of behavior or order of behavior which is the sign of the fish. You cannot verify the fish at a moment in time, but in a sequential manner by means of the dynamism. The probability of the existence of the fish increases continuously up to the point when you can verify the fish by holding it in your hands.

Process studies are often like fishing, i. e. we have a lake bottom, branches and fish in the form of phenomena that are studied with variables of varying importance. The contagion validity can be verified in much the same way as the existence of a fish. That takes place with the help of a measurement device and behavior of a variable in an orderly way in dynamism by performing operations adaptable to the phenomenon. The probability of a variable (operator) increases if it is significant, as

well as does constraint. How can the order be verified in reality? What are the criteria for the contagion validity?

There is one criterion at least, randomness. The processes are easy to randomize with the same scales; the values are produced with random tables or random generators, using different seed numbers for every operation. A parallel data matrix is constructed, and the random process is analyzed identically with the real one. Comparison of the processes reveals if there is organized information in the real dynamism. There is no need to test the differences because the significances of the values are applied as the basis of the existence of the order. If there are no significances in the random process, and there are in the real process, it can be inferred that something valid has been found with the measurement. If in both processes the values and significance are at the same level, then there is no contagion validity.

4. 5 Main Results

The problem was to find operators which affect the information organizer of an individual during dynamism in a social system. - Abilities and status structures have no effect on the information organizer, except on the individual level. Instead, job experience as a teacher is the initial effector of the process, which affects self-esteem that is mediated to reference and educational subenvironments which influence differentially in the information organizer that is fed back to the educational subenvironment, which in turn reacts to self-esteem. There is influential behavior between the operators. Behavior can be characterized as molding, unfolding, conserving, remodeling, feeding back, registering and delaying. In addition, a cyclic dynamism exists in

the process, which begins from self-esteem and repeats itself three times with different effects before the end of the process.

4. 6. More Detailed Results

Only the reliabilities of the variables which proved significant were evaluated.

Table 8. Reliabilities N=23

Variable	Coefficient
Job experience	.38
Self-esteem	.92
University students	.92
University teachers	.94
Information organizer	.92

The reliabilities are satisfactory in spite of job experience.

For evaluating contagion validity, a parallel random matrix was constructed by applying randomization with different seed numbers in the same ranges as in the real data. The correlations of the variables were calculated. Evidently the measures behave regularly as shown by the correlation matrices below. There is a fish not a branch due to the differences in the matrices.

From the comparison of the below two matrices, we can conclude that the real data correlations are not due to chance. Elaboration was performed in the same way as before by taking into account the time order of the variables and the location of the variables in the revised model.

Table 9. Real and Random Correlations N=23

Variable	Real data					
	CH	OP	US	UT	SE	IO
Job experience	.62	.52	.32	.25	.68	.55
Childhood home		.86	.70	.74	.67	.67
Other people			.69	.68	.70	.64
University students				.79	.55	.60
University teachers					.46	.65
Self-esteem						.72

Variable	Random data					
	CH	OP	US	UT	SE	IO
Job experience	.16	-.16	-.07	.18	-.01	.01
Childhood home		.02	-.17	.44	-.14	.14
Other people			.03	.13	-.35	.13
University students				-.11	.29	.03
University teachers					-.12	.02
Self-esteem						.05

Table 10. Elaboration by Partial Correlation N=23

Variables	P-r	P	Variable eliminated
Other people/ Self-esteem	.55	.01	Job experience
Self-esteem/ Information organizer	.57	.01	Job experience
Other people/ Self-esteem	.53	.01	University students
Self-esteem/ Information organizer	.58	.01	University students
Childhood home/ Self-esteem	.54	.01	University teachers
Other people/ Self-esteem	.59	.01	University teachers
Self-esteem/ Information organizer	.62	.01	University teachers
Childhood home/ Other people	.74	.001	Self-esteem
Childhood home/ University students	.54	.01	Self-esteem
Childhood home/ Other people	.76	.001	Information organizer
University students/ University teachers	.66	.001	Information organizer

We can observe that the test factors are related.

The coefficients of determination proved to be as below.

Table 11. Coefficients of Determination N=23

Variable	Variable	
	Self-esteem	Information organizer
Job experience	.46	.30
University students	.30	.36
University teachers	.21	.42
Other people	.49	.40

There is explained variance among the variables.

The distances among the variables were as below.

Table 12. Distances of the Variables N=23

Job experience	56.4	Self-esteem
Self-esteem	47.7	University students
		University teachers
University students	69.3	
University teachers	59.3	Information organizer
Information organizer	60.1	University teachers
University teachers	69.6	Self-esteem
Self-esteem	70.0	University students
		University teachers
University students	65.8	
University teachers	68.4	Information organizer
Information organizer	65.2	University teachers
University teachers	67.1	Self-esteem
Self-esteem	66.0	University students
		University teachers
University students	64.1	
University teachers	59.4	Information organizer
Information organizer	41.0	University teachers
University teachers	65.1	Self-esteem
Self-esteem	59.7	University students

The time order of the distances are up-down.

The first letters of the variable names are used in the abbreviations. The cutting point of "near" was 71. 9.

The elaboration by partial correlation gave the following directions of effects among the variables.

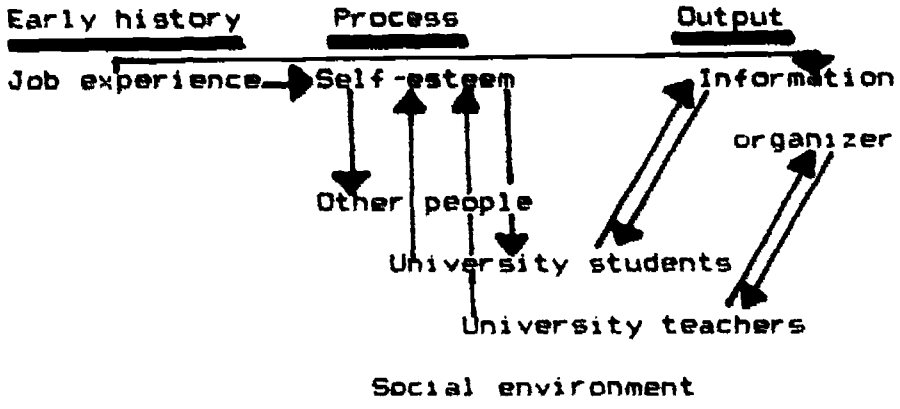


Figure 5. The Directions of the Effects

Now we have the indicators for transformations, the dynamism, and we know the directions of the effects. What we do not have is the magnitudes of the effects. They can be derived from the differences between the original correlations and the partial correlations. However, the situation is not satisfactory enough to have organized knowledge from the data. That is why the values of the three indicators are scaled by dividing the values with the greatest values. Because of the examination of the entire dynamism, we have to derive concepts which are suitable for getting the dynamism in sight.

That is why, with the help of the values of the indicators, the concepts are derived: 1) the coefficients of determination indicate the quantity of transformation among the operators 2) the changes of the correlations show the power of the effects, and the distances divided by 14 in-

dicate the velocities of the effects. The denominator 14 is the mean interval of time of the measurements. The velocity in question cannot be considered physical but behavioral or experiential, which is something other than physical velocity. In our minds, we can move more than one parsec at a time.

So we have three orthogonal components of the relations between operators. The consequence is that we can give the relations between the operators a vector presentation. The relation vectors can be located into a solid rectangular space where the vectors are defined by the coordinates=components. The length of a vector indicates behavioral intensity. Thus, we have for behavior a vectorial presentation, and behavior is defined as a relation between the operators. According to this train of thought, behavior has intensity, velocity, power of effect and magnitude of transformation. It is to be noticed that in the dynamism the vector is the same, although it changes in the four combinations.

In this context it should also be noticed that the locations of the vector are not known in the rectangular space. That is why the angles of the vector must be calculated in relation to the axes. They are the direction angles. But the angles are not a convenient way to study the dynamism. A better way is to apply direction cosines which are the relations perpendicular projections to each axes divided by the magnitude of the vector. The greater the cosine, the nearer the vector is the axis and the greater the share of the component is in behavior. However, we have to have a reference point with which we can compare the obtained values in the dynamism. The reference point is a steady state. Theoretically, the steady state of behavior is a vector presentation where the vector has equal direction cosines. That means the vector is equally distant

from every axis. Because of empirical information, the steady state cannot be comprehended in the above way due to the fact that the theoretical definition of the steady state is an expectation value. Usually residuals emerge in relation to ad hoc values. So is the case here. A better way to define the steady state is to calculate the mean of the direction cosines for the three components, and to define the steady state as the vector presentation where the end point of the vector is defined by the means as the coordinates of the point. One thing is worth mentioning in this context. We have the operators in the observation space. That means we are dealing with the columns.

Table 13. Direction Cosines and Lengths of the Vector N=23

JE	Length		1.55(SE)		1.32	US	1.50				
	Velocity		.52		.52		.66				
	Power of eff.		.56		.71		.54				
	Magn.of trans.		.64		.48		.52	IO	1.38		
						UT	1.37		.62		
							.62		.42		
							.42		.66		
							.66				
UT	1.30(SE)	1.51	US	1.47							
	.75	.66		.64							
	.56	.62		.56							
	.36	.42		.53	IO	1.42	UT	1.27(SE)		1.47	
			UT	1.46		.66		.75		.63	
				.67		.41		.56		.63	
				.41		.64		.36		.44	
				.63							
US	1.45										
	.63										
	.56										
	.53	IO	1.23	UT	1.25(SE)		1.42		US		
UT	1.37		.48		.74		.60				
	.62		.48		.56		.66				
	.42		.73		.36		.45				
	.66										

From the table we can observe that there are three cycles in the process. The cycles extend from self-esteem to self-esteem or from SE to SE.

In the dynamism the steady state was defined and after that we need a definition of dynamic equilibrium. This can be defined with the help of the means of the cosines and the standard deviations of the cosines. In this context, the dynamic equilibrium is defined as one (+, -) deviation from the means of the components. Accordingly, the values above the means are increasing in nature and the values below are decreasing. The same concerns the length of the vector.

Table 14. Means and Standard Deviations of theVector N=23

	Vector length	Velocity	Power of eff.	M of tr
Mean	1.40	.63	.53	.53
Std.	.09	.07	.09	.11

Before I move to the conclusions, it would be worth dealing with a matter of principle. The idea of organic wholes presented by Bahm (1985) is very applicable in this context. It is because of behavior that we do not respond according to some conceptual classifications, but rather entire persons. When we as people respond, we do it as organic wholes not intellectually, emotionally or in any other classified way. That is the same as calling people by their Christian names, not talented John or emotional Mary, but John and Mary behave.

As for the conclusions, they are based on the comparison of the values of Tables 13 and 14 in every time point. In Table 13 time goes from left to right and the values of Table 14 are used as the points of ref-

erence as mentioned above. However, there are vector length, velocity, power of effect and magnitude of transformation which must be taken into account simultaneously in combination. All the conclusions follow the order of Table 13 phase by phase.

4. 7. Conclusions and Theoretical Considerations

In order to see the totality of behavior of the process, we need an auxiliary device which tells what kind of behavior the operators produce in relations to each other. That can be verified in Table 15. Every combination of the four components corresponds to a behavioral relation. The length of the vector is interpreted as intensity of behavior.

Table 15. Combinations of Behavioral Relations

	Intensity	Velocity	Power of Effect	Magnt of Trans
1	I	D	I	I
2	D	D	I	D
3	I	I	I	D
4	D	D	D	I
5	D	D	D	I
6	D	I	I	D
7	I	I	I	D
8	I	I	I	D
9	I	I	D	I
10	I	I	D	I
11	D	I	I	D
12	I	D	I	D
13	I	D	I	D
14	D	D	D	I
15	D	D	D	I
16	D	I	I	D
17	I	D	I	D

D=decreasing I=Increasing

The next phase is to characterize behavior of the combinations by trying to answer the question: What kind of behavior does every combination present?

In the first case, there is decrease in velocity and increase in other components. That kind of behavior is slow but very molding because of the increases. In the second case, there is increase in power of effect but decrease in other components. Behavior can be said to be unfolding because of the three decreases. In the third case, there is decrease in magnitude of transformation but increase in the three others. Behavior can be characterized as conserving because of no transformation. In the fourth case, the matter is inverse to the third one. That means remodeling because transforming increases. Case five is similar to the fourth one except that it is a feedback. The sixth case can be called registering because it does not transform and has a low intensity. Cases seven and eight are the same as the third one. The ninth case is correcting because of the increase in intensity, velocity, and transforming. Case ten is again feeding back the correcting. Case 11 is again registering. Cases 12 and 13 can be called delaying because of the increase in intensity and power of effect and of slowness and no transformation. The phases of 14 and 15 are again remodeling. The latter one is a feedback. The 16th case is again registering and the 17th is delaying. In this phase we have the main operators and the descriptions for the behavioral relations. Thus we are able to present the whole process as a sequence of operators and behavioral relations between them. The same abbreviations are used as before and the order of Table 13 is preserved.

JE (molds) SE (unfolds) US (conserves) IO (feeds back)

UT (remodels) (remodeling) UT

(registers) SE (conserves) US (conserves) IO (feeds

UT (corrects) (back

(correcting)

)

UT (registers) SE (delays) US (delays) IO (feeds back

UT (remodels) (remodeling) UT

(registers) SE (delays) US

Figure 6. Operators and Behaving

In order to get "organisism" (Bahm 1985) to the dynamism, we have to use adequate concepts which cover the obtained empirical information. In this context, one such fertile concept is reference subenvironment=university students. University teachers is the education subenvironment of the subjects. Self-esteem was defined as the attitudes toward self. Information organizer was defined as a coordinative interface with five components. Job experience was the number of years as a teacher. Now we have the necessary conceptual repertoire to draw behavioral conclusions.

Working as a teacher molds attitudes toward self. The attitudes are revealed gradually to reference and education subenvironments. The reference subenvironment conserves the coordination of interface, but the education environment remodels the coordination. The remodeling is

fed back to the education subenvironment. The education subenvironment registers the attitudes toward self. The attitudes are conserved in relation to the two subenvironments. The reference subenvironment conserves the coordination of interface, instead the education subenvironment corrects the coordination. The correcting is fed back to the education subenvironment, which again registers the attitudes toward self. The attitude changes are delayed in relation to the subenvironments. The reference subenvironment delays the changing coordination of interface, but the education subenvironment remodels the coordination. The remodeling is fed back to the education subenvironment which registers the attitudes toward self. The attitudes are delayed in relation to the reference subenvironment. Next the conclusions are drawn on the proper behavioral level.

When you are working as a teacher, you begin to see what is essential in variable situations of instruction. You become less hasty, more certain of the choices in the insruction situations and more economical ir. the instructional behavior. That means you learn the demands and expectations of the teaching occupation. Your knowhow grows and skill level rises. Along with this, you alter your attitudes toward yourself and probably the attitudes become rather solid. You develop an attitude pattern about yourself where you evaluate yourself in certain ways. Then you decide, or some living conditions change in some way, that further education is needed. You apply for further education and are accepted. A new environment is confronted and you see it unwise to un ravel your evaluations about yourself towards the environment except gradually in communication. However, there are two sides to the environment: your fate companions and the teachers from various working areas, and that they behave differentially toward your desired coordinative interface in interaction with the social environment. Your fellow

students are disposed to maintain your wish for coordination, while teachers have dispositions to transform it. Changes take place in the interface, and you send messages about the modification to the teachers. However, the teachers infer modifications in evaluative attitudes concerning yourself, but you remain in the former pattern in dealing with your fellow students and teacher. The conserving functioning of the students continues, but the teachers want some improvements in the situations and that is why they perform corrective acts to alter the interface coordination. Assimilations take place and messages concerning the achieved transformations are sent to the teachers. The teachers continue to infer the modifications in the evaluative attitudes toward self. Changes have taken place, but you select the tactics of delaying the assimilations in interaction with the environment. The students also are disposed to slow down the changes in the interface, but the teachers continue working-up the coordination of the interface. In spite of delaying the modifications, the interface are fed back to the teachers who make inferences about assimilations in the evaluative self-attitudes. However, the slowing down proceeds in the interplay among the students.

A matter to be noticed is that all the modifications and events in the dynamism have their boundary conditions in the original values of the coefficients. That is why it is comprehensible that no drastic total changes took place in the dynamism because there were no perfect coefficients.

Naturally, after the conclusions the question arises of their theoretical fertility to educational sciences. The fertility is somewhat dependent on the kind of theories we are after. Are they grand, middle-level or micro-theories? In addition, the aspect of normativity in educational

theories exists, which means that the theories have to give good advice for the proceedings of behavior in varying situations. That, however, sets great demands on a theory. It must be functional, to "read" the world truthfully, well organized, flexible, and in addition adaptively predictive.

By examining the obtained relations from the viewpoint of educational theory construction, we can see the following kind of implications. The earlier history of individuals seem to contain operators that have focal relations to educational processes. That is due to the relation of job experience to self-esteem. On the other hand, evaluations of self seem to be central because the cyclicity of the studied process begins with the influences of self-evaluations and every cycle ends with self-attitudes. Thus it might be sensible to include in theory construction the relation nets between the early history and self. On the other hand, much of behavior in the process is originated in the interplay of parts of social environment and the coordination of interface or the information organizer due to the fact that the reference and education environments conserve, remodel, correct and delay the modifications in the border region. Thirdly, the results refer to the way that educational dynamism is composed of regulation and control systems in various degrees due to the feedback behavior in the process. It might be a fertile approach to examine educational dynamism from the viewpoint of cyclic control systems because the cyclicity includes control behavior. On the other hand, the synchronization seems to form a problem not yet solved because the delaying of self-attitudes continues over the time reserved for education. The direct implication from that is the research of long-term effects of education. Maybe the time spans are not applied effectively enough and something essential remains to be done. The last implication is that the theoretical concepts, which are suitable for both the in-

dividual level and simultaneously on the group level, are still unconstructed because in this study the examinations had to be made separately.

As for the hypotheses, they were partially corroborated due to the fact that an early history operator, job experience, seemed to be in a crucial position in the dynamism. Furthermore, two of the social environmental operators seemed to have direct effects on the information organizer.

Summarily it can be said that the results refer to the fact that behavioral relation nets between individual case histories, self, near social environment and coordination of the border region might be fertile for further development of the educational theory construction when seen as control systems.

5. DEVELOPING OF A MORE COMPREHENSIVE MODEL

5. 1. From the Revised Model to a System Model

The results have filtered out the non-essentials from the revised model. However, there arises a need in a researcher for widening the conceptual apparatus applied to include the already obtained results. That is why it is necessary to extend the scope of the model. Often the extension takes place by defining the set which contains the applied concept as a subset. The procedure is the same here.

When we extend job experience, we can say that the knowhow of an individual contains job experience because there is more than mere experiences in knowhow, such as skill-learning, perceptive insights and behavior repertoire with many choice alternatives. By elaborating upon self-esteem, we can speak of orientation of an individual system because attitudes are a part of orientation. There are values, expectancies, beliefs of future states and objectives, in addition to attitudes. Reference environment is a subset of timely close-environment and the same concerns tutor environment because the timely close-environment includes interest groups such as basketball clubs, tennis clubs and societal hobby groups. The information organizer is included in the data organizer because the data, e. g. sense data, contains both "semantic" and "syntactical" information, not merely bits deviating from the even distribution but relations. The orientation of an individual can be defined as a total configuration of bits of behavior which have the same valence for a preset state. This is due to the fact that if the valences are not the same, then some of the behaviors proceed in a different direction, which is contradictory to the orientation.

The knowhow of an individual system can be defined as skill learning which results in skillful behavior with smoothness of action, unhastiness and choice certainty which are peculiar to such behavior.

The timely close-environment means the subenvironment of social environment with which an individual has permanent contacts over a period of time.

A data organizer is defined as a selective interface between the information organizer and the total regulation system of behavior. So the information organizer creates order from the cognitions and the data organizer selects the fittest ones for input to the regulation system.

The obtained results indicated that the variation in the combinations of intensity, velocity, power of effect and magnitude of transformation produced differential operator effects. Anyway, we had two alternatives for the components of vector presentation with four qualities. That makes two to four alternatives which totals 16 choices. However, not all the combinations of the paradigm occurred during the dynamism. That is why it is necessary to take into account all the possibilities which may occur during the dynamism. In this way we obtain more comprehensiveness of the wider model. It is difficult to guess what kind of behavior the other alternatives produce. What combinations will lead to what kind of behavior is a question of empirical studies.

The whole store of the alternatives is in the table below.

Table 16. The Behavior Alternatives of the System

Model				
I	V	PE	MI	Behavior
H	H	H	H	
H	H	H	L	Conserving
H	H	L	H	Correcting
H	H	L	L	
H	L	H	H	Molding
H	L	H	L	Delaying
H	L	L	H	
H	L	L	L	
L	H	H	H	
L	H	H	L	Registering
L	H	L	H	
L	H	L	L	
L	L	H	H	
L	L	H	L	Unfolding
L	L	L	H	Remodeling
L	L	L	L	

The alternatives which occured in this study are on the right.

5. 2. System Model

The functioning of the model is proposed to be as follows: The know-how of an individual system causes behavior determining the orientation of the system according to an alternative of the behavior paradigm. The orientation initiates behavior stimulating the timely close-environment. The different subenvironments of the timely close-environment produce behavior giving the priorities of impulses to the data organizer. Some subenvironments are more effective in transforming the selections of the data organizer. The most influential subenvi-

ronment gets feedback from the transformed data organizer. The very subenvironment causes perceptive behavior, the individual orientation which produces maintenance and delay behavior to maintain the orientation.

In the dynamism of the model the produced behavior is assumed to take place according to the behavior paradigm. The below is an assumed cycle which may repeat itself one or more times. So the number of cycles remains open. However, the consummatory behavior of an individual system probably is directed toward a subenvironment which is the nearest one to the individual system. It must be noticed that behavior is considered an "organic whole" according to Bahm (1985). Thus every row is an organic entity without any further classfications. When you behave you behave as yourself entirely.

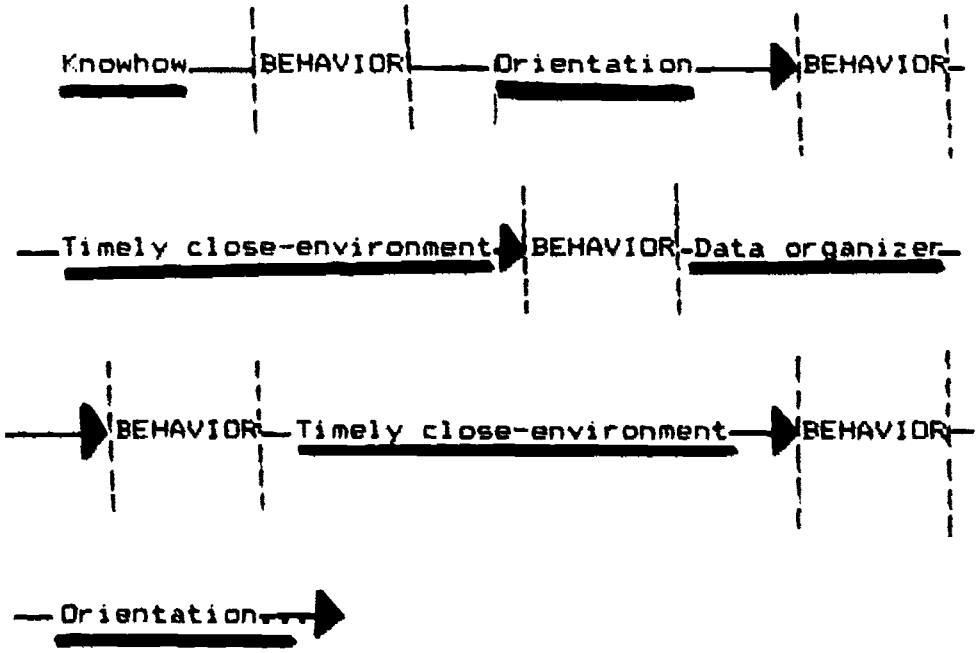


Figure 7. Illustration of the System Model

5. 3. Implicating Applications of the System Model

Implicating applications of the system model is the same as to show the extension of the model. However, we have the serendipity concept which makes it almost impossible to show all the possibilities that a model includes. Often the model will be applied to phenomena for which it was not intended, such as from weather streaming to group phenomena. That is why it is not necessary to present several examples; one which tackies the main points of the model is enough.

The system model presumes that there is a knowhow level before the dynamism of education. That is why basic education is excluded as well as "freshman" behavior in work life. The consequence is that the model seems to be most feasible for further education and re-education in the adult population. The model concepts are measurable, so the applications are not "Geisstwissenschaft" but either normal or abnormal research with its boundary conditions. On the other hand, the model has implications for educational planning because we have a rough picture of soft causalities which may exist in more than one case. The state of affairs enables us to apply instructional arrangements which are adaptable to the effects and promote achievement of the preset states of the processes. In the following I shall give a practical example which hopefully illustrates and deepens the scope of the system model.

There are many developing areas of work in society. The hasty development requires the organization of further education. One of the fastest moving areas is information technology which produces much stress because the result whip swings frequently and learning is continuous, not in discrete packages.

Let us assume that a firm has used a certain disc-operating system which becomes too limited for the expanded demands of the functions. It is necessary to transfer to another disc-operating system. The firm has many good programmers who are well-adapted to the old system. The new system creates a need for re-education of the programmers for the new system which is more many-sided. How should the education be organized along the outlines implicated by the system model?

It is assumed that financial aspects are in order and the place of education is in order, too. What is needed is teaching material, the teachers and the students for the course. The duration of the course must be decided because of the pacing of the dynamic cycles. Beforehand information is needed about the students. The main questions are about the knowhow level, the orientation configuration and the data organizers. Special attention is given to the selection of the teachers who are able to adapt to varying conditions during the course and who can choose behaviors which affect the function of the data organizer and orientation. The reason for the careful selection is that the teachers probably will be the actual close-environment for the students. Well, the initial information is that the students are skilled, their orientation is somewhat crystallized and their data organizers are a little bit worn out because they have used the same kind of methods to solve different problems in the product tests. What kind of strategy should be chosen for the course in order to gain a maximum transformation which would be the most suitable for adopting the new operating system?

Evidently the optimal strategy is one in which the teacher behavior in the paradigm has a high magnitude of transformation. The suitable combinations, however, must be found by experimenting because the most efficient one is not necessarily the one in which the first three

components are low. Furthermore, it is not adequate to produce inner conflicts in the orientation of the students but to avoid behavior which produces defensive behavior. The messages of teacher behavior should not be strong, instead they should be mildly strong. Yelling is not a means of change. Accordingly, the teaching material should be structured on the basis of the old operating system with the similarities and differences anchored in the outline of the old system. One can guess the responses to the entirely new handbook of 300 pages. The question is of assimilating the new system into the old one discretely. Probably the greatest labor is to open the data organizers of the students. That requires the presentation of problem-solving from many different aspects. The same problem is solved in many ways. One of the important things is that the teaching material and the pace of teaching are in synchrony. One of the implications of the system model is that if the students are not adaptable then the teachers have to be, because the feedback from the assimilating data organizer is to be converted into the construction of orientation of the students which is to the benefit of the firm, too. One of the possible tactics is to apply the micro-teaching type of management for learning novelties by cycling it alongside the previously known information. Well, the possibilities are many and the future will falsify or verify them.

DISCUSSION

A keener inference of the totality of the findings reveals a fact that social environment is an intervening environment because through its various subenvironments we grow into human beings. Thus, it is very close to the idea of development of the information organizer with the help of social environment. The consequential question is: What is the origin of the coordinative functions in the interface between mind and social environment? If there exists a material basis, then the core may be formed simultaneously in the plan which defines different parts of the body. The existence of a plan is indicated by De Robertis, Oliver, Wright (1990). On the other hand, if no material basis can be found, then there is the possibility of a conceptual system that is originated through social and task learning. It may be that functioning of the information organizer is a product of socialization with its different kinds, of learnings e. g. operant learning, direct tuition, role learning and identification. The mappings from mental functions onto or into physiological processes have not been very succesful and that is why the state of matters seems to be for the development of conceptual interface during the growth. That is why experience has a crucial position in the growth of the functions of the mediating interface. "But before the developing brain can attain the full power to process and analyze sensory experience, experience itself must place its own imprint on the finer structure of the brain." (Aoki, Siekevitz 1988). Thus experience has a focal position in the formation of the functions of the coordinative interface, due to the fact that the functioning is brain activity, too. Furthermore, we have a useful concept of behavior repertoire into which the experiences cumulate. So if we accept that experience precedes the organizing of information and the growth of

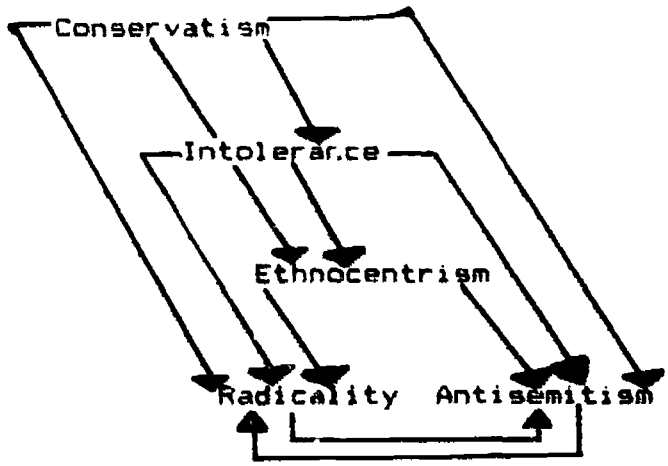
the interfacial functions, then we admit that the information organizer is an outcome of social diffusion processes from social level to an individual level. By denying the matter implies that the existence of the mediating coordinations of the interface exists before experience. The matter was not implied in this research (job experience was the initial kick for the dynamism). Because it appears that the information organizer develops in close relations with the experiences with social environment and the same concerns self, we can say that social environment is a necessary condition for the functioning of interface. The same holds if the question is to organize social or task information because you learn to organize from others.

Self-formation also takes place with other people through cumulation of experiences into the behavior repertoire. We probably learn our social boundaries in the form of images that others have of us and apprehension systems develop showing the kinds of creatures we people are. The classification processes about people are adopted from the social environment, and we begin to locate ourselves somewhere in the social surroundings. We begin to behave in an organized manner. From the above, the conclusion is that the functions of the coordinating border area emerge from the behavior repertoire to form an "organic" interface where comprehensive functions act in the boundary conditions set by self with its idiosynchracies, habits of thinking and forming images from reality. The functioning of the interface can be thought to be dual. On the one hand, it "reads" environmental information and offers stuff to higher mental activities. On the other hand, it controls and brings order to random impulses produced by the mind or it arranges chaos as defined by Goldberger, Rigney, West (1990). When the environmental messages are in accordance with the present state of the coordination, then information is taken in for further

treatises and organized along the state of the interface. However, if there is information which crosses the boundary limits of self, then information is overruled, passed by or defended. A typical example is statements against the value and belief systems of people which concern the nature of minorities. One's beliefs are defended.

Developing further the train of thought, it may be that a preliminary organizing of information takes place subliminally or unconsciously because "human beings can unconsciously carry out many intellectual tasks, including developing and executing plans for reaching certain goals." (Weiss 1990).

If we examine the functions of the components of the information organizer more theoretically then we get the following, presented as a figure.



Following the order of the interpretations of Table 3, and applying the definitions of the components, produces the following chain of functions in the information organizer.

Reforming ways of behaving restrains being prejudiced against Jews while being prejudiced hinders reforming. Racial superiorizing makes reforming more supportable to traditional ways of behaving and hinders being prejudiced against Jews. Reforming and being prejudiced together restrain showing racial superiority. The impatience towards the viewpoints of others hinders supporting of the tradition-based behaving, but it's functioning is a condition for being prejudiced and showing racial superiority. However, supporting traditional ways of behaving, being prejudiced against Jews and racial superiorizing together restrain being impatient towards the viewpoints of others. Supporting of tradition-based behaving is a precondition for the functioning of other components. Evidently, the functional basic tenet in the coordinative interface is to organize information, along the habitual way, in novel situations of social environment.

It may be assumed that not all selected information from the social environment is accepted as data for the regulating system of behavior, via the data organizer. The restraining and hindering functions on the coordinating interface lean in that direction. However, the selective relations between the coordinative border area, data organizer and the regulating system of behavior will have to wait for future research and study.

REFERENCES

ACCKOF, R.L., EMERY, F.E. 1972. On Purposeful Systems. London: Tavistock Publications.

ADORNO, T.W., FRENCEL-BRUNSWIK, E., LEVINSON, D.J., SANFORD, R.N. 1950. The Authoritarian Personality. New York: Harper & Row, Publishers, Incorporated.

ALEXANDER, M.J. 1974. Information System Analysis. Chicago: Research Associates Inc.

AOKI, C., SIEKEVITZ, P. 1988. "Plasticity in Brain Development." PIEL, J. (ed.) Scientific American. Vol. 259, N:o 6, 34-42.

BAHM, A.J. 1985. "Stages in the Development of Systems Philosophy." BANATHY, B.H. (Editor-in-Chief) Systems Inquiry: Theory, Philosophy, Methodology Vol. I 1985, 253-256.

BANY, M.A, JOHNSON, L.V. 1975. Educational Social Psychology. New York: McMillan Company.

BERGER, P.L., LUCKMANN, T. 1971. The Social Construction of Reality. London: Penguin Books.

BERRIEN, K.F. 1968. General and Social Systems. New Brunswick: Rutger University.

BLALOCK, H.M. 1968. "Theory Building and Causal Inference."

BLALOCK, H.M., BLALOCK, A.B. (eds.) Methodology in Social Research 1968, 155-197.

BREDEMEIER, H.C. 1970. The Analysis of Social Systems. London: Holt, Rinehart & Winston.

BUSH, J.A, BUSH, G.M. 1987. "Sociocybernetics and Social Systems Theory." DILLON JR, J.A. (ed.) General Systems Vol. XXX 1987, 47-55.

GHARAJEDAGHI, J. 1985-86. "Social Dynamics: Dichotomy or Dialectic." RAGADE, R.K. (ed.) General Systems Vol. XXIX 1985-86, 143-153.

COOPERSMITH, S. 1967. The Antecedents of Self-esteem. San Francisco: W.H. Freeman and Company.

CORTES, F., PRZEWORSKI, A., SPRAGUE, J. 1974. System Analysis for Social Scientist. New York: John Wiley & Sons.

COTTMAN, J.M. 1978. "Nonsequential Data Analysis Techniques in Observational Research." SOCKETT, G.P. (ed.) Observing Behavior Vol. II 1978. Baltimore: University Park press.

COWAN, T.A. 1963. "On the Very general Character of Equilibrium System." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. VIII 1963, 125-128.

DEUTSCH, K. 1968. "Field Theory in Social Psychology." LINDSEY, G., ARONSON, E. (eds.) The Handbook of Social Psychology 1968, 412-478.

FARARO, T.J. 1968. "Theory of Status." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. XIII 1968, 177-188.

GOLDBERGER, A.L., RIGNEY, D.R., WEST, B.J. 1990. "Chaos and Fractals in Human Physiology." PIEL, J. (ed.) Scientific American Vol. 262 N:o 2, 35-41.

CORDON, C., GERGEN, K.J. 1968. The Self in Social Interaction. New York: John Wiley & Sons Inc.

GREGORY, R.L. 1981. Mind in Science. Singapore: Richard Clay Pte, Ltd

GUILFORD, J.P. 1973. Fundamental Statistics in Psychology and Education. Tokyo: Kogakusha Company Ltd.

HALL, A.D., FAGEN, R.E. 1956. "Definition of System." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. I 1956, 18-28.

JANTSCH, E. 1980. The Self-Organizing Universe. Oxford: Pergamon Press.

KAPLAN, S. 1973. "Cognitive Maps, Human needs and the Designed Environment." PREISER, W.F.E. (ed.) Environmental Design Research 1973, 275-282.

KIRSCHT, J.P., DILLEHAY, R.C. 1967. Dimensions of Authoritarianism: A Review of Research and Theory. Lexington: University of Kentucky Press.

KLIR, J. 1965. An Approach to General Systems Theory. New York: Van Nostrand Reinhold Company.

KOESTLER, A., SMYTHIES, J.R. 1969. Beyond Reductionism. Boston: Bacon Press.

KRUSKAL, J.B. 1964. "Nonmetric Multidimensional Scaling: A Numerical method." Psychometrica Vol. 29 N:o 2 1964, 115-128.

LAITINEN, H., MIETTINEN, J., SINKKO, R. 1975. Yhdysvaikutusten analysoinnista sekä AID ja MCA-menetelmien käytöstä. Tampereen yliopisto. Yhteiskuntatieteiden laitos. Sarja C, opetusmonisteita 24.

LASZLO, CA., LEVINE, M.D., MILSUM, J. H. 1974. "General Systems Framework for Social Systems." Behavioral Science 1 1974, 11.

LASZLO, E. 1975. "The Meaning and Significance of General Systems Theory." Behavioral Science 1 1975, 11.

LEAVITT, H.J. 1958. "Some Effects on Certain Communication Patterns of Group Performance." MACCOBY, E.E., NEWCOMB, T.M., HARTLEY, E.L. (eds.) Readings in Social Psychology 1958, 563.

NEWCOMB, T.M., TURNER, R.H., CONVERSE, P.E. 1965. Social Psychology. London: Routledge & Kegan Paul.

NISKANEN, E.A. 1968. School Aachievement and Personality: Description of School Achievement in Terms of Ability. Situational and Background Variables. Helsingin yliopiston kasvatustieteen laitos: Research Bulletin N:o 21, 22, 23.

NUNNALLY, J.M. 1967. Psychometric Theory. New York: McGraw-Hill Book Company.

PLATT, J. 1970. "Hierarchical Restructuring." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. XV 1970, 49-54.

QUADE, E.S. 1985. "Predicting the Consequencies: Models and Modeling." MISER, H.J., QUADE, E.S. (eds.) Handbook of Systems Analysis.Chichester: John Wiley & Sons Inc.

RAPOPORT, A. 1970. "Modern Systems Theory." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. XV 1970, 15-25.

ROBERTIS, E.M., OLIVER, G., WRIGHT, C.V.E. 1990. "Homebox Genes and the Vertebrate Body Plan." Scinetific American Vol. 263 N:o 1, 26-32.

ROKEACH, M. 1960. The Open and Closed Mind. New York: Basic Books Inc.

ROSENBERG, M. 1968. The Logic of Survey Analysis. New York: Basic Books Inc.

SHAW, M.E., WRIGHT, J.M. 1967. Scales for Measurements of Attitudes New York: McGraw-Hill Book Company.

SONQUIST, J.A. 1970. Multivariate Model Building. An Arbor, Michigan: The Survey Research Center of the Institute for Social Research.

STUDER, R.G. 1971. "Human Systems Design and the Management of Change." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. XVI 1971, 131-143.

SUTHERLAND, J.W. 1973. A General Systems Philosophy for the Social and Behavioral Sciences. New York: George Braziller.

TURNER, R.H. 1968. "The Self-Conception in Social Interaction." GORDON, C., GERGEN, K.J. (eds.) The Self in Social Interaction 1968, 93-106.

VALKONEN, T. 1974. Haastattelu- ja kyselyaineiston analyysi sosiaalitutkimuksessa. Oy. Gaudeamus Ab.

VICKERS, G. 1970. "A Clasification of Systems." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. XV 1970, 3-6.

WEISS, J. 1990. "Unsconcious Mental Functioning." Scientific American Vol. 262 N:o 3, 75-81.

WILSON, B. 1984. Systems: Concepts, Methodologies, and Applications. Chichester: John Wiley & Sons. Inc.

WILSON, D. 1969. "Form of Hierarchy." BERTALANFFY, L., RAPOPORT, A. (eds.) General Systems Vol. XIV 1969, 3-13.

Appendix 1

The Means and Standard Deviations of the Process Model Study

Variable	Mean	Std.
ABILITIES	21.4	4.3
Verbal comprehension	1.8	1.2
Productivity	9.1	2.5
Verbal productivity	10.4	2.3
PERSONALITY	25.4	3.9
Sociability	6.8	1.1
Emotional balance	6.0	2.1
Braveness	7.3	1.6
Conservatism	5.2	1.3
STATUSES		
Status of trust	64.3	39.6
Status of decision	61.1	25.0
Status of dominance	58.4	23.0
Interaction	284.3	76.4
Cohesion	188.1	5.2
INFORMATION ORGANIZER	1375.7	50.2
Conservatism	289.7	17.4
Radicality	261.3	24.0
Antisemitism	342.3	22.6
Ethnocentrism	136.7	25.7
Intolerance	346.9	13.9

Appendix 2

The Correlations of the Process Model Study

Variables	P	I	St	Sd	Sdo	C	ID
Abilities	.14	.06	-.27	.11	-.11	-.04	-.15
Personality		-.08	-.08	-.27	-.30	-.25	-.28
Interaction			.57	.74	.68	-.33	.01
Status of trust				.77	.74	-.05	-.01
Status of decision					.83	.01	-.08
Status of dominance						.02	-.16
Cohesion							.01
Information organizer							

Appendix 3

The Means and Standard Deviations of the Revised Model Study

Variables	Mean	Standard deviation
Birth place	2.8	1.2
Basic schooling	3.2	1.0
School achievements	7.2	0.4
Sex	0.5	0.5
Cognitive activity	3.7	3.0
Basic examination	1.4	0.5
Number of jobs	4.2	2.2
Job experience	4.6	3.6
Willingness to attend schooling	2.2	3.1
Place of residence	3.2	0.9
Age	30.4	3.8
Abilities	9.1	1.8
Personality	25.6	4.4
Childhood home	160.1	19.2
Other people	160.6	19.6
University students	151.7	18.5
University teachers	156.0	19.0
Status of trust	32.8	33.9
Status of decision	35.0	40.9
Status of dominance	33.3	40.0
Self-esteem	1063.0	88.4
Information organizer	1477.8	164.3

Appendix 4

The Correlations of the Revised Model Study

	P	Ch	Op	Us	Ut	Sd	Sde	St	Se	IO	
Bp	.19	-.02	-.11	-.16	-.06	.25	.23	.28	.01	-.12	
Bs	.11	-.15	-.23	-.17	-.22	.01	.00	.05	-.20	-.25	
Sa	-.03	.29	.00	.19	.08	.23	.25	.34	.47	.32	
S	-.12	-.27	-.30	-.32	-.07	.23	.25	.18	-.29	-.13	
Ca	.22	-.42	-.48	-.28	-.40	.18	.14	.16	-.18	-.17	
Be	.08	-.34	-.25	-.07	-.36	.19	.16	.18	.07	-.10	(B)
Nj	.10	.00	-.04	-.13	-.13	.30	.34	.32	.35	.41	
Je	.06	.62	.52	.37	.25	.24	.30	.35	.68	.55	
Was	.34	.26	.18	.28	.21	.00	.00	.01	.21	.28	
Pr	.05	.10	.13	-.02	.00	-.26	-.31	-.23	.04	.00	
A	.22	.10	.23	.04	-.05	.41	.44	.43	.35	.21	
Bp	.54	.05	-.30	.45	.38	-.18	-.03	.15	.38	.00	.39
Bs		.17	-.28	.70	.54	-.26	-.25	-.09	.27	-.27	.37
Sa			-.17	.25	.15	.46	.46	.19	-.01	.02	.19
S				-.24	-.40	.02	-.13	-.18	-.48	.05	-.65
Ca					.81	.10	-.33	-.22	.21	-.06	.32 (A)
Ba						.11	-.24	-.30	-.01	.03	.39
Nj							.44	-.09	-.25	.39	.17
Je								.56	-.01	.60	.04
Was									.25	.30	-.02
Pr										-.02	.30
A											-.22

Appendix 4 (cont.)

Ab	-.09	-.07	-.15	-.21	-.39	-.19	-.17	-.11	.00	-.16	
P		-.06	-.02	.23	.29	.14	.13	.10	-.02	.24	
Ch			.86	.70	.74	.03	.04	.11	.67	.67	
Dp				.69	.68	-.03	-.03	.01	.70	.64	(C)
Us					.79	.03	.00	.02	.55	.60	
Ut						-.02	-.04	-.04	.46	.65	
Sd							.98	.97	.21	.12	
Sde								.97	.22	.12	
St									.28	.13	
Se										.72	

The correlation matrix was partitioned as below

$$\left[\begin{array}{c|c} (A) & (B) \\ \hline & (C) \end{array}\right]$$

Appendix 5

The Stimulus Heads of the Measures

The Statuses

Whom in our course do you allow to attend to your business?
Whom in our course do you allow to make decisions for you?
Whom in our course do you allow to organize your business?

Cohesion

I would not for any price change our course for another.
I want to be in our course group.
I like being in our course.

Conservatism

Cat-food is not suitable for people.
Swedes and Finns have the highest morals in the world.
Nobody has the right to kill another,even if it were a deed of mercy.
As an entity racial prejudice is useful because it keeps foreigners out of the country.
Children must be taught to respect their fore-fathers.
Generally Finns are more intelligent than other nationalities.
Our jury system is the most efficient way to guarantee justice.
It is impossible to invent a way to produce ice-cream by only opening a can and letting air stream into it.

Radicalism

Teaching reading should be innovative and made more simple.
Our legal system should be replaced by a new one corresponding to the era.
By letting teachers teach what they want, a service is made to real education.
Corporal punishment will be removed in the future.
Our universities should include as many researchers as teachers.
The courts of law should be in the hands of sociologists rather than lawyers.
Our measurement system should be replaced by a new one.
We should have a day to celebrate Pasteur rather than Snellman because Pasteur has done more for humanity.

Antisemitism

As an entity Jews are decent people.
Jews are as loyal to our country as others.
Jews have survived because they have many admirable qualities.
Jews are superior to others spiritually and morally.

There is no reason to believe that Jews are less honest than others.
Jews are as appreciated citizens as others.
Jews use any means to achieve their goals.
Jews form a separate group in our society due to their religion.

Ethnocentrism

People who give equality to gypsies try to create conflicts.
Gypsies become troublesome unless they stay where they are.
Physical work is more suitable for gypsies than mental work.
Gypsies have their rights but they should stay in circles of their own.
It would be a mistake to make gypsies leaders.

Intolerance

Lapps are honest and good workers.
Lapps are biologically the same as others.
Lapps should be held back from succeeding.
Lapps are less intelligent compared to others.

Appendix 6

Data of the First Study

Variable names: 1=verbal comprehension,2=productivity,3=verbal productivity,4=sociability,5=emotional balance,6=braveness,7=conservatism,12=interaction,13=status of trust,14=status of decision,15=status of dominance,19=cohesion,24=conservatism,25=radicalism,26=antisemitism,27=ethnocentrism,28=intolerance.

1 2 3 4 5 6 7 8 9 10 11
2 5 9 8 4 9 6 9 6 4 4

	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
	18	2	3	1	6	3	9	10	19	24	23	24	14	19	20	7	15	24
	22	1	4	6	9	6	3	10	20	27	18	21	15	17	20	7	17	28
	17	0	3	0	9	4	6	12	20	28	19	22	16	17	19	6	18	25
	18	2	2	2	6	6	6	11	21	30	20	20	15	19	20	5	18	25
	18	3	3	6	6	3	6	12	21	28	15	20	15	17	20	5	16	26
	12	0	0	2	2	3	9	11	19	29	18	18	16	18	21	6	17	26
	21	3	3	2	9	3	6	11	19	29	17	18	14	18	19	5	17	25
	11	6	3	3	0	2	3	10	18	29	16	16	15	15	23	7	22	29
	10	2	6	2	0	3	1	10	20	28	17	21	15	18	18	6	18	27
	12	6	6	1	2	0	2	11	21	29	16	21	18	20	19	6	21	28
	12	12	0	2	2	0	9	9	26	20	16	21	22	17	25	12	22	27
	9	3	1	3	6	3	0	10	20	29	17	20	15	18	19	6	20	27
	11	0	6	6	0	0	0	10	19	28	17	20	15	18	20	6	18	26
	10	4	2	0	0	0	2	10	21	22	16	18	17	16	20	7	21	28
	11	12	0	3	0	3	2	10	20	26	17	21	15	18	20	6	18	26
	12	4	3	2	2	2	6	11	20	27	16	20	19	18	17	8	18	22
	15	21	1	0	4	0	3	10	16	25	17	25	18	14	19	11	20	22
	14	9	6	6	3	6	3	8	19	26	17	19	15	18	18	6	18	27
	23	12	9	6	2	1	3	12	12	20	19	22	12	14	16	8	18	23
		4	10	11	8	10	8	5	12	9	5	4	30	15	9	6	0	3
	2	4	3	3	0	0	2	10	16	21	13	24	14	14	19	5	21	34
	33	15	6	9	4	2	3	12	12	23	12	20	14	14	17	5	21	32
	26	6	6	2	4	3	3	11	10	21	19	20	11	10.	17	8	16	23
	16	3	2	3	3	2	2	10	12	20	21	17	15	10	16	10	22	27
T	27	3	6	3	3	2	3	11	13	26	20	17	16	16	16	6	19	27
	17	2	6	0	6	3	3	10	23	21	15	22	15	18	26	5	20	31
I	12	3	2	2	3	2	1	11	23	23	17	20	17	19	18	5	23	21
	9	2	0	1	6	3	6	10	26	22	16	25	15	21	19	5	25	27
M	14	3	0	3	0	9	1	11	22	22	18	24	16	19	23	5	19	22
	12	2	1	1	3	1	0	11	18	21	16	23	19	12	22	5	21	24
E	14	2	0	1	18	6	3	11	22	17	16	26	23	24	21	15	19	26
	12	2	0	1	4	4	3	11	29	23	20	26	15	18	22	7	19	25
	13	2	3	0	3	2	2	11	14	24	18	23	11	20	19	5	21	33
	13	1	0	0	6	9	2	11										
	15	3	1	3	3	9	2	11	14	23	18	23	11	20	19	5	21	30
	18	2	3	3	3	3	3	2	8	9	6	5	4	6	14	15	4	5
	11	2	4	2	4	3	8	12	17	24	15	21	15	13	17	5	21	29

19	2	3	2	3	3	6	10	19	20	18	23	17	12	19	5	21	22
20	3	3	3	6	9	6	11	16	23	19	23	20	18	21	12	18	27
21	0	3	9	3	6	6	10	16	19	17	23	17	12	23	5	21	22
15	9	1	3	9	6	9	11	19	21	18	23	15	10	21	5	21	28
15	4	3	3	3	9	9	10	16	23	18	23	18	12	19	5	20	25
36	3	2	0	3	3	6	11	5	18	19	23	18	12	19	5	19	22
37	4	15	12	6	9	3	10	18	17	19	22	18	13	21	6	19	27
39	9	9	9	3	9	3	10	16	22	18	23	13	17	19	5	17	31
26	12	6	12	6	9	9	10	13	23	18	23	13	18	19	5	17	31
34	2	6	3	9	3	3	10	13	22	17	23	11	20	19	5	19	31
27	6	6	6	3	9	3											
32	6	9	3	3	6	6	10	14	23	17	23	11	20	19	5	19	32
28	6	4	9	6	6	3	10	14	23	17	23	11	20	19	5	19	31
18	3	4	6	9	3	3	10	14	25	16	25	21	20	25	5	21	26
20	3	1	3	4	8	9	10	24	21	16	26	24	10	21	5	15	25
25	4	3	3	3	2	3	10	19	22	18	22	17	16	21	7	21	26
	2	9	3	3	6	3	8	15	21	17	14	22	21	21	15	21	27

Appendix 7

Data of the Second Study

Variable names: 1=birth place,2=basic schooling,3=school achievements,4=sex,5=cognitive activity,6=basic examination, 7=number of jobs,8=job experience,9=willingness to attend schooling,10=place of residence,11=age,12=verbal comprehension,13=verbal reasoning,14=productivity,15= sociability,16=emotional stability,18=braveness,19= radicality.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
3	2	7	0	1	1	4	9	9	3	33	3	2	4	6	10	8	7
3	4	8	0	3	1	6	5	10	4	37	4	3	4	7	10	7	5
3	4	7	0	5	2	1	3	0	3	31	5	4	2	9	5	6	3
4	4	8	0	10	2	9	3	1	4	27	5	5	3	8	6	5	9
4	4	7	0	5	2	1	2	6	4	27	2	3	4	7	7	5	6
4	4	7	1	2	1	3	6	3	3	30	2	2	4	3	7	8	7
3	4	8	0	5	2	6	11	3	4	31	4	3	4	7	5	3	6
4	4	7	1	10	2	6	3	0	4	38	2	3	2	7	7	8	6
4	4	7	1	3	1	2	3	0	4	28	3	3	3	8	4	3	3
4	4	7	0	5	2	5	3	0	4	30	4	4	4	9	8	9	6
3	1	7	1	0	1	4	7	1	3	32	2	3	4	5	4	7	5
4	4	7	1	5	1	1	1	7	4	25	3	3	4	8	8	6	5
4	4	7	0	3	1	1	1	0	4	24	3	4	2	7	9	7	8
4	4	8	1	5	2	6	6	0	1	28	3	4	2	7	4	9	4
1	4	7	1	3	1	2	1	0	3	28	3	3	2	5	8	4	4
4	4	7	0	9	3	4	1	0	3	33	3	5	3	6	6	5	7
1	2	8	1	3	1	4	4	3	3	30	1	2	2	5	8	7	5
3	2	7	1	1	1	6	0	5	3	39	2	2	2	9	10	10	4

1	4	7	1		7	2	4	2	0	2		28	3	3	1	7	10	10	6
1	2	7	1		2	1	6	4	0	3		28	3	3	4	7	4	7	6
2	2	7	1		0	1	4	3	4	3		33	2	2	4	7	10	5	5
1	2	7	0		0	1	5	5	0	4		29	3	3	3	7	4	4	4
1	2	7	1		0	1	8	5	0	1		31	3	4	2	6	5	5	6

Childhood home Time

15	15	15	15	15	5	5	15	15	15	15	15	15	15
12	11	11	11	10	11	11	15	15	15	15	15	15	15
12	9	9	9	9	15	15	15	15	00	15	15	15	15
11	11	10	11	11	10	9	12	11	12	12	12	12	12
13	12	12	12	12	12	12	11	13	12	12	12	00	12
13	13	13	14	13	13	14	12	12	13	15	12	12	13
13	10	10	12	12	9	9	15	15	15	15	15	15	15
9	9	9	9	9	10	11	00	9	11	11	11	12	15
12	14	12	14	13	14	13	14	15	00	15	15	15	00
11	12	11	12	11	11	11	11	11	11	00	12	11	14
9	11	11	11	14	12	12	12	12	12	13	15	13	12
13	12	11	10	10	12	12	11	11	00	11	11	00	00
11	13	14	14	14	14	13	13	13	13	12	12	13	00
15	11	14	12	12	12	12	12	12	12	12	12	12	12
15	13	12	10	12	12	12	12	12	12	12	12	00	12
11	10	11	9	10	9	10	9	10	00	11	12	00	12
13	12	13	13	13	13	13	10	11	11	10	10	11	11
12	12	12	13	12	11	14	00	15	15	15	15	15	15
11	8	11	11	12	11	11	11	11	11	11	11	10	11
12	13	12	11	11	11	11	12	12	12	12	00	12	10
9	11	12	12	12	12	12	12	00	12	12	12	00	12
13	12	12	11	12	12	12	15	15	15	15	12	15	15
11	11	11	12	10	4	11	00	13	13	13	00	13	13

Other people

15	15	15	15	15	5	5	15	15	15	15	15	15	15
14	14	14	12	12	13	15	10	10	10	10	10	11	11
5	15	15	15	15	9	12	12	12	00	12	12	12	12
12	12	11	10	10	12	10	9	10	9	9	9	9	9
12	12	13	14	12	12	14	11	12	12	12	12	00	12
15	13	14	12	12	12	15	12	12	12	12	12	13	14
15	15	15	15	15	15	15	12	12	12	12	12	12	12
10	11	11	10	10	11	00	9	11	12	12	11	12	12
15	15	15	15	15	15	15	14	9	00	11	11	13	00
11	11	11	11	11	11	11	14	14	14	00	12	14	14
13	14	13	12	12	12	13	11	11	12	11	11	10	11
10	11	10	10	9	11	11	12	12	00	11	12	00	00
13	12	11	12	13	12	11	15	14	15	14	12	12	00
10	13	13	12	11	12	12	12	12	12	12	12	12	12
15	12	12	10	12	12	12	12	12	12	12	12	00	12
15	9	11	11	9	9	10	12	12	00	12	12	00	12
8	8	10	10	10	11	10	12	12	12	12	12	12	12
14	15	15	15	15	12	15	00	15	14	14	14	14	11
9	7	11	10	12	12	11	13	14	13	12	14	11	10

11 10 11 10 12 11 12 12 12 10 10 00 11 11
12 13 12 12 13 13 12 15 00 15 15 15 00 15
15 15 14 15 14 12 15 14 15 14 15 12 15 15
13 13 13 13 14 13 14 00 10 9 9 9 9 00

Students of university

15 15 15 15 15 5 5 14 15 14 15 15 15 15
10 12 11 11 11 11 12 11 11 11 10 11 12 12
12 12 12 12 12 12 12 12 12 00 12 12 12 12
10 10 10 9 9 9 9 9 9 9 9 9 9 9
11 14 12 12 12 12 12 11 13 12 12 12 00 12
14 12 12 12 11 9 11 11 11 12 12 11 12 12
12 10 12 12 12 12 12 12 12 12 12 12 12 12
9 10 9 9 9 9 9 00 9 11 9 9 9 14
11 9 9 13 9 11 10 11 9 00 9 11 9 00
10 12 12 12 14 13 14 13 14 12 00 12 12 14
13 11 10 10 11 11 12 10 10 10 10 11 11 12
11 13 12 12 11 11 12 12 12 00 12 12 00 00
9 12 11 12 13 13 13 12 13 12 12 12 12 00
11 12 11 11 12 12 12 12 12 12 12 12 12 12
12 12 9 11 12 12 12 12 12 12 12 12 00 12
12 12 11 11 11 10 11 12 12 00 12 12 00 12
13 12 12 12 13 12 13 12 13 13 13 13 12 14
11 13 14 13 12 10 12 00 12 14 13 13 12 13
10 10 13 11 10 11 10 10 11 11 11 11 11 11
12 10 11 11 10 10 10 13 10 10 10 00 13 11
9 12 12 12 12 12 12 12 00 12 9 12 00 12
12 12 11 10 13 12 12 12 13 13 15 12 15 12
10 10 11 10 10 10 10 00 10 10 9 10 9 00

Teachers of university

15 15 15 15 15 5 5 15 15 15 15 15 15 15
11 11 11 9 9 10 11 11 11 11 12 11 12 12
12 12 12 12 12 12 12 9 9 00 9 9 9 9
11 11 10 11 11 10 10 11 11 11 11 9 11 10
11 12 12 12 12 12 12 10 13 12 12 12 00 12
13 13 13 12 12 13 13 15 15 15 15 15 13 13
12 12 12 12 12 15 12 9 9 9 9 9 9 9
10 11 11 11 11 10 11 00 9 9 9 9 9 10
11 13 15 13 14 10 13 11 14 00 11 11 11 00
13 12 14 14 14 14 14 11 11 10 00 10 10 12
10 10 11 11 12 11 10 12 12 11 12 11 12 12
12 10 11 12 12 12 12 12 12 00 12 11 00 00
14 15 14 15 15 15 15 14 14 14 12 12 12 00
13 12 11 9 12 12 12 12 12 12 12 12 12 12
13 12 11 12 12 12 12 12 12 12 12 12 00 12
11 11 11 11 11 12 11 10 11 00 12 9 00 12
12 12 13 12 12 12 12 13 14 14 13 14 14 14
13 14 13 14 14 12 14 00 13 14 15 14 13 13
13 12 12 13 11 11 12 11 11 11 11 11 12 11
9 9 9 10 9 11 9 11 14 10 11 00 11 12
12 14 10 12 12 15 15 12 00 12 12 12 00 12

13	13	13	12	13	12	12	12	12	12	12	12	12	12
10	10	11	10	10	9	10	00	11	10	12	00	11	12

Status of dominance

5	8	6	6	6	3	3	1	2	1	1	2	3	2
5	1	5	4	4	4	5	5	4	5	4	3	5	4
2	0	1	1	0	0	0	1	2	2	0	0	1	1
0	0	0	0	0	0	0	1	2	0	1	2	0	1
1	1	2	1	1	1	2	1	3	2	3	2	2	3
1	0	0	2	2	0	0	0	0	0	0	0	0	1
1	0	0	0	0	0	2	2	1	1	3	2	2	2
16	18	17	12	12	11	11	7	5	5	7	7	6	4
1	0	1	1	1	1	1	1	3	1	1	1	2	0
1	2	1	5	5	3	5	3	4	0	0	4	3	3
2	3	5	8	8	3	5	5	4	4	5	3	3	5
0	0	0	0	0	1	0	0	0	0	1	0	0	0
0	0	0	0	0	0	0	0	0	0	1	2	2	0
10	16	15	16	16	14	12	11	5	9	8	9	6	8
0	0	0	0	0	2	2	1	2	1	1	1	1	0
0	0	0	0	0	0	0	0	3	1	2	1	2	1
1	1	0	0	0	1	7	0	2	0	1	1	0	1
2	1	4	2	2	4	3	5	3	3	2	2	1	2
0	1	0	0	0	0	0	1	0	1	1	0	1	1
1	4	3	3	3	5	4	4	4	4	6	3	3	2
0	3	2	1	1	1	1	0	0	0	1	1	0	1
2	0	0	0	0	0	3	2	3	1	1	2	0	0

Status of decision

4	5	6	7	4	0	1	0	0	2	1	3	2	2
7	2	4	3	6	5	5	6	4	8	7	5	7	5
0	1	1	0	1	0	1	1	0	0	1	1	1	1
0	0	2	1	0	1	2	1	2	2	2	1	0	1
1	0	2	1	2	1	3	1	2	0	3	2	1	3
2	1	0	0	1	0	0	0	0	0	0	1	1	1
1	1	0	1	0	1	0	0	0	1	2	2	2	2
14	14	11	10	9	11	8	7	8	7	10	7	6	8
0	1	1	1	1	1	2	1	3	1	1	1	2	0
0	3	1	3	3	3	2	4	5	3	1	3	2	2
4	4	7	9	7	4	7	7	7	4	3	4	4	5
0	0	0	0	0	0	0	0	0	0	0	1	0	0
0	0	0	0	0	0	0	0	0	0	1	0	2	1
13	13	13	16	12	14	13	11	6	10	10	11	10	10
0	1	0	0	1	2	3	1	3	1	0	1	2	0
0	0	0	0	0	0	0	0	2	2	2	2	2	2
1	0	0	0	1	1	2	0	2	0	1	1	0	1
4	4	5	2	2	4	6	4	4	4	3	2	2	3
1	4	0	2	1	1	2	3	2	2	3	4	2	2
0	0	0	1	2	0	0	0	0	0	1	0	1	0
5	4	1	3	4	5	2	3	3	4	7	3	3	3
3	3	0	0	0	1	2	1	1	0	0	0	0	1
0	0	0	1	3	2	2	1	5	2	2	2	0	1

Status of trust

1	5	0	6	4	0	1	2	2	4	2	2	4	1
2	1	5	3	4	7	6	6	4	5	5	5	7	7
1	1	3	1	1	0	0	0	0	1	2	3	2	3
2	0	2	1	1	1	2	0	1	2	2	2	0	1
2	1	2	0	1	1	2	0	2	3	3	2	1	1
1	1	0	2	1	0	0	0	1	0	1	1	0	1
3	2	1	7	2	2	2	0	2	3	5	5	3	3
11	13	11	1	6	8	7	11	8	8	8	6	9	7
1	0	1	3	1	1	1	1	3	1	1	1	2	0
0	1	0	10	1	2	3	3	4	2	1	4	4	3
5	5	8	0	6	3	5	5	3	3	5	4	3	6
0	0	0	0	0	0	1	0	0	0	0	0	0	0
0	0	0	14	0	0	0	0	1	0	1	0	2	0
10	12	13	0	13	12	14	10	9	7	1	0	7	9
0	1	0	0	2	2	2	0	1	1	2	2	0	1
0	0	0	0	0	0	0	0	3	1	1	0	0	2
1	0	0	2	1	1	1	0	2	0	2	0	1	1
5	3	5	0	3	2	3	4	4	3	1	2	2	2
0	0	1	0	2	2	1	3	2	2	2	0	1	2
0	1	0	4	0	0	0	1	0	1	1	1	2	2
1	3	2	0	4	5	5	4	4	4	6	5	2	2
0	2	0	0	1	1	1	0	0	0	0	0	0	1
1	0	1	0	1	1	1	2	3	3	1	1	0	0

Self-esteem

83	82	80	81	82	81	79	79	82	85	76	78	76	79
84	80	80	84	80	85	81	84	85	81	79	84	81	80
81	76	81	80	79	79	78	77	77	00	80	81	80	78
80	85	82	81	82	83	86	82	82	82	83	84	85	84
82	84	85	82	81	81	83	87	83	84	90	87	00	86
82	81	83	82	80	79	78	77	79	84	80	80	80	82
80	79	77	77	76	79	78	80	79	78	78	80	77	78
88	84	81	77	78	80	81	00	34	82	82	80	79	83
84	85	87	87	87	88	85	88	90	00	90	87	88	00
86	84	84	83	84	85	84	84	81	81	00	85	84	84
78	81	84	84	82	80	83	79	81	83	80	81	78	81
72	75	76	72	75	76	78	78	79	00	79	75	00	00
74	71	74	74	72	73	72	77	77	81	79	76	76	00
78	81	76	79	78	81	80	78	79	75	81	83	82	77
72	72	74	73	69	69	69	73	73	70	68	69	00	69
82	78	81	84	83	82	85	84	83	00	84	86	00	84
83	81	82	80	80	80	76	78	80	77	78	83	80	80
75	83	87	86	85	81	87	00	85	87	88	82	89	88
82	86	77	78	73	77	78	76	76	77	76	71	70	69
78	81	81	76	75	74	79	70	74	75	71	00	74	69
85	84	78	85	82	90	87	89	00	83	84	83	00	76
79	82	79	78	78	79	79	81	80	78	83	86	83	85
79	84	81	84	83	80	83	00	84	85	83	00	82	85

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