

Levels and Boundary Conditions in the Theory of Action

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Annetta Pedretti and Gerard de Zeeuw (Eds.).
Problems of Levels and Boundaries.
London UK & Zürich CH: Princelet Editions, 1983.
Pp. 155-180.

First presented as a paper titled “Levels and boundaries in the theory of action” to the Systemgroep Nederland Conference on Problems of Levels and Boundaries, Amsterdam NL, April 1981.

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OVERVIEW

In this essay I first present a minimal meta-theoretic vocabulary based on *set* theory, and define the distinction between *concrete*, *abstract*, and *formal* sets. Next I employ these terms to define the term *system*, and the field, space, state, process, structure, and development of a system. Of specific interest in the context of the essay are *global system properties* of closure, conservation, and control. These are defined and interpreted for deterministic and functional systems.

Next, the notions of *levels* and *boundaries* are discussed in the light of the previous meta-theoretic considerations. The notions of boundary conditions, and critical boundary conditions, are introduced. Science is presented as an attempt to coordinate logical or mathematical *systems* with philosophical *conceptualizations* and with *things*. The term ‘things’ is discussed, and a distinction between four kinds of things is introduced: individuals, *groups*, *aggregates*, and *situated individuals*.

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Living things are considered from the perspectives of complementary theoretical systems, derived from four primitive *metaphors* called *organism*, *machine*, *mind*, and *template*. The focus of attention is then narrowed on the theory of *action*, which emerges from the metaphor ‘mind.’ The description of the various levels and boundary conditions in the theory of action concludes the essay.

META-THEORETIC VOCABULARY

Sets

A SET is a collection of distinguishable entities. Entities that have been included in a given set are called ELEMENTS of that set.

By invoking the criterion of set inclusion (or set construction), we may distinguish *concrete*, *abstract*, and *formal* sets. CONCRETE sets are constructed by an operation called DENOTATION. By constructing such sets we realize (and conserve) a characteristic of the set as a whole, a set property, in this case called an EXTENSION of the set. ABSTRACT sets are constructed by SEPARATION and realize (conserve) an INTENSION. Formal sets are constructed by

² First presented as a paper titled “Levels and boundaries in the theory of action” to the Systemgroep Nederland Conference on Problems of Levels and Boundaries, Amsterdam NL, April 1981.

³ Original page number in: ANNETTA PEDRETTI AND GERARD DE ZEEUW (EDS.). *Problems of Levels and Boundaries*. London UK & Zürich CH: Princelet Editions, 1983. Pp. 155-180.

CHOICE and realize (conserve) a CORRESPONDENCE (order among the elements of the set, mapping between elements of different sets).

It is important that we distinguish two kinds of abstract sets, since separation can be employed in two different ways. A CLASS is an abstract set including as its elements (now called MEMBERS) all entities that *cannot be distinguished from each other* with respect to the same intension (property), although they necessarily must ¹⁵⁷ be distinguishable in other ways. A VARIABLE is an abstract set including as its elements (now called VALUES) all entities that *can be distinguished from each other* with respect to an intension, although they may be indistinguishable from each other in other ways. By definition, each value of a variable (e.g., 'color') is a class (e.g., 'red' or 'green').

A formal set includes all entities that have been chosen because they stand in a particular correspondence to each other. Thus formal sets express (conserve) the order (or its absence) among the included entities. By definition formal sets are ORDERED SETS. Elements of formal sets are n-TUPLES of entities ordered with respect to each other in the same way. The entities may also be elements of a concrete set or different concrete sets, members of a class or of different classes, or values of a variable or of different variables. Generally, then, a FORMAL SET expresses (conserves) a RELATION on the entities included in every n-tuple that is in the set.

Concrete and abstract sets have some trivial, but in the present context conceptually interesting, formal characteristics. A CONCRETE SET conserves the relation of INCLUSION (of every element into the set) and of NEGATION (distinguishability) between all the elements in the set. ABSTRACT SETS, in addition to the above relations, express (conserve) a trivial relation with respect to the intension of the set. A CLASS conserves the relation of double negation (non-distinguishability, EQUIVALENCE) with respect to the class property between all its members. A VARIABLE conserves the relation of negation (DISTINGUISHABILITY, variability) ¹⁵⁸ between all its values with respect to the variable property.

Systems

A SYSTEM is a set consisting of two sub-sets: (1) a subset whose elements are VARIABLES,⁴ and (2) a subset whose elements are RELATIONS on the variables in the first subset. Defined this way, a system is a generalized relation on n variables, *i.e.*, an n-ARY RELATION.

A FIELD of a system is the (set-theoretic) UNION (of all the values) of all the system variables. It is an unordered set. In science, we generally start with such an unordered set as the given ('data'), and attempt to abstract variables and formalize relations from it, *i.e.*, we attempt to construct a system of which the 'data set' is a field.⁵

A SPACE of a system is the UNIVERSAL RELATION on (a Cartesian product of) the system variables. A space is an ordered set of all possible n-tuples of the values of the system variables, with positions of the values in the n-tuples indicating the source variable.

A STATE of a system is simply an n-TUPLE in the space of the system.

⁴ Here the term *variable* is used in the **general** sense employed in logic and mathematics (an open expression that can take any element of a specified set as its value), rather than in the **restricted** sense employed earlier (an abstract set). The two senses are entirely compatible. The use of terms with context-dependent meanings is unavoidable; the alternative is proliferation of neologisms.

⁵ And/or to re-construct the 'data set' as a field of a system.

A PROCESS is a TRANSFORMATION OF STATES, *i.e.*, a relation on n different states of the system. The states are distinguished and ordered by the values of (at least) one system variable used as a parameter. While time is often used as an example of such a parameter, other variables can be used as well. Similarly, while a string of states [159](#) is the simplest example of process, a partial ordering of states is also a process.

A STRUCTURE of the system is a SUBSET OF THE RELATIONS CONSTITUTING the SPACE of the system. It expresses (in a formula) the CONSTRAINT(S) on the permissible relations on system variables. It is the set of all the permissible processes (relations on states) in the system, and therefore of all the permissible states of the system.

A DEVELOPMENT of the system is a TRANSFORMATION OF STRUCTURE, *i.e.*, a relation on i different sub-structures (e.g., levels, regions, phases, stages) of the system. At least one system variable is treated as an external parameter distinguishing and ordering the resulting substructures. The above comments about time and string as examples of process apply also to development.

By specifying a MENTAL / CULTURAL CONSTRUCT called a system, *i.e.*, a set of variables and relations on them, we simply delimit our curiosity about a phenomenon to questions about the field, space, state, process, structure, and development of the 'corresponding' system. By answering these questions, we have completed a general study of the system. We may however be also interested in three corollary questions about the system. While the answers to the corollary questions are entailed in the answers to the general questions above, they become our central concern when our interest in the system is partial or when our knowledge of the system is incomplete.

The questions concern what could be called GLOBAL SYSTEM PROPERTIES. They appear in different guises, depending on the FORM in which the system is cast. Basically, there [160](#) are four different forms in which a system can be cast (*deterministic, functional, probabilistic, and comparative-genetic*). The form of the system determines the form of the questions that can be logically asked about it. The discussion of the forms is regrettably beyond the scope of this essay.⁶

[Table 1](#) lists global system properties in general, as well as in the deterministic and the functional form.

Table 1. Global system properties

SYSTEM		Form	
		<i>Deterministic</i>	<i>Functional</i>
Property	<i>Closure</i>	Composition	Differentiation
	<i>Conservation</i>	Stability	Extrema
	<i>Control</i>	Hierarchy	Regulation

In general, we can ask whether and how we can distinguish between what is the system and what is not, and whether this distinction is sharp, fuzzy, general, particular, universal, context-dependent, a step-function, gradual, permanent, changing, probabilistic, etc. The global property being sought after is closure (or openness) of the system. If the system is

⁶ For a discussion of the functional form, *cf.* JUNG (1965b) or JUNG (1981a): 244-245.

cast in the DETERMINISTIC form (and we are interested in all the relations between all the system variables), the question of closure becomes the question of COMPOSITION. We ask whether and how a super-system can be decomposed as to yield the system of interest, and further, how the system itself can be decomposed to yield sub-systems. If the system is cast in the FUNCTIONAL form (and we are only interested in those variables [161](#) and relations that affect the value of a dependent 'essential' variable), the question of closure becomes one of DIFFERENTIATION. We attempt to isolate from a super-system the system that interests us as a functional entity, and to further analyze it into functional sub-systems, each of which may either maintain a different (sub)-essential variable, or be an alternative way to maintain (under different boundary conditions) the essential variable at an extremum.

We may also be interested in establishing whether the system can be thought of as a class, *i.e.*, an abstract entity all the permissible states of which are indistinguishable from each other with respect to (share) some intension (property). We ask to what extent, or under what circumstances, the system has the global property of CONSERVATION. In deterministic form, this becomes the question of STABILITY (equilibrium) with respect to a particular variable. In functional form the question becomes one of circumstances (if any) under which the essential variable maintains an EXTREMUM (maximum, minimum, or constant) value.

The last global system property of interest is, in general, that of CONTROL. Are there endogenous or exogenous variables or sub-systems that can be said to determine the processes or the development of the system? In the deterministic form this becomes the question of the existence of a HIERARCHY (static or dynamic) of sub-systems. When we treat a deterministic system as a universe (an actually or virtually isolated system), we assert (postulate) that it is controlled only by endogenous states; when we treat it as embedded or context-dependent, we assert (postulate) [162](#) that it is exogenously controlled. In the functional form the question becomes one of REGULATION. In the simple functional form, we treat the system as if the extremum value of the essential dependent variable(s) was regulated endogenously by the intervening functional sub-systems, and exogenously by context, *i.e.*, by the values ('boundary conditions') of relevant independent variables. In the cybernetic form the variation of the values of the essential variable is treated as itself endogenously regulating (via feedback) its subsequent values, *i.e.*, the dependent variable is treated also as an independent variable (its values being 'boundary conditions').

We can of course arbitrarily close a system by specifying the limiting values of some arbitrary and preferably abstractly and formally irrelevant parameter, *e.g.*, label, location, or time interval. To establish the natural closure of a system,⁷ we must invoke the abstract (class) criterion of conservation, and equate closure (composition, differentiation) of a system with the limits of conservation (stability, extremality) of some intension (property). Or we must invoke the formal (structural) criterion of control (hierarchy, regulation), and equate closure with the limits of endogenous control. The limits of control are then the limits in the range of permissible fluctuations of the boundary conditions (in the cybernetic form also of the essential variable) for the maintenance of the structure of the system.

⁷ For a detailed discussion of the difference between 'arbitrary' and 'natural' classification, see the chapter on "The logic of type construction" in JUNG (1962b).

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Boundaries

Definitions are not only conventions governing the use of terms in communication; they are also operating instructions for thought. Thus definitions should stay within the realm of established usage, yet harness the meaning of the term defined to serve the mental purpose for which it is employed. The terms *level* and *boundary* are in the behavioral and social sciences employed in their colloquial sense. Drawing on this usage, and some technical uses in other disciplines, I shall narrow their meaning to suit my analytical objectives.

The term *boundary* is often used colloquially instead of *bound*, 'bound' being the external or limiting line of an object, space, or area, something that limits or restraints. In topology, boundary is defined as a set of points that are neither inside nor outside a system. The adjective *bound* derives from Old Norse *bua*, to live, dwell, make ready. The Old English word *bower* derives from this, meaning to lodge, dwell, inhabit, enclose; also to manage and administer. The German terms *Bauer* (farmer) and *bauen* (to build, construct) are related.

I think of a boundary of a system either as a description (of the degree) of its closure, or as signifying that something definite is conserved within and not outside, or as expressing the criterion for the realization (*i.e.*, control) of a system. Of these three, the idea of conservation seems central: a system is closed to the extent that a particular extension, inten- 164 sion, or correspondence is conserved while the system undergoes process (transformation of state) or development (transformation of structure).

A boundary of the system is then a set of limiting states, since the states within the boundary are associated with conservation, and outside of the boundary with non-conservation. If an extension of a system is being conserved, the system has concrete boundaries; when an intension is conserved, it has abstract boundaries; and when correspondence is conserved, it has formal boundaries. In the case of the conservation of intension, the system can be class-like, in that non-distinguishability of members is being conserved, or variable-like, in that distinguishability of values is conserved. We can thus speak of conservation of CARDINALITY, NOMINALITY (class property), DIMENSIONALITY (variability), and CURVATURE (order, structure). These characteristics are the only non-arbitrary grounds for the identification of systems.

This is of particular interest if we attempt to decompose a system. For example, we not only can decompose a concrete system concretely (into concrete sub-systems of smaller cardinality), but also can decompose it abstractly or formally, etc. If we were to think of hierarchy as nested decompositions, this would be a crucial matter to keep in mind and to be explicit about.

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Levels

The term *level* is also loose and ambiguous. Level evokes the image of a horizontal, as contrasted with a vertical coordinate. If we think of a variable as the vertical coordinate, its values, or subsets of neighboring values (intervals), can be regarded as intercepts of levels. If the variable is a nominal scale, we can see the levels as a classification; if ordinal by set inclusion as a taxonomy; and if ordered by a control relation as a hierarchy.

The distinction between concrete, abstract, and formal sets (or systems) described above can then be regarded as a specification of meta-theoretical levels in systems analysis. An

interesting issue, on which I need to state my position here, is whether these constitute simply a nominal classification, or a hierarchy. The conventional view based on the scholastic DOCTRINE OF abstraction as PROGRESSIVE DEPLETION of criterial properties (intensions) of classes, asserts that a concrete entity has a complete (indefinite, infinite?) set of properties, an abstract has fewer than that, and a formal has none. Further, one can distinguish according to this view among LEVELS OF ABSTRACTION, depending on the number of properties remaining.⁸

I reject this doctrine. Concrete, abstract, and formal systems realize entirely different criteria of set construction. Both concrete and formal entities are characterized by the total absence of intension (proper- [166](#) ty); intension is a criterion of the abstract. Further, there are no 'levels of abstraction,' only sometimes 'LEVELS OF GENERALITY' within the abstract level. Thus in my view 'furniture' is not a more abstract, but merely a more general concept than 'tables.' (There can therefore be a formal taxonomy of abstract entities based on set inclusion or generality.) In a formal sense concrete, abstract, and formal systems can be said to constitute a hierarchy, based on the amount of information that these otherwise similar systems contain. I argue this point elsewhere.⁹

It appears that both 'levels' and 'boundaries' are concepts derivable from the system property of conservation. We think of a level as a region in intellectual space within which certain concrete, abstract, or formal properties are conserved. Outside of this region it is invalid, or nonsensical, to characterize a system by level-specific terms. The limits of the legitimacy of particular terminology are the boundaries of the level. If we now identify a system by a certain level of appropriate discourse (e.g., as a physical, a psychological, a self-referential, a deterministic, a hydrodynamic, a triadic, or a monetary system), the boundaries of a level are also the boundaries of the system. The concept of boundaries thus becomes quite trivial. What becomes of great interest are the CRITICAL BOUNDARY CONDITIONS, *i.e.*, the values of internal or external variables that determine the passage of a system from [167](#) one level to another, and therefore necessitate the employment of a different discourse. Construed ontologically, critical boundary conditions determine emergence. The interesting study is then of the range of boundary conditions within which a system will conserve a particular global property, and outside of which the property will no longer be conserved. This is of course the issue of control discussed earlier.

We can thus interpret the concepts of boundaries, levels, and boundary conditions as terms derivable respectively from the global system properties of closure, conservation, and control.

THINGS

I feel it is a misuse of terms to talk of system science. The investigation of SYSTEMS, *i.e.*, of formal entities, is the subject matter of logic and mathematics (and perhaps of looser formal reasoning). The investigation of abstract entities, *i.e.*, CONCEPTS (classes and variables) is the proper subject matter of philosophy, whether construed as ontology, critical philosophy, conceptual analysis, or phenomenology. And then there are THINGS. The various scholarly activities, which can be subsumed under choro- and chronography of the cosmos (e.g., astro- to ethnography and cosmic as well as human history), are concerned with the naming,

⁸ Although the term 'abstract' is derived from Latin *abstrahere*, to draw away, withdraw, it is **not** abstract properties that are being withdrawn (how could they: they are created by abstraction), but their referent (concrete index). Abstract is the grin that remains after the concrete Cheshire cat has withdrawn.

⁹ JUNG (1965b).

classification, and study of the spatial and temporal arrangement of things. SCIENCE is the study of the relations between systems, concepts, and things.

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Things can only be apprehended concretely, *i.e.*, by denotation. No intensions (properties) or forms (correspondences) can be directly divined in them. They can only be distinguished and identified by attaching arbitrary labels or indices to them; this precisely is denotation. Unless this is kept in mind, pseudo-problems arise. To speak of things more richly, not only in terms of the cardinality of sets of things, abstract or formal terms have to be employed.

The simplest way to identify things abstractly or formally is by using extrinsic variables or relations as boundary conditions. An example is the application in macrophysics of the logical principle of the identity of indiscernibles as the principle of unique and exclusive location in time and space: two indexically different things occupying exactly the same region of space at exactly the same time are indistinguishable and therefore identical (one).

The second procedure is to invoke intrinsic intensions, *i.e.*, to assign properties to indexed things, and to collect them into classes and variables. Thus a rose is a rose under any name, and yellow and green things have different values of color.

The third procedure is to invoke intrinsic formal relations, *i.e.*, to collect things on the basis of similarity of structure. This is the aim of theory. For the theory of living things, in addition to the operational ☞ 169 distinction between concrete, abstract, and formal systems (or levels), we shall need a formal distinction between things.

Individuals, groups, aggregates, and situated individuals

It would seem nice to be able to have as individuals entities so small that they could not be further broken down, and so uniform, that they could not be distinguished from each other either by intension or by structure. Let us assume that we live in the idyllic time when atomic physics regarded the electron as the basic, indivisible individual (monad) from which the rest of us is compounded. We could say that two electrons were different because they have occurred as events at different space-time locations, but we could not attach an index to them and then continue to observe them, since denotation destroys / modifies / makes uncertain their future behavior, or it converts it from fact to artifact. We could do neither the history nor the science of electrons, since even the insistence on the distinguishability of two electrons at different space-time locations necessitates assumptions about their behavior in space-time that lead directly to the Einstein-Podolsky-Rosen paradox.

In behavioral / social science the situation is different, since individuals are not identical, but is fraught with paradoxes as well. We proceed therefore with the concrete identification of individuals by attaching indices to entities that are abstractly or formally similar in terms of ☞ 170 a different level of analysis, e.g., the concrete reference of a psychological individual is an organism (cow, *Homo sapiens*). This is of course unsatisfactory, as both Strawson¹⁰ and Pask¹¹ have discussed at length.

Formally, an INDIVIDUAL is a system, with all its variables predicated on the same index and all its relations endosystemic; the structure therefore being predicated on the same index as well.

¹⁰ STRAWSON (1959).

¹¹ PASK (1976).

A GROUP is a system where each variable is repeated for each individual in a concrete set of indices; the relations are between the variables over the indices, but the structure is predicated to the set of indices as a whole, *i.e.*, to the group. The problem here, as in mechanics, is the many index problem: combinatorial explosion makes the study of anything but few relations over few variables and few indices unmanageable.

The solution is aggregation of individuals, and macroanalysis of an AGGREGATE. We still assume a concrete set of individuals with indices and with a specific cardinality (sometime infinite). The relations are now however only on the variables, and the structure is predicated to the aggregate as a whole. The predication of a specific state to any one indexed individual is only a matter of probability, and the state of the aggregate is specifiable only by statistical parameters or phenomenally. This is similar to the kinetic theory of gasses.

An interesting case is the SITUATED INDIVIDUAL. Here the two indices are respectively a particular individual and his situation (*i.e.*, either the structure of a particular group, or the statistical state of a particular aggregate). The structure of the situated individual is the permissible relations between the individual and his situation (*i.e.*, behavior, performance, action, or conduct – depending on interpretation¹²).

Living things

The class of living entities is employed as a semi-primitive term. Some of the properties of the class are generally agreed upon, such as irritability; permeability of boundaries; phylo- and ontogenetic variability and development; and adaptation, self-equilibration, and self-organization. Yet for the analysis of living systems, a more integrated definition is needed.

Four such definitions, models, or basic perspectives are currently available. They are complementary, in that they pertain to the same concrete set of 'living things,' but employ mutually exclusive concepts and formats of analysis. The four have differential explanatory power with respect to different properties and relations found in the class of living things, yet only jointly have sufficient power to exhaustively describe the whole range of phenomena manifested by the class. I shall briefly describe these under the name of four metaphors for the analysis of living things. According to the criteria discussed earlier, it will be apparent that they could be considered 'levels,' yet I am still bothered by the surplus implication of hierarchy when employing this term, which, in the case of equipotent complementary perspectives, is totally uncalled for.  172 The primitive root of the four theoretical systems are four complementary metaphors of living things, that are conceived of essentially as either ORGANISMS, MACHINES, MINDS, or TEMPLATES. A preliminary classification of these metaphors, shown in [Table 2](#), identifies the different epistemological perspectives that result in these conceptions.

From a NATURALIST perspective, living things are conceived of either as organisms or as machines, while from a HUMANIST perspective they are seen as essentially either minds or templates. On the other hand, from a REALIST perspective construing the world as consisting of facts, both organisms and minds are possible conceptions, while from an IDEALIST perspective construing the world as a set of artifacts, machines and templates become the possible conceptions of the essence of living things.

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An integrated formulation of four complementary theoretical systems for the analysis of living things would specify (on the abstract level) the essential variable for each system and (on the formal level) some extremum value of this variable. By extremum, as discussed ear-

¹² PASK (1976).

lier, is to be understood a maximal, minimal, or constant value that is maintained under given boundary conditions. Both organisms and machines can be formulated as essentially SYSTEMS OF ENERGY, while minds and templates as SYSTEMS OF MEANING. Under some circumstances, one could perhaps substitute ‘information’ for ‘meaning.’ Unfortunately, the discussion of the ‘meaning of meaning’ and of the relation of information to meaning is beyond the scope of this paper. I must rely on a sympathetic intuition of the reader, and only state that in my considered opinion the two concepts are not as different as currently believed.

Formally, both organisms and minds can be seen as ACCUMULATORS, TRANSFORMERS, and GENERATORS of their essential intensions. While accumulation and transformation occurs also in non-living things, generation is the *differentium specificum* of living things. This point has most recently been persuasively argued by Rom Harré,¹³ in his formulation of psychological as ‘ethogenic’ systems. On the other hand, machines and templates can be primarily seen as CONSTRUCTIVE, respectively harnessing energy or meaning, so that it is not diffusely dissipated but rather available in specific circumstances.

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The fourfold classification of systems of energy and meaning, and of generative and restrictive systems is summarized in Table 2.

Table 2. Metaphors for the analysis of living things.

ON	Efficient (Naturalism)	Final (Humanism)	URGE
Material Fact	ORGANISM Behavior	MIND Action	<i>Generative</i> (Realism)
Formal Artifact	MACHINE Performance	TEMPLATE Conduct	<i>Restrictive</i> (Idealism)
<i>System of</i>	<i>Energy</i>	<i>Meaning</i>	

Also in Table 2 are shown the outputs of the four systems conceptualized above: the activity of ORGANISMS is conceived of as BEHAVIOR, of MACHINES as PERFORMANCE, of MINDS as ACTION, and of TEMPLATES as CONDUCT. The common general principle could be that each system produces the maximal possible amount of output under given boundary conditions.

From a meta-conceptual point of view, the four systems can be seen as the results of distinctions made by Aristotle between the different kinds of ON (grounds of being). Thus, for example, the behavior of organisms is the activity of living things seen as the expression of EFFICIENT (initial) and of MATERIAL grounds of being; while the conduct of templates is the same phenomenon seen as arising on FINAL and FORMAL grounds.

A full discussion of Table 2 is beyond the scope of this paper, the remainder of which will concern the further development of one of the four systems, the one construing life as the action of minds.

¹³ Cf. e.g., HARRÉ AND SECORD (1972), or HARRÉ (1979).

Levels in the theory of action

Applying the distinction between individual and aggregate systems to organisms, one arrives at an analytical formulation of, respectively, physiological and ecological systems. The same distinction applied to [175](#) minds yields the definition of psychological and cultural systems. Without explaining the historical and theoretical reasons, let me state that under the metaphor 'mind' the output of individuals shall be called intention, of situated individuals action, of groups interaction, and of aggregates transaction. Since the primary empirical referent of the theory is the activity of situated individuals, the whole theory is called the theory of action. Systems of intentions, of action in the narrow sense, of interaction, and of transaction can be regarded as different levels of analysis of action.

The individual mind is then seen as a system of intentions. The term intention is used in a generalized Brentanian sense, as a relation between subject and object, some objects being 'strangely inexistent' in the mind, i.e., not necessarily referring to actual facts. Among the influences on the development of the concept 'intention' as here employed are Freud, Husserl, Heidegger, Wittgenstein, and Piaget. The concept of 'mind' is mainly influenced by Kant, and prior to that, the medieval philosophy of faculties (especially Aquinas and Duns Scotus), which saw the mind as consisting of the powers of cognition, cathection, and conation.

In my theory of mind, I posit three independent levels, each formulated as a special theory, which provide boundary conditions for each other. Each level has a special essential variable, a principle of conservation of this variable, and sub-levels and mechanisms that generate meaning. The composition of these three levels according to [176](#) to a general principle of intention is the task of the GENERAL THEORY OF INTENTION, which together with the general theories of action, interaction, and transaction compose the family of theories based on the metaphor of mind as the final and material ground of being of life. (A similar elaboration of the theories of behavior, performance, and conduct, and of the mutual relation of these to each other and to action, would constitute a complete theory of living systems.)

The three SPECIAL THEORIES of intention are the theories of ORIENTATION, of MOTIVATION, and of DECISION. The respective essential variables are UNCERTAINTY, TENSION, and RISK. The special principle governing (explaining) the conservation of the essential property in all three theories has the same form, i.e., the MAXIMUM POSSIBLE REDUCTION OF THE VALUE OF EACH ESSENTIAL VARIABLE.

Thus, for example, each intention (new or retained) is seen as reducing the greatest possible amount of uncertainty, given the boundary conditions of the amount of tension and risk present in the system, and the simultaneous tendency of the motivational and decision system to maximally reduce these. Lest the theory be mistaken for the Freudian type 'reduction of unpleasure' theory, let me hasten to explain, that in order to reduce the maximal amount of uncertainty, the system will tend to generate as much uncertainty as it is capable of reducing under the given boundary conditions (i.e., the tendency of the other sub-systems to maximally generate and reduce tension and risk).

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The general principle of intention is THE MAXIMAL POSSIBLE REDUCTION OF IN-AUTHENTICITY. Authenticity is used in the sense of Heidegger's *Eigentlichkeit*. The boundary conditions here are, first, the states and propensities of the systems of action, in which the system of intentions is lodged. (The system of action represents as situations relevant aspects of the systems of interaction (groups) and transaction (aggregates) in which the individual is embedded.) Secondly, they are the projection in situations of the states and properties of the

various relevant systems of behavior (organism), performance (machine), and conduct (template) which are the other analytic levels of the same concrete phenomenon.

To give some content to the concept of **inauthenticity**, and also to get nearer to the mechanisms that, according to the theory of intention, generate meaning out of INDEFINITENESS, I must discuss further sub-levels (or sub-systems) of the theory. As an example I shall identify the levels of the special theory of orientation.¹⁴

By applying the meta-theoretic distinction between concrete, abstract, and formal systems, we obtain three simple systems of orientation. Each system transforms indefiniteness respectively into concrete, abstract, or formal meanings. Combining them, two at a time, by the use of specific mental mechanisms called correspondence rules, we obtain three combined systems of orientation. The reduction of uncertainty consists in interpreting the available choices as assertions, and choosing  178 some as the orientational components of intention, *i.e.*, judgments.

Two kinds of meanings, assertions, and judgments have to be further distinguished. The distinction occurs in much current philosophy of action as the distinction between belief and desire. While 'belief' roughly coincides with the EPISTEMIC, as I call one of these new levels of orientation, the term 'desire' is far too broad to define the second level of orientation. Much of the content of the term I handle under the concept of motivation (e.g., the whole notion of intensity or drive). In accordance with medieval notions of will alluded to earlier, as well as in agreement with Freud and Heidegger, I treat – in the theory of decision – the component of 'desire' that transforms motives into actions as will, or more precisely as 'resoluteness' (*Entschlossenheit*), or willingness to accept risks. What then remains of 'desire' in the TELIC level of orientation is the 'intentional' component, *i.e.*, the tying together of the beliefs about oneself with one's beliefs about one's world, the noetic - noematic relation (Husserl), the transformation of beliefs into definitions of situations (Thomas). The essence of this level is self-referential beliefs, *i.e.*, the definition of oneself as an actor. The telic level of the theory provides twelve types of such definitions.

Roughly speaking, the propensity to reduce inauthenticity can be described as a TENDENCY TO HAVE INTENTIONS CORRESPOND AS MUCH AS POSSIBLE TO ONE'S DEFINITION OF ONESELF (however arrived at) AS AN ACTOR.  179 Since the individual analyzed as mind is lodged in groups and aggregates, which level itself is only one of four complementary projections of life (the others being systems of behavior, performance, and conduct), the inevitable dynamics of in-authenticity is theoretically realized.

The twelve levels of orientation define abstractly and formally the key concepts of psychology and sociology.¹⁵

¹⁴ For an introduction to a similar formulation of the theory of motivation, *cf.* JUNG (1965a).

¹⁵ The twelve levels of orientation and the resulting concepts and mechanisms are discussed in more detail in JUNG (1965b).

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