KONRAD LORENZ AND JEAN PIAGET

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ABSTRACT. Although Lorenz and Piaget share basic ideas on naturalistic thinking, their epistemologies and ethics are different and demonstrate that naturalization can be done in discrepant ways. The core point of Piaget's naturalization is the fact that he does not follow the main lines of Darwinian-evolutionary theories. Piaget's kind of naturalization leads more toward regulatory processes, bringing him close to systems theory and constructivism. Lorenz's position is much more in line with Darwin and evolutionary thinking; cognition as well as moral behavior is traced back to evolutionary successful actions, which got fixed genetically during phylogeny.

These basic ideas that form the framework of both epistemologies lead to different positions in ethics. In confronting Lorenz with Piaget, the gaps between phylogenetic-evolutionary and ontogenetic-social developmental methods appear. Some ideas to bridge these divergences are presented.

KEY WORDS. Constructivism; adaptation; cultural evolution; morality-biology; morality-cognition; naturalization; symbolization; ontogeny.

INTRODUCTION

This contribution outlines a brief comparison between Konrad Lorenz and Jean Piaget's main ideas. Intended is not just a historical analysis, one that could be done better by historians of science, but a parallel approach to the main epistemological and ethical ideas of these authors, intending a comparison of phylogenetic-evolutionary thinking with ontogenetic-social developmental considerations.

Evolutionary phylogenetic approaches and socio-cultural theories of human development still seem to be far from productive exchanges, and Lorenz as well as Piaget provide creative considerations for bridging some gaps.

Both Lorenz and Piaget can be considered as cornerstones of the scientific thought of the last century. Lorenz as one of the founders of classical ethology and Piaget as one of the most important developmental psychologists. Beside these main areas of their work, they also deeply influ-

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enced surrounding scientific fields, from epistemology to ethics to cultural sciences.

For this brief approach and comparison to K. Lorenz and J. Piaget's positions, I will try a three-step strategy.

A first step contains some details of the *personalities* of Lorenz and Piaget, followed by a short elaboration on and comparison of their *epistemological positions*. Some issues related to adaptation, necessity, and symbolization will be discussed. In the last step their *ethical considerations* are to be discussed, which—from my point of view—directly result from their epistemological positions.

Generally speaking, Lorenz and Piaget did their lifelong work under the premise to naturalize (in a broad sense) human thinking, feeling and behavior. Their different empirical and theoretical approaches led to different kinds of naturalization. One important fact, which probably lies behind their different approaches is their position related to Darwin. Piaget was always skeptical about classical Darwinism and favored ideas closer to Lamarck and Waddington. Leading assumptions in Piaget's approaches always were close to self-regulation and constructivism; in contrast, Lorenz's thinking always was in line with the basic Darwinian principles, what will be discussed later in more detail.

Both authors combined empirical studies (Piaget with children and Lorenz with animals) with a very broad theoretical background knowledge. It is remarkable that their methodologies were seriously criticized during their lifetimes and even more after their death. It is also interesting to point out that most (not all) kinds of criticism came from positions obsessed with quantitative reductionism. This kind of purely quantitative methodology is strongly in opposition to Lorenz and Piaget's synthetic and holistic views. Both had the kind of broad synthetic mind that seems to be a precondition for creative thinking.

I. SOME BIOGRAPHICAL DETAILS

Comparing the personalities of Lorenz (1903-1989) and Piaget (1896-1980) two different subjects appear.

To start with one common element, both were deeply interested in animals in their early years, spending a lot of time watching and describing their behavior. Lorenz activities during his youth remained focused on this area, while Piaget beside his animal related activities was also deeply interested in religious and philosophical questions.

Lorenz was the son of a very successful medical doctor and orthopedist, with a quite solid economical background. The whole family climate was deeply influenced by medicine and (by) scientific thinking. The father appeared as a very dominant figure, who was unconvinced about his son's

activities with animals (comp. Lorenz A. 1965; for a general biographical background see Wuketits 1990).

Piaget also was born within the upper middle class. His father was a professor of history at the local university at Neuchatel. He described his mother as a very religious person with serious instabilities in her psychic life. His parents were seen by young Piaget as opposite characters; the father as a scientific, rational person, the mother as more "emotional," probably a neurotic person with intense religious believes.

The early studies of Piaget dealt with the systematic of snails; his first publication appeared 1911 at age of fifteen. After school he studied zoology and wrote a dissertation about the adaptational abilities of *Limnaea stagnalis*. Remarkable is his strong bias to Lamarck—what was usual in French-speaking countries at this time (Etienne 1998, S84). One of his leading ideas was that phenotypic adaptations can cause feedback on the genotype (Piaget 1980/1976), a position that was combined with a deep skepticism regarding classical Darwinian ideas (comp. Hooker 1994; Heschl 1998).

Influenced by his philosophy teacher at school, the sixteen-year old Piaget dives into philosophical and social philosophy books. Beside his early studies on mollusks, he also was deeply impressed by the work of Henry Bergson. Later on, he intensively studied the main philosophical writings of Kant, Dewey and Spencer. Piaget at this time developed the idea of an "epistemology based on biology"—a concept that will direct his whole scientific development.

Piaget's early writing, *Recherche* (1918)—a kind of autobiographical novel—deals with numerous religious problems. The whole atmosphere in this book is full of melancholy, fear, and a search for religious belief (Vidal 1989). Leading ideas are balance (equilibrium) and disturbance of balance (disequilibrium)—themes that can be considered as guidelines for the whole genetic epistemology.

During his lifetime his positions related to philosophy changed and grew more and more skeptical. Especially in his 1974 book, *Wisdom and Illusions of Philosophy*, he drew something like a demarcation line between philosophy and science, leading to the statement that philosophy just produces something like wisdom, while science produces real knowledge.

After studies in Zurich and Paris he went to Geneva, where he founded the "International Center for Genetic Epistemology" (1955), which he directed until his death. In this interdisciplinary research center Piaget invited representatives from different disciplines (psychology, logic, philosophy, linguistics, mathematics, cybernetics...) and founded at the same time the journal *Etudes d'epistémologie génétique* as a forum for these activities.

His intense writing activities produced numerous publications, and everyone who reads Piaget will admit that he is not too friendly to his readers, something that caused severe kinds of criticism accusing Piaget's style as narcisstic. One reason for this could be—as Piaget mentions in an interview concerning his style—that he used writing for clearing up his thoughts (Bringuier 1980).

Lorenz's (1903-1989) main personality traits appear as more stable and less sensitive to philosophical issues. From early childhood he was extremely interested in animals; his parents house was like a zoo, and his diary notices are full of remarks about birds, dogs, and the like. School and other "duties" were done in an excellent manner but without any deep interest. The periods of serious exams at school are not even mentioned in his diary.

Following his parents advices he studied medicine, where he meet a very important teacher, the comparative anatomist Ferdinand Hochstetter. For Lorenz, who was extremely gifted for Gestalt perception, comparative anatomy offered a base to comparative ethology as well as for further ideas in morphology.

In 1940 Lorenz became professor at the Psychology Department at the University of Königsberg. At this time the famous article "Kant's doctrine of the a priori in the light of contemporary biology" appeared (Lorenz 1941). From 1944-1948 he was a prisoner of war in Russia; during this time he wrote the famous book *Behind the Mirror*.

His main philosophical interests were developed during his time in Königsberg and during his time as a prisoner of war, leading to "evolutionary epistemology" (Lorenz 1941, 1977; Lorenz/Wuketits 1983). The extremely productive time of "classical epistemology" in Buldern and Seewiesen led to the foundation of ethology as a scientific discipline.

In his late years Lorenz was an important representative within the environmental conservation movement in Austria—where he was a strong opponent of nuclear power plants.

II. EPISTEMOLOGICAL POSITIONS

It's not easy to sketch briefly the differences between Lorenz and Piaget's epistemological positions. To formulate them in a contrasting manner, I would say that Lorenz's position is close to phylogenetic-adaptionistic theories, while Piaget's is closer to ontogenetic-constructivist considerations.

One basic point is adaptation or adaptational processes. Their different concepts of adaptation offer the possibility to come closer to their discrepant kind of naturalizations, and even to see their different approaches in ethics. I will now point out these concepts in some detail.

Lorenz's notion of adaptation always refers to the Donald Mac Kay's kind of a transfer of environmental information to the organism (Lorenz 1941, 1977). Concerning the basic prerequisites of knowledge, he formulates:

> Our categories and forms of perception, fixed a priori to individual experience, are adapted to the external world for exactly the same reason as the hoof of the horse is already adapted to the ground of the steppe before the horse is born and the fin of the fish is adapted to the water before the fish hatches (Lorenz 1962, p. 25).

Our organic *Bauplan* as well as our cognitive apparatus contains the basic structures which provide (to our) successful behavior, because they fit to external conditions. This argument also implies Lorenz's concept of reality, which is called "hypothetical realism" based on the assumption that

> ...all knowledge derives from an interaction between the perceiving subject and the object of perception, both of which are equally real (Lorenz 1977, p. 14).

The term "hypothetical realism" has its origin in the work of D. Campbell, who defines "hypothetical realism" as follows:

> My general orientation I shall call hypothetical realism. An 'external' world is hypothesized in general, and specific entities and processes are hypothesized in particular, and the observable implications of the hypotheses (or hypostatization's or reifications) are sought out for verifications. No part of the hypotheses has any 'justification' or validity prior to, or other than through, the testing of this implication (Campbell 1959, p. 156).

Lorenz, who also was occupied with morphological structures, which show a lot of similarities between different kinds of organisms living in the same environment, drew the conclusion that there is an existing real world around us, and organisms develop structures that more or less fit the structures of reality. In evolutionary processes a "pattern matching" takes place, which leads to a correspondence between organismic structures and structures of reality (Lorenz 1977, p. 44). The basic behavioral pattern of the organism appears as the result of the long-term evolutionary processes of the species.

Concerning ethics he proposes, that in evolution behavioral structures with ethical relevance corresponded to specific environmental and social challenges and improved the conditions for survival. This will be elaborated with more detail in part three.

The genetic constructivism of Piaget offers another kind of naturalization beyond the evolutionary kind. For Piaget adaptation has two levels.

One is the common level, normally used within evolutionary biology, where adaptation means the interaction between organism and environment or between subject and object. These kind of adaptational processes are closely related to the above-mentioned view of Lorenz.

The other level of adaptation, for Piaget much more essential, means processes working inside the organism. These processes are oriented toward something that Piaget calls *equilibrium*, what means balance within the internal structures of the organism. Equilibrium (balance) and disturbance of balance (*disequilibrium*) are two of the core concepts of Piaget's genetic epistemology. This internal aspect of adaptation is also called *organization* (Piaget 1967, p. 150). Organization is concerned with internal balance, or internal coherence, opposed to the external correspondence between organism and environmental factors. Organization in a very general sense means the functions of the totality or integrity characterizing all living organisms of whatever level (Piaget 1967; Vuyk 1981, p. 68). In emphasizing organizational factors Piaget is close to constructivism without being a radical constructivist (comp. Seiler 1994, p. 84f).

Very close to Ludwig von Bertalanffy's "open systems," Piaget draws a close connection between auto-regulation and organization, valid for organic as well as for cognitive processes (Wetzel 1980, S37). The main domains of organization are:

Continuity. A so-called invariance (internal structure) remains stable during transformational processes. The existing structures remain balanced although there is permanent exchange between internal and external factors.
Interaction between parts.
Conservation of a specific form beyond changing contents.
Primary activity. It means that structural activity is not just reaction to external influences (Piaget 1967, p. 149).

It is necessary to see that these organizational activities are essential for organic as well as for cognitive processes. Cognitive activities in general are considered as processes closely organizing sense-data to internally constructed invariances. Yet these invariances don't appear as inborn yardsticks, they result from constructive activities. This leads to the probably confusing statement:

> While thinking adapts to the things, it structures itself, and while it structures itself it structures the things (Piaget 1975, p. 47).

It is especially this view of organization which contains serious differences to Lorenz adaptionistic and more static position. The main difference may be found in Piaget's emphasis on internal coherence versus Lorenz em-

phasis on external correspondence between environmental and organismic structures. Probably these different perspectives result from the kind of objects studied. While Piaget studied the cognitive activities of children, Lorenz was confronted with anatomical, morphological and behavioral structures of animals which, without any doubt, appear as more static and more stable.

As I mentioned before, these different epistemologies bring Lorenz close to adaptionistic stances, while Piaget's position is akin to constructivism, and it will be demonstrated that these different epistemologies imply as well different ethical positions.

Before coming to ethics, some remarks are necessary on a problem which has epistemological as well as ethical implications. It is an issue that especially occupied Piaget in a very serious manner, that of the *necessity and universality* of logic and mathematics. As an epistemological problem it also has serious implications related to ethics concerning the universality of norms and rules. It is a fascinating example of the interrelations between ethical and epistemological problems.

In a first approach, I will come to the epistemological dimension of the problem. The question can be put as follows: *Do cognitive structures* (and in this case, Piaget's logical mathematical structures as the highest and most stable kind of those structures) *own universality and necessity*?, and if this is the case, why?

This problem is one of the main topics in Piaget's very important book published 1967, *Biology and Cognition. The Relations Between Organic Regulations and Cognitive Processes*.

Our author discusses this problem confronting his ideas with Lorenz's epistemological position. Piaget's central argument is that logical necessity as well as universality gets lost if cognition is based on an instinctual-hereditary base—such as Darwin, Lorenz and other adaptationists do.

Compared to logic, instincts—as hereditary transmitted pattern of behavior—can never have the kind of necessity as logic, because there is always a high degree of arbitrariness in them (Piaget 1967, p. 321f). For Piaget heredity and logical necessity excludes each other, since each hereditary structure owns a kind of arbitrariness.

> ... that heredity and internal necessity of the logical mathematical operations exclude each other, and you have to decide for one or the other (Piaget 1967, S322, transl. M.W.).

In this area Piaget's mode of naturalization can be shown more precisely. His procedure is called *genetic regression* (Piaget 1972, Fetz 1988, p. 118). The term "genetic" in this sense has nothing to do with genes, heredity, and the like, but with genesis as development and so forth. Yet regression

does not have any psychoanalytic connotations but means a descent to the most basic level of life, what in his view is the level of "biological organization" with the characteristics mentioned above. Related to heredity Piaget underlines that this level itself is not inherited but the necessary condition for any hereditary transmission. Logical necessity and universality have their foundation at this level, which does not contain any structures, but just a kind of dynamism what he calls *general functioning* (Piaget 1967, p. 331).

Transferred to the epistemological question of the origin of knowledge, this leads to the argument that there is no absolute beginning for knowledge, but just basic, dynamic activities of self-regulation (Fetz 1988, p. 186).

Also, ontogenetic development starts at this general functional level, leading to different stages and structures. A developmental process ending in the above mentioned logical-mathematical structures (Piaget 1967, p. 324).

Ontogeny is characterized by a permanent growth of structures resulting from these regulating and coordinating activities. Cognitive development is constrained by internal structural and functional limits, leading to something like internal necessity in developmental processes. The whole process results in the most stable and most flexible structures: the logical-mathematical ones. One of the basic hypothesis in this seminal book by Piaget is that cognitive regulations result from organic auto-regulations (Piaget 1967, p. 27).

The whole question of the origin of knowledge is very close to the Kantian apriori/a posteriori distinction. Piaget never speaks from a *structural* a priori (as Lorenz does), he just mentions something like a *functional* a priori.

> Probably you can take a functional a priori of this kind, that each activity results from a structure, but the common ground (as Hegel mentions related to the dialectical contradiction) of structure and function is a structural activity, that is the same as auto-regulation implying a general and continuous functioning (Piaget 1967, p. 335, transl. M.W.).

This dynamic view is also called *dynamical Kantianism* (Piaget 1981, p. 15) and the relations to Kant are really close, in that such author never uses the word "innate," not even once, in his main book *Criticism of Pure Reason* (Engels 1989, p. 356).

In contrast to this position, Lorenz emphasizes a much more static and structural a priori. Especially in his famous 1941 article "Kant's doctrine of the a priori in the light of contemporary biology," he pointed out that the Kantian a priori in any individual reveals to be an a posteriori of the species.

> ...that the conception of a priori forms of thought and intuition have to be understood just as any other organic adaptation carries with it the fact that they are for us 'inherited working hypotheses', so to speak, whose truth-content is related to the absolutely existent in the same manner as that of ordinary working hypotheses which have proven themselves just as splendidly adequate in coping with the external world (Lorenz 1941, cited from Plotkin 1982, p. 133).

III. ETHICAL POSITIONS

The different epistemological positions of Lorenz and Piaget also include different positions in ethics. Most of the controversial thoughts concerning epistemology find their continuation within ethical issues.

Lorenz deals with ethics especially in the following books: *On Aggression* (1966), *Civilized Man's Eight Deadly Sins* (1974) and *The Waning of Humanness* (1987). His ethical considerations cover two areas: one is closely related to philosophical (normative) ethics and the other deals with environmental ethics.

A few words on his environmental ethics. In Austria he played an important role in the anti-nuclear power movement as well as in the whole environmental movement. He—as a Nobel Price winner—became something like a leading figure in the environmental debates. It is exactly twenty years ago that he was active in a massive movement against a power plant, which would have destroyed a unique river ecosystem. Lorenz always supported the argument that humans in the long run cannot spend more energy than the sun provides. Alongside he sees a close relation between human aesthetical and ethical senses, and complains for the decay of both in the modern world (Lorenz 1973, p. 30).

Lorenz general ethical considerations follow the basic pattern of the so-called evolutionary ethics, with the core idea that there exist biologically-based patterns of behaviors with ethical implications. He speaks of "behavior analogous to moral behavior" within the animal kingdom (Lorenz 1966). Especially animals with social instincts (like parental and filial affections) have this instinctually-based repertoire of moral behaviors, and this is considered as the basis of human moral behavior.

"Moral sense" or "moral feeling," therefore, is a kind of feeling that leads animals as well as humans to ethical choices, or seriously influences these choices. The core of Lorenz's argument is an evolutionary one, proposing that these kind of moral feelings (or sentiments) developed during evolutionary transformations, providing better chances for survival to the individual or the group. Ethical behavior is considered as a function improving the conditions for survival.

Taking into account, for example, human altruistic behavior and other inter-individual emotional relationships, it is argued that these kind of

behavior evolved and got stabilized in small groups—being the main social structure for ninety nine per cent of human phylogeny (comp. Voland 1992).

These shaping processes led to something that can be called "moral feelings," which are considered as emotional features we share with higher mammals, forming the evolutionary basis of moral behavior in general (Cela-Conde, Ayala 2004). In this way, moral behavior in a broad sense is traced back to its biological roots in opposition to philosophical stances dealing with morals embedded in the context of consciousness and reason.

Modern neurobiological research (in humans as well as in animals) demonstrates several emotional activities in different brain regions related to social behavior (Panksepp 1998; Damasio 1999). The general line of this arguments lead to the assumption that there are strong relations between deep and "old" parts of the brain (the limbic system and especially the amygdala and hippocampus) and the cortex, in particular the prefrontal lobe. This leads to the assumption that all "higher" forms of thinking (including ethically relevant behavior) result from interactions between the neocortex and the limbic system, including emotional systems, which is also a very strong argument for a biological base of ethics.

> It cannot be overemphasized that the basic emotional systems may developmentally be like dynamic system attractors that get larger, more complex and more sophisticated as they pull various cognitive structures into their spheres of influence (Panksepp 1998, p. 143).

The core question arising from these considerations is how emotional features within our behavior come along with cultural conditions beyond the evolutionary relevant sceneries.

To put the question the other way round: how—if so—can cultural influences transform the genetically-based biases toward ethically relevant behaviors? How, for example, can altruism be directed from the evolutionary context of group or tribal members to the whole humankind?

Lorenz and other evolutionists always mention that cultural development in its enormous speed overwhelmed the biological base, leading to a situation where humans are permanently overcharged by culture. The dynamics of cultural evolution are considered as more agile than our adaptational capacities. The statement "cultural evolution overwhelmed our biological base" is quite common within these debates, combined with suggestions to bring human life conditions closer to our biologically-based needs and preferences.

However, for theories that take evolution seriously and which also see an evolutionary pattern within cultural development, the following ques-

tions seem to be central: Why has cultural evolution favored the development of political and social systems with increasing size and complexity, although our social behavior was shaped for small group sizes? Why tribal organization was insufficient compared to much bigger and more complex forms of organization, even in contrast to our biological inheritance? How can these complex organizations survive, although our inherited features are shaped within quite different conditions? There are several answers:

1. Probably the more optimistic answer proposes that human nature is more flexible than expected, and humans have extremely high adaptational abilities. The interface between nature and culture is much more complex and interactive than the simplified proposals of the gene-centered or culture-centered positions.

2. The second is the more pessimistic view, assuming that the dynamics of cultural evolution (especially all its negative aspects) is getting out of control, and decoupled from the natural basis, in long term perspectives leading to the extinction on the human species.

3. The third answer gets out of affairs by stating that the time scale for innovations within cultural evolution is so small that it is impossible to give any answer to the question on the "success" of those innovations.

Just a few remarks on position one. Some of the underlying mechanisms of cultural change and combined adaptations are central topics in the work of the German sociologists Dieter Claessens and Norbert Elias**.** Their contributions are remarkable since as sociologists they take into account biological facts that can be integrated into sociological theories. Compared to the whole corpus of social science theories using the "Standard Social Science Model" (comp. Geertz 1973; Barkow, Cosmides, Tooby 1992, p. 24f) that neglects any instance of biological-evolutionary facts, the ideas of Claessens and Elias are interdisciplinary and extremely productive.

> I belief that today's anthropology has to deal intensely with the problem of the mediation between the archaic concrete and the abstract. And that's the question of evolutionarily-based motivation of humans in relation to the highly abstract situations they produced (Claessens 1993, p. 16, Transl. M.W.).

Norbert Elias work about the "process of civilization" offers a lot of insights within historical anthropology. He proposes the idea that one of the main characters of the development of human societies is differentiation, which leads to increasing interactions and interdependencies between all of its members. In society, spontaneous affective actions got gradually replaced by controlled expressions (Elias 1976, p. 102f). Within the process of civilization the whole biologically-based affective repertoire was transformed and configured (Elias 1976, p. 218).

I can't go into any details about their ideas, I just want to underline that their work offer a fruitful account for bridging the still deep hiatus between evolutionary and sociological theories. Coming from a different field, but arguing in a similar manner Cela-Conde and Ayala formulate that

> Biological naturalism explains how the genetic pool is capable of influencing an individual moral behavior. But cognitive naturalism, which starts to emerge through models of semantic representation (mainly schemes models), should have much to say on this subject (Cela-Conde, Ayala 2004, p. 183).

Concerning moral development, Piaget published in 1931 one of his most famous work, *The Moral Judgment of the Child*. Beside this book some important issues related to morals can be found in the lectures he made at the Sorbonne in the years 1953-54: "Intelligence and affectivity—their relationship during child development" (Piaget 1981).

Piaget's general characterization of ethics can be found in the introductory part of his 1932 book: "Morality can be considered as a system of rules, and the core of morality is the individuals respect for the rules" (Piaget 1932, p. 7).

Concerning moral development, some of Piaget's arguments were reconsidered and more broadly elaborated by Lawrence Kohlberg (1969). He identifies three stages in moral judgment:

I. Preconventional judgment (stages 1 and 2). Close to Piaget's period of heteronomous morality (until age 9). Children at this stage evaluate their behavior in terms of its consequences. In general it is characterized by the priority of the own interests. If rules are obeyed, there existence is traced back to parents, God or elder brothers and sisters. Stage 1, heteronome morality; stage 2, instrumental individualism and reciprocal change.

II. Conventional judgment (stages 3 and 4). Close to Piaget's autonomous morality. The children's choices invoke the concept of social rules and obligations. Basic prerequisite is the ability of role-taking and the interests of others are taken into account. Social norms are accepted. Norms are taken as socially constructed and not as untouchable. In competitive games children watch seriously that nobody plays against the rules. Rules can be changed depending on the internal scales. Stage 3, interpersonal conformity; stage 4, social system.

III. Postconventional judgment (stages 5 and 6). Here self-accepted moral principles result from abstract reasoning playing a major role. In Kohlberg's research, less than ten per cent of his subjects over sixteen reached stage 6. Rational and personal choice of norms are its main characteristics. Rules, values and norms are recognized as principles transcending individual and social relations. Stage 5, social contract and individual rights; stage 6, universal ethical principles.

Piaget always sees morality closely related to cognitive constructions. Moral behavior in a broad sense depends on cognitive abilities and therefore the cognitive stage of the person or the society. Close to his epistemological position, Piaget does not consider any evolutionary-based biases in ethics, and therefore his position is not an evolutionary one. Yet it can be considered as naturalistic, in taking into account the relevant biosocial conditions of human existence (Wuketits 1989, p. 308). Related to his studies on play in children he mentioned, that "...adoption of rules in children's play behavior obeys simple and naturalistic laws" (Piaget 1973, p. 49). As mentioned before, for Piaget the core issue in this field are norms, the origin of these norms and the personal concern for these norms.

I don't want to go into any details on the very complex field of the development of morality in general. What I will do is to present some of the most important cognitive prerequisites for moral development: *decentration* and *symbolization.*

Although symbolization is more intensely discussed within cognitive functions, it will be elaborated here because it is often neglected in evolutionary morals. It is important to see that these cognitive elements do not play a role within evolutionary considerations, and I would argue that the use of both functions could narrow the gap between evolutionary and ontogenetic concepts.

Piaget used the opposing terms *centration* and *decentration* in describing ontogenetic and scientific development. Centration is always related to a tendency conserving existing cognitive structures and their activity. During centration the organism is strictly oriented toward its internal, subjective state, what often leads to serious deformations in the assessment of the environmental conditions. Being centered on its own subjective perspective prevents perceiving situations in a more or less "objective" way. Accordingly, centration leads to a deformation of reality, since attention is focused on just one aspect of a situation, neglecting others (Vuyk 1981, p. 34).

In contrast, decentration is orientated toward changes and differentiation of the cognitive structures. Through decentration structures are enlarged so a broader range of stimuli can get assimilated, which leads to an increasing flexibility of the structure as it deals with those stimuli. This kind of flexibility increases the structure stability. It is necessary to mention that structural activity in general includes centrating as well as decentrating elements, and both tendencies have to be balanced.

Increasing centration leads to rigidity and minimizes the capacity to cope with changing conditions. In excessive decentration the connections to the basic underlying structures get lost. Internal balance within structures and schemes results from a harmonic interplay between centration and decentration.

In Piaget's *Genetic Epistemology* the relations between centration and decentration can be found on each level within ontogenetic development (Kesselring 1981, p. 164f). For Piaget decentration includes the development of rationality and offers the possibility to get some distance from one's own perspective, to see our own point from an outside context. This can lead to the position of autonomous morality, where somebody realizes that his/her own perspective is relative to those of the others.

Although centration and decentration is not necessarily connected with consciousness, in decentration we can become aware of our own structuring activities. In this way decentration is necessary for the development of self-reflection; self-knowledge of the subject is reduced to a minimum in the moment of centration, while increasing decentration opens the mind to new levels of reflection: "As a result of an apparently paradox mechanism, the subject knows himself least in that moment when he is most centered on himself" (Piaget 1975, p. 12).

In moral and social development decentration is the main prerequisite to recognize other persons as autonomous individuals, different from oneself and whose opinions have to be taken into account. Sociocentrism can therefore be considered as a kind of collective centrism with serious consequences—history is full of examples.

For Piaget decentration includes something like a progressive turn, which has to do with his links to the philosophy of the Enlightenment. This movement combined evolution with emancipation and progress for the individual as well as for humankind. Darwin's ideas were also closely related to the Scottish Enlightenment tradition, combining progress of instinct with perfectible rationality.

In Piaget each higher level of cognitive development increases flexibility, range, and stability of the rational structures of thinking and behaving, pointing to universal rationality overcoming deformative and centrating factors (comp. Wetzel 1984, p. 55).

It is remarkable that Piaget did not consider any emotional-affective components within this centration-decentration processes. He did not take into account the massive affective tendencies which are related to specific kinds of thinking and behaving, and their related centrating tendencies. I would argue that this neglect of emotional factors is one of the most serious deficits in Piaget's system, which also includes his distance from evolutionary considerations (comp. Wimmer 1998a).

Taking into account some of the typical behaviors which are subject to evolutionary ethics, e.g., favoring close relatives in contrast to strangers—as a kind of centrating and highly affective behavior—you can see how difficult decentration can be in developing something like universal ethics. In analyzing the evolution of law systems continuous difficulties in the acknowledgement of universal laws in contrast to tribal ones get visible.

A final point that is a major step in cognitive as well as in moral development has to be underlined: *symbolization.* I cannot go into too many details in this field but it seems an essential point, because the function of symbolization, from my point of view, is seriously underrepresented in the whole complex of evolutionary theories (evolutionary psychology, evolutionary ethics, and the rest) dealing with human behavior.

The distance between a symbolic operation and the concrete forms of perception and actions is easily filled up without any remarks concerning the fact that between the immediate sensorial area or the immediate concrete action and the area of symbols, probably formulated in language-structured sentences, exists a gap (comp. Sloterdijk, Henrich 2001, S88-89).

One of Piaget's main research topics was the development of symbolic thought, what he also called *semiotic function*, meaning the ability to manipulate signs and symbols. His ideas in this field can be considered naturalistic in the sense that he saw symbolizing processes resulting from concrete motor faculties (Piaget 1967, 1981).

In early pre-human as well as in most animal behavioral patterns, the connection between motivations and related concrete motoric action patterns is very close. Classical ethology has demonstrated in detail how the internal states (drives), sensory activities and action pattern are related and activated (Lorenz 1981, Tinbergen 1952). In most cases of animal behavior, activated behavioral programs include a specific motor pattern. Following Furth (1987), there is an essential difference between the concrete motor-output of behavior as it can be seen in an animal and the specifically human behavior, where patterns of motoric activity are replaced by symbolic forms of behavior.

It is especially the increasing distance between the concrete behavioral acts from the underlying physiological basis that opens the door for symbolizing activities. This means that with more complex mental-cognitive abilities the directness of behavioral acts gets lost. All the different stages of symbolic expressions and language-related communicative processes demonstrate the growing distance from the basic processing mechanisms at the underlying physiological base.

Piaget considers "object permanence" as one major fact that provides the basis for all kinds of symbolizing processes. An object attains a permanent character when it is recognized as continuing to exist beyond the limits of the perceptual field and the object is no longer a "thing of action" but an "object of contemplation" (Werner, Kaplan 1963, p. 67).

Every evolutionary reflection about ethics has to take into account this discontinuity arising with symbolization processes, as long as the direct connections between the motivational-physiological base and the behavioral acts gets lost. The so-called moral feelings being within a symbolic sphere are much more open to social-cultural shaping processes. Follow-

ing S. Langer, they result from "symbolic transformations" (Langer 1992, p. 34f).

Symbolic transformation—as a core element of S. Langer's philosophy—considers this capability as a central character of humans. In transforming sensorial-perceptual data into the symbolic sphere, the human mind demonstrates a creativity whose products are irreducible to the underlying physiological base.

As a critical remark it can be added that Piaget himself did not consider much the influence of the whole cultural sphere on the development of the semiotic function. Culture in general can be considered as a symbolic system that seriously shapes the development of the individual world. Some recent research connected to Piaget in this field produced very interesting results (Osterdiekhoff 1997). Related concepts coming from sociology and cultural sciences emphasize that there is something like a "cultural memory" (Assmann 2000, p. 11f) and a "sociohistoric apriori" (Knoblauch 1996, p. 16; Luckmann 1996) that have a serious influence on symbolizing processes in human ontogeny, providing a fundamental prerequisite for the whole complex of individual "meaning" and "sense" dimensions.

It is necessary that each evolutionary concept dealing with humans has to take these symbolizing activities into account, since it is exactly within this capacity of the human mind where its plasticity and variability can be located. Probably not all evolutionary-based biases of human behavior can be modified by symbols, but quite a lot of these biases get transformed by symbolic thought, and it is fascinating to see how the basic structures of many symbolic systems can be traced back to a biologically-based pattern of behavior.

In this sense, Piaget's research on symbolization can be seen as an essential connecting link between cultural sciences, which often take symbol systems as purely socially constructed, and biological-evolutionary strategies, which often totally neglect symbolizing activities (comp. Barash 1982; Dawkins 1986).

Form my own point of view, a synthesis of Piaget's work with evolutionary-based ideas could open up our perspectives in a different way than the simplifying evolution–gene stories put forward by the sociobiological models, get related to Piaget's ideas of internal developmental dynamics, situated within a societal frame.

As the result of this approach, an anthropological concept could appear where humans will neither be considered as calculating machines directed toward logical mathematical structures (as it seems to be the case in Piaget) nor as slaves of their evolutionary-established gene constellations (Dawkins 1986), but as developmentally open systems whose capacities for establishing cultural diversity are immense, without being unlimited.

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