

On Non-Substantialism in Psychology – Convergences between Whitehead’s Process Philosophy and Piaget’s Genetic Structuralism

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In this paper the basic concepts of Jean Piaget’s genetic structuralism (structure, wholeness, transformation [accommodation/assimilation], self-regulation) will be compared with Alfred North Whitehead’s fundamental notions (actual entity, subject, concrescence, final aim, superject, and eternal object). It will be shown that there are many parallels within the content of these concepts and even with the problems which they give rise to. Both approaches in being thoroughly processual and relational are radical non-substantialist. The apparent problems of both non-substantialist approaches (the ‘paradox of structuralization’ or ‘paradox of concrescence’ and the problem of the ‘identity of persons’) will be discussed in detail. It will be shown that Whitehead’s proposed solutions for these problems go deeper than Piaget’s and so may be a starting point for further developing and clarifying Piaget’s approach. This also shows that a Whiteheadian non-substantialist process-psychology must not start from scratch but may in principle build up on the empirically corroborated work of Jean Piaget. Finally some methodological issues which become relevant in a radically non-substantialist process-psychology are indicated for further research.

1. Why Whitehead and Piaget?

Whitehead as well as Piaget have been among the most influential thinkers of the twentieth century. Whitehead's contributions to logic and metaphysics are probably best known. Piaget did fundamental research in the fields of psychology, particularly child-development, and epistemology. There is scant evidence of any direct connections between them, however, despite the strong parallels which will be demonstrated shortly. Instead the connections seem to emerge out of a common perspective, a reaction against the „mechanistic world view“ which they inherited according to Ludwig v. Bertalanffy. In his work, *aber vom Menschen wissen wir nichts* [1], he argues that this world view has come under attack in different disciplines.

Originating from general biology and experimental embryology the critical discussion of materialist mechanicism spread to scientific fields such as psychology, sociology and the philosophical tradition of Neukantianismus. New alternative concepts were developed. All these alternatives rested - according to Bertalanffy - on the common ground of a few central ideas. These ideas made up what Bertalanffy had called the "organismic conception" [2] and which he characterized as follows:

Conceiving living systems as wholes in contrast to simply analytic and summative method, dynamic conception in contrast to static or machine-theory of organism; the basic assumption that organisms are primarily active and not reactive systems. [3]

Wholeness and self-activity of the research phenomena, dynamic research perspective and the corresponding methodology are at the core of the organismic paradigm. Bertalanffy mentions that "in philosophical respects . . . especially Whitehead (1925) was one of the important precursors" [4] in the development of the organismic paradigm.

But Bertalanffy does not only subsume Whitehead amongst the forerunners of the organismic paradigm; the same, in his eyes, is true for Piaget: "Again about at the same time [when Werner and

Bertalanffy developed their organic approaches in psychology and biology] the Genevan psychologist Piaget started his research on the cognitive development of the child in a way that can also be subsumed under the term ‘organism’.” [5] So Bertalanffy implicitly states a consensus between these two thinkers concerning the core assumptions of the organismic paradigm.

Piaget himself has characterized Bertalanffy’s organismic conception as promising approach and affirmatively made reference to his central organismic assumptions: ”The structure of organization too is characterized by three features: open system, dynamic of the exchange processes and primary activity in contrast to a primitively conceived reactivity.” [6] The parallels to Bertalanffy’s characterizations of the organismic paradigm are striking.

In this context it is interesting to shift attention to the only reference Piaget makes on Whitehead as a philosopher. Here Piaget - just as Bertalanffy - refers to Whitehead as one of the founders of organicism: ”Already Whitehead in his works on scientific thinking has taken the view that the interpretation of the analysis of reality usually classified as mechanistic cannot be driven to the end and that the terms ‘organism’ and ‘organization’ have specific characteristics that we have to use.” [7]

From this consensus in the main paradigmatic features we now can turn toward a more detailed comparison of the basic concepts of Whitehead’s and Piaget’s approach.

2. Whitehead and Piaget: Convergences in the Basic Concepts

Parallels between Whitehead’s and Piaget’s approaches can be looked for in two different ways: (1) First one can look for parallels in the basic concepts and assumptions of both approaches. (2) Second it is possible to compare Piaget’s psychological theory with those psychological topics that

Whitehead has dealt with to some extent. Such themes are for instance ‘experience’, ‘consciousness’ and ‘person/subject’. In this paper only the first way will be used. [8]

The first way of proceeding is promising since Piaget at the Centre d’Epistemologie Genetique tried to develop a general frame for the integration of special sciences such as logic, mathematics, physics, biology, chemistry, psychology, sociology and linguistics. This frame he called ‘general structuralism’ and it should function as the basis for ”the possibility of a synthesis” [9] of the different scientific disciplines. [10]

Whitehead too intended to frame a general – in his case a metaphysical - system that could and should function as an integrative pattern for the sciences. ”Also it [metaphysics] is not a mere juxtaposition of various sciences. It generalizes beyond any special science, and thus provides the interpretative system which expresses their interconnection.” [11]

In order to meet such a requirement of integration a general structuralist theory had to be built on very general ideas. The general concepts and basic assumptions of structuralism should be exemplified in different sciences. In doing so the underlying structuralist concepts and axioms should build the interpretative frame for all sciences. The core concept of his structuralist conception, of course, is the term ‘structure’. Piaget qualifies this notion by characterizing it as wholeness, transformation (by accommodation and assimilation) and self-regulation. In his later writings he uses a somewhat different vocabulary - like equilibrium and equilibration - but these new terms can easily be linked to his early concepts just mentioned.

In the following sections these central Piagetian notions will be critically compared with some of the fundamental concepts of Whiteheads organismic process metaphysics such as actual entity, superject/eternal entity, subject/concrescence, subjective aim. This comparison will show parallels

between the two conceptions of genetic structuralism and process philosophy. The profoundness of the parallels will become even more evident when the analysis brings to light the same problems both approaches are struggling with.

2.1 Piaget's Concept of Structure

The term 'structure' is not only the corner stone in Piaget's book *Le structuralisme* but in all of his works. All other "fundamental terms of assimilation, accommodation, adaptation presuppose it, for there is always an assimilation 'of' and an accommodation 'to' a structure." [12]

A structure can be characterized in analogy to a system which elements are ordered in certain relations to one another. Hence Piaget conceives a structure as "an integral system of self-regulating transformations" [13]. In order to gain a better grasp of what Piaget meant by structure we have to take a closer look at the characteristics of a structure. These aspects are (2.1.1) the static aspect of definite wholeness, (2.1.2) the dynamic aspect of transformation and (2.1.3) the aspect of self-regulation of the dynamic aspect in order to achieve a new static integrated wholeness again.

2.1.1 The Static Aspect of a Structure: Wholeness

The term 'wholeness' Piaget received from the Gestalt-psychologists. They had emphasized that a whole is more than the sum of its parts. [14] Wholes are not just aggregates, that - being analyzed - would show no features that differ from the characteristics of their constituting parts. On the contrary they are characterized by 'over-summativity': they are unities that are characterized by qualities which their parts taken by themselves lack. Piaget speaks of "building-up [composition] laws"

[15] that determine the relations of the parts to one another and thereby generate the new attributes of the integrated system. He calls this aspect of a structure as the "organized organization" [16].

In emphasizing the wholeness of a structure Piaget dissociates his position from the atomist Associationists as held for instance by psychologists or philosophical empirism of the 19th century. He rejects this position because of its inherent one-sidedness: the elements play the decisive role and the whole correspondingly is of a secondary, inferred status. Within this point of view the qualities of the whole are already given with its parts. So the whole is totally reducible to its constituting parts. The Associationists hold a position that Piaget has termed "genesis without structure" [17].

So Piaget seems to side with the Gestalt-people. But this appearance is deceptive too. Piaget criticizes the Gestalt-approach as well, for being one-sided. He characterizes their position as "structure without genesis" [18] because they also neglect an important aspect of structure: namely its dynamic aspect. The wholeness of structure can not be adequately conceived of without any consideration of its emergence - and hence without regard to its constituting parts.

Piaget decides to take the middle course between the two extremes of Associationism and Gestalt-psychology and he calls this position "operative structuralism" [19]. This dynamic structuralism "provides a link in as far as neither the element nor the whole counts but the relations between the elements, expressed differently: the building-up procedures and -processes . . . the whole is the result of these relations or this construction, and its laws are those of the system." [20] This passage shows that Piaget attributes the more fundamental status to the relations or processes of construction and not to the elements or to the whole. And hence it is only consequent when he maintains: "[T]o answer the question, what knowledge (or the variety of its appearances) is, one would have to formulate it as follows: how does knowledge grow?" [21] This principle does not only hold in the field of epistemology but is also one of the most basic assumptions of his 'genetic structuralism' [22]

This becomes clear when we focus on a quotation Piaget takes from the Neukantian Paul Natrop: "The fieri alone is the factum: all being that sciences try to ascertain must again dissolve into the stream of becoming." [23] Piaget does not discuss Natrop's eminently metaphysical position any further in his opus. But one thing is clear: Piaget gives priority to the diachronic as against the synchronic method of analysis. [24]

So far we have seen that the whole is the product of relational processes of construction. But now an answer to the question of what kind this aspect of wholeness of a structure is becomes even more urgent. Along with that question Piaget raises the problem of Platonism. He asks "are the structures constructed or are they more or less eternally prebuilt" [25]? And if answered in a platonic mode another question raises: "[A]re these building-up wholenesses eternally existent, but how and created by whom?" [26] This according to Piaget "is actually the central problem of structuralism" [27]. Piaget rejects any kind of Platonism and takes the side of Radical Constructivism: "because this construction is the only access to the universe of ideas it [the construction] is self-sufficient, with no need of hypostasizing its result." [28] Piaget's argument against Platonism hence is a purely pragmatic one following 'Occam's razor': Since the only forms and ideas human beings are able to grasp are their own constructions any additional assumptions of any kind of reality of ideas is simply superfluous.

On this point Piaget and Whitehead depart from each other fundamentally. Whitehead holds - according to the ontological principle - an immanent Platonism: A definite form that may be the wholeness of a structure is part of an actual entity which he calls 'God'.

2. 1. 2 Dynamic Aspect of a Structure: Transformation

Under the heading of 'transformation' Piaget deals with the dynamic aspect of structures. Structures are by no means once and for all given. They change by interacting with a changing environment which itself is built up by structures. Structures are not annihilated when they interact with the changing environment - at least generally they are not. But they usually do not stay the same but are transformed. Piaget maintains that they do not simply change but improve. Within the newly developed structures all their old capabilities of the old structures are preserved and new ones are added.

The result of such an interaction with the environment means enlargement and differentiation. A structure is enlarged insofar as it now can deal with more aspects or dimensions of its environment: its field of application is broadened. This enlargement of the field of application can only be brought about by a complementary differentiation of the structure's pattern. This qualitative change of the old structure yields a structure that expresses a new definite wholeness.

A qualitative change is necessary because the unity of a structure is expressed by a wholeness that is more than the sum of its parts. It follows that new elements cannot simply be integrated to the old structure in an additive manner. Enlargement of a structure implies the creation of a qualitatively new structure by fusing the old structure with the new elements. For instance, a very young child that has developed a behavior scheme (or senso-motoric structure) that allows for grasping a rattle, can without any problem apply this structure to things similar to the rattle. However if the child tries to grasp tiny objects - for instance a ring - the scheme has to be modified in order to adapt to the new features of tiny objects. The child now has to use the fingertips to be able to grasp the small object. The newly developed behavior structure now includes the possibility to grasp rattle-like objects as well as smaller things. So in the new structure the older abilities have been preserved and are supplemented by new ones. Insofar as this new structure is applicable to more ob-

jects than the older one, the new one is more stable. Stability in Piaget's view means to be in equilibrium with the environment. For a structure to be in equilibrium with its environment means that a structure can adapt to the changes in the environment. To be in disequilibrium, hence, means that a structure cannot deal with new elements or aspects of its environment. Because the newly developed structure is by definition able to deal with more aspects of its surroundings, it also is more stable.

The process of transformation of structures is an ongoing process which starts from a certain structure with its definitely patterned wholeness and results in a qualitatively new (transformed) structure (in the static sense). This final result itself is the starting point of a new process of transformation that will lead to another level of a more integrated structure. Piaget terms transformation also 'structuring' or 'genesis'. He stresses the fact "that every genesis emerges from a structure and ends in a structure, but inverted each structure has a genesis". [29] "We would like to say that genesis is a relatively determined system of transformations that has a history, and hence in a continuous way, leads from state A to state B, whereby state B is more stable than the original state." [30] Here Piaget's position that genesis has a direction towards more complex (integrated) and enlarged structures which therefore are more stable, is explicitly expressed. It will be discussed later (2.1.3.1).

Now we shall turn to the double-concept of 'assimilation-accommodation'. Piaget introduced this concept in order to specify the process of transformation. The two notions Piaget has adopted from biology: organisms adapt towards the changing environments by assimilating new elements from the environment into their structure (for instance by digestion) and accommodate to the environment at the same time. There can never be assimilation without accommodation and vice versa. Piaget has formulated a formula that should express the process of transformation [31]:

$(T + I) \rightarrow AT + E$ whereby:
 T. . . . old structure
 I. . . . elements of the environment (i. e. structures)
 AT. . new structure that has evolved by accommodating to I
 E. . . . elements of the environment that are excluded from the
 process of assimilation
 \rightarrow . . . process of transformation
 $+$. . . assimilation

An old structure assimilates new elements from the environment, and thereby accommodates to the new elements. At the same time other environmental elements are excluded from the process of assimilation-accommodation in order to secure the survival of the new structure, which of course cannot assimilate all elements of a given environment without being destroyed. So transformation is a process of changing the definite wholeness of a structure (accommodation) in order to meet the new requirements of environment and thereby being able to integrate new elements (assimilation).

So far we have presented the process of transformation. But now we shall turn to the last characteristic of a structure: self-regulation.

2. 1. 3 The Regulatory Aspect of Structure: Auto-Regulation

This third aspect of a structure relates the two before mentioned aspects of wholeness and transformation to one another: Auto-regulation secures that the process of transformation produces a definite wholeness. Self-regulation "means that those transformations inherent in structure do not transcend its boundaries, but always create only the elements that belong to the structure and conserve its laws." [32]

Only those elements of the environment will be assimilated which do not destroy the emerging structure. Elements that are not capable of being integrated into a new synthesis are not assimilated; otherwise no new wholeness could emerge because the elements would not allow for integration to the new structure.

At this point we have to deal with the surprising fact that Piaget almost nowhere in his work, has ever dealt with the problem of the destruction of structures. One of these rare passages may be quoted here: "The whole, hence, will be transformed in its structure if only one of its elements is changed. That means that either death enters, hence decay occurs, or that something continuous as a totality." [33] One can only speculate why Piaget has only very infrequently mentioned this possibility of decay or destruction of structures and nowhere in his work it is discussed thoroughly. Of course one could argue that he was primarily interested in the growth of structures and not in their possible decay. But then we have to ask how one can hope to construct an adequate theory of structures and their growth without taking into account and explaining the possibility of decay and destruction. So here Piaget's approach shows some deficiencies.

2.2 Whitehead: Actual Entity

In Whitehead's system the notion of an actual entity designates the core concept. Among the eight categories of existence [34], the category of actual entities is singled out because of its unique importance and centrality: "Actual entities . . . are the final real things of which the world is made up. There is no going behind actual entities to find anything more real." [35] All that exists is constituted by, or derived from actual entities. So actual entities in Whitehead's approach take the place of Piaget's structures.

An actual entity too has a static, a dynamic and a self-regulatory aspect. Whitehead calls these aspects 'superject', 'subject' and 'subjective aim'. "An actual entity is at once the subject experiencing and the superject of its experiences. It is the subject-superject, and neither half of this description can for a moment be lost sight of." [36] As for Piaget each structure is at once a genesis (transformation) and the result of that transformation, the emerged definite whole, for Whitehead an actual entity is the emerging subject as well as the definite outcome of this emergence: the superject. Once this distinction between a dynamic and a static aspect, is made it takes only one further step towards postulating two different strategies of research: a genetic and a morphological one. Each actual entity, hence, can "be considered genetically and morphologically." [37] Piaget speaks of a 'synchronic' (static) and a 'diachronic' (dynamic) way of analyzing structures. [38] Both thinkers agree that both ways of investigation have to complement each other in order to do justice to reality. But they also agree that the dynamic aspect is the more fundamental one. Whereas Piaget stresses the fact that to understand what knowledge *is* means to know how it *grows*, Whitehead formulated the same insight more generally in the principle of process: "[H]ow an actual entity *becomes* constitutes *what* an actual entity *is*." [39]

Before continuing to compare the two basic concepts in more detail with each other another basic concept of Whitehead's system first has to be introduced. To designate the dynamic aspect of an actual entity, Whitehead also uses another notion: concrescence. Just as the etymology of this notion suggests, it stresses the growing together of diverse elements into a new unit: an actual entity. The difference between 'subject' and 'concrescence' lies in the different aspects of the process they emphasize: whereas the notion 'subject' stresses *the internal unity of the process*, the term 'concrescence' stresses the fact that the process is an *integration of diverse and definite elements*. After this terminological clarification we may continue by comparing in detail Whitehead's term actual entity to Piaget's structure.

2. 2. 1 Wholeness - Superject

The superject is the final synthesis of the process of concrescence of an actual entity. As such, it is more than a "mere multiplicity" [40] of elements, and hence any new element entering into this synthesis would change its definite quality. [41] This implies that according to Whitehead an actual entity "in no sense is ... the sum of its parts." [42] Here we find that Whitehead just like Piaget sides with the gestalt-psychologists: the whole is characterized by 'oversummativity', and Whitehead illustrates this aspect by referring to the composition of a picture. "The pattern of colors is 'given' for us. But an extra patch of red does not constitute a mere addition; it alters the whole balance. Thus in an actual entity, the balanced unity of the total 'givenness' excludes anything that is not given." [43]

An actual entity achieves its definite unity or wholeness by realizing an eternal object. [44] Eternal objects - also called Platonic forms by Whitehead - exist *before* their realization in and through an actual entity. But that does not mean that they exist apart and devoid of all actual entities; all eternal objects together make up God's primordial nature. Since God is an actual entity eternal objects are derivative of at least one actual entity. So Whitehead holds a naturalized Platonism, since God as an actual entity is not transcendent, but immanent in the sense that it exemplifies all metaphysical categories. On this point, as we have already mentioned, Piaget diverges from Whitehead. Discussing the problem of the existence of mathematical patterns Piaget holds a pragmatic position: "Sure, one can always say the subject acquires only structures that exist virtually eternal, and since the logico-mathematical realities still are more of a possibility than of reality one can be content with this Platonism for one's own use." [45] But immediately Piaget adds that this 'Platonism for one's own use' does not suffice if one tries to develop an epistemology, because an inevitable question that cannot to be answered in a satisfactory way is raised: "where does that virtual have its

place” [46]. And he continues: ”To base it on essences is just a *petitio principii*. To look for it in the physical world is untenable. To relate it to the organic life is more fruitful yet, if one is conscious of the fact that algebra is not contended in the activities of bacteria and viruses.” [47] As we have already seen, Whitehead’s answer to Piaget’s question is: eternal objects are within an actual entity and hence within the universe. This one actual entity that encompasses all eternal objects Whitehead calls ‘God’ or more accurately: the primordial nature of God. In as far as Whitehead conceives God as an exemplification of his metaphysical principles his solution of the problem is immanent rather than transcendent. Furthermore, it is interesting on this point to draw one’s attention to the 5th category of obligations, namely the category of conceptual reversion. This category establishes the possibility of genuine constructions of new patterns within the process of concrescence without recurrence to God: ”It is the category by which novelty enters the world.” [48] Postulating this category, Whitehead comes very close to Piaget’s position on that topic, for this category means that ”[t]here is a secondary origination of conceptual feelings with data which are partially identical to, and partially diverse from, the eternal objects forming the data in the first phase of the mental pole.” [49] So this category opens the possibility to construct out of the given data new patterns that are not simply given for the subject. Since God’s primordial nature is an element in the datum of any concrescence this seems to mean that the subject is able to construct new eternal objects. As promising as this (extreme?) interpretation of the category of reversion may seem for our attempt to relate Piaget’s and Whitehead’s approach to one another, one must not forget that Whitehead abolished this category [50], when he recognized that this category contradicted the central ontological principle. According to this principle everything that exists has to be either an actual entity or has to be derived by abstraction from an actual entity. [51] Since a construction of an eternal entity ‘*ex nihilo*’ violates this metaphysical principle, Whitehead in striving for a coherent metaphysical system had to abolish the category of revision.

Piaget instead holds the position, that the pattern that gives the process of structuralization its definite unity, is created in and through the process of structuralization itself; hence there is no need for any place where the patterns exist before they are constructed in the act of structuralization. Although Whitehead in his purified version (after abolishing the category of conceptual reversion), characterizes the formation of an actual entity as an act of "self-creation" [52] that - as far as concerned with patterns of definiteness - only refers to (1) to the selection of preexisting eternal objects and (2) to the mode of integration (subjective form) of the eternal object into the process of concrecence of an actual entity.

So although it is evident that Piaget and Whitehead hold different positions on this topic it should have become clear that they are closer than one might expect at first glance and superficial reading. If Whitehead's concept of eternal objects is reformed, or even abolished - as many thought it to be possible without essential loss [53] - and the category of conceptual reversion is revived, Whitehead's position fits quite well to Piaget's position. But there is also another possibility (that I prefer): In *Le structuralism* Piaget discusses the concept of a God that could be compatible with the structuralist approach he favors and that could be referred to when looking for a place where eternally existing structures could be localized: "God [has] ceased to be unmoving and he constructs constantly ever 'stronger' systems" [54]. This God seems to bear some similarity to Whitehead's conception of God - at least to the consequent nature of God. So Piaget seemed to see a possibility to interpret his genetic structuralism in a less naturalized way. On which side one wishes to side on, one thing should have become clear: Whitehead's and Piaget's position are so close that they can easily be made consistent.

2. 2. 2 Transformation - Subject/Concrecence

An actual entity is more than the final realization of a definite pattern. An actual entity in its essence is a process: a process of concrescence or growing together.

As a subject, an actual entity is the process of its own self-creation. This process can be characterized as growing together and thereby finally realizing a definite pattern. These processes are the only actualities that constitute the universe. The datum of this process of growing together are the preceding actual entities. So an actual entity emerges from other actual entities which build its datum. This parallels Piaget's position that a structure evolves by integrating the old structure and new environmental elements which of course are nothing else than structures themselves or aspects of such structures.

Piaget does not discuss this process - as we have mentioned before - on a metaphysical but rather on biological or psychological levels. So he deals with what Whitehead would have called societies. That being the case it leaves no wonder that Piaget emphasized the aspect of continuity between the ongoing structuralizations that must secure a complex organ (biological structure) or psychical structure. To emphasize continuity he stresses the role of the old (complex) structure in the process of structuralization. Apart from this emphasis the process of structuralization and concrescence show deep parallels.

We have seen that Piaget tried to structure this process with the double-category of assimilation and accommodation. He even expressed the process in a formula (see: 2.12). According to Whitehead an actual entity - just like a structure in Piaget's system - emerges by a process of integration of diverse elements into a definite unity or wholeness. So there should be no problem to interpret Piaget's formula in Whiteheadian terms. That this can be done without any difficulty is shown here by substituting Piaget's terms by Whiteheadian ones:

$(T + I) \rightarrow AT + E$ whereby:

T, I. . . datum of the process of concrescence: perished actual entities

AT. . . new actual entity

E. negatively prehended actual entities that are excluded from the process of concrescence

\rightarrow process of concrescence

+ (re)integration

In an enduring society i. e a personally ordered society "T" would be the immediate precursor of the newly developing actual entity. 'I' would be actual entities that build the environment of that actual entity.

That this substitution of the original notions of the variables in Piaget's formula of structuralization by Whiteheadian terms without any difficulty and thereby leaving the meaning unchanged indicates that our attempt to search for parallels between the two approaches has been quite successful.

But let us leave this general level of this formula for a while and switch to the field of interacting societies: Whitehead comments on it: "There are thus two sides to the machinery involved in the development of nature. On one side, there is a given environment with organisms adopting themselves to it. ... The other side of the evolutionary machinery, the neglected side, is expressed by the word *creativity*. The organisms can create their own environment." [55] So Whitehead although not using the terms 'assimilation' and 'accommodation' sees them nevertheless both at work in the development of nature. And contrary to many Darwinists he - just as did Piaget repeatedly - emphasizes the active side of this dipolar process: assimilation.

In Whitehead's account societies come closest to Piaget's (complex) structures. And it is interesting to see that these societies interact constantly with their environment (i. e. mainly other societies). If for instance we return to a personally structured society: A personal society is defined by a definite pattern. This pattern has to be reproduced and altered according to the changes of the environment. New elements have to be integrated (positively prehended) and others have to be excluded from integration (negative prehension). So the society that has just perished throws its pattern on to a new emerging society that raises out of the 'old' and yet perished societies and other environmental influences. Thereby the pattern that is passed on is modified - accommodated to the prehended new elements - and on the other side new elements are integrated into this structure. So a new pattern is realized. The process of concrescence is an interactive process of adaptation: a process of growing together.

There is even one passage in Whitehead's writings where he even uses the term 'assimilation'. In his essay 'The Rhythmic Claims of Freedom and Discipline' [56] he writes: "It must never be forgotten that education is not a process of packing articles in a trunk. Such a simile is entirely inapplicable. It is, of course, a process completely of its own peculiar genus. Its nearest analogy is the assimilation of food by a living organism" [57]. This is the same analogy Piaget uses to introduce the double-category of assimilation-accommodation. Whitehead has no equivalent for the double-notion assimilation-accommodation but on the metaphysical level the terms 'concrecence', 'integration' and 'reintegration' [58] suffice the same function.

2. 2. 3 Self-Regulation - Subjective Aim

Concrecence far from being chaotic is a regulated process that leads to the emergence of new actual entities. Piaget's structuralizations end in new definite unities namely structures and White-

head's concrescence bring about new actual entities exemplifying eternal objects. Whitehead introduces the concept of subjective aim [59] in order to do justice to this regulative aspect. "This subjective aim is the subject itself determining its own self-creation as one creature." [60] The subjective aim can be conceived as an eternal object that from the initial phase guides the (a-temporal) process of melting together of the diverse elements of the immediate past. [61] Without this tendency towards an end (pattern) no definite unity of a superject could be reached. The subjective aim determines which perished actual entities are positively prehended and thereby integrated and what elements of the immediate past are negatively prehended and so excluded from the process of the realization of the aimed at pattern.

All that comes very close to Piaget's position on self-regulation. And since this is the case Whitehead runs into the same troubles as did Piaget: the circularity of the conception of self-regulation. This will be discussed next.

3. The Paradox of Becoming

It should have become clear so far that both thinkers hold radically relational and process-oriented positions. Now that the parallels between the basic concepts of the two approaches have been discussed in detail, we shall shift our attention to a main problem both thinkers are confronted with: the paradox of becoming.

3.1 The Paradox of Equilibration

Self-regulation of structuralizations is one of the essential features of a structure. According to Piaget, it is this self-regulation of structures that saves the structures from being destroyed, by assimilating new incompatible elements. So the structure is "conserved in a way that the introduced changes are an enrichment." [62] According to Piaget structuralization normally produces a new improved structure. However this raises the problem that the new structure has in some way to be present at the outset of the process of its own production, because that seems to be the only way to make intelligible how those elements, which are not capable of integration into the new structure, are excluded from the process of assimilation. Piaget has admitted that this situation is "disturbingly similar to a vicious circle" [63]. For it seems that "the cycle of interaction . . . is the cause as well as the result of the regulations." [64] In one of his latest books *L'équilibration des structures cognitives* Piaget's tries to solve the problem by giving priority to the wholeness: "But in each biological and cognitive system the whole must be characterized as more original; it does not evolve from the combination of parts, but the parts evolve by differentiation from it." [65]

This decision in favor of the whole as against the parts, however, has consequences that undermine Piaget's whole approach. For if we take serious, that the parts (elements that are to be integrated into a new definite structure) evolve by differentiation out of the whole, so the grave question raises if thereby, the parts are formed in advance by the whole. Stated in different words: does this solution not abolish accommodation? If so, one is forced to ask whether Piaget's theory is still the same? For a regulation that abolishes one of two interacting elements is no regulation at all. Broughton clearly expressed Piaget's proposed solution of the problem: "Piaget has emphasized the 'active subject' at the expenses of the active environment." [66] And he goes on by demonstrating that this position leads to consequences that cannot be accepted: "How can a world that is constructed by the subject resist to construction of the subject?" [67] Ros' objection is very similar: "[O]n the one hand the 'equilibration majorant' is defined as an equilibration that leads to a new wholeness. But if this is true, the whole on the other hand is not to be conceived as the regulator of this transition - Piaget

does just exactly that.” [68] Here we find one of the reasons why Piaget often is interpreted as a radical Constructivist (see for instance v. Glasersfeld [69]). For if the constructed whole (here: subject/person) is given absolute priority, the parts (environmental aspects) are reduced to secondary creations of the wholes (subjects/persons). Moreover this late position is obviously contradicting Piaget’s earlier writings. In his book *Biologie et connaissance*, for instance, Piaget explicitly rejects his later position when he states ”the whole does not precede the parts” [70].

So it seems that the late Piaget has given up his radical relational position between whole and parts in the light of the paradox of structurization. Hence Piaget’s proposed solution either is no adequate solution or one of the central assumptions of his early approach has to be given up, namely that of assimilative-accommodative interaction of subject and object [71]. This alteration of interactionist and process-relational core assumption is so central that - if accepted - one hardly can speak of the same theory anymore. What about Whitehead? Did he face the same problem? And if so, was he able to propose a better solution?

3.2 Paradox of Concrecence

An actual entity is its own becoming. On the one side a new actual entity is about to emerge but on the other it has to guide this process of its own self-creation which seems impossible, since it does not exist yet. But without this guidance there is no fair chance the actual entity will ever come into existence. In other words: that which is about to emerge and so has to be realized yet has to effect its own process of becoming. This paradox has been criticized severely by different thinkers. Already very early Gentry had put the question as follows: ”How shall the subject’s response, the reaction etc. to the datum or the selective and discriminating functions that are ascribed to prehensions be explained, if there is not postulated an existing subject?” [72] And Eslick hits the point when he writes: ”Here we have to do it with something very mysterious. As the subject of its own

feelings, the subject exists before its own existence . . . The principle of contradiction is violated: a thing cannot at the same time exist and not exist.” [73]

Whitehead was well aware of this problem. He tried to solve it by his epochal theory of time. In attempting to find a solution he did not try to solve the problem by eliminating one factor of the process of interaction, like Piaget did when he gave absolute priority to the subject (assimilation). On the contrary: the epochal theory of time allows Whitehead to hold on to his radically relationalist position.

The before mentioned paradox of becoming is essentially a problem of succession, in time because the problem is that of a subject that has to exist *before* its own existence, in order to secure its own coming-into-existence. Now Whitehead maintains that within the process of concrescence there “is not the temporal succession: such a view is exactly what is denied by the epochal theory of time. Each phase of the genetic process presupposes the entire quantum, and so does each feeling in each phase. The subjective unity dominating the process forbids the division of that extensive quantum which originates with the primary phase of the subjective aim.” [74] Rather the product of this process is temporal extension but not the concrescence itself. Hence its unity is not dividable into sequences describable terms such as ‘before’ and ‘after’. That implies that the creation of an actual entity follows a principle of ‘all or nothing’. Either it comes into existence at once - as a whole - or it does not - and then there exists nothing at all.

Whitehead relies on W. James for support of this - at first sight unquestionably strange - concept. [75] On the other hand Whitehead argues that this contradiction is due to the deficiencies of our languages that rest on a basic subject-predicate structure. According to this argument the mentioned contradiction, is fictitious. “If the subject-predicate form of statement be taken to be metaphysically ultimate, it is impossible to express this doctrine of feelings and their superject.” [76] This structure

of language supports a substance-attribute approach in metaphysics by supplying it with evidence. Hence Whitehead takes the only available way to argue for his position. He has tried to provide for his epochal theory of time what is called an 'indirect proof' in mathematics: he shows that the contradicting thesis, namely that each process or sub-process can be divided into temporal successive phases, leads into severe difficulties (contra-dictions) as well. So the problem in question at least remains an open one. Doing that he uses an old and well known argument that was proposed by Zeno: the paradox of the flying arrow. Whitehead summarizes the argument as follows:

“The argument as far as it is valid, elicits a contradiction from the two premises: (i) that in a becoming something (*res vera*) becomes, and (ii) that every act of becoming is divisible into earlier and later sections which are themselves acts of becoming.” [77]

The second premise states that each earlier section of becoming itself is dividable into new sections and so on infinitely (ii). Hence nothing can become at all since hence any act of becoming presupposes the earlier sections of its own becoming which themselves divisible cannot come into existence, since they themselves presuppose earlier phases of their becoming, in order to be able to become and so on. And so this premise (ii) contradicts premise (i) that states that in any act of becoming something comes into existence.

”Consider, for example, an act of becoming during one second. The act is divisible into two acts, one during the earlier half of the second, the other during the later half of the second. Thus that which becomes during the whole second presupposes that which becomes during the first half-second. Analogously, that which becomes during the first half-second presupposes that which becomes during the first quarter-second, and so on indefinitely. Thus if we consider the process of becoming up to the beginning of the second question, and ask what then becomes, no answer can be given. For, whatever creature we indicate presupposes an earlier creature which became after the beginning of the second and antecedently to the indicated creature. Therefore there is nothing which becomes, so as to effect a transition into the second in question.” [78]

This last inferred sentence contradicts premise (i). So we have to abolish at least one of the two premises in order to avoid the contradiction. Whitehead decided to reject premise (ii). The conclusion he draws from his argument is “that in every act of becoming there is the becoming of something with temporal extension; but that the act itself is not extensive, in the sense that it is divisible into earlier and later acts of becoming which correspond to the extensive divisibility of what has become.” [79] That is an exact statement of Whitehead’s epochal theory of time.

Of course Whitehead - and many critics have called attention to that fact [80] - describes the process of concrescence by using temporal terms such as “succession”, “antecedent”, “continuity” and “until” [81]. This is due to the impossibility of talking within a language with a subject-predicate structure about processes in any other way than by using such terms.

The same line of argumentation is taken by the physicist D. Bohm. He maintains that the subject-predicate structure of language is not capable of expressing subatomic processes adequately. [82] Hence he has proposed a more dynamic mode of language. This “[R]hei-mode is based on a world view, that differs absolutely from the common use of language.” [83] That modern quantum physics quarrels with analogous problems like Whitehead’s approach is supportive of Whitehead’s position. That is especially so because in reference to the epochal theory of time he claims that “the cosmological outlook, which is here adopted, is perfectly consistent with the demands for discontinuity which have been urged from the side of physics. Also if the concept of temporalization as a successive realization of epochal durations be adopted, the difficulty of Zeno is evaded.” [84] Bohm confirms this impression when he declares that his “declared starting point in the whole equals that of Whitehead.” [85]

Kesselring in dealing with the analogue paradox of structurization in Piaget's approach too refers to the deficiencies of our language(s) and to the limits of analytical thinking that are brought about by these deficiencies: "The . . . paradoxes are not the result of contradictions that could, in principle, be avoided or into which one has involved without noticing and which one could be charged of by opponents, but rather they are consequences of the inability of analytical thinking to adapt to the dynamic structures which biological as well as cognitive processes express." [86]

As we have already seen Piaget was fully aware of that problem and that he tried to solve the problem by giving priority to the whole at the cost of the role of the parts. Whitehead on the contrary did not give up his process-relational position when facing the paradox of becoming. Instead he developed the 'epochal theory of time' which allowed him to hold the process-relational position that tries to do justice to the subject (wholeness) and to the objects (parts). So Whitehead's investigations of the process-relational approach go deeper than Piaget's and are even compatible with the basic features of contemporary (quantum) physics. [87]

So far we have seen that Piaget and Whitehead have developed two systems of thought that are parallel - even concerning their inherent problems.

4. The Concept of Person

In this section the concepts of the terms 'person' (Whitehead) and 'subject' (Piaget) will be compared and discussed. Today the term 'subject' usually involves an almost chaotic multiplicity of associated notions: subjectivity, person, self, individual, sub-stance, . . . Many definitions for these terms and their interconnections have been proposed and so a confusing situation has evolved in that field. With reference to the term 'person' Theunissen states: "The term substance here is confronted with the concept of person, there it is identified. Here the person appears as the individual,

there as its opposite. One sees no difference between person and subject the other one sees an insurmountable gap. For the one, personality and Ego coincide, for others they do not even affect each other. And while one when saying 'person' means the self, the other one understands it as that which has to be overcome by the becoming of the self." [88] Theunissen tries to get some system into this multiplicity of concepts. He differentiates between two contrasting concepts of person:

- (1) the relationalist concept of person
- (2) the substantialist (absolute) concept of person. [89]

The relational position characterizes the person as "a being consisting of relations" [90] The relations are constitutional for the person. It follows that a person cannot even be thought of without its relations to its environment. This position according to Theunissen is derived from the domain of the theater. "The being-in-the role of the actor is the model form which the being in relations of the person has been read of. . . . He [the person] is not behind or above the role, not somebody which as one that is already existing would perform in a role, but solely the role in which he performs." [91]

The absolute substantialist view of person defines the person as self-sufficient and independent of its relations. A person here is conceived as a pre-relational and thereby a self-sustaining entity: a substance. This substantialist approach conceptualizes the person as the *bearer* of relations. The person itself exists before and hence independent of these relations. Referring to its theatric origin of this metaphor Theunissen states: "But the actor also can be detached from its role and be viewed as the bearer of the role. The 'individual in itself' was at the place of origin of the term of empty substratum, that was left after abstraction of the role." [92]

This distinction drawn by Theunissen is helpful as a principle of classification in our context, for it facilitates to show the parallels between Whitehead's and Piaget's approaches; it will be demonstrated that Whitehead just as Piaget held relationalist concepts of person.

4.1 Subject in Whitehead's Approach: Person

It was already mentioned that Whitehead used the term 'subject' in an extraordinary way. Within his system it designates a metaphysical notion, namely the private aspect of the concrescence of an actual entity. To refer to that which today usually is termed 'subject' he therefore introduced the notion 'person'.

A (human) person, according to Whitehead, is a series of actual entities. Such a serially ordered actual entities are technically called *personal society* in Whitehead's system. It is not man as a whole. Man is a "complex structure" [93]: different kinds of societies are hierarchically interwoven into one complex unity. [94] The body itself a complex of societies of different levels is ordered in a way that allows a personal society to sustain on top of that hierarchy. This personal society with its "dominant members" [95] integrates the subordinate societies and their reactions towards environmental changes into a unity and thereby secures the survival of that complexity called man. [96] Because of its sequential order a personal society shares the main characteristics of an actual entity.

Rejecting what he called the 'subjectivist principle' [97] Whitehead withdrew from any substantialist concepts of person. In doing so he at same time dissociated from empiricism (cf. Hume) as well as from Transcendentalism (cf. Kant). If a person is conceived as a 'prote ousia' (first substance) in the Aristotelian sense, by definition only attributes and not substances themselves can be experienced by persons (which themselves are first substances). For, according to Aristotle, substances can neither inherit in, nor be predicated of other substances. [98] In Hume's case that implies that

there is nothing like a 'substance' at all, since only what can be experienced can exist. In Kant's case this leads to a complete ignorance about the substance or 'noumenon' (Ding an sich).

Whitehead by conceiving the (human) person as a serially ordered society kept distance to all these conceptions. His position takes the 'via media' between the two extremes of empiricism and transcendentalism: an actual entity is as well the product of the environment (to a certain extent) as a process self-determination (to a certain extent). To put it in Piaget's terms: the process of structuring takes place by assimilation *and* accommodation.

There are at least two aspects of an actual entity that distinguish it from a Aristotelian 'first substance': First it is (1) radically relational and second it is (2) active. And since a person is constituted by a sequence of actual entities, these two characteristics equally apply to persons.

(1) Relationality means "that all actual things are subjects, each prehending the universe from which it arises." [99] An actual entity emerges out of its immediate past environment. Each member of the living personal society is constituted by this process of 'growing together'. It grows of the environment, which is nothing else than its immediate predecessors. So an actual entity is nothing apart from its relations to its immediate past. It does not exist before these relations. It is rather the process of 'being-related'.

(2) A growing together of an actual entity is not a mere passive occurrence. The emerging actual entity shapes itself around the environmental conditions. In this restricted sense it is an act of self-creation. Whitehead rejects the so called 'sensationalist principle' [100] which states that experience is a passive registration of something simply given. Whitehead shows that even Hume violated this sensationalist principle: supposed we present a continuity of shades of a certain color leaving one tone it would according to Hume be possible for a viewer to add this tone autonomously. [101] What for Hume was a violation of an important principle is for Whitehead a central principle itself: the constructive activity of an actual entity. Whitehead illustrates this position by

using a theater-metaphor: The process of concrescence of a new actual entity out of the just perished world is "not a mere representation of the cause. It is the cumulation of the universe and not a stage play about it." [102] Through this activity novelty enters the world. In respect to human beings this is a necessary condition of their freedom.

Now that we have characterized Whitehead's concept of person as radically relational and active an important problem rises: the problem of identity. Whitehead is well aware of this problem. [103]

The problem can be stated as a logical dilemma (more special: a constructive dilemma):

On the one side the identity of a human person has to be secured. This is done by the concept of a serially ordered society which passes on a certain pattern from the just perished actual entity to the emerging member of the society. And exactly this feature of securing the identity between actual entities of one society threatens the possibility for flexible response to environmental change. Adequate (re)action towards environmental changes means integration of new elements into the unity of an actual entity; thereby its unifying pattern has to be altered. So the new actual entity must by definition be qualitatively different from the preceding one which threatens the continuity, and hence identity, between the two actual entities in question.

The problem hence can be stated as a constructive dilemma with the following argument form

[104]:

- (1) The (human) person is a serially ordered society or it is not a serially ordered society.
 - (2) If the human person is a serially ordered society, then the (human) person cannot bring about *new* acts.
 - (3) If the (human) person is *not* a serially ordered society, then it has no identity.
- . ∴ The (human) person cannot bring about new acts or it has no identity.

Both consequences expressed in the conclusion of the argument are not acceptable. Since a constructive dilemma is a valid logical argument, there is only one way out of the problem: by differentiating at least one of the premises. And that is exactly the strategy Whitehead takes: He introduces a *new form* of personal society: namely the *living* personal society. While the principle of inheritance of the defining pattern is kept by the introduction of propositions the members of a living personal society are freed from the grip of the immediate past. Propositions loosen the grip of the past by enabling the production of novelty. This is, according to Whitehead, their main function: to be a "lure for feeling" [105].

But how is identity to be conceived in a society which members, by definition, produce novelties? Obviously it cannot be a simple static form of identity. Whitehead nowhere has dealt extensively with that question. He made only a few sketchy remarks on this topic which need interpretation. This we shall undertake now.

There are mainly two sections in *Process and Reality* that give a glimpse in which direction Whitehead thought a solution to be possible: "We - as enduring objects with personal order - objectify the occasions of our own past with peculiar completeness in our immediate present." [106] And: "An enduring personality in the temporal world is a route of occasions in which the successors with some peculiar completeness sum up their predecessors." [107] An alternative to the static inheritance of the defining pattern of a personal society a *living* personal society changes its pattern by integrating new elements into its newly developing unity but under the condition that the old pattern of unity is somehow 'conserved' in the new unifying pattern. So the old pattern becomes qualitatively transformed, but still is 'summed up' in the new one and thereby preserved on a new - more complex - level. To arrive at a unity that is able synthesizes the old pattern with new, sometimes very strange environmental elements, a great deal of flexibility in developing new patterns is needed. Such flexibility only can be attained by constructing propositions.

4.2 Person in Piaget's Approach: Subject

What now is Piaget's concept of a (human) person? First we have to mention that Piaget in general uses the term subject to designate what Whitehead has termed 'person'. But what is a subject from Piaget's point of view? The answer must take into account that Piaget holds the position that reality is built up by structures and structures only. Hence the subject has to be a structure or a sequence of structures. To put it in Piaget's own words: "The subject exists, because the 'being' of the structures in general is their structuralization." [108] So Piaget just like Whitehead rejects an underlying substratum of the process of structuralization and so avoids the 'reification' of the subject.

So the subject has to be a structure. But structures change continuously while interacting with the environment. And so we arrive at the same problem of identity as we did when dealing with Whitehead's position. There are not many sections in Piaget's work that deal with that question. So Piaget's position needs clarifying interpretation. First Piaget maintains that "the organism is the origin of the subject [109]. This is in accord with Whitehead's position because the living personal society needs an adequate surrounding in order to be able to survive. This environment is the body. So the subject seems to be tightly connected to the bodily structures.

According to Piaget man is a complex of structures which are hierarchically ordered and which members intensively interact with each other. Hence Piaget distinguishes between three types of structurizations – or as he terms it in his later works: equilibration [110]. There are equilibrations between

(1) the subject and the objects,

(2) the subsystems (substructures) of the organism (for instance organs),

(3) the subject and the subordinated systems, which organize the substructures "to a hierarchical order" [111].

For a discussion of the (human) subject only type three is primarily relevant because it deals with the question how the subject is related to the body. Piaget mentions that equilibrations of type three "dominates the other two." [112] If this were not the case very easily harmful equilibrations on the lower levels could take place that might even threaten the existence of the whole organism. "This ability to preserve the whole hence is the regulator, which can at any time force a direction on the [subordinate] regulations and that with an imperative demand: either integration of the new assimilation and accommodation into the whole cycle is possible or this cycle is interrupted, the system has to be given up." [113]

This implies that the subject from Piaget's point of view is on top of the hierarchy, continuously equilibrating between the influences of internal substructures, the external changes and its very own goals. That suggests to conceive the enduring subject as a sequence of structurings of the structures on top of the hierarchy. This interpretation of course is in accord with Whitehead's position on the (human) person. Though Piaget himself does nowhere in his work discuss this problem, it is hard to see how else his conception of the subject as a structure can do justice to temporal endurance. Of course this position raises the same problem as Whitehead's: the problem of the subject's temporal identity.

Since Piaget nowhere explicitly takes the view of the temporally continuing subject as a linear series of structurings there of course cannot be found any passages on the problem this position involves. The problem emerges because a sequence of structurings by definition permanently changes the unifying pattern. In what sense are these different structures which constitute subject identical? There is only one passage - as far as I can see - where Piaget touches the problem at least

slightly. He writes: "[T]he assimilation is also a factor of permanence and continuity of the forms of the organism." [114] Even in that passage we do not find the terms 'identity' and 'subject'. But Piaget writes of 'permanence' and 'continuity'.

But how can assimilation be 'a factor of permanence'? Isn't it just the contrary: is assimilation not necessarily associated with the need to accommodate to the assimilated elements? Here the notion of the 'equilibration majorant' may help to understand the quotation. Equilibrations (structurizations) are reactions to disturbing environmental occasions. By altering the pattern (wholeness) of the old structure these new elements can be integrated and so lose their aspect of disturbance. These modifications of the structures definite character of wholeness is not to be conceived simply as a change; it is rather - as Piaget has put it - an "enrichment" [115] of the old structure: The new structure secures the old possibilities along with the development of new ones. So Piaget's few expressions on the problem of the (human) subject easily can be interpreted in accordance with Whitehead's position.

But there are even more parallels. For Piaget too the (human) subject is characterized as (1) radically relational and (2) as essentially active.

(1) According to Piaget the process of structuralization (equilibration) is an act of integration of environmental influences into the thereby altered structure. And it is primarily this process of development that exists and not the developed static structure. Piaget expresses this fact by calling the subject an "organ of relations" [116]. There is only one possibility to conceive the subject as an organ of relations: "the subject . . . owns no structure before it constructs them" [117]. So the subject is the process of its own construction in interaction with the environment.

(2) In order to be an organ of relations the subject must be active. Piaget has stated that the subject is "the center of activity." [118] or "the center of functioning" [119]. Piaget himself expresses this

fact in a theater-metaphor: "In one word, even in the domain of perception the subject is not simply the theater on which stage plays take place, independent of the subject and in advance, regulated by laws of an autonomous physical equilibration; it is the player and often enough even the author of these structurings which it establishes . . . through an active equilibration of external interferences and their compensations, hence through continuous self-regulation." [120] And Piaget is well aware that he dissociates from the empiricists on that topic - just as did Whitehead. While Hume conceived perception as a passive act of copying external stimuli, Piaget is "in contradiction to this passive conception of the act of perception." [121] Rather in his view "the stimuli have to be dissociated from the noise, that means the individual has to decide with all risks of gain or loss of information that such decisions involve" [122]. So it is the active subject that creates the act of perception out of the multiplicity of stimuli by deciding what stimuli are to be integrated into the emerging structure and which of them are to be neglected and driven into the background of mere noise. But Piaget departs from Transcendentalism and its modern form of Radical Constructivism as well. He decides for the middle way: "Of course the subject needs *objective* information be become aware of its own actions but it also needs many subjective components." [123] And here again the aspect of activity meets the aspect of relationalism: the subject is active in relating itself to the environment and thereby creating itself in an ongoing process.

So finally we again have found deep parallels between Whitehead's and Piaget's accounts of person/subject.

5. Final Remarks and Some Future Issues

The result of this comparison indicates that a non-substantialist process psychology, which is - as far as I can see - yet to be developed, can build on Piaget's empirically corroborated theory. Since

Piaget's approach has deeply influenced developmental psychology and also the so-called social-cognitive approach there is good hope that Whitehead's metaphysics is consonant with at least some recent approaches in the field of psychology.

We also have seen that Whitehead's analysis and proposed solutions on several topics (personal identity and paradox of becoming) go deeper and are more promising than Piaget's. So the Piagetian approach might profit from this comparison with Whitehead's philosophy. The process approach may introduce interesting new ideas that might be leading to the testing of new hypotheses.

Besides these advantages in contentions a radical non-substantialist process approach in psychology involves profound consequences on methodological issues too. I would like to mention just a few here.

For instance the concept of reliability defined as test-retest-reliability has to be reexamined carefully if the human person is conceived as interacting with its environment and thereby constantly changing. For test-retest-reliability - if I am to put it a bit ironically - seems to be a measure that shows the *insensitivity* of a test towards change! Of course I do not argue against the concept of reliability in terms of test-retest in general. This criterion is very important in the fields of morphological (static) investigations. What I want to point at is simply that within an eminently non-substantialist, processual approach there is an urgent need for the development of genetic (dynamic) research tools and corresponding criteria.

Also within a relational process-view the human person has to be conceived of as unique, for the person's interactions with the very special environments from birth on (and even before birth) lead to the development of idiosyncratic personality patterns. And on the basis of these unique patterns the person construes *his/her situations* i. e. s/he gives psychological meaning to it. No person ever

simply responds to pure stimuli (objective situations) - as Jean Piaget and George Kelly have realized quite early in this century - but only to experienced and hence meaningful situations. Hence the radical behaviorist approach must fail from the start. But for the protagonists of a process psychology the task remains: the development of instruments which do justice to this idiosyncratic patterning of human persons and their activities be it action, experience or thought. In order to do so process psychologists may first examine the - admittedly very few - different idiographic tools already developed in the field of psychology. Here George Kelly's grid-technique seems to be among the most promising ones ^[124].

We are touching here the issue of transsituational consistency or situation-specificity in human agency that has been discussed by one of the main proponents of the social-cognitive approach, Walter Mischel [125]. Mischel demands that there are no traits in humans that transcend all kinds of different situations. Humans are constantly interacting with unique environments and hence adopt themselves to ever changing specific situations. Rather than using static personality questionnaires a process approach should favor the analysis of behavior-situation-cognition units in order to do justice to these continuously ongoing interactions [126]. Instead of expecting from a measure to yield similar scores for the same subjects (population) on different occasions (as is usual with classical ANOVA (analysis of variance) designs in psychology and experimental education) within a process-approach it is more promising to try to predict under what conditions stability and/or change are more likely to occur in the same person in different situation(s). Such a perspective in investigation would be more relevant to psychotherapy and education as well.

These very few remarks on methodological issues may show that implementing a non-substantialist approach in the field of psychology - while surely a promising and necessary task - at the moment is not much more than vision. [127] Only hard work and very different issues will transform it into a

reality. But visions are lures for feelings. So vision is the first and necessary task towards realizing the goal of developing a non-substantialist process psychology.

Notes:

- ¹ Ludwig von Bertalanffy, . . . *aber vom Menschen wissen wir nichts* (Düsseldorf: Econ, 1970).
- ² Ludwig von Bertalanffy, 14.
- ³ Ibid. 14.
- ⁴ Ludwig von Bertalanffy, 115.
- ⁵ Ibid.
- ⁶ Jean Piaget, *Biologie et Connaissance* (Paris: Gallimard, 1967), 157.
- ⁷ Jean Piaget, *Epistemologie des sciences de l'homme* (Paris: Presses Universitaires de France, 1972a), 244.
- ⁸ For a detailed discussion of the second way see: Franz Riffert, *Whitehead und Piaget - Zur interdisziplinären Relevanz der Prozessphilosophie* (Wien: Peter Lang, 1994), 211-333.
- ⁹ Jean Piaget, *Le structuralism* (Paris: Presses Universitaires, 1968), 17.
- ¹⁰ Jean Piaget, *Le structuralism*.
- ¹¹ Alfred North Whitehead, *The Function of Reason* (Boston: Beacon Press, 1929/1958), 86.
- ¹² Reto Luzius Fetz, "On the Formation of Ontological Concepts: The Relationship Between the Theories of Whitehead and Piaget," *Process Studies* 17/4 (1988b), 214.
- ¹³ Jean Piaget, *Le structuralism*, 44; see also 8.
- ¹⁴ Jean Piaget, *Le structuralism*, 11.
- ¹⁵ Jean Piaget, *Le structuralism*, 10.
- ¹⁶ Jean Piaget, *Biologie et Connaissance*, 335 fn5.
- ¹⁷ Jean Piaget, *Le structuralism*, 12.
- ¹⁸ Ibid.
- ¹⁹ Jean Piaget, *Le structuralism*, 11.
- ²⁰ Ibid.

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- ²¹ Jean Piaget, "Piaget's Theory," *Carmichael's Manual of Child Psychology* (New York: Wiley, 1978), 86.
- ²² Jean Piaget, *Le structuralism*.
- ²³ Jean Piaget, "Piaget's Theory," 86.
- ²⁴ Cf. Jean Piaget, *Biologie et Connaissance*, 71.
- ²⁵ Jean Piaget, *Le structuralism*, 12.
- ²⁶ Ibid.
- ²⁷ Ibid.
- ²⁸ Jean Piaget, *L'epistemologie genetique* (Paris: Presses Universitaires de France, 1973), 141.
- ²⁹ Jean Piaget, "Piaget's Theory," 270.
- ³⁰ Jean Piaget, "Piaget's Theory," 266.
- ³¹ Jean Piaget, "Piaget's Theory," 32.
- ³² Jean Piaget, *Le structuralism*, 150.
- ³³ Jean Piaget, *L'equilibracion des structure cognitives. Problemes centrale du development* (Paris: Presses Universitaires de France, 1975), 31.
- ³⁴ Alfred North Whitehead, *Process and Reality* (New York: Free Press 1929/1978 Corrected Edition), 22.
- ³⁵ Alfred North Whitehead, *Process and Reality*, 18.
- ³⁶ Alfred North Whitehead, *Process and Reality*, 29.
- ³⁷ Alfred North Whitehead, *Process and Reality*, 219.
- ³⁸ See for instance : Jean Piaget, *Biologie et Connaissance*, 71.
- ³⁹ Alfred North Whitehead, *Process and Reality*, 23.
- ⁴⁰ Alfred North Whitehead, *Process and Reality*, 44.
- ⁴¹ Alfred North Whitehead, *Process and Reality*, 44ff.
- ⁴² Alfred North Whitehead, *Process and Reality*, 140.
- ⁴³ Alfred North Whitehead, *Process and Reality*, 44f.
- ⁴⁴ Alfred North Whitehead, *Process and Reality*, 23.
- ⁴⁵ Jean Piaget, *Le structuralism*, 66.

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- ⁴⁶ Ibid.
- ⁴⁷ Ibid.
- ⁴⁸ Alfred North Whitehead, *Process and Reality*, 249.
- ⁴⁹ Alfred North Whitehead, *Process and Reality*, 26.
- ⁵⁰ Alfred North Whitehead, *Process and Reality*, 250.
- ⁵¹ Alfred North Whitehead, *Process and Reality*, 73.
- ⁵² Alfred North Whitehead, *Process and Reality*, 47.
- ⁵³ This position for instance was held by: Charles Hartshorne, "On Some Criticism of Whitehead's Philosophy," *Philosophical Review* 44 (1935), 323-344; Victor Lowe, "Wiliam James and Whitehead's Doctrine of Prehension," *The Journal of Philosophy*, 38 (1941), 115 fn 12; different in: Victor Lowe, *Understanding Whitehead* (Baltimore: John Hopkins Press, 1966), 321; I. P. Shahan, *Whitehead's Theory of Experience* (New York: King's Crown Press, 1950) and B. Fitch, "Actuality, Possibility and Being," *Review of Metaphysics* 3 (1950), 367-384.
- ⁵⁴ Jean Piaget, *Le structuralism*, 135.
- ⁵⁵ Alfred North Whitehead, *Adventures of Ideas* (New York: Free Press, 1933/1967a), 111; see also: Alfred North Whitehead, *The Function of Reason*, 7f.
- ⁵⁶ Alfred North Whitehead (1967b), *The Aims of Education* (New York: Free Press, 1929/1967b), 29-43.
- ⁵⁷ Alfred North Whitehead (1967b), *The Aims of Education*, 33.
- ⁵⁸ Alfred North Whitehead, *Process and Reality*, 245.
- ⁵⁹ Alfred North Whitehead, *Process and Reality*, 19.
- ⁶⁰ Alfred North Whitehead, *Process and Reality*, 69.
- ⁶¹ Alfred North Whitehead, *Process and Reality*, 102.
- ⁶² Jean Piaget, *Le structuralism*, 16.
- ⁶³ Jean Piaget, *L'equilibracion des structure cognitives. Problemes centrale du development*, 30.
- ⁶⁴ Ibid.
- ⁶⁵ Ibid.
- ⁶⁶ J. M. Broughton (1981), "Piaget's Structural Developmental Psychology III: Function and the Problem of Knowledge," *Human Development* 24 (1981), 273.

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- ⁶⁷ J. M. Broughton (1981), "Piaget's Structural Developmental Psychology III: Function and the Problem of Knowledge," 274.
- ⁶⁸ Arno Ros, *Die genetische Epistemologie Jean Piagets: Resultate und offene Probleme* (Tübingen: Mohr, 1983 (Philosophische Rundschau, Beiheft 9)), 67.
- ⁶⁹ Ernst von Glasersfeld, „Piagets konstruktivistisches Modell,“ *Piaget und der radikale Konstruktivismus*, G. Rusch & S. J. Schmidt eds. (Frankfurt a. M.: Suhrkamp, 1994).
- ⁷⁰ Jean Piaget, *Biologie et Connaissance*, 334.
- ⁷¹ See: Jean Piaget, *Biologie et Connaissance*, 175; Jean Piaget, "Piaget's Theory," 35; Jean Piaget, *L'équilibration des structure cognitives. Problemes centrale du development*, 15.
- ⁷² G. Gentry, "Prehensions as an Explanatory Process," *The Journal of Philosophy* 35 (1938), 518.
- ⁷³ L. Eslick, "Substance, Change and Causality in Whitehead," *Philosophical and Phenomenological Research* 18 (1958), 512.
- ⁷⁴ Alfred North Whitehead, *Process and Reality*, 283.
- ⁷⁵ Alfred North Whitehead, *Process and Reality*, 68.
- ⁷⁶ Alfred North Whitehead, *Process and Reality*, 222; There have been many attempts to explain Whitehead's epochal theory of time positively. Perhaps the most intelligible is the one provided by W. Christian in his essay "Some Aspects of Whitehead's Metaphysics," *Explorations in Whitehead's Philosophy*, Lewis Ford and George Kline, eds. (New York: Fordham University Press, 1983).
- ⁷⁷ Alfred North Whitehead, *Process and Reality*, 68.
- ⁷⁸ Ibid.
- ⁷⁹ Alfred North Whitehead, *Process and Reality*, 69.
- ⁸⁰ So for instance: Rem B. Edwards, "The Human Self: An Actual Entity or a Society?" *Process Studies* 5/3 (1975), 202; Robert Neville, "Genetic Succession, Time, and Becoming," *Process Studies* 1/3 (1971), 198; V. C. Chappell, "Whitehead's Theory of Becoming," *A.N. Whitehead: Essays on His Philosophy*, George Kline ed. (New Jersey: Prentice Hall, 1963), 73; Wolfhart Pannenberg, „Atom, Dauer, Gestalt: Schwierigkeiten mit der Prozeßphilosophie,“ *Whiteheads Metaphysik der Kreativität*, Friedrich Rapp & Reiner Wiehl eds. (Freiburg: Alber, 1986), 190; W. W. Hamerschmidt, *Whitehead's Philosophy of Time* (New York: Russell & Russell, 1947); Wiliam Christian, *An Interpretation of Whitehead's Metaphysics* (New Haven: Yale University Press, 1967) and Ivor Leclerc, *Whitehead's Metaphysics* (New York: Humanities Press, 1958) among many others.
- ⁸¹ See for instance: Alfred North Whitehead, *Process and Reality*, 26.
- ⁸² David Bohm, *Wholeness and the Implicate Order* (London: Kegan, 1987), 51-99
- ⁸³ David Bohm, *Wholeness and the Implicate Order*, 75.

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- ⁸⁴ Alfred North Whitehead, *Adventures of Ideas*, 206; Alfred North Whitehead, *Modes of Thoughts* (New York: Free Press, 1938/1968), 136.
- ⁸⁵ David Bohm, *Wholeness and the Implicate Order*, 77).
- ⁸⁶ Thomas Kesselring, *Entwicklung und Widerspruch - Ein Vergleich zwischen Piagets genetischer Erkenntnistheorie und Hegels Dialektik* (Frankfurt a. M. : Suhrkamp, 1981), 126.
- ⁸⁷ For more detailed accounts on that topic see for instance: Abner Shimony, "Quantum Physics and the Philosophy of Whitehead," *Boston Studies in the Philosophy of Science* Vol. I, Marx Wartofsky & R. Cohen eds. (New York: Humanities Press, 1967); F. B. Wallack, *The Epochal Nature of Process in Whitehead's Metaphysics* (Albany: State University of New York Press, 1980), 262; Y. Tanaka, "Bell's Theorem and the Theory of Relativity - An Interpretation of Quantum Correlation at a Distance based on the Philosophy of Organism," http://www.asahi-net.or.jp/~sn2y-tnt/tanaka_3_s.html (1997); Tim Eastman, "Process Thought and Natural Science," *Process Studies* 26 (1997), 239-246; C. Papatheodorou & B. Hiley, "Process, Temporality and Space-Time," *Process Studies* 26 (1997), 247-278; David Finkelstein & W. M. Kallfelz, "Organism and Physics," *Process Studies* 26 (1997), 279-292; L. Fagg, "Electromagnetism, Time and Immanence in Whitehead's Metaphysics," *Process Studies* 26 (1997), 308-317; J. Rosen, "Response to Hartshorne Concerning Symmetry and Asymmetry in Physics," *Process Studies* 26 (1997), 318-323.
- ⁸⁸ Michael Theunissen, „Skeptische Betrachtungen über den anthropologischen Personbegriff,“ *Die Frage nach dem Menschen*, H. Rombach ed. (München: Alber, 1966), 465.
- ⁸⁹ Michael Theunissen, 463.
- ⁹⁰ Ibid.
- ⁹¹ Michael Theunissen, 483.
- ⁹² Michael Theunissen, 484.
- ⁹³ Alfred North Whitehead, *Process and Reality*, 109.
- ⁹⁴ Alfred North Whitehead, *Adventures of Ideas*, 206; Alfred North Whitehead, *Modes of Thoughts*, 25.
- ⁹⁵ Alfred North Whitehead, *Process and Reality*, 102; see also: Alfred North Whitehead, *Modes of Thoughts*, 23.
- ⁹⁶ Of course this distinction between subordinate societies and the dominant or personal society as just introduced is oversimplified as Whitehead himself has emphasized (Alfred North Whitehead, *Modes of Thoughts*, 24f.)
- ⁹⁷ Alfred North Whitehead, *Process and Reality*, 157.
- ⁹⁸ See Aristotle: *Met.* V 7, 1017b [24].
- ⁹⁹ Alfred North Whitehead, *Process and Reality*, 56f.
- ¹⁰⁰ Alfred North Whitehead, *Process and Reality*, 157.

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- ¹⁰¹ Alfred North Whitehead, *Process and Reality*, 260f.
- ¹⁰² Alfred North Whitehead, *Process and Reality*, 237.
- ¹⁰³ See: Alfred North Whitehead, *Adventures of Ideas*, 186f.
- ¹⁰⁴ For a detailed account of logical dilemmas see Wesley C. Salmon, *Logik* (Stuttgart: Reclam, 1973), 68-71.
- ¹⁰⁵ Alfred North Whitehead, *Process and Reality*, 25.
- ¹⁰⁶ Alfred North Whitehead, *Process and Reality*, 161.
- ¹⁰⁷ Alfred North Whitehead, *Process and Reality*, 350.
- ¹⁰⁸ Jean Piaget, *Le structuralism*, 134.
- ¹⁰⁹ Jean Piaget, *Le structuralism*, 50.
- ¹¹⁰ Jean Piaget, *L'equilibracion des structure cognitives. Problemes centrale du development*, 166.
- ¹¹¹ Ibid.
- ¹¹² Ibid.
- ¹¹³ Jean Piaget, *L'equilibracion des structure cognitives. Problemes centrale du development*, 176f.
- ¹¹⁴ Jean Piaget, *Le structuralism*, 70.
- ¹¹⁵ Jean Piaget, *L'equilibracion des structure cognitives. Problemes centrale du development*, 38.
- ¹¹⁶ Jean Piaget, *Le structuralism*, 68.
- ¹¹⁷ Jean Piaget, *Le structuralism*, 69.
- ¹¹⁸ Jean Piaget, *Six etudes de psychologie* (Geneve: Gonthier, 1964), 206.
- ¹¹⁹ Jean Piaget, *Le structuralism*, 68.
- ¹²⁰ Jean Piaget, *Le structuralism*, 58.
- ¹²¹ Jean Piaget, "Piaget's Theory," 25.
- ¹²² Jean Piaget, *Problemes de psychologie genetique* (Geneve: Gonthier, 1972b), 81.
- ¹²³ Jean Piaget, "Piaget's Theory," 26 italics mine.
- ¹²⁴ George A. Kelly, *The Psychology of Personal Constructs* 2 vols. (New York: Wiley, 1955); for an introduction to Kelly's grid-technique see: Fay Fransella & Don Bannister, *A Manual for Repertory Grid Technique* (London: Academic Press, 1977).

¹²⁵ Walter Mischel, *Personality and Assessment* (New York: Wiley, 1968); Walter Mischel, "Toward a Cognitive Social Learning Reconceptualization of Personality," *Psychological Review* 80 (1973), 252-283; see also: Jean-Luc Patry, *Transsituationale Konsistenz des Verhaltens und Handelns in der Erziehung* (Frankfurt a. M. : Peter-Lang Verlag, 1991a); Jean-Luc Patry, "Der Geltungsbereich sozialwissenschaftlicher Aussagen. Das Problem der Situationsspezifität," *Zeitschrift für Sozialpsychologie* (1991b), 223-244; Franz Riffert, "Verhalten, Emotionen, Ziele - Zur Situationsspezifität in Unterrichtsfächern," *Situationsspezifität in pädagogischen Handlungsfeldern* Jean-Luc Patry & Franz Riffert eds. (Innsbruck: Studienverlag, 2000), 167-189.

¹²⁶ Walter Mischel & Yichi Shoda, "A Cognitive-Affective System Theory of Personality: Reconceptualizing Situations, Dispositions, Dynamics, and Invariance in Personality Structure" *Psychological Review* 102 (1995), 246-268.

¹²⁷ The growing substantial interest in the implications of Process Philosophy for the psychological domain finally has led to the foundation of the APP (Association of Process Psychology) at the Third International Whitehead Conference in Los Angeles, 1998 and to the WPN (Whitehead Psychology Network) in Europe (see: <http://www.lofs.ucl.ac.be/log/perso/Weber/#WPN>). It is an encouraging sign that the task of developing a non-substantialist Process Psychology is about to start in different parts of the world.