

# Continuing commentary

On Charles J. Brainerd (1978) *The stage question in cognitive-developmental theory*. BBS 1:175–213.

**Abstract of the original article:** The term “stage” appears to be used in three general senses in theories of behavioral development: (a) as a metaphor; (b) as a description of behaviors that undergo age change; (c) as an explanation of age-related changes in behavior. Although most existing stage models are purely descriptive, a few of them purport to have explanatory power. One such model, Piaget’s stages of cognitive development, is considered in this paper.

To be viewed as potentially explanatory, a stage model must describe some behaviors that undergo age change, posit antecedent variables believed to cause the changes, and provide procedures whereby the behavioral changes and the antecedent variables can be independently measured. Piaget’s stages seem to satisfy some but not all of these requirements. Piaget’s stages describe many age-related changes in behavior, and some antecedent variables have been proposed. However, procedures do not exist for measuring the two factors independently. In lieu of such procedures, Piaget has outlined a “program” of five empirical criteria whereby the reality of his stages can ostensibly be verified. Some objections to these criteria are considered.

The five criteria in Piaget’s program are invariant sequence, cognitive structure, integration, consolidation, and equilibration. Three of the criteria (invariant sequence, integration, and consolidation) lead to the same sorts of empirical predictions (culturally universal sequences in the acquisition of certain behaviors). Such predictions are subject to the objection that Piagetian invariant sequences are often measurement sequences. A measurement sequence is said to occur when some later-appearing behavior consists of some earlier-appearing behavior plus additional things. The cognitive structure criterion is subject to at least three criticisms: First, it yields, at most, descriptions of behavior; second, these are often nothing more than descriptions of task structure; third, they cannot be regarded as unique to the given stages for which they are posited. The fifth criterion, equilibration, generates some predictions that might be considered as *prima facie* evidence for the existence of stages. However, these predictions conflict with the current data base on Piaget’s stages.

It is concluded that there is no compelling support for Piaget’s hypothesis that his cognitive stages do more than describe age-related changes in behavior. Since explanatory statements involving stages appear with some regularity in Piagetian and neo-Piagetian writings, there are grounds for supposing this conclusion to be nontrivial.

## From the study of psychological stages to the understanding of the processes involved in the cognitive development of child and pupil

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**Piaget’s theory and procedure: An approach derived from biology.** Piaget and his collaborators study the development of intelligence by considering it to consist of the construction of a set of mental operations allowing the individual to adapt to his environment.

This approach – as Piaget himself has often suggested – is profoundly inspired by the biological perspective from which it was born. It has adopted some of that perspective’s features, particularly the interest in the *forms* that the organism takes during its development. We suggest that this kind of interest is revealed in the attention that Piaget has devoted to describing the different stages of elaboration of cognitive structures. In Piaget’s perspective the stages of development must be characterized by forms (that is, structures) of thought.

Let us state immediately, since Brainerd (1978a; 1978b) adds to his critique of the notion of stages a reflection on its pedagogical implications, that Piaget originally investigated the problem of knowledge as a biologist and epistemologist and not as an educator. It seems that from the beginning Piaget considered himself an observer and not someone committed in the way an educator is. Consequently he was not inclined to take into consideration – nor, hence, to evaluate – the eventual consequences of an educational commitment.

**From the study of forms (and stages) to that of processes.** We can note, however, that just as the science of biology, in

exploring experimental possibilities went beyond its initial interest in simple observation of forms to attempts to unravel the *processes* at work, so have Piaget and his collaborators, who during the last decade seem to have abandoned the description of stages and their characteristics in order to study the *processes at work in development*. They have described these processes in terms of autoregulation and equilibration (Inhelder, Sinclair & Bovet 1974; Piaget 1975).

We agree with these authors that the study of the processes at the origin of intellectual growth is essential to understanding its forms – and its eventual stages. This is why, in this commentary, we will not be concerned with Piaget’s approach to the description of stages but with what seems to us a more fundamental problem: Piaget’s view of the *mechanisms* that produce such stages. Let us recall that Piaget presents the stages he describes as “universal,” as something like a cognitive developmental characteristic of the human species; he does not seem puzzled by the possible ethnocentric biases in the fact that the intercultural studies conducted by his school always seem to show a developmental superiority of urban middle-class occidental children compared to their peers of other social backgrounds. This is attributable, we believe, to Piaget’s conception of the impact of social factors on cognitive growth: in Piaget’s theory social factors may facilitate or slow down development, but they cannot directly enhance development. The experimental study of this question, we believe, could open the way to a better understanding of the nature of operational thought.

**A process presently neglected by Piaget’s experimental work: Social interaction as a causal factor of development.** In their recent work, Piaget and his collaborators present the cognitive development of the child as arising essentially from the processes of autoregulation built into the subject as well as from

the dynamics of the structures themselves. But in various experiments we have conducted during these last years we have obtained data revealing a reductionistic aspect to this conception: Indeed we have shown that it is primarily when a cognitive conflict is *socially experienced* that important cognitive restructuring can be observed (Doise, Mugny & Perret-Clermont 1975; Perret-Clermont, Mugny & Doise 1976; Perret-Clermont 1980; Mugny, Perret-Clermont & Doise, in press). Precise comparisons of different experimental conditions have shown that it is mainly when two individuals with two different points of view are brought to interact on the same task (or to solve the same problem) that the necessity to coordinate actions (or points of view) emerges and provokes a sociocognitive conflict between the partners. This sociocognitive conflict gives rise to new cognitive elaborations, the consequences of which are noted on two levels: that of a collective performance superior to individual performance and that of subsequent progress at the level of the operational structure of the individual's thought.

The *cognitive* conditions of this conflict seem to have been relatively widely studied (see, for instance, Inhelder, Sinclair & Bovet 1974; Kuhn 1972; Lefebvre & Pinard 1972; 1974; Perret-Clermont 1980). But little is known of the *social* conditions of this conflict; these should be important to study, for, in our opinion, it is not at all evident that all sociocognitive conflicts (or conflicts in general) are always necessarily resolved by operational restructuring: other solutions are possible, such as nonperception or avoidance of the conflict, compliance with the other's point of view, submission, and so on. Under what social conditions is a sociocognitive conflict at the basis of an intellectual elaboration of the operational type? The answer to this question could help us understand how "universal" the cognitive structures described by Piaget are.

What are the social necessities that induce subjects to elaborate an operational solution to their sociocognitive conflicts? Research presently being carried out with some colleagues (Dionnet, Jacq, Lévy) suggests that the social relevance of a situation for the child can facilitate his cognitive structuring of the task and of the notions involved.

We mentioned previously that an understanding of the processes responsible for cognitive growth could lead to better comprehension of the forms into which they develop. If such is the case, it should be possible to formulate this last question within the framework of a debate on "stages." And this we will try to do here.

**The examination of the question of stages: The operative structures described by Piaget would be the product of specific social interactions relative to tasks whose characteristics would seem to be perceived differently according to the level of development of the individuals concerned.** Brainerd suggests that the operational structures to which Piaget refers are in fact merely "task descriptions." But then how can one explain that we arrive at a particular description of the task? Is this description trivial and immediately evident for all individuals? Brainerd does not propose any other description of the tasks concerned. Is this type of operational description of the task self-evident to the adult? But then how are we to explain that what is evident to the psychologist does not seem to be evident in the same way to the young child he is questioning (at least until a certain age, which varies according to cultural context)? Our question then becomes, What are the interindividual relationships that lead the child to elaborate the behaviors that Piaget calls "operational"?<sup>1</sup> The answer to this question is important for optimizing pedagogical strategies.

**Educational relevance of the issue.** By definition, the educator is always in a situation of social interaction with his students. Therefore it is one of his duties to examine to what extent the modalities of social interaction that he imposes upon them (and that he induces them to experience among themselves) are sufficient to induce - or to inhibit - cognitive

elaborations. Can he observe that the students progress in their understanding of the task he proposes? If the educator wanted to make that observation by referring to Piaget's stages it is evident that he would be using an instrument that is inadequate because it is too global. But his observations he could make as Piaget did. It seems to us that Piaget's constructivist and interactionist approach, if it takes into consideration the role of the social context in which the child develops, could help us understand not only how to choose the moment for an educational intervention but also how to define the type of intervention and how to modify it according to its results.

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#### NOTE

1. Are all the behaviors of this type elaborated simultaneously or is it a question of parallel - or independent - development? This is the main question in the present debate on "délage" which would certainly be clarified by an identification of the *causes* of development.

## Author's Response

### Task descriptions and circularity

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In the first-round *BBS* treatment of the stage problem, the soundness of Piaget's particular stage model was questioned. For the most part, my objections were theoretical rather than empirical: It was argued that Piagetian statements of the form "children do *x* because they are in Stage *S*" are circular because no provision is ever made for the independent measurement of *x* and *S* (Brainerd 1978b); it was argued that the model's key predictions - culturally universal sequences in concept development - are untestable because of measurement-sequence confounds (Brainerd 1978a; 1978b) and measurement-error confounds (Brainerd 1978a; 1979); and last, it was argued that the "cognitive" structures that are supposed to define Piagetian stages are, at most, descriptions of behavior, and often are only task descriptions; they cannot be regarded as unique to the particular stages they are said to define.

The **Perret-Clermont** commentary is not much concerned either with these criticisms or with others raised in previously published commentaries. Indeed, the principal intent of the remarks seems to be to draw attention to some recent learning research by the author (Perret-Clermont 1980), research whose connections to the stage problem are obscure. The only criticism that Perret-Clermont rebuts is the one about cognitive structures, and I should like to respond briefly to these comments.

As I have mentioned, the original critique of cognitive structures turned on three points. In her commentary, **Perret-Clermont** attempts to neutralize the objection that Piagetian cognitive structures are mere task descriptions. Since I found this rebuttal somewhat elliptical, I quote it before replying:

Brainerd suggests that the operational structures to which Piaget refers are in fact merely "task descriptions." But then how can one explain that we arrive at a particular description of the task? Is this description trivial and immediately evident for all individuals? . . . Is this type of operational description of the task self-evident to the adult? But then how are we to explain that what is evident to the psychologist does not seem to be evident in the same way to the young children he is questioning?

To begin with, the first sentence in this quotation is in error. I did not say that Piagetian cognitive structures are "merely 'task descriptions.'" What I said (Brainerd 1978b, pp. 177-78) was that they are merely *behavioral* descriptions. I added that there are certain structures, such as the concrete-operational *groupements*, which have no known behavioral referents. In these cases, of course, the structures are nothing more than a description of the structure of some task. However, the important issue is not that Piagetian structures sometimes reduce to task descriptions. Instead, it is that since they are at most descriptions of behavior (and remarkably abstract descriptions at that), these structures cannot be regarded as satisfactory explanatory constructs. Thus, Perret-Clermont's commentary appears to miss the point.

Although the premise is wrong, it is nevertheless instructive to consider the other statements in the quotation, because they reveal an astonishingly Platonic view of what is sound evidence for a theoretical construct. As I said, I am not sure that I fathom their meaning. Perret-Clermont *seems* to be claiming that the fact that we can articulate the structure of some task - by, for example, translating it into the language of abstract algebra or symbolic logic - is, somehow, grounds for inferring that such structures are in the head. For Perret-Clermont, then, the fact that humans can sometimes effect descriptions of the structure of certain aspects of their environments demands explana-

tion in terms of cognitive structures. This is Platonism with a vengeance. The fact that, cognitively speaking, humans do certain things, in this case describe aspects of their environments in rather abstract language, evidently demands explanation. But since it is something to be explained, an explanandum, to suggest that it validates some particular explanation is just more of the circular reasoning that was criticized in the target article.

## References

- Brainerd, C. J. (1978a) Invariant sequences, explanation, and other stage criteria: Reflections and replies. *Behavioral and Brain Sciences* 1: 207-13. [CJB, ANP-C]
- (1978b) The stage question in cognitive-developmental theory. *Behavioral and Brain Sciences* 1:173-82. [CJB, ANP-C]
- (1979) Further replies on invariant sequences, explanation, and other stage criteria. *Behavioral and Brain Sciences* 2: 149-154. [CJB]
- Doise, W.; Mugny, G. & Perret-Clermont, A. N. (1975) Social interaction and the development of cognitive operations. *European Journal of Social Psychology* 5:367-83. [ANP-C]
- Inhelder, B.; Sinclair, H. & Bovet, M. (1974) *Learning and the development of cognition*. London: Routledge and Kegan Paul. [ANP-C]
- Kuhn, D. (1972) Mechanisms of change in the development of cognitive structures. *Child Development* 43:833-44. [ANP-C]
- Lefebvre, M. & Pinar, A. (1974) Apprentissage de la conservation des quantités par une méthode de conflit cognitif. *Revue Canadienne des Sciences du Comportement* 6:398-413. [ANP-C]
- Mugny, G. & Doise, W. (1977) Factores sociológicos y psicociológicos el desarrollo cognitivo. *Anuario de Psicología* (Spain) 1:21-40. [ANP-C]
- (1978) Socio-cognitive conflict and structuration of individual and collective performance. *European Journal of Social Psychology* 8:481-92. [ANP-C]
- Mugny, G.; Perret-Clermont, A. N. & Doise, W. (in press) Interpersonal coordinations and sociological differences in cognitive growth. In: *Progress in applied social psychology*, vol. 1, ed. G. N. Stephanson & J. H. Davis. New York: Wiley. [ANP-C]
- Perret-Clermont, A. N. (1980) *Social interaction and cognitive development in children*. New York: Academic Press. [CJB, ANP-C]
- Perret-Clermont, A. N.; Mugny, G. & Doise, W. (1976) Une Approche psycho-sociologique du développement cognitif. *Archives de Psychologie* 44:135-44. [ANP-C]
- Piaget, J. (1975) *L'équilibration des structures cognitives*. Paris: Presses Universitaires de France. [ANP-C]

**On Michael C. Corballis and Michael J. Morgan (1978) On the biological basis of human laterality: I. Evidence for a maturational left-right gradient; II. The mechanisms of inheritance. *BBS* 1:261-336.**

**Abstract of the original article, Part I:** In this paper, we consider human handedness and cerebral lateralization in a general biological context, and attempt to arrive at some conclusions common to the growth of human laterality and of other structural asymmetries. We suggest that many asymmetries appear to be under the influence of a left-right maturational gradient, which often seems to favor earlier or more rapid development on the left than on the right. If the leading side is damaged or restricted, this gradient may be reversed so that growth occurs with the opposite polarity. A mechanism of this sort appears to underlie the phenomenon of *situs inversus viscerum et cordis*, and the same principle may help explain the equipotentiality of the two sides of the human brain with respect to the representation of language in the early years of life. However we must also suppose that the leading side normally exerts an inhibitory influence on the lagging side, for otherwise one would expect language ultimately to develop in both halves of the brain. Examples of an inhibitory influence of this kind can also be found in other biological asymmetries; for instance, in the crab *Alpheus heterochelis*, one claw is normally greatly enlarged relative to the other, but if the larger claw is removed the smaller one is apparently released from its inhibitory influence and grows larger.

Although this account does not deny that the right hemisphere of humans may be the more specialized for certain functions, it does attribute a leading or dominant role to the left hemisphere (at least in most individuals). We suggest that so-called right-hemisphere functions are essentially acquired by default, due to the left hemisphere's prior involvement with speech and skilled motor acts; we note, for instance, that these right-hemisphere functions include rather elementary perceptual processes. But perhaps the more critical prediction from our account is that the phenomenon of equipotentiality should be unidirectional: the right (lagging) hemisphere should be more disposed to take over left-hemisphere functions following early lesions than is the left (leading) hemisphere to take over right-hemisphere functions. We note preliminary evidence that this may be so.