



Intelligence, adaptation, and inverted selection

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Sternberg's target article is an interesting attempt to integrate in a unified though composite theory a number of aspects of intelligent behavior (i.e., of what people intuitively label by these words) that are left out by most traditional psychologies of intelligence, especially those theories based on the measure of IQ and the like. Such measures, as is widely recognized today, evaluate only those intellectual performances that are closely related to school training, and, beyond it, to the particular context of Western society. Theories derived from mental testing have altogether ignored cultural relativism and that part of intelligence that is revealed in real-life situations rather than in academic settings. Even Piaget's theory, though it claims to deal with universal mechanisms, and though it is totally alien to the mental testing approach, has been criticized for putting exclusive emphasis on the formal aspects of intelligence at the expense of the more practical social aspects - *knowing* versus *know-how*. Modern conceptions try to integrate both, and in so doing, they necessarily give sociocultural context the attention it deserves and look at individual differences in terms of "styles" rather than of rankings on a unidimensional scale.

Sternberg's triarchic theory is one of these conceptions, and a very ambitious one. It has a number of merits, some of which I shall point out as indicating that the theory, though quite in tune with the *Zeitgeist*, does not indulge in some naive views *à la mode*, especially in the educational version of psychological theories. Sternberg emphasizes the roles of novelty and automatization in intelligence. The more automatized routines individuals have available for solving a variety of problems or parts of problems, the more likely they are to deal efficiently with new ones. This is no new discovery, as Sternberg himself admits, but the complementarity of automatization and novelty had been forgotten by advocates of creativity, as a potential for free expression that would be hampered by any sort of systematic learning (or teaching), with some well-known consequences for the school curriculum. Though he draws mainly from cognitivist psychology for his componential subtheory, Sternberg proposes a qualified view of the use of *speed* as a measure of intelligence; he suggests that this fashionable measure, derived from laboratory studies, valuable as it may be, is not less ethnocentric than the old IQ; it reflects an obsession of our society for time-saving. He appropriately brings in the concept of inhibition, withholding immediate action often being a condition for solving a problem. Anyone who has watched children at various ages confronted with practical problem-solving tasks has observed the difference it makes in performance to engage immediately in (often unsuccessfully repeated) action or to withhold action for a while, "thinking about the problem." Similar observations were made long ago, of course, concerning chimpanzees.

Sternberg's theory also recommends itself by taking diversity into account, and by giving up unidimensional characterizations and measurements of intelligence. Intelligence is no simple thing and we should not simplify it. The triarchic theory, however, has some important flaws and limitations, some of which I shall comment on briefly.

At the methodological level, one can call into question the use (not exclusive, but important) of questionnaires asking people how they characterize and rate intelligence. Data obtained in this way seem more relevant to a theory of attribution than to a theory of intelligence itself.

The concept of adaptation, as used by Sternberg, is vague and inconsistent. It is tempting to think of intelligence in terms of adaptation, but it is not clear at the sociopsychological level what the criteria for adaptation are. There is the danger of falling into

a conformist view - the better you adjust to your environment as it is, the more intelligent you are - but this goes counter to our intuition that people who object to the present state of affairs, or who are ahead of their time, are not necessarily stupid. Sternberg is aware of this, although he also argues that individuals adapt to their particular "niche" - that is, cultural or subcultural niche - a term obviously reminiscent of the biological, ethoecological view of adaptation. I am prepared to share this view, and its qualification, as being distinct from crude Social Darwinism. But where we do get into trouble if we adhere to a biological definition of adaptation extended to intelligent behavior is in the concept of *selection* as it is used by Sternberg. Under the heading *selection* and throughout his argument, Sternberg assumes a process that is exactly the converse of selection in the biological sense. *Environmental selection*, for Sternberg, refers to individuals' selecting the environment that best fits them. Eventually, this will lead them to modify the environment, or, if this is not possible, to move elsewhere. The partner leaving the marriage, the employee leaving the job, or the resident of Nazi Germany leaving the country are proposed as examples of the latter solution. In these and similar cases, an alternative explanation would put the selection pressure on the environmental conditions, rather than putting the power to select in the hands of the individual. Escape and avoidance behavior can be explained in a very satisfactory way in terms of contingencies of reinforcement or control by consequences without resorting to any decision of the organism to change its environment or to move away. This alternative account does not imply that such behaviors - occurring also, obviously, in humans as Sternberg's relevant examples remind us - have nothing in common with intelligence. After all, mechanisms of learning are but aspects of what has evolved as intelligent behavior. This is not to say that there is no such thing as an individual "making a choice" of an environment - as we all do when visiting dozens of apartments and houses before settling down in a new place - but, if we think of human behavior, be it of the most sophisticated kind, with the conceptual tools of biology, we are left with the problem of explaining how selection of an environment has evolved as a product of selection by the environment, a major problem for a general theory of intelligence. Sternberg completely ignores it, though well-known psychologists have dealt with it in a heuristically successful manner (Piaget 1967; 1974; 1976; Skinner 1969; 1981). One of them is Skinner, whose view, centered on the selective action of the environment, is akin to modern biological thinking - though, for some reason, his writings are often disregarded, unappreciated, and misrepresented. [See special issue on works of B. F. Skinner: forthcoming *BBS* 7(4) 1984.] Another is Piaget, whose lifelong endeavor has been accounting for the emergence of knowledge and logic in the framework of biological theory. (Incidentally, Piaget's contribution has practically no place in Sternberg's theory, which looks to European readers like building a general theory of physics leaving out Bohr's contribution - not just Bohr's name.)

What sets Sternberg's view in opposition to Piaget's theory (and, for that matter, to Skinner's approach) is that it is essentially *subject centered*, while Piaget and Skinner offer an *interactionist* conception. Because his theory is subject centered and does not recognize the role of selection by the environment, Sternberg is unable to avoid a normative definition of adaptation, despite his claim to the contrary. The biological model is the only one that provides a nonnormative concept of adaptation, but it has no place for the one-way *environmental selection* of Sternberg's theory. The author, being reluctant to decide from outside what is adaptive or not, is led to rely on the subject's own feeling about his adaptation - or on others' opinion, as in the questionnaire method mentioned above. In both cases, the definition of adaptation is normative, in the sense that it is loaded with value judgments.

The triarchic theory takes for granted that intelligence is a sort

of inherent property of the individual, a sort of competence that is expressed by means of a series of strategies and under specific forms, depending upon the peculiarities of the cultural context (looked at as a stage on which the subject will eventually choose a given behavior or strategy rather than another). This is of course in line with current cognitive theories. It leaves out the dynamics of intelligence: How does the individual come to perform some tasks intelligently? To answer this question, one has to look at the development of intelligence or at learning processes. Sternberg gives explicit attention neither to development nor to learning. True, we are told that, at some point, intellectual skills can become automatized and ready for use in solving novel problems. However, in spite of offering rather abstract speculations concerning the *ability* to automatize information processing, Sternberg tells us little about the way this automatization *takes place*. It would seem that understanding intelligence, and therefore building a general theory of it, would imply understanding the way it is built in the individual. Here again, one is surprised not to find any allusion to the constructivist theory of Piaget, and to the large amount of research derived from it. If Sternberg's ambition is to "answer a broader array of questions about intelligence than has been answered in the past by single theories," why does he not address himself also to some important questions that have been answered, at least partly, in the past, even though by less comprehensive theories? Omission of such an important contribution as Piaget's developmental theory would require some explanation.

This brings me to a last general comment. Reading Sternberg one cannot help having a feeling of *déjà vu* at many of his points, already made years ago by now forgotten authors. In at least one case, he is aware of the convergence, quoting Thurstone on withholding responses. But except for Thurstone (1924) and Dewey (misleadingly referred to in a 1957 reissue), the naive reader might have the impression that nothing intelligent had been written on intelligence until 1960 or so. I trust that Sternberg knows his classics, and, for those he might not know, I praise him for having rephrased by himself some of the things they had said earlier. Still, explicit reference to authors before the sixties or seventies would be useful. Limiting myself to contributions in French – because they are so widely ignored by American researchers – I think that psychologists of the Geneva School, before and besides Piaget, namely, Claparède (1933) and Rey (1946; 1962; 1963) have anticipated many of the ideas developed by Sternberg. One should go back to their work not just for the sake of historical erudition, or for founding one's theorizing on authorities of the past (Claparède and Rey certainly won't give Sternberg the prestigious support the *Grammaire de Port-Royal* brought to Chomsky), or for the moral pleasure of being fair to one's forerunners. In the controversial field of intelligence, looking back at earlier works that did not have much influence in their day is a way to detect the extra-scientific factors that account for the acceptance of a given paradigm, at a given time, and a way to put the scientific debate in a healthy relativistic perspective. Theories of intelligence that prevailed in the past may have been biased: the same is not necessarily true of all that has been said by some uninfluential authors, possibly too intelligent for their contemporaries. Perhaps they were maladapted?

What are the interrelations among the three subtheories of Sternberg's triarchic theory of intelligence?

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In order to become an integrated theory of intelligence, the triarchic theory must be more than three separate lists of criteria

for assessing intelligence – contextual aspects, extent of experience in a task, and mental mechanisms. The goals of the theories appear to include both assessing individual differences in intelligence and understanding the processes of intelligence, that is how people manage to do intelligent things. It may be sufficient to provide three lists of criteria for the purpose of the assessment of intelligence, but a theory for understanding intelligence requires considering how the various parts of the theory work together.

The relations among the three subtheories are not discussed in detail in Sternberg's target article. Specification of the roles of the subtheories appears limited to defining their domains of explanation: The contextual subtheory deals with the contents of intelligent behaviors; the two-facet subtheory (unfortunately labeled) deals with intelligent treatment of a task according to previous experience with it (novelty and automatization); and the componential subtheory involves the mental mechanism used in behaving in an intelligent fashion, independent of the particular contents of the task. Each subtheory has points to recommend it, but a theory requires more integration.

I would like to suggest a direction in which the three subtheories could find more integration, by focusing on a problem in Sternberg's account of the contextual subtheory. Sternberg proposes that the role of context is to provide the content on which intelligent processes work. This separation of content and process is fallacious, in that processes convert into content depending on the perspective from which they are viewed. Cross-cultural psychology provides many examples in which cognitive processes (such as control processes in memory) appear to be specific content areas with which individuals from particular cultures are familiar. (See discussions of the contextual nature of cognitive processes in Laboratory of Comparative Human Cognition 1983; Rogoff 1982; Rogoff & Mistry, in press; Scribner & Cole 1981.) Although the metacomponents discussed by Sternberg have not received direct attention in cross-cultural studies, it is reasonable to predict that they too, would not be identifiable independent of specific task.

In addition, Sternberg's separation of content and process is logically unverifiable. He asserts that, although the content of intelligence varies across cultures, the hardware (anatomy and physiology) and potential software (cognitive processes, strategies, mental representations) are found in varying degrees in all people in all sociocultural milieus. To demonstrate this would require giving tests across several cultures with valid measures of both content and process. But Sternberg argues that one cannot impose a test upon several cultures without being certain that the adaptive requirements of the skill are the same in those cultures. And to be certain of this seems to require equivalence of performance. So how would we interpret a finding of differences in the processes of intelligence? The difference could indicate that the test was not tapping the process with equal validity in the different cultures, or it could refute the assumption that the processes of intelligence are independent of context and culture. It may be more parsimonious not to separate content and process and instead to regard intelligence as being contextually grounded through and through.

The stance that all aspects of intelligence are related to context suggests that contextual aspects of intelligence may play an overarching role coordinating the other two subtheories. Contextual aspects of intelligence focus on the purpose of the individual's actions, the fit of the chosen means with the outcomes regarded as desirable in that context, and social conceptions of intelligence and socially provided tools and techniques for thinking. Hence these contextual aspects of an activity coordinate how the individual brings previous experience to bear on novelty and automating skilled processes (the two-facet subtheory), and how the person attempts to plan, monitor, and make decisions (componential subtheory) based on the skills, tools, and techniques familiar through practice of culturally organized activities.