The following text was originally published in *Prospects: the quarterly review of comparative education* (Paris, UNESCO: International Bureau of Education), vol. XXIV, no. 1/2, 1994, p. 311–327.

JEAN PIAGET

(1896–1980)

Alberto Munari[1]

A portrait of an educator that is also a portrait of the great Swiss epistemologist and psychologist might, at first glance, seem surprising. Indeed, why should Jean Piaget be regarded as an educator?—since he never practised that profession and always refused the title of educationist, going so far as to affirm: 'I have no views on teaching' (Bringuier, 1977, p. 194), and since all his writings on education[2] do not amount to more than a three-hundredth[3] part of his *œuvre* as a whole.

Such bafflement is altogether in order if we refer only to Piaget's own scientific output. But it is less surprising if we remember the many books that we owe to other authors on the educational implications of Piaget's achievement[4]. Indeed, for several years, we have ceased to count the number of educators and educationists in different countries who explicitly refer to Piaget's work to justify their methods and principles. But is the interpretation always the same? Do writers invariably refer to Piagetian *psychology*, or do they evoke other aspects of his complex and many-sided work? To which of the very different Piagets do we owe the most important contributions: to Piaget the *biologist*, Piaget the *epistemologist* or Piaget the *psychologist*? or are we particularly indebted to the *educational 'politician'*?—as one might call Piaget in his capacity as Director of the International Bureau of Education.

A lifelong cause: science

Let us start, however, by filling in the background. Jean Piaget epitomizes the 'enlightened' academician who struggled all his life against the institutions and intellectual prejudices of his day—and also perhaps against his own youthful idealistic and spiritual concerns (Piaget, 1914, 1915, 1918)—in order to defend and promote the *scientific approach*.

Encouraged by his father, whose 'scrupulous and critical mind disliked hasty generalizations' (Piaget, 1976), he was introduced very early to the precision of naturalist observation by the malacologist Paul Godet, Director of the Natural History Museum in Neuchâtel, his native town (ibid., p. 2–3). While still a schoolboy, he entered the arena of international scientific controversy by publishing as early as 1911, at the age of 15, the first of his articles in high-circulation journals. Piaget was very quickly attracted by the charm and rigour of scientific research. In his own words:

> Precocious as they were, these studies were nevertheless very useful in my scientific training. Moreover, they acted, if I may say so, like protective weapons against the demon of philosophy. Thanks to them, I had the rare privilege of catching a glimpse of science and what it represented before I went through the philosophical crises of adolescence. The early experience of these two sets of problems constituted, I am sure, the hidden inspiration for my subsequent activity in psychology (ibid., p. 3).

Thus, in spite of two major 'adolescent crises', one religious and the other philosophical (ibid., p. 4), Piaget was gradually brought to the firm conviction that the scientific approach was the only

valid way of gaining access to knowledge, and that the introspective approaches of the philosophical tradition could, at best, help to develop a certain wisdom (Piaget, 1965*a*).

This increasingly strong conviction determined the fundamental choices that Piaget made in the 1920s or thereabouts, and which, from then on, did not waver, whether they involved the psychology he decided to study, the academic policies he chose to defend or the commitment he undertook with regard to educational issues. On the subject of psychology, he declared: 'This made me decide to devote my life to the biological explanation of knowledge' (ibid., p. 5), thereby abandoning, after an initial interest linked to his own family experiences (ibid., p. 2), psychoanalysis and pathological psychology. With regard to his work as a researcher and university teacher, the constant concern influencing and guiding his work and, indeed, his entire life was that of winning recognition, especially by his colleagues in physics and the natural sciences, for the equally *scientific* nature of the human sciences and, more specifically, of psychology and epistemology. His attitude and his involvement in the field of education led him quite naturally to champion the pupil's active participation as the royal road to the scientific approach in school.

The discovery of childhood and education

It was, then, this plan that motivated Jean Piaget to move away from philosophical introspection and to go to work in Paris with Janet, Piéron and Simon in the laboratories founded by Binet. It was there that he discovered for the first time the rich world of children's thinking. It was also on this occasion that he prepared the first rough draft of his *critical method*—which he sometimes also referred to as his *clinical method*—of questioning very young children, on the basis of a wholly novel and remarkable distillation of what he had just learned from Dumas and Simon in clinical psychology and from Brunschvicg and Lalande in epistemology, logic and history of the sciences.

The originality of the Piagetian exploration of a child's thought resides in the methodological principle whereby the flexibility and subtlety of the 'in-depth' interview, characteristic of the clinical approach, need to be modulated by the systematic search for the logico-mathematical processes underlying the reasoning put forward. To conduct this type of interview, however, it is necessary to refer to the various developmental stages through which the concept to be examined has passed in the course of its historical evolution. Hence, the Piagetian methodology emerges from the outset as an attempt to associate the three traditionally Western approaches that had hitherto remained separate: the empirical method of the experimental sciences, the hypothetico-deductive method of logico-mathematics and the historical-critical method of the historical sciences (Munari, 1985*a*, 1985*b*).

In Paris, most of the children questioned by Piaget were children in hospital. Only when he was called to Geneva by Edouard Claparède and Pierre Bovet did he begin to study children in their 'normal' surroundings, especially at school. The Maison des Petits of the Jean-Jacques Rousseau Institute then became the principal venue for his research. His work in this leading centre of modern education—and subsequently in the primary schools of the day in Geneva, perhaps less 'modern' than the Maison des Petits—probably helped Piaget to understand the distance which too often separated the unsuspected intellectual skills that he had just discovered in children and the teaching practices commonly adopted by teachers in State schools. Moreover, the fact that he was working this time within a Jean-Jacques Rousseau institute, entirely dedicated to developing and improving educational systems and practices, and no longer in hospital establishments or medical laboratories dealing with sick or handicapped children, was bound to have a certain influence on Piaget's awareness of the wider education issue.

'However', Piaget admitted, not without candour, 'teaching did not interest me at the time, since I had no children of my own' (Piaget, 1976, p. 12). It was only later, when he returned to Geneva after a brief period in Neuchâtel where he had replaced his former teacher, Arnold Reymond, and was made co-director, with Claparède and Bovet of the Jean-Jacques Rousseau

Institute, that his commitment to education first took tangible form. 'In 1929, I unwisely accepted the post of Director of the International Bureau of Education, yielding to the insistence of my friend Pedro Rosselló' (ibid., p. 17). This was a decisive turning-point in Piaget's life, for it led him to the discovery of the socio-political issues that are inseparable from any educational undertaking and prompted him to embark on the grand scheme of international education.

From the IBE adventure to Piagetian educational principles

'This adventure was something of a gamble', Piaget said (ibid.), as if he wanted to play down its importance. Nevertheless, he remained at the head of this international organization from 1929 to 1968! This is, undoubtedly, a remarkable fact, not only in itself but especially in view of Piaget's own personality, since he was notoriously reluctant to commit himself to non-scientific tasks.

Was it his desire to improve teaching methods by 'the official adoption of techniques better adapted to the mind of the child' (ibid.) and therefore, once again, more *scientific*? Or should the project be viewed as a way of becoming more effectively involved in official school institutions through the action of a supragovernmental organization? Or, again, did it hold out the hope of combating misunderstanding among peoples, and hence the evils of war, through an educational effort directed towards international values?

Every year, from 1929 to 1967, Piaget diligently drafted his 'Director's Speeches' for the IBE Council and subsequently for the International Conference on Public Education. It is in this collection of some 40 documents—forgotten by most reviewers of Piaget's works that we find features of Jean Piaget's educational credo expressed much more explicitly than in his other writings. Hence, it is those documents, rather than the few general works that Piaget agreed to publish on education (Piaget, 1969, 1972*b*), which provide illustrations of the underlying principles guiding his educational plan. We shall see that this plan is far less 'implicit' and less 'unconscious' than has often been claimed.

Above all, Piaget—contrary to what is usually thought—attached very great importance to education, for he unhesitatingly declared that 'only education is capable of saving our societies from possible collapse, whether violent, or gradual' (Piaget, 1934*c*, p. 31). In his view, the educational endeavour is therefore worth fighting for, since the outcome is sure: 'We need only remember that a great idea has its own intrinsic strength[5], and that what exists is largely what we want[6], in order to feel confident and to be sure that, starting from nothing, we shall succeed in giving education its rightful place internationally' (ibid.). On the eve of the Second World War, Piaget again declared: 'After the upheavals of these last few months, education will once more constitute a decisive factor not only in rebuilding but also, and especially, in construction proper' (Piaget, 1940, p. 12). Hence, in his view, education was the prime challenge facing all peoples, transcending ideological and political divergences: 'The common wealth of all civilizations is the education of the child' (ibid.).

But what kind of education? Here, too—and contrary to what he would later say to Bringuier (1977, p. 194)—Piaget was not afraid to enlarge on his opinions in his 'Speeches'. First, he stated a basic precept: 'Coercion is the worst of teaching methods' (Piaget, 1949*d*, p. 28). Accordingly, 'in the field of education, example must play a more important role than coercion' (Piaget, 1948, p. 22). Another precept, just as fundamental, which he put forward on several occasions, is the importance of the pupils active participation: 'A truth learnt is only a half-truth; the whole truth is reconquered, reconstructed and rediscovered by the pupil himself/herself' (Piaget, 1950, p. 35). In Piaget's view, this educational principle rested on an indisputable psychological fact: 'All modern psychology teaches us that intelligence proceeds from action' (ibid.), hence the fundamental role that the exercise of research must play in all educational strategies. That research, however, must not be an abstraction, for 'Action presupposes prior research, and research has value only with a view to action' (Piaget, 1951, p. 28).

A school without coercion, then, where pupils actively experiment with a view to reconstructing for themselves what is to be learnt. Here, in outline, we already have Piaget's blueprint for education. However, 'Children do not learn to experiment simply by watching the teacher performing experiments', he warns 'or by doing exercises organized in advance; they learn by a process of trial and error, working actively and independently, that is, without restriction and with ample time at their disposal' (Piaget, 1959, p. 39). On this principle, which he considered paramount, Piaget did not fear controversy: 'In most countries, however, the school turns out linguists, grammarians, historians and mathematicians but fails to educate the inquiring mind. It is important to remember that it is much more difficult to train an experimental mind than a mathematical mind at primary and secondary school [...]. It is much easier to reason than to experiment' (ibid.).

What, then, would be the role of books and textbooks in such a school? 'The ideal school would not have compulsory textbooks for pupils but only reference works used freely [...]. The only essential manuals are those for the teacher's use.' (ibid.)

Are these principles applicable only to children's education?

> On the contrary, active methods requiring a type of work that is both spontaneous and guided by the questions posed, and work in which the pupil rediscovers and reconstructs truths instead of receiving them ready-made, are as necessary for the adult as for the child [...]. For it should be remembered that *every time an adult tackles new problems, his or her sequence of reactions resembles the way in which reactions occur in the course of mental development*[7] (Piaget, 1965*b*, p. 43).

So these are the basic principles of Piagetian education. Nor, in his 'Speeches', did Piaget hesitate to give plenty of sound advice concerning specific disciplines, especially the teaching of mathematics:

> As small children are more developed on the sensorimotor plane than on the plane of verbal logic, it is advisable to provide them with patterns of action on which subsequent learning can be based [...]. An introduction to mathematics is [therefore] facilitated by a sensorimotor education, such as that practised, for instance, at the Maison des Petits in Geneva (Piaget, 1939*c*, p. 37).

His stance on this subject is very clear:

> Mathematical understanding is not a matter of ability in children. It is therefore erroneous to consider that lack of success in mathematics is due to a lack of ability [...]. The mathematical operation derives from action, and it therefore follows that the intuitional presentation is not enough. The child itself must act, since the manual operation is necessarily a preparation for the mental one [...]. In all mathematical fields, the qualitative must precede the numerical (Piaget, 1950, p. 79–80).

The teaching of natural sciences also received Piaget's special attention:

> Those who by profession study the psychology of intellectual operations in children and adolescents are always struck by the resources at the disposal of every normal pupil, provided that he/she is given the means to work actively without the obligation of too much passive repetition [...]. From such a standpoint, science teaching is the active inculcation of objectivity and the habit of verification (Piaget, 1952, p. 33).

But the principle of active education may also be applied to less technical areas, such as the process of learning a modern language: 'learning a language as directly as possible in order to master it; then thinking about it so as to clarify the grammar' (Piaget, 1965*b*, p. 44); or it may even be applied to the development of an international outlook: 'as a means of dealing with scepticism and relational difficulties between peoples, only remedies of a receptive order have been considered, in the form of lessons, appeals to the sensitivity and imagination of the pupils [...]. We need to create

social links between children, especially adolescents, and to encourage them to act and assume responsibility' (Piaget, 1948, p. 36).

With respect to the links between education and psychology, Piaget, in his 'Speeches', is much more explicit than in his other writings. Firstly, the link between education and psychology is, in his opinion, a *necessary* link: 'Indeed, I do not believe that there is a universal method of teaching, but what is common to all education systems is the child itself, or at least a number of general features of the child's psychology' (Piaget, 1934, p. 94). And these are precisely the general features that psychology should accordingly highlight, so that educational methods can take them into account: 'It is undeniable that psychologists' research has been the starting-point of almost all methodological or didactic innovations in recent decades. It is unnecessary to reiterate that all methods appealing to a pupil's interests and actual activity have been inspired by genetic psychology' (Piaget, 1936*b*, p. 14). Nevertheless, 'the links between teaching and psychology are complex: teaching is an art, whereas psychology is a science, but while the art of educating presupposes unique innate abilities, it needs to be developed by the requisite knowledge of the human being who is to be educated' (Piaget, 1948, p. 22). Furthermore, 'it is often asserted that education is an art and not a science and therefore does not require scientific training. Although it is true that education is an art, it has the same claim to be an art as medicine which, while it requires abilities and innate gifts, also calls for knowledge of anatomy, pathology, etc. Similarly, if teaching is to train the pupil's mind, it must emanate from knowledge of the child, hence from psychology' (Piaget, 1953, p. 20). In still more specific terms, when writing about scientific research, Piaget claims—rather argumentatively—that experimental teaching could not exist without the help of psychology:

> If experimental teaching seeks to remain a purely positivist science, i.e. confining itself to recognizing facts but not seeking to explain them, confining itself to recognizing achievements but not ascertaining the reasons for them, it goes without saying that psychology is unnecessary [...]. But if experimental teaching seeks to understand what it discovers, explain the achievements it acknowledges, and grasp the reason for the greater effectiveness of certain methods compared with others, then, of course, it is essential to combine educational research with psychological research—in other words, to make constant use of educational psychology constantly and not merely to measure achievements in experimental teaching (Piaget, 1966, p. 39).

But, if the links between teaching and psychology are complex, the dialogue between *educators* and *psychologists* is equally so. Piaget went so far as to offer strategic advice that, surprising as it may seem, nevertheless reflects the wisdom and experience of a skilful negotiator. He reminded us that it should always be borne in mind that 'the most elementary of psychological rules is that no human being likes being told what to do, and educators even less than all others. For a long time psychologists have been well aware that, in order to be heeded by teachers and administrators, one must be wary of appearing to have recourse to psychological doctrines and must, instead, pretend to appeal only to common sense' (Piaget, 1954*b*, p. 28).

Is this opportunism? It may seem so at first glance, but on further reflection we again find Piaget's underlying fundamental educational credo:

> We have trusted in the educational and creative value of objective exchange. We have believed that mutual information and reciprocal understanding of different angles are ways of attaining the truth. We have shunned the mirage of general truths and instead have believed in that concrete and living truth which stems from free discussion and from the laborious and tentative co-ordination of different, and sometimes opposing, points of view (ibid.).

This credo is not confined to the sphere of educational endeavours: it is, in Piaget's opinion, the *sine qua non* of all scientific work, the regulating principle of all human activity and the rule of life of every intelligent being.

The long process of genetic epistemology

It was, then, in this frame of mind that, for many years, Piaget pursued the grand plan which had fascinated him from the beginning of his career: that of being able to establish 'a kind of embryology of intelligence' (Piaget, 1976, p. 10). Thus, it was by trying various approaches and methods, and comparing scholars from various backgrounds and different specialized fields, that he studied the development of intelligence from earliest infancy. This led him to construct his famous theory of 'parallelism' between the process of constructing individual knowledge and the process of constructing knowledge, i.e. between *Psychogénèse et histoire des sciences* [Psychogenesis and history of science] (Piaget and Garcia, 1983).

This theory aroused sharp controversy far beyond the frontiers of the Geneva region and the specific field of psychology. It was, however, from the heuristic standpoint, remarkably fruitful: not only did it spark off the tremendous scientific output of the International Centre for Genetic Epistemology, whose studies now run to 37 volumes, but it was also at the origin of the fresh impetus given to the fundamental debate on education of Piagetian inspiration, especially in the United States[8].

Piaget the psychologist had already supplied the educator with a substantial series of experimental data in support of the active methods that were also advocated by Montessori, Freinet, Decroly and Claparède. Through his work on the developmental stages of intelligence, he had already incited teachers to gear their teaching methods more effectively to the level of operation attained by the pupil. And now Piaget the epistemologist suggested another approach, namely, that teachers should to some extent distance themselves from the pupils, their level of attainment, their difficulties and their individual skills, with a view to becoming more broadly aware of the cultural context and taking into account the various lines of progression and historical paths of development followed by the very concepts that they were setting out to study or to teach.

In particular, the basic postulate of genetic psycho-epistemology whereby the explanation of all phenomena, whether physical, psychological or social, is to be sought in one's own mental development and nowhere else, helped to give the historical dimension a new role, in teaching methods as well as in general debate on education. Every theory, concept or object created by a person was once a strategy, an action, an act. From this basic postulate then emerges a new teaching precept: if to learn properly it is necessary to understand properly, then to understand properly it is essential to reconstruct for oneself not so much the concept or the object in question but rather the path that led from the initial act to that concept or object. Furthermore, this principle is applicable both to the object of knowledge and to the knower: hence the need to develop, in parallel to all learning processes, a metalanguage in which to talk about the very process of learning[9].

The double reading of genetic constructivism

But the facts and theories of Piagetian genetic constructivism, and more especially its description of the developmental stages of intelligence and scientific knowledge, were the subject of very different readings depending on the type of conception, avowed or not, that each reader had of culture, which is undeniably the ultimate goal of any educational endeavour.

Among these various conceptions, two marked tendencies may be distinguished: one which sees culture as a sort of structure to be built gradually according to a well-planned procedure, and the other which considers it rather to be a kind of network endowed with a certain flexibility and capacity for self-organization and whose construction or reconstruction may accordingly be prompted, facilitated, but not entirely controlled (Fabbri and Munari, 1984*a*).

The interesting fact is that both tendencies refer to Piagetian genetic constructivism, or to be precise to its theory of stages, but give two interpretations of it which are situated at different levels, one more specifically psychological and the other more strictly epistemological. These interpretations have, in the practice of teaching, ultimately become radically opposed to each other.

The first, that which places greater emphasis on the psychology of the child, considers a stage to be a *degree*, a precise and necessary step in the construction of the cultural edifice; it is a step determined by the very nature—almost the biological nature—of the developmental process, and is supposed to represent a stable and solid acquisition without which any subsequent construction is impossible. Typical of this position is, for instance, recourse to Piagetian 'tests' so as to give a more 'scientific' justification to educational guidance and selection procedures aimed at organizing both the education system and educational practices into a hierarchy of levels regarded as 'homogeneous' and increasingly difficult to attain.

Opposed to this first interpretation of Piagetian genetic constructivism is the second, which is more concerned with epistemological analysis. This school of thought interprets the stage rather as a sort of structuring or sudden restructuring, partially unpredictable, always temporary and unstable, of a complex *network* of relations which link a number of concepts and mental operations together in a continually changing pattern. A typical example of this second position—which is strongly reminiscent of Kuhn's (1962)—is the jettisoning of all rigid forms of programming and standardization in teaching practices in favour of close attention to setting up the right *contexts*, i.e. those believed to foster the emergence of the desired patterns of organization of knowledge (Munari, 1990*d*).

Although opposed, these two positions are often found simultaneously in various areas (both literal and figurative) of the complex and heterogeneous world of education. Sometimes one or the other gains the upper hand, depending on the precise historical circumstances, local traditions, economic issues and the political forces at work.

However, the latter seems to be the one that is gaining ground today, perhaps less in conventional schooling than in non-formal education, and in particular in managerial training strategies for company executives, possibly as a result of the new challenges that a more and more interconnected and unpredictable environment imposes on the organization of human dealings[10].

So, while Piaget the *psychologist* has left an undeniable stamp on educational practices, especially where early childhood education is concerned, and while Piaget the *educational 'politician'* has unquestionably contributed to the promotion of movements for the international co-ordination of education, Piaget the *epistemologist* now influences the educational task in fields he never dreamed of. Here we have an undeniable indication of the wealth of theoretical implications and concrete suggestions that his work still offers to educators.

Notes

1. Alberto Munari (Switzerland). Psychologist and epistemologist, professor at the University of Geneva where, since 1974, he has been running the Unit of Educational Psychology. From 1964 to 1974 he collaborated with Jean Piaget and , under his tutelage, obtained his doctorate in experimental genetic psychology in 1971. He is the author of numerous publications, including *The Piagetian approach to the scientific method: Implications for teaching; La sculoa di ginebra dopo Piaget* [The Geneva school since Piaget]; and (1993) *Il sapere ritrovato: conoscenza, fromazione, organizzazione* [Knowledge rediscovered: acquisition, training, organization].
2. Piaget, 1925, 1928, 1930, 1931, 1932, 1933*a*, 1933*b*, 1934*a*, 1934*b*, 1935, 1936*a*, 1939*a*, 1939*b*, 1942, 1943, 1944, 1949*a*, 1949*b*, 1949*c*, 1954*a*, 1957, 1964, 1965, 1966*a*, 1966*b*, 1969, 1972*a*, 1972*b*, 1973; Piaget and Duckworth, 1973. Piaget also drafted, as Director of the International Bureau of Education, some 40 speeches and reports, all published courtesy of the IBE between 1930 and 1967.
3. In other words, slightly less than 1,000 pages (including speeches and reports written for the IBE) out of a total estimated at approximately 35,000 pages, not counting translations!

4. In this connection, world literature is extremely rich and it is difficult to draw up a complete list. 'Classic' reference works include Campbell and Fuller, 1977; Copeland, 1970; Duckworth, 1964; Elkind, 1976; Forman and Kuschner, 1977; Furth, 1970; Furth and Wachs, 1974; Gorman, 1972; Kamii, 1972; Kamii and De Vries, 1977; Labinowicz, 1980; Lowery, 1974; Papert, 1980; Rosskopf et al., 1971; Schwebel and Raph, 1973; Sigel, 1969; Sinclair and Kamii, 1970; Sprinthall and Sprinthall, 1974; Sund, 1976; Vergnaud, 1981. We ourselves, with the help of a number of colleagues who collaborate with our group and in particular with Donata Fabbri, have on several occasions analysed the educational implications of Piaget's psycho-epistemology: Bocchi et al., 1983; Ceruti et al., 1985; Fabbri, 1984, 1985, 1987*a*, 1987*b*, 1988*a*, 1988*b*, 1989, 1990, 1991, 1992; Fabbri and Formenti, 1989, 1991; Fabbri et al., 1992; Fabbri and Munari, 1983, 1984*a*, 1984*b*, 1985*a*, 1985*b*, 1988, 1989, 1991; Fabbri and Panier-Bagat, 1988; Munari, 1980, 1985*a*, 1985*b*, 1985*c*, 1987*a*, 1987*b*, 1987*c*, 1988, 1990*a*, 1990*b*, 1990*c*, 1992; Munari et al., 1980.
5. This was one of Jean Piaget's fundamental convictions, already to be found in his very earliest writings: cf. *La mission de l'idée* (Piaget, 1915).
6. A worthy constructivist act of faith!
7. We have deliberately emphasized this excerpt—too often unfamiliar to those who see the Piagetian approach as relevant only to the child—for it seems to us of paramount importance from the educational standpoint. For the same reason, we have also developed, with Donata Fabbri, a strategy for an educational approach applicable to adults, which we have called 'Laboratory of operative epistemology' (Fabbri, 1988*a*, 1990; Fabbri and Munari, 1984*a*, 1985*b*, 1988, 1990, 1991; Munari, 1982, 1989, 1990*a*, 1992, 1993).
8. Cf. Copeland, 1970; Elkind, 1976; Furth, 1970; Gorman, 1972; Schwebel and Raph, 1973.
9. In this connection, and although they do not seem to have had direct links with Piagetian psychology—except of course in Geneva—the various tendencies that incline increasingly towards the use of 'educational biographies' or 'life stories' as teaching tools could be regarded as a specific development of this principle (cf. for example, Dunn, 1982; Ferrarotti, 1983; Josso, 1991; Pineau and Giobert, 1989; Sarbin, 1986). Similarly, even if its origins are elsewhere (Flavell, 1976), the rising tide of educational research and initiatives relating to metacognition can also be hailed as part of the same trend (cf. Noël, 1990; Weinert and Kluwe, 1987; and also Piaget, 1974*a*, 1974*b*).
10. Cf. for example, Fabbri, 1990; Fabbri and Munari, 1988; Landier, 1987; Munari, 1987*b*.

Works by Jean Piaget

Piaget, J. 1914. Bergson et Sabatier. *Revue chrétienne* (Paris), vol. 61, n 4, p. 192–200.

——. 1915. *La mission de l'idée*. Lausanne, La Concorde.

——. 1918. *Recherche*. Lausanne, La Concorde.

——. 1925. Un grand éducateur. *Le nouvel essor* (Paris), vol. 20, n 25, p. 1–2.

——. 1928. Psychopédagogie et mentalité enfantine. *Journal de psychologie normale et pathologique* (Paris), vol. 25, p. 31–60.

——. 1930. Les procédés de l'éducation morale. Dans : *Cinquième congrès international d'éducation morale, Paris, 1930 : compte rendu et rapport général*. Paris, Alcan, p. 182–219.

——. 1931. Introduction psychologique à l'éducation internationale. Dans: *Comment faire connaître la Société des Nations et développer l'esprit de coopération internationale*. Genève, Bureau international d'éducation, p. 56–68.

——. 1932. Les difficultés psychologiques de l'éducation internationale. Dans: *Comment faire connaître la Société des Nations et développer l'esprit de coopération internationale: Vème cours pour le personnel enseignant : compte rendu des conférences données du 25 au 30 juillet 1932*. Genève, Bureau international d'éducation, p. 57–76.

——. 1933*a*. L'évolution sociale et la pédagogie nouvelle. Dans : *VIème congrès mondial de la Ligue Internationale pour l'éducation nouvelle*. London, New Education Fellowship, p. 474–484.

——. 1933*b*. Psychologie de l'enfant et enseignement de l'histoire. *Bulletin trimestriel de la Conférence internationale pour l'enseignement de l'histoire* (La Haye), n 2, p. 8–13.

——. 1934*a*. Une éducation pour la paix est-elle possible? *Bulletin de l'enseignement de la Société des Nations* (Genève), n° 1, p. 17–23.

——. 1934*b*. Remarques psychologiques sur le self-government. Dans : *Le self-government à l'école*. Genève, Bureau international d'éducation, p. 89–108.

——. 1934c. *Rapport du directeur : cinquième réunion du Conseil*. Genève, Bureau international d'éducation.

——. 1934*d*. Discours du directeur. Dans : Troisième Conférence internationale de l'instruction publique : procès-verbaux et résolutions. Genève, Bureau international d'éducation, p. 27–30.

——. 1935. Remarques psychologiques sur le travail par équipes. Dans : *Le travail par équipes à l'école*. Genève, Bureau international d'éducation, p. 179–196.
——. 1936*a*. Rapport préliminaire sur l'enseignement des langues vivantes dans ses relations avec la formation de l'esprit de collaboration internationale. *Bulletin de l'Enseignement de la Société des Nations* (Genève), n 3, p. 61–66.
——. 1936*b*. *Rapport du directeur à la septième réunion du Conseil*. Genève, Bureau international d'éducation.
——. 1939*a*. Examen des méthodes nouvelles. Dans : *Encyclopédie française, t. 15 : éducation et instruction*. Paris, Société de gestion de l'Encyclopédie française, 28, p. 1–13.
——. 1939*b*. Les méthodes nouvelles : leur bases psychologiques. Dans : *Encyclopédie française, t. 15 : éducation et instruction*. Paris, Société de gestion de l'Encyclopédie française, 26, p. 4–16. (publié aussi in Piaget, 1969, p. 197–264).
——. 1939*c*. Discours du directeur (et autres interventions). Dans : Huitième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 22–23 ; 37 ; 73 ; 86–87 ; 144–145 ; 148–149.
——. 1940. *Rapport du directeur : onzième réunion du Conseil*. Genève, Bureau international d'éducation.
——. 1942. Psychologie et pédagogie genevoises. *Suisse contemporaine* (Genève), vol. 2, n 5, p. 427–431.
——. 1943. Les tâches présentes et futures des instituts de pédagogie curative. *Pro Infirmis* (Zurich), vol. 1, n 9, p. 280–281.
——. 1944. L'éducation de la liberté. *Berner Schulblatt* (Berne), vol. 77, n 16, p. 297–299.
——. 1948. Discours du Directeur du Bureau international d'éducation (et autres interventions). Dans : Onzième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 22–23 ; 28 ; 36 ; 48 ; 80.
——. 1949*a*. *Le droit à l'éducation dans le monde actuel*. Paris, Libr. du recueil Sirey, 56 p. (publié aussi in Piaget, 1972b, p. 41–133).
——. 1949*b*. La pédagogie moderne. *Gazette de Lausanne et Journal suisse* (Lausanne), vol. 152, n 63, p. 10.
——. 1949*c*. Remarques psychologiques sur l'enseignement élémentaire des sciences naturelles. Dans : *L'initiation aux sciences naturelles à l'école primaire*. Genève, Bureau international d'éducation, p. 35–45.
——. 1949*d*. Discours du directeur du Bureau international d'éducation. Dans : Douzième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 27–28.
——. 1950. Discours du directeur du Bureau international d'éducation. Dans : Treizième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 35–36.
——. 1951. Discours du directeur du Bureau international d'éducation. Dans : Quatorzième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 28.
——. 1952. Discours du directeur du Bureau international d'éducation. Dans : Quinzième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 31–33.
——. 1953. Discours du directeur du Bureau international d'éducation. Dans : Seizième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 25–26.
——. 1954*a*. L'éducation artistique et la psychologie de l'enfant. Dans : *Art et éducation : recueil d'essais*. Paris, UNESCO, p. 22–23.
——. 1954*b*. Discours du directeur du Bureau international d'éducation. Dans : Dix-septième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 27–28.
——. 1957. L'actualité de Jean Amos Comenius : Préface. Dans : *Jean Amos Comenius, 1592–1670 : pages choisies*. Paris, UNESCO, p. 11–33.
——. 1960. Discours du directeur du Bureau international d'éducation. Dans : Vingt-troisième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 38–39.
——. 1964. Development and learning. Dans : *Piaget rediscovered : A report of the Conference on cognitive studies and curriculum development*. Ithaca (NY), Cornell University Press, p. 7–20.
——. 1965*a*. Education et instruction depuis 1935. Dans : *Encyclopédie française, t. 15 : éducation et instruction*. Paris, Société nouvelle de l'Encyclopédie française, p. 7–49.
——. 1965*b*. Discours du directeur du Bureau international d'éducation. Dans : Vingt-septième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international

d'éducation, p. 42–44.
——. 1966*a*. L'initiation aux mathématiques, les mathématiques modernes et la psychologie de l'enfant. *L'enseignement mathématique* (Paris), série 2, vol. 12, p. 289–292.
——. 1966*b*. The psychology of intelligence and education. *Childhood Education* (Wheaton, MD), vol. 42, p. 528.
——. 1966c. Discours du directeur du Bureau international d'éducation. Dans : Vingt-neuvième Conférence internationale de l'instruction publique : procès-verbaux et recommandations. Genève, Bureau international d'éducation, p. 37–40.
——. 1969. *Psychologie et pédagogie*. Paris, Denoël, p 264.
——. 1972*a*. Fondements scientifiques pour l'éducation de demain. *Perspectives : revue trimestrielle de l'éducation*, Paris, UNESCO, vol. 2, n 1, p. 13–30 (publié aussi dans : *Education et développement*, 1973, n°32, p. 6–22 ; *Revue suisse d'éducation* (Berne), 1972, vol. 45, n°9, p. 273–276 et 1973, vol. 46, n°2, p. 33–36 ; et dans : Piaget, 1972*b*, p. 5–40).
——. 1972*b*. *Où va l'éducation ?* Paris, Denoël, p. 133
——. 1973. Comments on mathematical education. Dans : *Developments in mathematical education : proceedings of the 2nd International congress on mathematical education, Exeter, 1972*. London, Cambridge University Press, p. 79–87.
——. 1974*a*. *La prise de conscience*. Paris, Presses universitaires de France.
——. 1974*b*. *Réussir et comprendre*. Paris, Presse universitaires de France.
——. 1976. Autobiographie. Dans : G. Busino (dir. publ.) : Les sciences sociales avec et après Jean Piaget. *Cahiers Vilfredo Pareto. Revue européenne des sciences sociales* (Genève), vol. XIV, n° 38–39, p. 1–43.
Piaget, J. ; Duckworth, E. 1973. Piaget takes a teacher's look. *Learning : The magazine for creative teaching* (New York), vol. 2, n° 2, p. 22–27.

Quelques lectures sur Piaget

Bocchi, G., et al. 1983. *L'altro Piaget : strategie delle genesi*. Milano, Emme Edizioni.
Ceruti, M., et al. 1985. *Dopo Piaget : aspetti teorici e prospettive per l'educazione*. Roma, Ed. Lavoro.
Bringuier, J.C. 1977. *Conversations libres avec Jean Piaget*. Paris, Laffont.
Campbell, T.C. ; Fuller, R.G. 1977. A teacher's guide to the learning cycle : a Piagetian approach to college instruction. Dans : *Multidisciplinary Piagetian-based programs for college freshmen*. Lincoln, University of Nebraska.
Copeland, R. 1970. *How children learn mathematics : teaching implications of Piaget's research*. New York, MacMillan.
Duckworth, E. 1964. Piaget rediscovered. Dans : R.E. Ripple ; V.N. Rockcastle (dir. publ.) : *Piaget rediscovered*. Ithaca (NY), Cornell University Press.
Dunn, J.V. 1982. *Autobiography : towards a poetics of experience*. Philadelphia, University of Pennsylvania Press.
Elkind, D. 1976. *Child development and education : a Piagetian perspective*. New York, Oxford University Press.
Fabbri, M.D. 1984. Obbedienza e potere. *SE-scienza-esperienza* (Milano), vol. 2, n 16, p. 7–9.
——. 1985. L'obbedienza del bambino. *Studi di psicologia dell'educazione* (Rome), vol. 4, n 2, p. 98–116.
——. 1987*a*. Musica e conoscenza. Dans : G. Belgrano (dir. publ.). *Il bambino dal suono alla musica*. Teramo, Lisciani & Giunti Ed., p. 36-45.
——. 1987*b*. Il senso della scienza. *Scuola lariana* (Como), n 13, p. 8–10.
——. 1988*a*. Epistemologia operativa e processi di apprendimento. Dans : U. Morelli (dir. publ.) *La formazione : modelli e metodi*. Milano, Franco Angeli Ed., p. 29–44.
——. 1988b. Norme, valori e educazione. *L'educatore* (Milano), vol. 36, n 4, p. 55–58.
——. 1989. Psicogenesi del giudizio morale e attività agonistica. Dans : A. Selvini (dir. publ.) *Attività mentale e movimento*. Roma, Borla Ed.
Fabbri, D. 1990. *La memoria della regina : pensiero, complessità, formazione*. Milano, Guerini.
——. 1991. Segni e simboli del conoscere. *Bambini* (Milano), vol. 7, n 8, p. 16–21.
——. 1992. Costruttivismo come metafora. Dans : M. Ceruti (dir. publ.) *Evoluzione e conoscenza*. Bergamo, Lubrina. p. 433–442.
Fabbri, M.D. ; Formenti, B.L. 1989. Per un approccio costruttivista neo-piagetiano dell'identità : prime riflessioni. *Attualità in psicologia* (Rome), vol. 4, n 4, p. 9–16.
Fabbri, D. ; Formenti, L. 1991. *Carte di identità. Per una psicologia culturale dell'individuo*. Milano, Franco Angeli.
Fabbri, D. ; Mari, R. ; Valentini, A. (dir. publ.). 1992. *La paura di capire : modelli di socializzazione e nuove patologie nei primi anni dell'adolescenza*. Milano, Franco Angeli.
Fabbri, M.D. ; Munari, A. 1983. Per una psicologia culturale. *Studi di psicologia dell'educazione* (Rome), vol. 2, n 2, p. 16–28.

——. 1984*a*. *Strategie del sapere : verso una psicologia culturale*. Bari, Dedalo.
——. 1984*b*. Piaget anti-pedagogo? *Quaderni razionalisti* (Padova), p. 4-5.
——. 1985*a*. Come il bambino vede il proprio corpo. Dans : D. Gaburro et al. *Il bambino e il suo pediatra : alle soglie del futuro*. Milano, Plasmon Ed.
——. 1985*b*. Il conoscere del sapere : complessità e psicologia culturale. Dans : G. Bocchi et M. Ceruti (dir. publ.). *La sfida della complessità*. Milano, Feltrinelli.
Fabbri, D. ; Munari, A. 1988. *La scoperta della conoscenza : simboli, strategie, contesti*. Carpi, Comune di Carpi, Quaderni di aggiornamento del Comune di Carpi.
——. 1989. Dopo Piaget : Strategie della conoscenza e implicazioni educative. (A cura di N. Bulgarelli). *Infanzia*, n 9–10, p. 5–8.
——. 1990. Il pensiero in diretta. *Oikos* (Bergamo), 1, p. 225–231.
——. 1991. Cultural Psychology. A new relationship with knowledge. *Cultural dynamics* (Leiden, NL), vol. 3, n°4, p. 327–348.
Fabbri, M.D. ; Panier Bagat, M. 1988. Normes et valeurs : Le concept d'obéissance chez l'enfant. *Archives de psychologie* (Genève), vol. 56, n°216, p. 23–39.
Ferrarotti, F. 1983. *Histoire et histoire de vie*. Paris, Méridiens.
Flavell, J.H. 1976. Metacognitive aspects of problem solving. Dans : L.B. Resnick (dir. publ.) : *The nature of intelligence*. Hillsdale, Lawrence Erlbaum.
Forman, G. ; Kuschner, D. 1977. *The child's construction of knowledge : Piaget for teaching children*. Monterey, CA, Brooks & Cole.
Furth, H.G. 1970. *Piaget for teachers*. New York, Prentice-Hall.
Furth, H.G. ; Wachs, H. 1974. *Thinking goes to school : Piaget's theory in practice*. New York, Oxford University Press.
Gorman, R. 1972. *Discovering Piaget : a guide for teachers*. Columbus, Ohio, Merril.
Josso, C. 1991. *Cheminer vers soi*. Lausanne, L'Age d'Homme.
Kamii, C. 1972. An application of Piaget's theory to the conceptualization of a preschool curriculum. Dans : R.K. Parker (dir. publ.) : *The preschool in action*. Boston, Allyn & Bacon.
Kamii, C. ; De Vries, R. 1977. Piaget for early education. Dans : M. Parker ; R. Parker (dir. publ.) : *The preschool in action : Exploring early childhood programs*. Boston, Allyn & Bacon.
Kuhn, T.S. 1962. *The structure of scientific revolutions*. Chicago, University of Chicago Press.
Labinowicz, E. 1980. *The Piaget primer : thinking, learning, teaching*. Menlo Park, CA, Addison-Wesley.
Landier, H. 1987. *L'entreprise polycellulaire*. Paris, ESF.
Lowery, L. 1974. *Learning about learning : conservation abilities*. Berkeley, CA, University of California Press.
Munari, A. 1980. Piaget et l'inconscient cognitif. *L'éducateur* (Lausanne), vol. 39, p. 1179–1180.
——. 1982. Per una epistemologia operativa. Dans : E. Bojani (dir. publ.). *Laboratorio Giocare con l'arte*. Faenza : Ed. Museo Internazionale delle Ceramiche, p. 49–57.
——. 1985*a*. Per una metodologia della interdisciplinarità. *Studi di psicologia dell'educazione* (Rome), vol. 4, n°2, p. 117–126.
——. 1985*b*. The Piagetian approach to the scientific method : implications for teaching. Dans : V. Shulman ; L. Restaino-Baumann ; L. Butler (dir. publ.). *The future of Piagetian theory : the neo-Piagetians*. New York, Plenum Press, p. 203–211.
——. 1985*c*. La creatività nell'età evolutiva : metafora e trasgressione. Dans : C. Musatti et al. *Psicologia e creatività*. Milano, Selezione, p. 118–125.
——. 1987*a*. Per un approccio psico-culturale all'educazione musicale. Dans : G. Belgrano (dir. publ.) *Il bambino dal suono alla musica*. Teramo, Lisciani & Giunti Ed., p. 46–53.
——. 1987*b*. Soggetto-oggetto : Nuovi rapporti di complessità. *Quaderni di Formazione Pirelli* (Mileno), n°61, p. 55–60.
——. 1987*c*. Insegnare le scienze o la scienza? *Scuola lariana* (Como), n°13, p. 5–7.
——. 1988. Le concept d'équilibration majorante et d'homéorhèse dans la psychogénèse du sujet individuel. *Archives de psychologie* (Genève), vol. 56, n° 219, p. 281–287.
——. 1989. Il pensiero del computer : l'epistemologia operativa al servizio della formazione dell'utente di sistemi informatici. *Sistema ER* (Bologna), vol. 3, n°1, p. 26–31.
——. 1990*a*. Ricerca-azione : la scoperta della prosa. *Il quadrante scolastico* (Trento), n 45, p. 25–38.
——. 1990*b*. Lo sviluppo dell'intelligenza : una equilibrazione maggiorante?. Dans : D. Barnabei et al. *The brain and intelligence, natural and artificial*. Bologna, Ed. L'inchiostroblu, p. 111–119.
——. 1990*c*. Incontri : Bateson e Piaget. *Oikos* (Bergamo), n°2, p. 173–181.
——. 1990*d*. Emergenza e formazione. Dans : G. Zanarini. *Diario di viaggio : auto-organizzazione e livelli di realtà*. Milano, Guerini, p. 9–14.

——. 1992. Dall'epistemologia genetica all'epistemologia operativa. Dans : M. Ceruti (dir. publ.). *Evoluzione e conoscenza*. Bergamo, Lubrina, p. 507–519.
——. 1993. *Il sapere ritrovato : conoscenza, formazione, organizzazione*. Milano, Guerini.
Munari, A. ; Bullinger, A. ; Fluckiger, M. 1980. La ville : un objet à construire. Dans : A. Bulhinger et al. *Il bambino e la città*. Milano, Franco Angeli, p. 177–183.
Noël, B. 1990. *La métacognition*. Bruxelles, De Boeck.
Papert, S. 1980. *Mindstorms : children, computers, and powerful ideas*. New York, Basic Books.
Pineau, G. ; Jobert, G. (dir. publ.). 1989. *Les histoires de vie*. Paris, L'Harmattan.
Rosskopf, M. ; Steffe, L. ; Taback, S. (dir. publ.). 1971. *Piagetian cognitive-developmental research and mathematical education*. Washington, National Council of Teachers of Mathematics.
Sarbin, T.R. (dir. publ.). 1986. *Narrative psychology : the storied nature of human conduct*. New York, Praeger.
Schwebel, M. ; Raph, J. 1973. *Piaget in the classroom*. New York, Basic Books.
Sigel, I.W. 1969. The Piagetian system and the world of education. Dans : D. Elkind ; I. Flavell (dir. publ.). *Studies in cognitive development : essays in honour of Jean Piaget*. New York, Oxford University Press.
Sinclair, H. ; Kamii, C. 1970. Some implications of Piaget's theory for teaching young children. *School Review* (Chicago, IL), vol. 78, n°2, p. 169–183.
Sprinthall, R. ; Sprinthall, N. 1974. *Educational psychology : a developmental approach*. Reading, Addison-Wesley.
Sund, R. 1976. *Piaget for educators*. Columbus, Charles Merril.
Vergnaud, G. 1981. *L'enfant, la mathématique et la réalité*. Berne, Peter Lang.
Weinert, F.E. ; Kluwe, R.H. (dir. publ.). 1987. *Metacognition, motivation and understanding*. Hillsdale, Lawrence Erlbaum.