

YOUNG PIAGET REVISITED: FROM THE GRASP  
OF CONSCIOUSNESS TO DÉCALAGE\*

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#### SUMMARY

Though trained as a biologist, the young Piaget was chiefly concerned with the growth of logic in children's language. His biological equilibrium model dates from 1918; however, during 1919 to 1925 he adopted explanatory mechanisms from psychoanalytic theory, child psychology, and logic for a functional "grasp of consciousness" of new mental structures. In particular, he reworked the functional psychology of intelligence of his mentor, Claparède, around the structural philosophy of science of Brunshvicg, Goblot, and Bergson. His central explanatory mechanism of *décalage* involved three stages of cognitive development: (a) verbal "hypotheses," (b) irreversible "mental experiments," and (c) reversible "logical experiments." This foreshadowed the present-day mechanisms of assimilation and accommodation and the familiar stages of preoperational, concrete operational, and formal operational thought.

## I. INTRODUCTION

The stage-dependent theory of Jean Piaget divides cognitive development into sensorimotor, intuitive, concrete operational, and formal operational periods, based on invariant qualitative uniformities in the sequence but not the chronological age (24, pp. 264-266, 411-416). It has been relatively well received by American psychologists over the years. Piaget's stage-independent theory, however, has incurred periodic criticism for "the absence of any set of theoretical statements that accounts for how or why a child passes from one stage of operations to another" (8, p. 365; 10, p. 179; 36, p. 98; 37, p. 61; 84, p. 54; 87, p. 164). In particular, the concept of *décalage* (shifting, uncoupling, unwedging) has seemed to describe rather than explain the mechanism of cognitive growth.

I will show that *décalage* is a theoretical explanatory mechanism fashioned from interrelated traditions in psychology at the turn of the century: psychoanalysis, child psychology, and logic or philosophy of science. It took shape during the sociological phase of Piaget's work, from about 1918 to 1924, which was followed by a biological and a genetic epistemological phase (27; 59, p. 4; 76, p. 3f; cf. 83, p. 361-362). He wrote in 1924, the year before he turned to a more biological language to describe his own infants, that

We have chosen the language of sociology, but wish to emphasize the point that there need be nothing exclusive in the choice. We reserve the right to revert to the biological explanation of child thought and to bring our present description into accordance with it (53, p. 201).

By exposing the historical origins of *décalage*, I think we gain a clearer understanding of a unifying thread in his work. Piaget's recent book, *The Grasp of Consciousness*, lends relevance to the task of reinterpreting Piaget, as does the reader, *The Essential Piaget* (29), which makes his early work accessible in English for the first time.

My reinterpretation of the nonbiological nature of the early principle of *décalage* rests on the demonstration that Édouard Claparède was a central figure in Piaget's early maturation as a psychologist. Piaget's later adoption of the biological terminology of assimilation, accommodation, and circular reaction has led historians of psychology to presume a closer relationship with the American James Mark Baldwin (46). In comparison to Baldwin and other theory-builders, Claparède was pre-eminent for his versatile "police work" with the methods, as well as the theories, of psychology (19, p. 92, citing 4, p. 490).

## II. CLAPARÈDE'S FUNCTIONAL LAW OF INTELLIGENCE

### A. INTELLIGENCE AS ADAPTED THOUGHT

Édouard Claparède (1873-1941) was a leading figure in Swiss "comparative psychology," as the psychology of animals and children was then called in Alfred Binet's *l'Année Psychologique*. He had distinguished himself by founding the *Archives de Psychologie* with Théodore Flournoy, patterned after the French model, in 1901. In 1905, he published *La Psychologie de l'Enfant et Pédagogie Expérimentale*, a book which had undergone six editions by the time Piaget read it. In 1912, he established a private school *cum* child study institute in Geneva devoted to Rousseau's educative principle of allowing the natural tendencies of the child's mind to express themselves.

Claparède was known especially for his contributions to a functional definition of intelligence, which he derived from the trial and error learning paradigm of Herbert Spencer Jennings and Edward Lee Thorndike (13, 14, 17), but applied to the study of children rather than animals. As he wrote in his encyclopedia article on animal psychology in 1913,

I have attempted to show that intelligence intervenes when the automatic response (instinctive or acquired) is incapable of solving the problem which confronts behavior, and I have derived intelligence from trial and error. But in the case of intelligence, it is by thought that the problem of adaptation is resolved anew. My definition agrees therefore with that of Stern (15, p. 1198; quoted in 19, p. 80, and 30, p. 68).

The view that thought could be adaptive and derived from trial and error was tremendously important in those years. Dewey's critique of the reflex-arc concept had been enlarged into the functional definition of "how we think," not reflexively, but by taking thought when we encounter obstacles (23, 83, p. 30). Functional and genetic psychologies merged in the European program which combined functional interaction with the principles of mental evolution in a new emergentist alternative to American behaviorism.

### B. THE METHOD OF "THINKING ALOUD"

Claparède belonged to the generation of Wilhelm Stern in Hamburg, Alfred Binet in Paris, and G. Stanley Hall in Worcester—psychologists who founded child study institutes and pioneered new methods to investigate the unique capacity of the human organism for language and reasoning. The descriptive work of William Preyer, James Sully, and Carl Stumpf was incorporated naturally into experimental child psychology. In his book, Claparède catalogued the available methods as introspection, retrospection,

normal, genetic, pathological, comparative, descriptive, and quantitative. He termed his own task "genetico-functional"; it was to reconcile the subject matters of structural and functional psychologies by pointing them toward a single problem—the growth of intelligence.

This point of view, which has been so strikingly emphasized by Professor Dewey of Chicago, and his pupil Irving King, has been but little regarded, so far, even by those who are engaged in child psychology (14, p. 71).

Claparède's Swiss research institute was to be aimed at coordinating and interpreting the work of Americans on animal learning, of the French in mental testing, and of the Germans on the psychophysical measurement of sensation, perception, and memory. As yet, however, Claparède did not have a method of his own.

Then in 1917, when he was 44 years old, Claparède announced a method which had been put into use by himself and his co-worker, Professor Pierre Bovet:

In the course of a certain number of experiments on the intellectual act pursued recently at the Laboratory of Psychology at Geneva, we have employed a new procedure intended to avoid the deficiencies of the customary method of introspection, which we have called the "method of thinking aloud (*réflexion parlée*). The subject, who is given a problem of some difficulty to solve, is asked to think aloud, to recount exactly what unfolds in his consciousness, his hesitations, doubts, the ideas which come to his mind, etc. This method has been shown to be fertile. It avoids the drawbacks of "*rétrospection*" and of "*dédoublément*" (17, p. 355).

By retrospection, he meant Ernst Meumann's principle of judging language retrospectively on the basis of subsequent development; e.g., if abstraction is not present in an older child then it could not have existed in a younger one (14, p. 92). By *dédoublément*, he referred to the method wherein human Ss reported the contents of their consciousness without interpreting them: i.e., introspection. By contrast, Claparède proposed to employ the method of thinking aloud already used by Clara and Wilhelm Stern to study children's language (80) in his own investigation of the growth of intelligence.

### C. THE LAW OF THE GRASP OF CONSCIOUSNESS

Claparède's paper in 1917 on "The Psychology of Intelligence" also offered a hypothetical mechanism for the development of human intelligence which was reminiscent of his definition of animal intelligence (15, 20). It involved a disadaptation between an instinct or automatic action and a certain "cause,

goal, or plan." Intelligence is the result of a new adjustment, and it comprises three operations: (a) the question, or grasp of consciousness; (b) the formation of hypotheses, or random "trial and error" groping (*tâtonnement*); and (c) the selection or control of these hypotheses.

In the following year, 1918, Claparède did an empirical study of five children in which he put his explanatory mechanism to use. He asked children of ages 5-8 a series of questions, beginning with "is there a resemblance between a bee and a wasp?" (18, p. 68) and continuing with "binary comparisons" of a bee and a fly, a bee and a bird, a bee and a rabbit, a bee and a rose, and a bee and an automobile accident. He concluded that the younger children of 5 or 6 were more likely to answer in terms of difference than resemblance—e.g., "the rabbit can jump, the bee cannot"—while the older children of 7 or 8 were able to note that the bee and the wasp both sting, the bee has six feet and the bird has two, and the automobile has wheels while the bee has feet—all of which are points of resemblance. Claparède interpreted this as evidence for his functional account of intelligence. The answers of the 5- and 6-year-olds were automatic: "no resemblance," only difference between the two objects. The answers of the 7- and 8-year-olds indicated a "grasp of consciousness" (*une prise de conscience*) such that they were able to appreciate the question at a new level and generate "hypotheses" about the resemblances of two dissimilar objects. Apparently Claparède was unable to demonstrate his third operation, (a) the question and (b) the formation of hypotheses, and (c) the selection of hypotheses.

Claparède's verbal protocols using the method of "thinking aloud" were somewhat less compelling than the law by which he proposed to interpret them. He termed it "the law of the grasp of consciousness" (18, p. 71; 20). This empirical law went beyond the law of association, whereby learned actions become habitual. This was known as the principle of lapsed intelligence in the work of George Romanes (78, p. 192), who took it from William Carpenter (12, pp. 339-345) and transmitted it to William James (33, I, 110-112) and Théodule Ribot (74). Specifically, Claparède was proposing that habitual actions—when they are maladapted to a given situation or problem—give way to learned ones. He illustrated this law by the example of a child making an acquaintance with two cats, cat A and cat B, in succession. Four types of reactions were possible, depending on whether the cats were alike or different in terms of friendliness or hostility, and upon whether the child's reaction was appropriate. If the reaction was inappropriate, the child "grasped consciousness" of this resemblance or difference (see Table 1).

TABLE 1  
CLAPARÈDE'S LAW OF THE GRASP OF CONSCIOUSNESS (18, p. 74)

A and B are different	I. Different reaction (instinctive)
	II. Similar reaction; disadaptation
	(a) automatic readjustment
	(b) conscious readjustment (conscious of the difference)
A and B are similar	III. Similar reaction (instinctive)
	IV. Different reaction; disadaptation
	(a) automatic readjustment
	(b) conscious readjustment (conscious of the resemblance)

#### D. HISTORICAL SIGNIFICANCE: A FUNCTIONALIST CRITIQUE OF ASSOCIATIONISM

Claparède's law originated in a widespread criticism of associationist psychologies. Numerous books on logic and thought around 1900 challenged the associationist view of "no concept without verbal image, no thought without language" (81, bk. 1, chap. 2,3; 2; 16; 38). A judgment no longer required two images in conjunction if it could be founded on action rather than thought. This program drew support from two fields: child study and evolutionary theory. William Preyer (68, p. 234) observed "logic without words" in the child which drew back from the candle and William James described the case of a deaf-mute child who was capable of intelligent action (34, p. 613f). Such data challenged the theory of association and the introspective method. It supported instead a new theory based on the Lamarckian theory of adaptation and inherited habit (75). The terms came from Baldwin, who in turn took them over from the current biological conception of the "circular reaction" to describe the characteristic ability of the organism to react spontaneously to an external stimulus (86). In the case of the child and the flame, pleasure and pain are consequences of the action which are selected as adaptive (1, pp. 183-186). Useless habits, or ones which bring pain, are dropped; those which prove serviceable or pleasureable remain.

Claparède, with his Thorndikean background, preferred to term habits reactions, but he placed them on an explanatory framework similar to the law of effect. Serviceable habits were those which satisfy a need. In addition, like Baldwin, he was chiefly concerned with the origin of consciousness in directing these needs. The arguments of Baldwin were directed at the Spencer-Bain formulation, which gave insufficient prominence to the active role of interest in selecting the serviceable reaction. Claparède's arguments

for a "law of momentary interest" were chiefly directed at the French exponent of Spencer, Théodule Ribot, whose passive account of "the evolution of general ideas" through a kind of mental chemistry (74) was criticized in a book by a brilliant young Parisian *doctorant*, Théodore Ruysen, in 1904 (79, pp. 139-158).

It was Ruysen's book, *Essai sur l'Evolution Psychologique du Jugement*, which led Claparède to the concept of interest (16, p. 280), and later to the law of the grasp of consciousness. Claparède had defined interest as that which directs the mental tendencies to one end or another. He compared it to the "libido" concept of Freud, since it was also founded on the analogy of a reservoir of psychic energy which was "dynamogized" in a "circular reaction." In another comparison, interest supplied the instrument of choice in the new psychology, covered in Wundtian psychology by will or apperception, and in Ribot by attention (73). Not only was it based on ontogenetic adaptation, but also on phylogenetic evolution. For the psychology of the child, interest was the "thread of Ariadne" in any account of the origin of intelligence (19, pp. 75-77). At each stage of mental development, adaptation goes on while interests change. Thus Claparède's *Experimental Pedagogy* (14, p. 174) described the evolution of interests by age as follows: perceptive (0-1), linguistic (1-3), intellectual (3-7), objective (7-12), moral (12-18), and work (adult).

As early as 1907, Claparède characterized the first of these stages as "syncretic," because of the infant's propensity to see things differently from us, as "suckable" or "touchable," rather than as objects interesting in themselves (16, p. 195). Rereading Ruysen in 1918, Claparède realized the implications of this claim for a functional psychology of intelligence. He wrote that

from a functional point of view, the response is easy. The child has at his disposal only a small number of reactions. Thus, as Ruysen remarked, the first source of generalization (and consequently of the reactions of implicit resemblance) must be sought "in the unequal differentiation of our sensory receptivity and our motor activity. . . . Our ways of acting are much less diverse than our ways of sensing (79, p. 142). . . ." It is the encounter between the very general reactions and the individual character of things which gives rise to the feeling of difference (18, p. 75).

The classical account of the origin of abstract ideas from simple ones was stood on its head by this claim. In effect, the child perceives the whole before the parts. "Let us remark in passing that this syncretic and *confused* perception is a fusion of the whole and has nothing in common with perception of

the *complex* (14, p. 177). As Claparède found in his verbal protocols, the child initially notices no resemblances; i.e., he fails to generalize in his *conscious* thought. Yet he unconsciously acts on the basis of implicit differences—e.g., between a bee and a fly. Gradually, through successive encounters in his action, he does grasp consciousness of the differences. Only then can he be truly said to be conscious of abstract ideas.

Claparède's functional law of the grasp of consciousness, as we will see, would come to play a key role in Piaget's theory of *décalage* five years later. His law of interest, by comparison, was virtually ignored.

### III. PIAGET'S STRUCTURAL LEVELS OF INTELLIGENCE

#### A. BIOLOGY AND KNOWLEDGE

Piaget's life work may be summed up in the title of his mature book, *Biology and Knowledge*, in 1967 (63). It may also be recognized in his first book, *Recherche*, composed in 1916 (47), where the equilibrium model of mental structures is spelled out. And it is implicit in his dissertation in 1918, which demonstrated structural changes in molluscs at different altitudes in the Valais mountains.

Piaget belonged to the generation after Claparède, and his work before coming into contact with the Geneva institute gave him the background to go beyond his mentor. Therefore, it is essential to come to terms with his theory of knowledge and its close connection to biological thinking before we follow the development of his empirical work in the early 1920's.

In calling his first book a sketch of neo-pragmatism, Piaget signalled that for him "pragmatism was the most interesting of contemporary movements" (47, p. 54; 61, p. 241). He came to pragmatism by way of an intellectual journey through the French moral philosophers, Marie Jean Guyau and Alfred Fouillée. They each endorsed a principle of spontaneity, the *fécundité morale* and the *idée-forces*, respectively, which they opposed to the mechanical laws of science. Piaget saw the futility of thus setting the laws of religion and science at odds, and he proposed that facts and purposes be combined in a different way:

The fact is a form of equilibrium or of disequilibrium—the ideal is another equilibrium, just as real in a sense as the former but often sketched more than realized. The ideal is a limiting case, as the mathematicians say, or again the full equilibrium toward which the false or unstable equilibria of reality tend (47, p. 46).

This model of equilibrium was derived from that of the biologist and philosopher, Félix Le Dantec, with an important modification; instead of merely "assimilating" and "submitting to" the milieu, as in the example of a cell taking nourishment and reacting to stimuli, Piaget emphasized that an unstable equilibrium gives way to a more stable one. Implied here is a hierarchy of mechanical equilibria which approximate more and more to a purposive ideal—without coming under the control of any "*idée directrice*" such as invoked by the great physiologist Claude Bernard (47, p. 159).

Here was the strength and weakness of pragmatism. It "mocked metaphysics" and it "preached action and faith" (47, p. 54). Piaget agreed with William James that the battle of science and religion could be circum-

vented by giving their principles a psychological expression. He followed Émile Boutroux, the spiritualistic positivist who distinguished the "constituted reason" of science from the "constituting reason" of mental spontaneity which constructs science. This shifting of the nineteenth century debates over the philosophy of science onto the plane of psychology and logic was easier said than done, however. Piaget accused James of failing to specify how psychology leads to logical thinking. As for the pragmatists

their greatest merit was to make will and faith intervene in addition to reason, but their great mistake was to believe that this faith or this will knew anything at all (47, p. 55).

Auguste Comte, the French positivist, had pointed the way to a succession of new laws succeeding old ones, from mathematics to sociology. His spiritualistic successor, Henri Bergson, had ascribed this creative evolution to an *élan vitale* (3). Piaget quipped of him, too, that the explanatory mechanism was absent: "and how not see that the spirit as a whole, if it can follow its own impulse, tends toward stability, equilibrium, absolute" (47, p. 52).

It is important to recognize the psychological focus of Piaget even in his earliest work. To be sure, he claimed that this biological equilibrium was the basis of a psychological and a sociological order in the individual and the society, respectively. But his fundamental question was one of action: how ought we to act in society?

This a priori could be formulated: act in such a manner as to realize the absolute equilibrium of the vital organization, collective as well as individual, which is at root a faithful enough translation of the famous Kantian formula (47, p. 177).

He was of course referring to Kant's categorical imperative to act as if your actions were based on a universal law. Piaget's equilibrium model was inspired by Le Dantec's book, "Egotism, the Sole Basis of Any Society" (39). Typically, wrote Piaget, "the social equilibrium coincides with the ideal psychological equilibrium" (47, p. 178). This stress on the social conditions of thought makes use of a biological conception of equilibrium, yet it is fundamentally a mechanism of individual cognitive development. And it is an integral part of Piaget's systematic theory of knowledge five years before he wrote his first book, *Language and Thought in the Child*, on the principle that thought grows from egocentric to socialized and logical in the child.

#### B. THE CLINICAL METHOD

Piaget had not yet been trained in psychology when he speculated about the biological conditions of: knowledge, nor did he know of Claparède's

work. He was very much the outsider in terms of clinical and experimental psychology in 1919, the year in which he left Neuchâtel. After brief exposure in Zürich to the laboratories of Arthur Wreschner and Theodor Lipps and the clinic of Eugen Bleuler, he learned how to conduct clinical interviews from Georges Dumas in Paris. He also became interested in the lectures of Pierre Janet. The opportunity to work for Theodore Simon was the turning point; under the guise of standardizing mental tests, he found a subject matter for his biological theory of knowledge.

This subject matter was the verbal protocols of children answering questions on the Burt Intelligence test (11). Piaget was very selective about the items he administered; only those which revealed the subject in transition from incorrect to correct reasoning were used. His first published study required the children of age 9 to 13 to tell him whether "part of my flowers are yellow" meant that "all of," "some of," or "none of" the flowers was yellow. He argued that children confused the concept of property with that of relation, a confusion which was promoted by language since the particle "of" was used to express both a property of something and a part of a whole.

The delicate control of the interview by hypothesis may well be criticized here. Piaget's findings were, after all, very reminiscent of his speculative theory of equilibria passing from unstable to stable in the cell, the organism, and society. There he had postulated three stages: dominance of the whole over the part, then dominance of the part over the whole, and finally, equilibrium of parts and wholes. Here he described three stages again: the child's misunderstanding of the part as a property (belongingness), his realization that this was problematic, and his recognition that part was a class relation (inclusion). Piaget differed from his contemporaries in child psychology in being at once more clinical and more theoretical. We shall return to his clinical skill below; here, we may mention that he lent credence to his theory by citing current views of the development of logical thinking after he had collected his verbal protocols and classified them into stages (41, 71, 79).

Then Piaget read Claparède's 1917 paper, which announced the method of "thinking aloud" and the three operations of intelligence—the question, the formation of hypotheses, and the control of these hypotheses. In sending his next paper to Claparède's journal, he endorsed this method in programmatic terms and he employed the concept of hypothesis to describe the child's attempts at a solution to his mental test problems. The children were told, "Edith is blonder than Suzanne. Edith is more brunette than Lili. Who is the darkest, Edith, Suzanne, or Lili?" (50, p. 144). Piaget typically classified the protocols into three stages. The child went from a judgment of

predication, "Edith is brunette" or "Edith is blond," to an awareness of the contradiction, to a judgment of relation; i.e., by substituting "is less brunette than" for "is blonder than," the child discovered that Suzanne was the darkest. Although he temporarily adopted Claparède's terminology of "directive hypotheses" for the child's answers, Piaget was actually relying on the current view of Brunshvic and Goblot that we learn to reason by discovering the principle of identity and contradiction (9; 28).

Claparède replied by publishing the paper and inviting Piaget to conduct his research at Geneva. In a generous preface to Piaget's first book three years later, he recognized that Piaget's program of research went beyond his own:

The method which in M. Piaget's hands has proved to be so prolific is also one of great originality. Its author has christened it "the clinical method." It is, in fact, that method of observation which consists in letting the child talk and in noticing the manner in which his thought unfolds itself. The novelty consists in not being content simply to record the answers given by the child to the questions which have been put to him, but letting him talk of his own accord. . . . And this is where M. Piaget's qualities as a naturalist have intervened. All his readers will be impressed by the care with which he has set out his material, by the way in which he classified different types of conversation, different types of questions, different types of explanations; and they will admire the suggestive use to which he puts this classification (62, pp. xiii-xiv).

So impressed was Claparède that he put aside his work on intelligence from 1917 until 1934, when animal research on "hypotheses" brought it again to contemporary relevance and a colleague prevailed upon him to publish it (21, p. i).

Piaget was in the mainstream of child psychology and the psychology of reasoning in his use of verbal protocols in this first stage of his career—before he turned to behavioral observations on his own infant children. With his clinical training, he realized that

the good experimenter must, in fact, unite two often incompatible qualities; he must know how to observe, that is to say, to let the child talk freely, without ever checking or side-tracking his utterance, and at the same time, he must be constantly alert for something definitive, at every moment he must have some working hypothesis, some theory, true or false, which he is seeking to check (54, p. 9).

In addition, with his background as a naturalist, Piaget brought to the psychology of reasoning a feel for the classification of his data so as to test a prevailing theory. In this case, the theory was a blend of several streams of psychology, all converging on the common problem of the origin of intelligence. We will turn next to the mechanisms which he fashioned into a

psychoanalytic, functional, and structural explanation of the growth of logical thought.

### C. THE LAW OF DÉCALAGE

Piaget's equilibrium model from biology and his levels of knowledge from philosophy are already familiar. He had recognized by 1919 that a mechanism was needed to account for his three-stage hypothesis of the origin of logical thinking. We will trace his exploration of the current literature of psychoanalysis, child psychology, and epistemology for such a mechanism during the years 1919 to 1924. This eclectic search culminated in Piaget's discovery of Claparède's law of the grasp of consciousness in 1922 and his subsequent reworking of it into his law of *décalage* in 1924.

#### 1. *The Psychoanalytic Mechanism*

In a very real sense, psychoanalysis provided the first scientific model for Piaget's study of intelligence in the child (88). He was introduced to the Zürich school of psychoanalysis through his visit to the clinic of Eugene Bleuler in 1919. Soon thereafter, he heard of the lectures of Pierre Janet in Paris, whose rival view of psychogenesis had been published recently (35). He was profoundly impressed by the dynamic and developmental aspects of both Freud's and Janet's theories, as well as by the method of dream analysis. His explanations of the verbal protocols in his early papers were especially influenced by conceptions derived from certain aspects of psychoanalysis (*cf.* 5, 25).

In 1919, Piaget gave a talk on "Psychoanalysis in Relation to Child Psychology" before the Society of Alfred Binet. Here he explored the role of the "censor" in the theory of Freud and Adler (48, pp. 18-39). He exposed a fundamental circularity in the argument that civilization *comes from* the work of the "censor" upon the Freudian sexual instincts or the Adlerian strivings for superiority. For in fact, the censor already *is* "civilization" as the moral rule in the individual. How can the "censor" both be civilization and produce it? Furthermore, how can sublimation occur if the "censor" is doing its job?

The solution to this problem was constructed by Piaget using the terminology of the Zürich school and of Janet's theory of dissociation (48, pp. 40-58; *cf.* 43, pp. 30-41). In their study of *dementia praecox*, Bleuler and Jung had employed a theory of "complexes," or associated groups of ideas and feelings, to account for the introverted state of folding back onto oneself called "autism." The autistic complex comprised a "second ego" which



threatened to supplant the primary ego in the field of consciousness. Piaget proposed there exists a continuum of complexes, or schemata, from unconscious to conscious. Autistic thought and rational thought are characterized by differences of conscious degree only; in both, there is (a) resistance to the unconscious complexes and (b) assimilation to the conscious ones. Piaget was chiefly interested in how reasoning "disengages" from autistic thought through a progressive increase of conceptual thought "at the expense of" symbolic thought.

In two empirical studies from Paris, which he published in the *Journal de Psychologie normale et pathologique* of Janet and Dumas, Piaget adopted Janet's conception of "field of attention" (49; 51; cf. 35, pp. 260-265). Attention and logical thinking interact such that when the field of attention is narrow, judgment is restricted to the logical form of predication (e.g., of property), whereas when the field of attention is broad, judgment expands to hierarchical and relational forms (e.g., transitive relations, conditional propositions). Thus, the logical forms dilate the field of attention as each form assimilates a maximum of content at a given extent of the field (49, pp. 479-480). For instance, when the child is beginning to adapt to adult language, he hears the word "brown" and yet he has another nuance derived from experience in his memory. In the narrow state of attention, he simply labels both "brown." In the expanded field, however, many representations of "brown" may coexist. The class "brown" divides into subclasses, and judgments of relation are necessary to justify their hierarchical order. In short, the rigidity of class judgments and consequent illogicality of children's thought is accounted for by the "field of attention." "What is striking is the coexistence of an exaggerated rigidity of classes with an undeniable illogicality" in the initial stages of children's thought (50, p. 171).

The breakthrough in his own reworking of the psychoanalytic explanatory mechanism occurred when Piaget recognized that condensation, displacement, and overdetermination could be used to account for this shift of "fields of attention." In a paper delivered to the Seventh International Congress of Psychoanalysis in Berlin in September, 1922, Piaget argued that autistic thought, like dreams, is symbolic thought (52). For Freud, symbols were the result of the work of the "censor," while for Jung they were a primitive manner of economizing through thinking without words. Piaget modified each man's view in turn. He rejected the concept of "censor" and substituted the mechanism of "condensation" and "displacement," and he pointed out that the latter mechanisms deal with images rather than words, serving as a primitive form of generalization and abstraction. For instance, the thought

of a child is symbolic when it "condenses" the movements of the sun and "displaces" them onto the image of a living thing.

Piaget's theory of intelligence went beyond the Zürich and Paris schools when he introduced the role of contradiction in the shift from autistic to egocentric to logical thought. Egocentric thought manifests characteristics of both autistic and logical thought, and it lies midway between them. Observations of children from age 3 to 8 at the Rousseau Institute provided evidence of "overdetermination" of the content of their egocentric causal explanations; for instance, when asked why boats float on water, they answered (a) because of the movements of the water, (b) because there is a lot of water, (c) because the boats are large, (d) because boats have motors, and (e) because they are chained up in port (52, p. 296; 53, p. 157). Contradiction is inevitable among such diverse answers, any one of which may exclude the other. Logical thinking arises around the age of 7 or 8 when the child begins to choose among the hypotheses and eliminate some of them. For example, an intermediate stage on the way to logical thinking would be the answer that small boats float because they are light but large boats float because they are heavy. Here is a contradiction based on the association of large size with force (53, p. 167). In other words, logical thought is characterized by a maximum of coherence; to attain this, it becomes necessary for the child to entertain a number of hypotheses and to arrange them in relation to one another, choosing finally the one which is noncontradictory. We shall see next how this mechanism of "overdetermination" followed by "contradiction" overlapped with those taken from functional psychology and logic in Piaget's account of the shifting from prelogical to logical thought.

## 2. *The Functional Mechanism*

Piaget came late to the study of child psychology. When he chanced to find a position in Binet's former testing school in Paris in 1919, he realized that children's language would offer the subject matter for his biological, epistemological, and clinical ideas. Only in 1921, after his arrival at the child study institute of Claparède in Geneva, did he begin to take issue with associationism. He took over the term "hypothesis" from Claparède, and soon he began to employ the functional mechanism of the grasp of consciousness.

Piaget discovered this mechanism when he read Claparède's 1917 article proposing that "thinking aloud" reveals three "operations" of intelligence: the question, the formation of the hypothesis, and the control of this hypothesis. From 1922 to 1932, he gradually took over the mechanism and re-

fashioned it for his own purposes. For example, in his 1922 essay on the transitive relation, he described the efforts of the child to determine the darkest of the three girls as "directive hypotheses" (50, p. 152). The judgments of predication were such hypotheses, and their control was the contradiction, which gave way to judgments of relation. In the following year, having recounted the experiments in *The Language and Thought of the Child*, Piaget recognized Claparède's critique of associationism. He quoted Claparède as follows (62, p. 229):

According to Associationism, the categories are the result of reiterated associations which have become inseparable. But observation shows that precisely when association reaches its highest degree of automatism (instinct, habit), the individual is not conscious of the categories, because, not having failed to adapt himself, he has no need to ask any questions (17, p. 361).

Having just argued from percentages of "egocentric" versus "socialized" speech without reliance on Claparède's law, Piaget seems to have been laying the groundwork for his more analytic second volume on *Judgment and Reasoning in the Child*, in 1924.

Specifically, Piaget saw the power of Claparède's interpretation of the Kantian categories as "questions" whose fundamental nature changes from child to adult. The studies in his book on judgment would be those dealing with the category of relation: namely, the physical relation of cause and the logical relation of implication. The Kantian categories of quantity, quality, and modality were left for later studies, as were the intuitions of space and time. Using the responses of children to statements followed by "because," he discovered that children were unable to give a logical reason for their judgments. They reasoned only about particular cases. He referred to this as "an absence of the grasp of consciousness" (53, pp. 56-57). This was his first use of Claparède's law to interpret his empirical results.

The foregoing study was done on 5- to 8-year-olds; not surprisingly, Piaget noticed the similarity between reasoning from particulars, which he called juxtaposition, and syncretism. "Syncretism" was Claparède's term for confused perception (16, p. 522; cf. 69, p. 301). However, Piaget was using it in the sense of symbolic thought—overgeneralized thought in which wholes preceded parts. His study of the psychoanalytic mechanism prepared him to accept Claparède's criticism of associationism, which had maintained that parts precede wholes: i.e., that particular ideas precede universal ones. Both the functional and the psychoanalytic traditions lent support to his finding that the judgments of younger children lack physical necessity (a cause) or logical necessity (an implication).

Having dealt with judgment, Piaget turned to how the child reasons. Piaget wanted to avoid the assumption that the child reasons like an adult, whether by logical or scientific or legal reasoning. He had read Claparède's 1918 paper in the meantime, and it occurred to him to explore further the "thinking aloud" of the child as he actually tries to solve a concrete problem. For example, he gave children of ages 7 to 10 this arithmetical problem:

This table is 4 meters long. This one is three times as long. How many meters long is it (53, p. 139)?

The child usually gave the correct answer promptly: 12 meters. However the follow-up questioning about how he found the answer elicited such "hypotheses" as "I added 2 and 2 and 2 and 2 and 2 always 2." These betrayed an utter lack of "introspection" about the actual reasoning process of multiplication, 3 times 4. To understand this paradoxical finding, that children could automatically come up with the correct answer before they could say how they did it, Piaget turned to Claparède:

M. Claparède has shown in a remarkable contribution to the subject that we grasp consciousness of the relations which have been woven into the texture of things by our action in so far as automatic usage fails, and some new mode of adaptation is forced upon us (53, p. 144).

Piaget then recounted Claparède's example of the child who automatically treats bees and flies as the same until he discovers that "yellow flies" sting and grasps consciousness of the difference. The adjective yellow indicates that the child was conscious of the difference at the perceptual level, but not at a logical level of being able to justify the difference. Similarly, children who gave the correct answer of 12 to the multiplication problem did not know, in the initial stage, how they arrived at the answer. They simply used automatic "hypotheses" such as manual operations with their fingers.

Indeed, the first important point about the "grasp of consciousness" which Piaget owed to Claparède was that it was closely related to action; initially the child seems to solve problems by means of "mentally pictured manual operations, which, like the vagaries of movement, follow each other without any necessary connection" (53, p. 146). These operations are characterized by a lack of consciousness in reasoning. The second important point which he took from Claparède was that the actual "grasp of consciousness" comes about through interaction with the external world. Without the shock of a bee sting, the child would not conceptualize a bee. Without the disappointment of failing to justify his answer to a friend or a teacher, the child would not be able to reflect about the process of multiplication. Notice, however,

that Piaget subtly altered the level of the disadaptation from action and thought as Claparède had understood it, to thought and thought: i.e., to social discourse and logical justification. This will be amplified in the next section on the "logical mechanism."

We have seen that Piaget furthered his psychoanalytic insights about the disengagement of formal from symbolic thought through his gradual acceptance of Claparède's concepts of "syncretism," "hypothesis," and the "grasp of consciousness." He found confirmation of the autistic origins of child logic in the syncretic nature of the causes and implications advanced by the child's "hypotheses" statements of "because." And he discovered a lack of logical justification in children's accounts of how they found the correct answer to an arithmetic problem. He argued that social adaptation occurs when the older child ultimately feels compelled to state logical implications or necessary causes.

In one respect, however, Piaget was profoundly unsatisfied with Claparède's functional mechanism. In his own words:

Claparède's law is a functional law, and only indicates when the individual does or does not require to grasp consciousness. The structural problem remains (53, p. 213).

We shall find that Piaget's equilibrium model and his knowledge of the philosophy of science entered into his own proposal of a structural mechanism. He was still searching for a way to combine functional disadaptation with structural adaptation in his theoretical explanation of the origin of logical thought.

### 3. *The Logical Mechanism*

So far, Piaget had placed logical structures on a genetic dimension; however he had not really provided a mechanism to get beyond the first of his three stages. Our examination of his early papers has shown that Janet and Freud provided the mechanisms of "field of consciousness," attention, "overdetermination," and their "contradiction"; however, this only accounted for the disengagement from symbolic thought. Child psychology explained the separation from egocentric thought by the disadaptation of verbal "hypotheses," to bring about a "grasp of consciousness." Again, the problem was to account for the next two stages of controlled hypotheses and finally, of logically justifiable solutions.

In *Judgment and Reasoning in the Child*, with its concluding summary of his first two books, Piaget went beyond Janet and Claparède for the first

time: Janet had written that "the essence of reflection is an arrest, a slowing of thought which permits a better test" (51, p. 242), and Claparède had shown this arrest to be a disadapted action. But Piaget recognized that these were only functional laws:

What are the means and obstacles to this grasp of consciousness? In order to answer this question, we shall have to introduce a second law, the law of *décalage*. For to grasp consciousness of an operation is to make it pass over, from the plane of action to that of language; it is therefore to reinvent it in imagination in order to express it in words (53, p. 213).

The reinvention of action in thought would later come to be called "assimilation," and the functional disadaptation which triggered it would become "accommodation" (60, pp. 29-36). At the time, however, Piaget was working within the mainstream of European philosophy of science, with its emphasis on the evolution of thought through crisis and reconstruction (7, 70, 71, 72). The biological terminology of his later work originated in his subsequent study of the sensorimotor stage with infants; his interest here is in the "sociological" explanations which the law of *décalage* offered.

The idea that thought was "constructive" found support in the period before World War I from both the history of science and the theory of evolution. Henri Poincaré represented the "conventionalist" view of science whereby scientific facts and laws are relative to a given stage of knowledge. "Is Euclidean geometry true?" wrote Poincaré. "It makes no sense. . . . One geometry cannot be more true than another; it can only be more convenient" (67, p. 66). Geometry, as well as the sciences and logic, was therefore considered subjective in that it was based on a certain "intuition" as to its appropriate axioms. The subjectivity of Poincaré's laws of nature was endorsed by Piaget in his *Recherche* in 1918.

Above all, Piaget was ushered into this tradition through his reading of Leon Brunschvicg's *Les étapes de la philosophie mathématique* (9). Piaget affirmed Brunschvicg's notion of the evolution of the categories of judgment in 1923 when he wrote:

The genetician will therefore have to note the appearance and use of these categories at every stage of intelligence traversed by the child, and to bring these facts under the functional laws of thought (62, p. 231).

The program of genetic logic, while faulted for its lack of experimental foundation, was readily acknowledged by child psychologists as a guiding theory. As Claparède justly remarked of Piaget,

He knows every nook and cranny and is familiar with every pitfall of the old logic—the logic of the textbooks; he shares the hopes of the new logic, and is

acquainted with the delicate problems of epistemology. But this thorough mastery of other spheres of knowledge, far from luring him into doubtful speculation, has on the contrary enabled him to draw the line very clearly between psychology and philosophy, and to remain rigorously on the side of the first. His work is purely scientific (62, pp. xv-xvi).

The "old logic" to which Claparède referred was founded on the term, proposition, and syllogism, which the psychologism of the Mills and Hegelians had identified with the concept, judgment, and inference. Among their successors, Lotze and the British Hegelians, it was popular to argue that concepts depended upon the "coherence" of attributes and judgments upon a "hypothetical" or subjective determination of conditions (89). Reason, therefore, was a psychological inference drawn from psychological concepts and judgments (77). The problem remaining to "genetic logic" was to demonstrate the phylogenesis of these inferences in the evolution of animal intelligence and their ontogenesis in the mind of the child.

Piaget brought an awareness of these issues to his study of the psychology of reasoning. He was primarily interested in the ontogenesis of child logic. His early papers were reminiscent of his redefinition of a fact as a "form of equilibrium" and the ideal as "another equilibrium, just as real in a sense but more sketched than realized" (47, p. 46). This was a statement of the conventionalist view of science on a genetic foundation. The genetic mechanism for him was the separation of logical intention, or implication, from physical extension (45). For example, in the child's judgment of "part of" the flowers, the judgment of inclusion was intentional and the judgment of belongingness was extensional (49). Or in the judgment that one girl's hair was "darkest," the transitive judgment was intentional and the predicative judgment extensional (50).

Finally, in a study involving the separation of conditional from absolute judgments, Piaget made it clear that language was his mechanism of logical evolution. The test item was as follows:

If I have more than 10 francs, I will go see René or Henri, to whom I owe money.  
If I have only a little time, I will go see Henri or Paul, who live near me. Now I have 15 francs and I have only a little time. To whom do you think I will go? (51, p. 238).

The verbal protocols exemplified three states of "disengagement" of logic from reality: (a) the child was bound to sensible reality, juxtaposing the two conditions rather than placing them hierarchically; (b) the child became confused by the noninteraction of the two classes, money and time, and (c) the child discovered that the correct answer was Henri by separating the

"verbal plan" of logical implication from the "sensible plan" of observation. Piaget thus made informal use for the first time of a concept which would become a central principle in his theory:

this *décalage* is of great interest . . . implication disengages from causality but it remains a production of reality richer than a real production (51, p. 257).

The mechanism of *décalage*, or unsteady shifting, was social:

reflection is the outcome of an internal debate in which a conclusion is reached, just as though the individual reproduced toward himself an attitude which he had previously adopted toward others (62, p. 75).

But still an explanation of the transition to the second and third stages of thought was wanting.

In 1924, as we mentioned in opening this section, Piaget at last brought the mechanism of *décalage* to completion. He had been impressed by Edmond Goblot's *Traité de logique* (28). Goblot revised the traditional separation of induction and deduction by showing that deduction may proceed from particular to particular. For example, we deduce from several particular triangles that the sum of the angles of any triangle is 180 degrees.

Piaget chose Stern's term "transduction" for these arguments from particular to particular in children at stage one. Based on the laws of association, he had referred to them previously as the juxtaposition of experiences. However, he adopted from Goblot and Mach [see Mach (42)] the term "mental experiment" for stage two, in which the child's initial "questions" toward a solution go beyond association of particulars and random "gropings" (53, p. 185). The child now forms "directed hypotheses" or "mental experiments" which serve to repeat actions in thought; however he still "knows nothing of contradiction," hence he cannot get from *a* to *b* and back to *a* again (53, p. 235). In other words, because the mental experiment only copies events as they succeed one another in nature, it remains, like the physical experiment, irreversible.

Piaget believed that Goblot had overlooked the necessity which principles impart to reasoning. Unless the child has formulated a "law" or general principle, he finds nothing contradictory in claiming that a pebble raises the water level because it is heavy, and that a piece of wood produces the same result because it is large. But when he does so, then necessary conclusions follow such that one proposition must be given up. Piaget introduced the term "logical experiment" to describe this situation in stage three of logical thinking. "Logical experiment is therefore an experiment carried out on oneself for the detection of contradiction" (53, p. 237). Its necessity is that of

implication, in comparison to the mental experiment in which the necessity is that of fact.

#### 4. *Historical Significance: A Structural Critique of Functionalism*

To summarize briefly, Piaget brought a new method and a new law to bear on child psychology. His clinical method was an improvement on the method of thinking aloud of his mentor, Édouard Claparède. Whereas Claparède had required the child to answer a few set questions, Piaget posed a problem from a mental test which required successive attempts at solution. He analyzed his verbal protocols into three stages: egocentric, prelogical, and logical. Meanwhile, Piaget used Janet's "field of attention," and Claparède's "grasp of consciousness" to account for stage one results. However, he went beyond them to propose a law of *décalage* to explain the transition to stage two by means of the reinvention of action in thought, then to stage three by the logical justification of this thought to others.

In the remainder of this paper I will sketch in the fate of the principle of *décalage* from 1924 to 1974. A swing is noticeable over this 50 year period away from the study of consciousness and then back to it again. Piaget admitted as much himself when he tried to describe Claparède's psychology as a "science of behavior" in 1941 (57, p. 202), and then turned around in 1974 to emphasize the "grasp of consciousness" in a book which took its title from Claparède's principle. Thus he recently wrote in *The Grasp of Consciousness: Action and Concept in the Young Child* (65):

Now that it is agreed, contrary to the classical behaviorist view, that there is no dichotomy or basic opposition between behavior and consciousness—since cognizance itself constitutes a type of behavior that interacts with all other types—the problem of cognizance is of increasing interest to scientific psychology (p. v).

Thus, psychology, if Piaget is right, has returned to the problem of the ontogenesis of reasoning which was current in the 1920's (26).

The principle of *décalage* remained central to Piaget's writings until 1932. In 1927, for instance, he made ample use of it in his book on physical causality (55) and in 1932 he extended it to *The Moral Judgment of the Child*. This was the fifth and last book of his early period, with its emphasis on language rather than behavior. The book warrants attention here not only because the transition from egocentrism to the idea of justice in the moral realm paralleled that from egocentrism to logical and causal thinking in the scientific realm, but also because the mechanism was similar. For example, three stages were again found: in the case of 5- to 12-year-olds playing marbles, the egocentric child plays "by his own" without trying to win and

without any codification of rules. The cooperative child of 6 or 8 plays with others and tries to win; however his knowledge of rules is somewhat vague. Only in the third stage reached at age 11 or 12 are the rules codified by each player in the same way. The mechanism of the *décalage* from "individual rites" to "common rules" to the "idea of justice" resembled that from symbolism to mental experiment to logical experiment. In particular, Piaget again relied on a grasp of consciousness through a social encounter, followed in the subsequent stages by "the confusion of what is just with the content of established law" (56, p. 324). Contradiction between the real and the ideal action gave rise to the idea of the good; in Piaget's words:

The notion of good which, generally speaking appears later than the notion of pure duty, . . . is perhaps the final grasp of consciousness of something that is the primary condition of moral life—the need for reciprocal affection (56, p. 173).

As Theodore Mischel has recently pointed out in a different context (44), Piaget's equilibration model can be construed as a theory of motivation; in our context, we could point to the fact that Piaget here came full circle from his promise, in 1918, to investigate the norms of science and morality. "Reciprocal affection" was seldom made this explicit; however it provided the implicit social motivation for the movement from symbolic to logical thought.

Claparède was the source of another rethinking of *décalage* with his paper, "The Genesis of the Hypothesis," in 1934. Here he modified his earlier claim that the gropings of the child for a solution are random "hypotheses" and emphasized instead that they contain "implications" of the solution. He gave the example of Pavlovian conditioning of a pink-colored stimulus to food meal for a dog. Piaget answered in *The Origins of Intelligence in Children* (60):

But the problem is only extended. How is it possible to explain this necessity which appears at the first meeting of two terms hitherto foreign to each other so that they immediately appear to the subject as implying each other? . . . In the conditioned reflex, to resume Claparède's examples, the pink A is implied in the meal A because, according to the author's terms, that color "is taken for" the meal itself. What does this mean, if not that the color is assimilated to the meal itself, or that it receives a signification as a function of this schema? Here, as everywhere, the implication results from a previous assimilation (60, pp. 404, 406).

This book marks the beginning of Piaget's substitution of the theory of assimilation and accommodation for that of *décalage*, evidently in order to emphasize the role of sensorimotor action underlying the schemas of conscious thought. In a sense, consciousness went underground; yet if we read

Piaget carefully then and now, we still recognize that his basic criticism of Claparède was the absence of mental structures, here called schemata, to which the conditioned stimulus could become assimilated (*cf.* 64, 66, pp. 148-149). As he wrote in a necrology to Claparède in 1941, "Claparède has had the great merit of raising a functional problem where few authors had perceived one, but without having followed it immediately with structural analysis" (57, p. 199).

The death of Claparède in 1941 seemed to stimulate Piaget to an intellectual stock-taking. He admitted, for instance, that the reversible "logical experiment," which has come to be known as a formal operation, can be construed as either the cause or the result of increasing intellectual maturity. Then he posed a rhetorical question:

What is the exact role of the grasp of consciousness in all this? Does it explain the reversibility of logical thought or is it the result of it? There is here a field still open for research rather than a problem resolved (57, p. 202).

Recall that the grasp of consciousness had previously been thought to occur when the child encountered an obstacle in his action; since about 1937, Piaget had initiated a research program on "concrete operations": i.e., the child's manipulation of objects having to do with numbers, physical quantity, spatial, temporal, and other relationships (59, pp. 249-250). Importantly, these studies showed that the child solves the problem through action before he grasps full consciousness of the operation in thought. This was consistent with his earlier principle; however, it inserted a stage of "concrete operations" between intuitive and logical thinking. Even more important, Piaget learned from these studies by his collaborators Inhelder and Szeminska that the *décalages* of these various operations mature at different rates! This forced him to a new theoretical distinction. "Vertical *décalage*" referred to the overall development with which we are already familiar from irreversibility to reversibility, or in modern terms, toward the achievement of "conservation." By contrast, "horizontal *décalage*" became the above-mentioned chronological differences in the maturation of different "conservation" domains; "for example, weight after quantity of matter, and physical volume after weight" (58, pp. 263-264).

This historical investigation will leave off at the point where Piaget's theory as it is known today becomes recognizable: with the stage theory and the *décalage* mechanism of epigenetic cognitive development (82, pp. 88-107). We have seen that Piaget's earliest work in psychology focused on the egocentric and logical stages, now called pre-operational and formal opera-

tional stages. We have mentioned in passing that his subsequent period from about 1925 to 1936 (59, 60), was devoted in part to the sensorimotor stage, and that his concrete operational stage grew out of work conducted after that from about 1936 to 1947 (*cf.* 59). Although *décalage* is not mentioned conspicuously in his work since then (e.g., 31, 63; *cf.* 22), we feel that it is absolutely crucial to an understanding of his explanatory theory (*cf.* 24, pp. 20-23; 32, p. 15). We have seen too, that *décalage* was eclipsed by the terminology of assimilation and accommodation by 1936. The biological explanation which these terms suggest is misleading unless it is recognized that assimilation to schemata—at least in the concrete and formal operational stages—is a conscious process involving language and logical justification, as well as conservation actions; this is the heart of the mechanism of *décalage* uncovered here. Indeed, now that Piaget's early class judgment problems have been replicated and refined (6, 85), critics have correctly noted that the crucial criterion is the introspective verbal justification rather than the conservation task itself (40, p. 153).