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Piaget's Theory of Knowledge. Genetic Epistemology and Scientific Reason. Richard F. Kitchener. New Haven, Connecticut: Yale University Press, 1986, 230 pages, $25.00 hard.

Reviewed by Philip M. Lewin, Clarkson University

Kitchener's is a fine exposition, its excellence stemming from its singular focus on Piagetian epistemology. This is not to say that his book is flawless, nor that I am completely comfortable with his representation of Piaget. I will get to these concerns presently. But in the context of Piagetian commentary, it is exemplary. Such scholarship typically tends to treat Piaget as an experimental psychologist, and apprehends his epistemology either as an unfortunate and expendable aberration (i.e., the "psychology" is preserved *despite* the epistemology) or as so fundamentally wrongheaded that it critically undermines his empirical work (i.e., the "psychology" is repudiated *because* of the epistemology). Kitchener takes the opposite, and I think correct, approach: that Piaget understood his lifework as the investigation of what he called "genetic epistemology" (that is, the study of knowledge in the process of its construction), and that his empirical investigations of children were seen as contributory to this larger project. They did not constitute an empirical psychology to be corroborated or falsified in their own right. Piaget hoped that he had found a means whereby epistemology, traditionally a part of philosophy, could become empirically grounded, and thus a part of science. (This theme is fully discussed by Kitchener in his fifth chapter.) The degree to which he succeeded in this effort may be open to question; but that this, and not an experimental psychology, was his focus is not open to question. Kitchener takes Piaget at his word and makes his epistemology central. This is a significant mark in his favor.

Another excellence of Kitchener's book is the tone he adopts. The book is refreshingly free of jargon and rhetorical flourish. Kitchener writes simply and clearly; he intends for the reader to understand. His concern is carefully and fairly to explicate Piaget's epistemology, providing resolution where the theory is resolved, and indicating sources of tension where it is not. To write simply about Piaget is not as easy or straightforward a task as it might seem. Piaget's work is rich and complex; it was developed over some seventy years, usually with many collaborators, and while it underwent few major revisions of substance, it did undergo changes of emphasis and many substantive elaborations of the basic theory.

Most important, Piaget left unclear an issue at the very center of his thought concerning what is meant by constructivism in epistemology. The issue can be posed in the following way: Does constructivism lead to a correspondence theory of truth, in which our knowledge, as it is constructed over time, progressively approaches closer and closer to the actual ontological structure of the world-in-itself? Or alternatively,

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Requests for reprints should be sent to Philip M. Lewin, Ph.D., Liberal Studies Center, Clarkson University, Potsdam, New York 13676.

does it lead to a coherence theory of truth, in which our knowledge, as it is constructed over time, becomes increasingly resilient and productive, expanding the range within which our activity and understanding are viable, but bearing no necessary relation to the actual ontological structure of an unknowable world-in-itself?

Piaget argued in support of both sides of this question, and many of the disagreements and misunderstandings surrounding his theory can be traced back to it. Upon its resolution rests the principle of what Kitchener calls "orthogenesis," or the developmental teleology informing much of Piaget's thought. For instance, orthogenesis underlies Piaget's faith that the logico-mathematical thinking characteristic of formal operations is a universal and necessary culmination of cognitive development. And orthogenesis is implicit in the large and quite controversial thesis basic to genetic epistemology that there is a nontrivial parallel between the psychogenesis of knowledge in the individual and the historical sociogenesis of knowledge which resulted in western science. It seems to me that Kitchener does a commendable job in both systematically untangling the philosophical issues involved in Piaget's position (psychological subject vs epistemic subject; ontology vs metaphysics; realism vs idealism) and suggesting a plausible reading of them. That I disagree with some of his conclusions is less a criticism of his work than an indication of the difficulty of fully appropriating Piaget's theory.

Kitchener provides a succinct overview of Piaget's central concern with epistemology in the first chapter, and lays proper stress on Piaget's intellectual background. He cites several traditions contributory to Piaget's thinking, some of which are familiar (e.g., functionalism), and some of which have been unduly neglected (e.g., the historico-critical philosophy of science) in understanding Piaget's overall vision. He also emphasizes Piaget's early and continuing fascination with biology. Indeed, a central claim of genetic epistemology is that the construction of knowledge is isomorphic across interactions in three domains—general subject-object relations in epistemology, organism-environment relations in biology, and knower-known relations in psychology. Of these, organism-environment interactions through which biological adaptation occurs are foundational for the other two.

Kitchener's second chapter offers an overview of Piaget's well-known theory of cognitive development. His concern is to help the reader understand the role of empirical data for Piaget's theory, that such data are not theory-neutral, but have meaning only within the context of the epistemology as a whole. Kitchener decomposes Piaget's epistemology into its component themes, and provides useful discussions of each of them in turn—decentration, internalization of action, grasp of consciousness, reflective abstraction, equilibration, etc.

The third chapter situates Piaget's theory of knowledge by discussing it in terms of the traditions within epistemology which seem to have influenced it, explicitly or implicitly. These include empiricism, rationalism, Kantianism, Hegelian dialectics, and pragmatism. I found particularly interesting Kitchener's association of Piaget's faith in reason with Englightenment rationalism, followed by a long discussion of Piaget's Kantian tendencies which concludes by differentiating Kant's transcendental subject from Piaget's epistemic subject. Finally, Kitchener describes Piaget as an Aristotelian rationalist, sharing with Aristotle both a passionate commitment to reason and a grounding for the development of reason in naturalism.

Kitchener's fifth chapter centers on Piaget's conception of epistemology, and his problematic contrast between philosophy and science—that philosophy is concerned with the coordination of values and achieves many wisdoms, while science, due to the refinement of its methods and the delimitation of its problems, achieves one truth. Piaget believed that epistemology was in the process of transition from philosophy to science. The bulk of Kitchener's sixth chapter is concerned with explicating Piaget's

efforts at bringing about this transition through the overall project of genetic epistemology. In parallel with the widely known "clinical method," which Piaget used to elucidate the psychogenesis of knowledge, he also sought to employ a version of the historico-critical method to investigate the historiogenesis of positive knowledge, i.e., of science. Thus, as Kitchener observes, Piaget's intent was to provide a rational reconstruction of the epistemic development of science, exclusive of the idiosyncracies of individual scientists, much as his concern in cognitive development was with the psychogenesis of knowledge, exclusive of the differentiating qualities of individual knowers.

The concerns of these chapters receive focus through the heart of the book, Kitchener's fourth chapter, in which he tries to elucidate what is meant by Piaget's constructivism. I feel Kitchener is only moderately successful in his efforts, but this is an instance where failures are as instructive as successes. Kitchener begins by situating Piaget's constructivism as an epistemological and not a metaphysical position (i.e., we construct our knowledge of the world; we do not construct the world). He then very usefully associates Piaget's work with a philosophical position largely developed by Grover Maxwell, known as "structural realism," in which it is argued that what we know of the world are those properties and relations revealed through our interactions with it, either directly as actors, or indirectly as observers. He thereby reaches the central tension in Piaget's theory (mentioned above), namely whether or not our epistemological constructions can be taken as becoming isomorphic to the ontological structure of the world. On the face of it, there is nothing in Piaget's constructivism that *requires* such an ontological isomorphism; our cognitive structures may or may not achieve it, but we can never *know* if they do or not, and never select them on the basis of such a correspondence. All we can know are (1) the internal coherence of our structures through what they reveal (i.e., the absence of disequilibration), and (2) whether or not we meet with a degree of resistance (and how seriously we take such resistance when we encounter it) in our efforts to negotiate the world. Such a coherence position is taken by structural realism. Yet Piaget waffles here, and seems at times to argue in terms of correspondence; as Kitchener rightly points out, the orthogenetic tendency that celebrates science and logico-mathematical thinking suggests Piaget is after more determinate philosophical game than a coherence theory licenses.

I think, though, that Kitchener partially misinterprets Piaget, perhaps due to an unexamined presupposition of realism in his own thinking. This emerges at several points. He, for instance, offers a preliminary definition of constructivism as "the view that the subject constructs the cognitive schemes, categories, concepts, and structures necessary for knowledge" (p. 102). However, this characterization omits the essential notion that knowledge and cognitive structures are dialectically tied, as content for form at succeeding hierarchic levels, and instead implies (perhaps unintentionally) that knowledge is independent of structures, to be acquired through their application.

A more serious misinterpretation occurs when Kitchener tries to specify the inadequacy of Piaget's constructivism by arguing that

> If the epistemic object is constructed out of a set of undifferentiated relations, how then can one truly speak of the subject acting on the object and transforming it? For in order to transform it via an operation on it, it must already exist. If the epistemic subject constructs the object and if the object is the result of a set of operations, it would seem that before the object was constructed there would be nothing to transform. On the other hand, if there is something object-like present from the beginning, which the subject transforms, then in what sense is this object constructed? (p. 114)

Kitchener seems to be presupposing an unwarranted realism in the articulation of these alternatives. In his assumption that there must be some ultimate object to serve as foundational for further epistemic activity—what he calls the "object-in-itself" (p. 115)—his argument seems to me an example of what Campbell and Bickhard have discussed as "encodingism" (1987). In the alternative view which they offer, called "interactivism," the cognitive object is elaborated in the process of being known. A metaphor which might illuminate the difference between encodingism and interactivism—and thereby highlight where Kitchener's perspective falls short—is that of a conversation. A conversation only exists as it is constructed through the interaction of speakers. There is no foundational object-in-itself that exists independent of this act of construction. What an observer might later summarize as the "argument" or "topic" of the conversation is the artifact of the interaction; it did not exist until it was collaboratively created.

The importance of Kitchener's misreading emerges when he argues

> Suppose the subject were to abstract a property from itself, that is, its action, when there was no real object present. Suppose that, after abstracting this property, the subject then constructs the object and attributes this abstracted property to it. In this case the property would be abstracted from the object only in a Pickwickian sense, as if I were to say that I discovered something external by creating it and putting it there. (p. 114)

But this is far from Pickwickian; it is in fact how cognition commonly functions. One of the chief strengths of Piaget's work is that he provides a means of access to the psychological act of "set." Such an act may be helpful, as in creative intuitions and predictions; it may be largely neutral, as in anticipations and expectations; it may be harmful, as in projections and biases. But such pre-judging is an important function of cognition, and has measurable consequences.

It may be Kitchener's lingering encodingism which leads him to conclude his discussion of Piaget's constructivism somewhat problematically. He introduces points—such as the distinction between epistemologist and epistemic subject (p. 116), or the principle of epistemic transference (p. 117)—which are misleading at best, and ends the chapter with a discussion of von Glasersfeld's "radical constructivism," which is simply wrong—representing it as a straw man, and not taking into account von Glasersfeld's anticipations of, and responses to, the very objections Kitchener raises against it. To give only one short instance of this, Kitchener points out in a footnote that "von Glasersfeld attempts to avoid a radical idealism by claiming that the environment is just a sum of constraints within which the organism can operate. But the crucial question is where these constraints come from" (p. 119). He thereby leaves the impression that von Glasersfeld's position lacks a genuine grounding. But this is a discouragingly inaccurate reading of von Glasersfeld, for whom organism-environment relations over ontogenetic and phylogenetic time, much in Piagetian spirit, provide constraints. In fact, von Glasersfeld's radical constructivism is an attempt to articulate a coherence model of constructivism, consistent with Piaget, while excluding Piaget's lingering objectivism (cf., e.g., von Glasersfeld, 1985).

Kitchener's seventh chapter provides the ostensible rationale for the text as a whole, an account of Piaget's philosophy of science in terms of the work of Popper, Kuhn, and Lakatos. This is particularly valuable since Piaget's systematic philosophy of science, elaborated collaboratively with Roland Garcia at the very end of Piaget's life, is still unavailable in English. Kitchener claims that, "Not only is Piaget's genetic epistemology a fertile and promising philosophy of science, and not only does current philosophy of science corroborate Piaget's theory of genetic epistemology, but in addition, Piaget's

theory may provide a more empirical, psychological grounding for current philosophy of science" (p. 176).

In this chapter, Kitchener recapitulates many of the themes he has discussed earlier—orthogenesis, Piaget's realism, and especially epistemic change—in terms of the philosophy of science. Still, it is somewhat surprising that his only examination of Piaget's late and rich work in equilibration should appear here rather than in the chapter on constructivism, since he thereby leaves the impression that the revised model of equilibration was primarily intended to support Piaget's philosophy of science; and more important, by not discussing it earlier, he weakens his presentation of constructivism. On the other hand, by explaining how equilibration functions in the development of thought, he is able to indicate the potential importance of Piaget's work for understanding the rational process of theory-change within science.

Overall Kitchener succeeds in his sedulous effort to represent Piaget objectively. Occasionally, though, I felt he succumbed to an implicit interpretive bias. Let me provide some examples of what I mean. In first introducing Piaget, Kitchener states "If there is a single leitmotif in Piaget's thinking it is this: All reality—biological, physical, psychological, sociological, intellectual—is evolving in the direction of progress" (p. 6). Yet what could it mean to say this? "Progress" is a highly charged and philosophically suspect concept (cf. Nisbet, 1980). It presupposes the articulation of clear criteria in terms of which what would count as progress could be evaluated. While an argument could be (but need not be) made that Piaget has articulated such criteria for cognitive development—i.e., the normative *telos* of logico-mathematical thinking—what might progress mean in a biological context? Growth in anatomical complexity? Growth in behavioral complexity? Reproductive success in terms of increasing numbers of offspring? Extended environmental range? More specialization resulting in more efficient resource usage? An expanded gene pool? To simply invoke "progress" as a global category, without further specification, is not helpful.

Again, Kitchener argues that, "Piaget has always been committed to a biological (especially evolutionary) epistemology" (p. 7). There can be no quarrel in saying Piaget's epistemology is biological. But to call his epistemology "evolutionary" invites misunderstanding, when there exists a contemporary literature which calls itself "evolutionary epistemology," but which models itself after neo-Darwinian random-variation-and-selection processes (cf., e.g., Campbell, 1974), a model Piaget explicitly and repeatedly rejected.

These possibly trivial points become somewhat more important when Kitchener translates Piaget's "la raison n'en peut changer qu'avec raison" as "reason evolves rationally" (p. 8). Certainly this is consistent with his usage of "evolution," indicated above. But by choosing a highly charged word like "evolve" when a much more neutral translation such as "change" would do, he imputes an unwarrantedly strong bias toward biologism to Piaget. Is the isomorphism between biology and cognition to be construed as though there were no qualitative, but only quantitative, differences between organisms adapting and humans cognizing? Certainly biology is vital to Piaget's project, but he does not collapse cognition into biology. Kitchener employs a rhetoric of evolution, when the rhetoric of development would frequently be more appropriate.

Kitchener occasionally formulates central issues in Piaget's theory inadequately. For instance, he describes Piaget's rationalism as follows:

> Since the hallmark of logico-mathematical knowledge is its necessity, and since this necessity evolves from an earlier state of non-necessity to a later stage of necessity, a closely related problem is: how can one explain the necessity of logico-mathematical knowledge from an evolutionary perspective? In particular, how can one account for the fact that, historically, necessity emerges out of non-necessity? (p. 8)

But in stating the issue in this way, he makes Piaget subject to criticisms like Fodor's (1980), who argues the logical impossibility of necessity emerging from non-necessity, and thereby seriously transmogrifies Piaget's constructivism into an innatist theory with maturation. This line of reasoning is followed explicitly by Kitchener (cf. p. 72), and leads to problems in his presentation of constructivism (discussed above). Formulating Piaget's constructivism in terms of an encodingism, rather than an interactivism, both vitiates what is most valuable in Piaget's work, and lays it open to charges of incoherence.

A second, less important, shortcoming of the text is that Kitchener minimizes the degree of internal revision the theory underwent. Thus, for instance, in discussing the stage question, probably that part of Piaget's theory which has been mostly widely seized upon for further investigation, Kitchener presents both sides of the many issues it raises—e.g., are they merely descriptive, classificatory devices, or are they epistemologically necessary; are they domain-specific or are they global logics; and so forth. At the same time, though, he does not acknowledge that Piaget's thinking about stages changed, that he attributed greater and lesser importance to them at different times, and that he ultimately abandoned what had originally been one of his seminal ideas, that of "structures-of-the-whole." Similarly, he gives inadequate attention to Piaget's later theory of equilibration. He thus fails to convey how Piaget's theory underwent significant revision in the last years of his life (and thus denies to Piaget's own epistemology the right that it be understood genetically). And by presenting the different components of the theory as a pastiche, he sometimes leaves the impression, accidentally or not, that Piaget's work suffers from more confusion than is actually the case.

Some of these problems, especially Kitchener's non-genetic presentation, may stem from his stated intent to make Piaget's work more familiar to an Anglo-American audience. He therefore wishes to speak in two directions: first, against charges that Piaget's work suffers from conceptual confusion, and therefore fails as philosophy by definition (as philosophy has been understood within that tradition), and second, in favor of the contribution Piaget's work makes to ongoing issues within contemporary philosophy, particularly concerning philosophy of science and epistemology. In choosing to address such an audience, he emphasizes the analysis of concepts. But this may have been a strategic blunder, for such a static mode of presentation minimizes our sense of Piaget's lifelong struggle to clarify his intuitions. The theory thus emerges as more finished and doctrinaire, and less alive and in development than it actually was.

Overall, this is an excellent text, full of careful and valuable discussions that usefully represent and situate Piaget's lifework. On the other hand, it is marred by not itself representing genetic epistemology genetically, and more fundamentally, by a tendency to inaccurately portray Piaget's constructivism. Kitchener's book has so much to recommend it that I would deeply regret if it were to become part of the cottage industry which misrepresents Piaget and then argues on the basis of that misrepresentation that he got it wrong.

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