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WHAT IS WRONG WITH DEWEY'S THEORY OF KNOWING

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In view of the strong influence of Dewey's thinking on contemporary educational thought, looking back over his epistemological conceptions is of crucial importance. The heart of Dewey's theory of knowing rests on a fundamental postulate derived from his naturalistic interpretation of human cognitive development: that of the functional separation, in the understanding of meaning, between observed or experienced phenomena and theoretical constructs. This postulate underpins Dewey's agreement with operationalism, his critique of the spectator theory of knowledge and his conception of causality as a sequential order. If this postulate is disproven, the principles relating to intellectual training that are derived from Dewey's theory of knowing collapse.

Introduction

The present essay proposes to critically deepen an area of John Dewey's thought that has not been extensively explored: the issue of meaning and knowing in relation to conceptual systems. To be comprehensive enough, because Dewey's knowledge conception involves a radical reconstruction of traditional concepts, I will first recall the meaning Dewey ascribes to the concepts I rely on to build my argument. This argument refers to a significant aspect of Dewey's conception of the understanding of meaning which is at the heart of his theory of knowing.¹

Despite some well-known exceptions and the fact that his work has been

1. Because knowledge in Dewey is an ongoing process involving an active subject, I use the notion of "theory of knowing" rather than that of "theory of knowledge", considering also the fact that he was highly critical of the philosophical legacy in terms of "epistemology" and "theory of knowledge".

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increasingly studied for some decades,² the relative negligence of Dewey's philosophy by professional philosophers contrasts with the situation that can be observed in educational philosophy and theory, where Dewey occupies a central position, as demonstrated, in this field, by the polarization of problematic issues around premises predefined by the Deweyan line of argument.³ The weakness of philosophers' interest for Dewey's conceptions could be explained by a fundamental lack of understanding linked to the difficulty they might have in breaking away from traditional philosophical concepts preformed by a mentalist psychology to which Dewey is diametrically opposed.⁴ But there is no reason for educational philosophers and other scholars in the field of education not to encounter similar difficulties and reservations. The election of Dewey's philosophy in contemporary educational thought may primarily reflect a general adherence to the social-political aspect of his fight for democratic education likely to weaken interest in critical readings. Dewey's success among educational philosophers and scholars explains to a great extent his much more diffused and implicit—but profound—influence on research currents in education that focus on the way individuals construct their knowledge through experience. The theories in play, which have developed under different labels such as "situated cognition", "radical constructivism", "discovery learning", "inquiry-based learning", "problem-based learning", "competency-based approach" or else, "social constructivism", inspire contemporary reforms in Western education.

The importance of Dewey's theory of knowing for Western thought, and more precisely its impact on modern-day changes in the dominant modes of intellectual training, is only equaled by the weak significance accorded, from a scientific or technical point of view, to his logic and, more generally, his epistemology, which nevertheless constitute the rational foundations of his influence in pedagogical matters.⁵ According to Jim Garrison (1995), the problem would be that adopting Deweyan social epistemology and constructivism would involve overtly adopting his social behaviorism. Alternatively, Garrison demonstrates that the Deweyan perspective provides a theory of meaning acquisition and emergent mental development which constitutes one way of understanding social constructivism and situated cognition: In coherence with George Herbert

2. It should be noted that Dewey's philosophy is central, for instance, in Richard Rorty's, Hilary Putnam's, Christopher J. Voparil's, Larry Hickman's and Richard J. Bernstein's works. See also John R. Shook (2000), and Horace S. Thayer (1990).

3. A recent empirical study of the subjects of articles published in journals of educational philosophy confirms that the distribution of articles is heavily skewed to Dewey (Hayden 2012).

4. See Hook (1950); and also, for instance, Thayer (1990).

5. Garrison notes for instance that some social constructivists have remarked on the similarity between their research programs and that of Dewey's philosophical pragmatism but that "no one, has attempted to specify in any detail the virtues of Deweyan pragmatism as an epistemology for contemporary social constructivism" (1995: 718).

Mead's (1934) social behaviorism, understanding in Dewey's works does not involve the manipulation of inner meanings but the coordination of acts through participation in the social processes of meaning construction.

If we make an effort to study the Deweyan theory of knowing, we realize its insight, as well as consistency and, in a certain way, aesthetics. Nevertheless, my purpose will be to show its fundamental fragility, which may reveal some of the crucial shortcomings of contemporaneous theories of situated cognition and social constructivism.⁶ This fragility is reflected by a common core of criticisms he received, in particular from eminent epistemologists who had read him, but not necessarily in detail. I propose to begin this study, as stated previously, by entering into the Deweyan epistemological world with the help of some of his key concepts, developed mainly in Dewey (1929) *The Quest for Certainty: A Study of the Relation of Knowledge and Action*, and in Dewey (1938) *Logic: The Theory of Inquiry* (for reasons of clarity, I will henceforth refer to Dewey's works using an abbreviation of their title). Next I defend that the heart of Dewey's theory of knowing rests on a fundamental postulate: that of the functional separation, in the understanding of meaning, between observed or experienced phenomena and theoretical constructs. I then show that this postulate underpins Dewey's agreement with operationalism, his critique of the spectator theory of knowledge and his conception of causality as a sequential order. Finally, I defend the claim that if this postulate is disproven, certain foundations of Dewey's philosophy of experience collapse and, with them, the principles relating to intellectual training that are derived from them.

2. Some Key Concepts in Dewey's Theory of Knowing

2.1. *The Experiential "Situation" as Basis and Continuity as Explanatory Principle*

In Dewey's work, the development of knowledge fundamentally brings into play the notion of "situation". The importance accorded to this notion marks the non-separation of elements of experience, the idea that they are apprehended in a comprehensive, syncretic way, or exist through the relations they maintain with one another for the active subject:

What is designated by the word 'situation' is not a single object or event or set of objects and events, for we never experience nor form judgments

6. Obviously, showing these links would require a new paper. That task will not be addressed here.

about objects or events in isolation but only in connection with a contextual whole. (*Logic*: 66)

On this basis, the idea of “experience” designates a form of transaction between the subjects and their surroundings. In inquiry, it assumes the alteration of a previous situation necessitating an intentional process of adaptation of their means of action. This process aims to overcome one disturbance or doubt by modifying the relation they have with the contextual whole that defines their situation:

Experimental inquiry or thinking signifies *directed activity*, doing something which varies the conditions under which objects are observed and directly had and by instituting new arrangements among them. (*The Quest*: 36)

The disturbance that lies at the origin of the cognitive operations of inquiry manifests itself through a form of discontinuity and resolves itself through the re-establishment of the continuity of experience as a unified existential situation. According to Dewey, the “business” that all thinking and objects of thought have to effect is to “connect, through relevant operations, the discontinuities of individualized observations and experiences into continuity with one another” (*The Quest*: 146). The transformation of their situation by the subjects thus allows a switch from discontinuous to continuous, from heterogeneity to homogeneity, through the formation of appropriate functional relations between observed or experienced elements. This re-establishment of continuity of experience is the object of inquiry:

Inquiry is the controlled or directed transformation of an indeterminate situation into one that is so determinate in its constituent distinctions and relations as to convert the elements of the original situation into a unified whole. (*Logic*: 104–105)

On this basis, an “unsettled or indeterminate situation”, or else, an uncertain “contextual whole”, is “taken” to be problematic, which signifies that it is being subjected to inquiry. It is a matter of discriminating relevant existential⁷ elements,

7. Dewey uses the term existential, applying it to situations, conditions, matters, activities, objects, knowledge, consequences, etc. in the ordinary sense of “relating to existence, as a lived reality”. Besides, in his works, existential qualifies the elements of experience developed by past experiences and which are not doubtful—i.e., habitual and nonreflective. In this framework, existential materials stand for the qualitative elements of experience, the unquestioned features which constitute the background of the thinking, the facts of inquiry. Dewey speaks of the “function” of

taken as facts, and of organizing and identifying functional relations between them that result in the unification of the whole situation in play. These relations, which allow to anticipate the effects of action, underpin human rationality:

Reasonableness or rationality is, according to the position here taken, as well as in its ordinary usage, an affair of the relation of means and consequences. (*Logic*: 9)

The effect of this organization, unification through functional continuity of the observed datum, is the resolution of the problem, of the uncertainty, i.e., control, that is to say, security.

The notion of continuity serves Dewey's argument in another, related, way. It is closely linked to his naturalistic interpretation of intellectual development. In this respect, it expresses the unity of the evolutionary process, based on the emergence of higher thinking functions from lower physiological phenomena:

As it (the term 'naturalistic') is here employed it means, on one side, that there is no breach of continuity between operations of inquiry and biological operations and physical operations. 'Continuity', on the other side, means that rational operations *grow out of* organic activities, without being identical with that from which they emerge. (*Logic*: 19)

Elsewhere, Dewey writes that "unless there is breach of historic and natural continuity, cognitive experience must originate within that of a non-cognitive sort" (*Experience and Nature*: 23). This makes clear that rational processes, emerging from organic processes, retain their function. They serve action, adjustment between means and consequences. Human intelligence is a relay for genetically programmed action in the control of the environment. According to Dewey, this is also true of the highest forms of scientific thinking:

If one were to trace the history of science far enough, one would reach a time in which the acts which dealt with a troublesome situation would be organic responses of a structural type together with a few acquired habits. The most elaborate technique of present inquiry in the laboratory is an extension and refinement of these simple original operations. (*The Quest*: 123)

"existential material" as "evidential data" and opposes "existential operations" to "mental processes".

Dewey's naturalistic interpretation of intellectual development underpins his conception of the functional continuity of experience and, in fine, the aim of inquiry as the successful adjustment of coordinated habits—we will return to this.⁸

The idea of continuity ultimately justifies the significant struggle led by Dewey against the many dualisms that punctuate traditional philosophical thought: body and mind, sensation and reason, matter and form, practice and theory, etc. Because we now know that human thought is the product of material factors, the dynamic of action of which is governed by the process of evolution, we have to abandon meaningless speculative habits in order to found a true science of Man:

To see the organism in nature, the nervous system in the organism, the brain in the nervous system, the cortex in the brain, is the answer to the problems which haunt philosophy. And when thus seen they will be seen to be in, not as marbles are in a box, but as events are in history, in a moving, growing, never finished process. (*Experience and Nature*: 295)

2.2. *The Instrumental Role of Logic*

The methods underpinning the unifying role of intelligence, the linking of means and consequences in the course of experience, represent the matter of “logic”. Logic, from Dewey's standpoint, is not a matter of formal and normative rules that can be defined independently of any context. Its aim is the inquiry into the operational linking of the existential data. Logic therefore represents the envisaged inquiry in the second degree, the inquiry itself being taken as object: “inquiry into inquiry.” This approach was qualified by Dewey as naturalist (he states that this is a matter of cultural naturalism—the situations in play include social cultural contexts) because it is intrinsically linked to the “biological natural foundations of inquiry”—or else, to the uniqueness of the evolutionary line going from lower functions toward higher functions, expressed, as we have seen, by the idea of continuity:

The primary postulate of a naturalistic theory of logic is continuity of the lower (less complex) and the higher (more complex) activities and forms. (*Logic*: 23)

Logic, to the extent that it is naturalist, can only be normative in terms of methods and not results. It is applied to the means by which intelligence functionally links the observed data:

8. On this subject, see for instance Tiles (2010).

(The principles of logic) state habits operative in every inference that tend to yield conclusions that are stable and productive in further inquiries. (*Logic*: 13)

2.3. *Concepts and Ideas as Schemes of Action and Operational Control as the Matter of Knowledge*

The functional linking of the data is assumed to be carried out by two complementary types of operations, one observational in character and the other conceptual in character. Operations of a conceptual nature organize existential data and establish the appropriate connections of means to consequences. They have a role of functional unification of experience. According to Dewey, if empiricists did not understand the fundamental role of concepts not directly derived from sensory experience in the linking of the data, rationalists, for their part, did not understand that concepts do not represent any reality in itself, no more ideational than material. These, Dewey writes, are definitions of consequences of operations:

The rationalist school was right in as far as it insisted that sensory qualities are significant for knowledge only when connected by means of ideas. But they were wrong in locating the connecting ideas in intellect apart from experience. Connection is instituted through operations which define ideas, and operations are as much matters of experience as are sensory qualities. (*Logic*: 39)

The meaning of a concept thus relates to the modification of experience it involves: It refers to the functional connections that it is used to establish, which can be clarified by the assertion of Charles Sanders Peirce that "If one can define accurately all the conceivable experimental phenomena which the affirmation or denial of a concept could imply, one will have therein a complete definition of the concept" (cited in *Le Développement du Pragmatisme Américain*: 412). This can be linked to Dewey's early statement according to which the concept "can be grasped only in and through the activity which constitutes it" (*How Do Concepts Arise from Percepts*: 144).

For their part, "ideas", fed by conceptual knowledge related to the effects of specific operations, are "operations to be performed" (*The Quest*: 137); "anticipatory plans and designs" (*The Quest*: 166); "proposals and plans for acting upon existing conditions . . . to organize all the selected facts into a coherent whole" (*Logic*: 112–113). Ideas are thus not the products of a pure, "merely mental" reason. They apply to specific operational relations and are plans of action for the resolution of problems, or else the re-establishment of continuity of experience, in a given situational framework.

Links between these notions and the concept of schema introduced by Immanuel Kant and developed in psychology by Jean Piaget may be noted. A schema is a structure of the organization of actions that can be adapted to numerous situations.⁹ We can express Deweyan views by writing that schemas of action define concepts, and schemas of resolution define ideas. This is reflected in Max Horkheimer's comment that pragmatism "believes that an idea, concept or a theory is nothing but a scheme or a plan of action, and therefore truth is nothing but the successfulness of the idea" (1947: 42).

These principles lead Dewey to contend that it is by acting or operating in situation that the subject develops the knowledge that is the object of the inquiry:

If we see that knowing is not the act of an outside spectator but of a participator inside the natural and social scene, then the true object of knowledge resides in the consequences of directed action. (*The Quest*: 27)¹⁰

Knowledge (concepts and ideas—schemas of action and resolution) relates, as do schemas in psychology, to a set or class of situations. There is, therefore, as much knowledge as there are schemas developed in this way, relating means to effects in defined classes of situations: "For on this basis there will be as many kinds of known objects as there are kinds of effectively conducted operations of inquiry which result in the consequences intended" (*The Quest*: 196), or else:

There are as many conceptions of knowledge as there are distinctive operations by which problematic situations are resolved. (*The Quest*: 221; see also Thayer 1990)

Taking into account this multiple and evolutionary aspect of knowledge applied to experience and developed along with it, what counts is not what is acquired, but the potential for acquisition, it is knowing how to transform experience into potential for action, it is logic itself, defined as a method of inquiry:

The quest for certainty by means of exact possession in mind of immutable reality is exchanged for search for security by means of active control

9. In Piaget's works, the schema represents the structure or the organization of actions as they transfer to one another or spread during the repetition of these actions in similar or analogous circumstances (Inhelder & Piaget 1966: 11).

10. We note with Georges Dicker that major criticisms of Dewey's theory of knowing stem from misunderstanding of his position which, namely, assumes that knowledge "is a specific kind of purposive activity in which consequences are secured or averted. Its object is simply its objective—i.e., the desired practical consequences of the activity of knowing" (1976: 51, 53).

of the changing course of events. Intelligence in operation, another name for method, becomes the thing most worth winning. (*The Quest*: 204)

Truth or rather, assertibility, therefore does not correspond to any given, whether material or conceptual. It is associated with the establishment of appropriate connections between observed or experienced elements, linking means to consequences. It is what unifies experience here and now. True knowledge for a given class of situation is a set of existential operations, or else, a schema, which changes conditions at the source of a problem in such a way as to ensure control for the subject.

These conceptual clarifications allow me to now bring to light a central but fragile postulate of Deweyan theory of knowing, which involves the links between existential materials and conceptual materials.

3. The Links between Theory and Empiric in Dewey's Naturalistic Theory of Knowing

3.1. The Deweyan Solution: The Functional Complementarity of Observational and Conceptual Materials

In an article (*Kant and Philosophic Method*) directly linked to his PhD thesis (*The Psychology of Kant*), Dewey poses, by pointing out the limits of the Kantian solution, the fundamental epistemological problem of the relation between rational knowledge and sensory knowledge. His subsequent work can be considered, in most part, as the development of his own solution, which is associated with the philosophy of pragmatism and functionalist psychology. In view of this solution, which invokes the idea of functional complementarity, the problem of heterogeneity of the two forms of knowledge disappears.

Without a synthesis process, which empiricism was unable to account for, our apprehension of the world would be limited to a "rhapsody of perceptions", according to the Kantian expression. Kant, as we know, when researching how reason can ensure this synthesis, replies using transcendental logic, a doctrine of categories or pure acts of thinking that ensure the possibility of experience, and therefore the constitution of its objects. The criterion of knowledge is therefore not external to it. It is not a transcendent element or an abstract principle. It is, according to Kant, the very system of its pure forms. But the Kantian solution, which has the merit of making knowledge of the object by the subject possible, keeps both in a relationship of exteriority. The subject's thinking which, when pure, is analytical and deductive, becomes synthetic when applying itself to an external material object, which is formed by

the subject's action upon it. This distinction appears artificial because reason is simultaneously analytic and synthetic.

Dewey then formulates certain principles, by way of Hegel's philosophy initially, which will span his epistemology: The relations of the subject to the object, like the relations that link all conceptions, constitute an organic unit.¹¹ What Dewey means by organic unit refers to the following idea: Such relations are not external to the linked elements but constitute them.

The idea of a mutual, constitutive formation of knowledge and the object of knowledge removes the problem of concepts' relation with reality. The object is not given in an external way but constituted operationally by the inquiry in a particular contextual whole. We have seen that, potentially, there are as many objects of knowledge as there are operationally obtained solutions to posed problems. Concepts, for their part, do not serve the apprehension of external "things" but are instruments of action. They develop as problems are encountered and solutions reached.

This is how Dewey's solution can be understood: Observed elements and ideas are composed of operational links. Respectively, they represent neither objects of an external world, nor concepts predefined in a conceptual world. Thus, Dewey eliminates the problem of heterogeneity evoked by a representational conception of knowledge and the associated quest for identification. Observations organize themselves and tools of thought develop according to a process of functional cooperation. Cooperation evokes an organic relation of complementarity, or else "functional correlativity", "in such a manner that the former (perceptual material) locates and describes the problem while the latter (conceptual material) represents a possible method of solution" (*Logic*: 111). Observational and conceptual materials serve not knowledge as mentally conceived, but the inquiry, the control of action, and have no other validity than its success. Dewey (*Experience and Nature*: 381) proposes an enlightening comparison with architecture to explain his conception of the operational role of concepts in knowing. Architecture does not transform the very nature of its raw materials, stone and wood, but it arranges them to give them new properties and features. Similarly, the art of knowing is not a question of altering its subject matter, but of acting by conferring "upon non-cognitive material traits which did not belong to it."

Hence Dewey's recurrent attack against rationalists and classical empiricists,

11. Subsequently, certain similarities between Deweyan inquiry and Hegelianism were noted: For Dewey the process of inquiry does not issue in some universal state of consciousness and truth. A specific problem generates and determines the course of thought and circumscribes its conclusions . . . nonetheless . . . each individual inquiry is like a little Hegelian universe; an evolutionary struggle of consciousness against 'otherness' proceeding through moments and 'forms' (Gestalten) to a unified concrete whole, self-realization and truth; thought mediating existence (Thayer 1988: 527).

who both made the error of posing the object of knowledge as prior and independent of operations of knowing. Both considered human reason as the organ of apprehension of this object, supposed to be endowed with a specific capacity for "identification." This capacity reflected, for the former, the capacity to immediately access principles of a universal character, and for the latter, to sense-data. But Dewey takes human reason, which he prefers to call intelligence, to be an organ of control and adaptation. In this respect, (referring to William James),

the pragmatic attitude consists in looking away from first things, principles, 'categories', supposed necessities, and looking towards last things, fruits, consequences, facts. (*Le Développement du Pragmatisme Américain*: 419)

For their part, the rationalists, as opposed to the empiricists, were right on one point: Sense knowledge is mediatized by ideas, but they were wrong to conceive of the latter as purely "mental." We have seen that these are schemas, plans of action, applied therefore to real or possible situations. The empirical theory of ideas and not the Kantian theory of knowledge marks, according to Dewey, the true Copernican revolution in philosophy (*The Quest*:118; 291).

Facts and ideas collaborate in thought, because according to the Kantian formula, apart from each other "perceptions are blind and conceptions empty". But Kant conceived of the conditions of the synthesis operated by ideas based on ultimate structures of "Reality", which renders perceptual and conceptual materials epistemologically heterogeneous to one another and necessitates a third activity, that of synthetic understanding, to bring them together. According to Dewey, the solution must be reversed, perceptual and conceptual materials are derived from the same source:

Both are determinations in and by inquiry of the original problematic situation whose pervasive quality controls their institution. (*Logic*: 114)

They both have an "operative and functional" nature but the tasks of each are separated and complementary. The first "locates and describes the problem", and the second "represents a possible method of solution" (*Logic*: 111). The separated functions of the observational and conceptual dimension of thought, "perceptual and ideational subject-matters", or else "observed data and directive ideas" is repeatedly expressed by the idea of division of labor (for instance, *Logic*: 283, 310, 515, 517).

The idea of functional complementarity between observational and conceptual materials resolves, according to Dewey, the fundamental epistemological problem of their relations. It ensures the continuity of a world whose unity is es-

tablished by action, or else, interaction and transaction. The function of observational materials, we have seen, is to describe the problem that triggers thought, and that of conceptual materials—whatever they may be, and we will see that they can be of an empirical or of a theoretic nature—is to bring a solution to it through the links they reveal between means and consequences.

3.2. *The Understanding of Meaning and Its Existential Reference*

Whereas selected observational elements, as such taken for granted, serve the description and are presented as primary data of the inquiry, conceptual materials serve the operational understanding. In coherence with the Deweyan notion of concept, meaning refers to relationships between things. Understanding the meaning of something is thus to grasp its position and relationships in experience, and thus being able to perceive the modifications or consequences involved. In other words, it expresses a contextualized capacity for drawing operational links:

Things gain meaning when they are used as means to bring about consequences (or as means to prevent the occurrence of undesired consequences), or as standing for consequences for which we have to discover means. The relation of means-consequence is the centre and heart of all understanding. (*How We Think: A Restatement*: 146)

Understanding, or grasping meaning (of a thing, an event, or a situation), is explicitly defined by Dewey as “to see it in its *relations* to other things: to note how it operates or functions, what consequences follow from it, what causes it, what uses it can be put to” (*How We Think: A Restatement*: 137).

It is always in a relational sense applied to the subject’s activity that conceptions serve understanding. Besides, understanding is often immediately experienced as direct understanding or “apprehension”. Indirect or mediated understanding is provisional, associated to a doubtful situation and the building of hypothetical links. The true goal of the acquisition of meaning—i.e., learning—is that of forming “habits” of direct understanding or apprehension:

Our intellectual progress consists, as has been said, in a rhythm of direct understanding technically called apprehension with indirect, mediated understanding technically called comprehension. (*How We Think: A Restatement*: 140)

Full understanding in Dewey is thus not an anticipation in the reflective sense. It is a perception of consequences in the sense of intelligent or, we may

say, adjusted behavior: To “perceive” meaning, “is to refer the present to consequences, apparition to issue, and thereby to behave in deference to the connections of events” (*Experience and Nature*: 182), which we can link to the idea that the consolidation of meanings is derived primarily from practical activities. The aim of full understanding is thus realized in “the properly coordinated and completed action” (Shook 2000: 178)—i.e., in Dewey’s naturalized empiricism, the adjustment of habitual behavior.

3.3. *The Operational Function of Symbolic Concepts*

A corollary of the Deweyan hypothesis of functional complementarity is functional separation, in inquiry, of observational and conceptual materials. This separation, as we shall see in the following, is a consequence of Dewey’s naturalistic understanding of human cognitive development and the correlative explanatory function of the notion of continuity. In other words, it satisfies the Deweyan naturalistic postulate underlying his whole theory of knowing. The functional specialization in question entails that conceptual systems as such do not give meaning, even tacitly, to existential materials. We may add that, if this were the case, the function of theoretical concepts—i.e., of those whose meaning depends on the system of concepts they constitute—in inquiry would not be limited to the identification of operational links. It would support also and primarily the development of logical links involving hierarchical conceptual structures and interrelated symbolic meanings to give sense to the existential elements and their relations. But it does not and, in the absence of such function in inquiry, conceptual systems do not serve understanding of meaning, save in a conjectural, provisional and secondary way.

Let us return briefly to these ideas. At the empirical level, the concepts refer to existential operations and confer an operational meaning to the perceived data. At the ideational or symbolic level, they are defined by interconnected meanings: They do not directly refer to the observable elements of the world but allow operations on qualitative (existential) objects to be indirectly guided based on symbolic operations—i.e., operations developed with artificial signs. The articulation of the theoretical and experiential levels is ensured by links that Dewey compares to ideas—originally from John Stuart Mill—of denotation (“existential terms are denotative”) and of connotation (“abstract terms are connotative”), which allow the association of empirical elements and an abstract meaning.

Symbolic terms are theoretical constructs whose function is that of abstract operational guides. Once the inquiry has ended, reflective thought leaves room for the new existential unity, in which Dewey sees the very object of the inquiry. In the first chapter of *Experience and Nature*, titled “Experience and Philosophic Method”, Dewey outlines what he means by “denotative method”—which is

not identical with the theory of inquiry but can illuminate it. Denotative method means “empirical method” and, like scientific method, issues from primary experience, denotation, from the simple reference to the situation in its qualitative unity, and returns to it at the end.¹² Once the initial problematic situation has been resolved, it is apprehended in its interconnected unity. The return to denotation thus signifies a return to primary experience—i.e., to the re-establishment of continuity of experience through the denotation of the “whole system of meanings as they are embodied in the working of organic life” (*Experience and Nature* 230).

(Empirical methods) use refined, secondary products [the objects of secondary or reflective experience] as a path pointing and leading back to something in primary experience . . . Things perceived directly are hard, colored, odorous, etc. But when the secondary objects, the refined objects, are employed as a method or road for coming at them, these qualities cease to be isolated details; they get the meaning contained in a whole system of related objects; they are rendered continuous with the rest of nature. (*Experience and Nature*: 5–6)

This return to the primary experience, the restoration of continuity of experience, assumes recognition of the secondary and derived character of theoretical constructs, considering the principle of organic continuity previously mentioned:

The brain and nervous system are primarily organs of action-undergoing; biologically, it can be asserted without contravention that primary experience is of a corresponding type. . . . The only way to maintain the doctrine of natural continuity is to recognize the secondary and derived character aspects of experience of the intellectual or cognitive. (*Experience and Nature*: 23)

I propose a metaphoric illustration of, especially, the role of conceptual systems in the Deweyan inquiry. Let us compare the contextual whole that defines my situation with a projection plane that could be represented by a cinematographic screen, and concepts with lights behind the screen that would make appear the expected effects of operations carried out on this plane. An alternative would have been to consider that the conceptual systems I am calling upon constitutes the projection plane from which I reason, linking elements from my situation to abstract (postulated) elements from the plane. The choice of a pro-

12. On this subject see for instance Thomas Alexander (2004).

jection plane, contextual versus theoretical, expresses the relations that are supposed to be meaningful to me. Whereas, in the second case, these relations link symbolic constructs, in the first case, they link the elements from reality that I perceive or experience. My situation pertains to an interconnected set of existential factors. I shed light on it using knowledge, one dimension of which is theoretical and the other empirical and applicable to defined situational wholes. This knowledge enables me to anticipate the effects of my action. For Dewey, what ultimately makes sense for me is not the abstract links that associate symbolic, or else theoretical, constructs with one another, but the links to experiment between existential factors. Understanding of meaning points to operational links that guarantee, for the subjects, the continuity of a given on which they can act intelligently without ever having to claim to know it from within, beyond its existential context:

In actual inquiry, movement toward a unified ordered situation exists. But it is always a unification of the subject-matter which constitutes an individual problematic situation. It is not unification at large. (*Logic*: 531)

Finally, in order to clarify the process of unifying experience to which the mediate phase of reflective activity participates, let us describe the structuration of the knowing process by using the three types of relations on which it is based. Firstly, the word “relation”, designates the relationships internal to the conceptual systems—“symbol-meaning systems” in Dewey. Symbols, as such, take their meaning from these relationships and, consequently, do not denote. Secondly, the term “reference” designates the relation that concepts, in their empirical dimension, maintain with existence, involving the mediating intervention of existential operations. Thirdly, the term “connection” designates the connections maintained by things with one another. On one side, the relations among symbolic terms or concepts convey ideational meanings. On the other side, the connections among things substantiate existential meanings. Besides, the relation of reference secures a link between existential and ideational meanings.

As we have seen, the discontinuity of experience reflects the maladjustment of habitual behaviors that the intermediate process of inquiry aims at readjusting. Facts are discriminated within the existential situation—i.e., things taken for granted as a result of prior experiences and whose meaning is not called into question here and now. Besides, conceptual thinking underlies the construction of hypothetical relationships in experience, pointing to existential operations. Finally, existential connections secure operational knowledge:

The final test of valid reference or applicability resides in the connections that exist among things. Existential involvement of things with one an-

other alone warrants inference so as to enable further connections among things themselves to be discovered. (*Logic*: 55)

We note that one of Dewey's pervasive criticisms, against Kantian epistemologies and others, is that existential connections exist prior to thought:

What takes place because of its connections does not require an act of thought to give it connection. (*Context and Thought*: 228)

Knowledge develops provided that it is associated with a modification of the existential material involving habitual behaviors: "Beliefs and mental states of the inquirer," writes Dewey, "cannot be legitimately changed except as existential operations, rooted ultimately in organic activities, modify and requalify objective matter" (*Logic*: 158). In other words, genuine knowledge is, as (full) understanding, existential: "mediated through certain organic mechanisms of retention and habit" (*Logic*: 143). The reflective and conceptual phase of inquiry thus leads to the organic adjustment of behavior to things in their connection to other things. Its function is to restore the harmonious unity of life through the successful, meaningful activity of organic habitual behavior (see, on this return to unity, Shook 2000: Chapter 5).¹³

These distinctions help understanding of how we pass from the conceptual/reflective level to the existential/behavioral level involving the idea of habit. The function of symbolic, or else theoretical, concepts is intermediate and dedicated to suggesting meanings by proposing means-consequence relations between selected facts. Relayed by existential operations, understanding of meaning then becomes existential—i.e., non-ideational but direct and behavioral in habitual activity—"after considerable experience, we understand meanings directly". (*Logic*: 143)

13. Robert Dewey (1977: Chapter 2) points to the two different, potentially incompatible meanings of "primary experience": one, technical, "knows no reflective thought distinctions at all", and the other one refers to the primary experience of ordinary persons, dealing with the world of "stars, rocks, trees, and creeping things". In this sense, "if Dewey were to be true to his more technical notion of primary experience", things are products of reflective discrimination, so they would have to be removed from the level of primary experience. Nevertheless, Dewey exhorts philosophers to rely on the experience of ordinary men and also promotes the empirical method, where "primary experience" excludes reflective thought distinctions, to solve the traditional problems of philosophy which begin by taking "the objects of reflection as competitors for reality with the objects of primary experience". According to the argument developed here, the elements of ordinary experience are not mentally but, we may say, operationally, or even, organically discriminated through habitual behavior.

4. A Fundamental Assumption Underpinning Major Deweyan Arguments

In what follows I propose to show that the functional separation, in inquiry, of observational and conceptual materials is reflected, in Dewey's work, by three major features of his theory of knowing: his agreement with operationalism, his critique of the "spectator theory of knowledge" and his conception of causality as a sequential order.

4.1. All Physical Concepts Must Have an Operational Meaning

It was logically inevitable that as science proceeded on its experimental path it would sooner or later become clear that all conceptions, all intellectual descriptions, must be formulated in terms of operations, actual or imaginatively possible. (*The Quest*: 118)

The reference to two types of operations, symbolic operations and existential operations, allows Dewey to assert the operational character of all concepts:

Does the doctrine of the operational and experimentally empirical nature of conceptions break down when applied to 'pure' mathematical objects? The key to the answer is to be found in a distinction between operations overtly performed (or imagined to be performed) and operations symbolically executed. (*The Quest*: 150)

This consideration of both existential and symbolic operations tends, in first analysis, to render trivial the operational definition of concepts but it is associated with a clear distinction, in Deweyan theory, between the meaning of physical concepts and theoretical constructs.

Dewey distinguishes the mathematical dimension and the experiential dimension of physics. Propositions of mathematical physics form an autonomous mathematical system of related symbol-meanings, but as physical propositions "they have reference to existence; a reference which is realized in operations of application" (*Logic*: 55). Physical concepts, as opposed to mathematical concepts, are thus all assumed to be defined by existential, or else experimental, operations, as implied in the operationalism of Percy W. Bridgman, where they are assumed to be "recognized by means of the experimental operations by which they are determined". For example, the meaning of the concept of length is determined by all the operations through which length is determined.

This is akin, according to Dewey, to James's pragmatism, to the "instrumen-

tal" theory of conceptions implying that they are intellectual instruments for directing our activities in relation to existence and this is assumed to be anticipated in Peirce's statement that "the sole meaning of the idea of an object consists of the consequences which result when the object is acted upon in a particular way" (*The Quest*: 111). We find in Dewey that the physical object, defined scientifically is "a statement . . . of the relations between sets of changes the qualitative object sustains with changes in other things" (*The Quest*: 131). It is the same for any existential object:

an object, logically speaking, is that set of connected distinctions or characteristics which emerges as a definite constituent of a resolved situation and is confirmed in the continuity of inquiry. (*Logic*: 520)

By contrast, concepts putting into relation non-observable elements pertain to theoretical models and not to the physical world. Dewey therefore introduces a demarcation between the physical dimension and the mathematical dimension of physics. In other words, that which is not defined operationally, such as the electron, has a theoretical and not existential status. (*The Quest*: 191)

The links from Dewey's instrumental theory of concepts to operationalism are not yet clearly established since all concepts, physical as well as mathematical, are supposed to have an operational function. The issue here is to understand how one passes from the instrumental theory of concepts to the definition of all physical concepts on the basis of existential operations. In other words, why no physical concept can be defined mainly theoretically, and secondarily empirically? The answer lies in the exclusively instrumental role of concepts, or else, in the Deweyan idea that the function of concepts as symbols cannot be descriptive in any way. No doubt Dewey puts too much emphasis on the separation between existential and ideational meanings and, despite his brilliant intuitions, his battle, as we shall see, turns out to be ultimately useless if not disastrous. The condition that radicalizes his instrumentalism is the functional separation in inquiry between observational and conceptual materials, the latter being dedicated to revealing operational links between existential elements. We have seen in Section 3.3 that this separation entails that conceptual systems as such do not give meaning to existential materials. Since a physical entity is, by definition for Dewey, an existential entity, it must be defined by existential operations, symbolic operations only serving as intermediate tools in the discovery of existential links. Therefore, the functional division of labor in inquiry, as conceived by Dewey, underlies his agreement with operationalism.

4.2. Criticism of the "Spectator Theory of Knowledge"

The object of knowledge is defined on the basis of the operational links developed between existential elements that make up the meaningful mesh resolving a given situation:

An object, logically speaking, is that set of connected distinctions or characteristics which emerges as a definite constituent of a resolved situation and is confirmed in the continuity of inquiry. This definition applies to objects as existential. (*Logic*: 520)

The functional separation, in inquiry, of observational and conceptual materials allows isolation of the object of knowledge from the theoretical constructs that participated in bringing it to light. Dewey uses maps as illustrative models to account for the role of operational guide played by theoretical systems, and more essentially by mathematics, in connection to reality. He explains that the relation of reality to mathematical models is comparable with the isomorphic relations maintained between various possible planes of projection and, in this respect, it is functional:

As far as the map is usable as an illustration of mathematics, the isomorphic relation is definitely exemplified in the relation to one another of maps that are drawn upon different projection systems. (*Logic*: 402)

The role of guide played by theoretical constructs explains Dewey's incessant criticism of their representational interpretation, which he assimilates to forms of hypostases of thought. From the moment the theoretical constructs are disconnected from their operational function, they tend to be held as mental representations, and the observed phenomena as manifestations of an ontological type of reality (*Logic*: 523; 531). Here lies the core of his criticism of the "spectator theory of knowledge", according to which knowledge is understood on the model of the apprehension of a fixed and independent object on the part of a subject, or else, on the model of conformity of thought with something antecedent. This criticism is so important to him that it is to be found throughout his work. We have to wonder why it holds such an important place whereas as such, it seems trivial, even when placed in the intellectual context of the early 20th century. The reason is that Dewey's criticism underpins premises that in reality are much more restrictive than the simple rejection of the "spectator theory of knowledge" might imply, and are a major issue in his epistemology.¹⁴

14. Robert Dewey (1977) and Kulp (1992: 184) point to the overgeneralization in Dewey of certain paradigm cases that aptly fit his own view (Robert Dewey 1977: 29).

Involving theoretical constructs in our understanding of the meaning of an external reality does not imply that we believe in their representative function as such, or else the fact that we do not believe in their representative function does not exclude them from underpinning our understanding of the meaning of reality. As Christopher Kulp (1992: 188, 189) contends and, in another way earlier, Emile Meyerson (1908), “Knowing is fundamentally a matter of the knower having a cognitive grasp of the object of knowledge, whatever one holds the object of knowledge to be”; this cognitive grasp is what is well captured and fundamentally correct about the spectator theory of knowledge. This leads me to suggest that it is not the criticism of the “spectator theory of knowledge” that carries Dewey’s argumentation and makes it so important to him, but a deeper hypothesis. This hypothesis involves the specific functional roles assigned to existential and conceptual materials, or else, as we have seen, the idea that the understanding of meaning points to operational links. It is on the basis of this idea that the summoning of theoretical constructs for the understanding of meaning—above their instrumental and subordinate function—appears to be a philosophical archaism that calls on a reference to a former world, to a trans-empirical reality, to objects of knowledge likely to exist independently of existential situations—“prior to and independent of the operations of knowing” (*The Quest*: 196) and, in fine, to the separation of knowledge from practical activity, of knowing and doing. This is why the purpose of knowledge is not to grasp reality (*The Quest*: 9, 97, 196, 205, 244, etc.), it is to resolve posed problems. But Dewey tends to radicalize this view by postulating that the function of theoretical constructs is to reveal and arrange the existential, and to serve the reflective anticipation of the effects of action.¹⁵

The metaphor of projection illustrates this aspect of Deweyan epistemology: The subjects, in the inquiry, project closed theoretical systems to shed light on the open systems which constitute their situations, the latter being support of meaning. This is why, for example, individual cases must not be understood as “instances of laws” in physics (*The Quest*: 184, 205). Theoretical systems only allow for the identification of existing existential links. The frame of reference, for the understanding of meaning, involves the open, contextual space set up by existential links. Criticism of the “spectator theory of knowledge” unfolds from that point and goes beyond a simple defense of the instrumental—and not representational—role of theoretical systems. It fundamentally involves the functional distinction, in the understanding of meaning, between existential materials and conceptual systems.

15. The rejection of the direct representative function of knowledge seems to open to just one (experiential) alternative, as is obvious, for instance, in the following statement by Mark Johnson:

There is no place for ideas as quasi-entities floating around in some disembodied mental space, subject to manipulation by an allegedly pure ego. On the contrary, meaning has to come from experience, and experience is at once irreducibly bodily, biological, and cultural. (2010: 136)

4.3. Causality as Sequential Order

David Hume (1748) noted that thought which refers itself directly to the empirical world can only establish relations of conjunction between facts from experience. Consequently, the idea of causality does not represent an existential truth, but is just the fruit of associative habits. These views have fed, as we know, the positivist refusal to establish truths other than those that are relational, and to seek, beyond phenomena, underlying and hidden mechanisms likely to account for them as their true causes. We can consider that Dewey's epistemology inherits these conceptions, if we keep foremost in mind that, in his works, the conceptual links do not point to existential prior relations but to operational relations—linking means and ends together. More specifically, the immediately given does not consist of perceived elements that are ultimately disconnected and associated by the mind in relation to something prior in existence. On the contrary, it constitutes a whole qualitative situation, on the basis of which functional distinctions are made for the sake of resolving the problem in hand and of controlling the operational relations identified as solutions. This is what makes Dewey write that pragmatism is “an extension of historical empiricism with this fundamental difference that it does not insist upon antecedent phenomena but upon consequent phenomena, not upon the precedents, but upon the possibilities of action” (*Le Développement du Pragmatisme Américain*: 421). Consequently, causality in Deweyan theory does not rest on existential but operational associations, not on links of conjunction between facts but on relations between means and consequences. Because, among all of the connections of things with one another, anything can be linked operationally to anything, it is the action to be carried out that determines the appropriate operational, i.e., causal, relations:

Since every event is existentially connected with some other event without end . . . no event comes to us labeled ‘cause’ or ‘effect.’ An event has to be deliberately taken to be cause or effect. Such taking would be purely arbitrary if there were not a particular and differential problem to be solved. (*Logic*: 459)

Causality is anchored in the experience of causality. Dewey deduces from this that causality does not refer to an ontological reality, it is a logical category - which is close in this respect to the Kantian conclusion. Causality is necessary to the inquiry but is not inherent to the existential data. However, and as was the case previously concerning the criticism of the “spectator theory of knowledge”, the rather trivial rejection of the ontological conception of causality is accompanied by very restrictive consequences. According to Dewey, causality expresses nothing but an experience of connection between existential events. Since exis-

tential sequences do not repeat themselves, causality expresses the recurrence of “kinds” — a kind being described as “a set of conjoined traits”. It is nothing but a sequential order: “Causality . . . consists in the sequential order itself” (*Experience and Nature*: 99); “an abstract conception of the indefinitely numerous existential sequences that are established in scientific inquiry” (*Logic*: 458). The putting in order of sequences is defined as the goal of all existential inquiry, and in this respect, “causation” is not an instrument of theoretical understanding but “a functional means of regulating existential inquiry” (*Logic*: 462).

The far-reaching premise that authorizes Dewey to deduce, from the rejection of the ontological category of causality, the interpretation of causality as a sequential order, is still the functional separation between existential materials and conceptual systems in the understanding of meaning, for this separation entails the provisional and subsidiary function of conceptual systems, or else theoretical systems, in knowledge. As a consequence, the understanding of meaning, in science in particular, is immanent to each “kind” of contextual whole and associated with the establishment of operational—i.e., causal—relations between existential elements.

5. Understanding of Meaning and the Role of Theoretical Constructs

We have seen that an important feature of Dewey’s naturalistic interpretation of human cognitive development is functional separation, in the understanding of meaning, between existential materials and conceptual systems, the function of the latter being essentially conjectural and provisional. Certain major criticisms made of Dewey’s theory can be understood, I suggest, on the basis of this fundamental issue. In this respect, I propose to return to some of those associated with the criticism of operationalism, the objects of knowledge and causality. I will for instance refer to Filmer Northrop and Henry Margenau’s criticisms as offering a very widespread alternative to the Deweyan conception of the relations between theory and empirie, especially because as contemporaries of Dewey, they sometimes point to shortcomings in his conception. When this alternative is followed, theories do have an instrumental function. But existential materials and conceptual systems are not functionally separable from the point of view of understanding meaning. Conceptual systems represent reference systems, or planes of projection, from which existential situations take on meaning for the knowing subjects. Therefore, understanding of meaning involves abstract relationships derived from conceptual systems and only indirectly applies to operational control.

In this framework, priorities that Dewey believed to establish are reversed.

Knowledge develops on the reference plane, source of meaning, which is constituted by conceptual systems and not by existential situations. It is thus on this plane that all scientific concepts must be defined. More generally, the objects of knowledge do not develop their meaning on the prior basis of operational relations but of logical, or else theoretical, links, and causality is a logical category which belongs to theoretical systems and not to existential sequences.

5.1. A Reversal of the Operationalist Condition

In Northrop and Margenau's works, immediately apprehended, perceived or experienced reality constitutes a borderline dimension of knowledge, bringing into play "concepts by intuition" which denote, and refer to items conveyed by the senses and abstracted from a wider context. Besides, knowledge involves constructs (Margenau), or "concepts by postulation" (Northrop), or else scientific or theoretical concepts. The meaning of these constructs depends on their relations with the concepts system they belong to. As we have seen with Dewey, constructs do not make direct reference to immediately apprehended elements of the world. Concepts of energy, charge, electromagnetic field, force, and electron represent postulated elements of physical theory and serve as constructs of physical explanation. They can be described as physical systems which serve as carriers of certain properties which are observable elements (among the observables of a particle we have its mass, position, velocity, energy) or "latent observables"¹⁶. The relations that associate the constructs designated by a concept by postulation to their directly inspected component denoted by a concept by intuition are "rules of correspondence" (Margenau) or "epistemic correlations" (Northrop). These relations are termed "epistemic" because they join factors which do not participate in the same world of discourse: They are given by two different ways of knowing. Thanks to such relations, the theoretical concepts of science can, indirectly, have an operational meaning.

In the majority of scientific theories, only a certain number of scientific constructs can have an operational meaning based on denotatively given epistemic correlates. In other words, to advocate that all physical concepts have an operational definition is to deny (as Dewey does) theoretical concepts "related to entities that are regarded as the carriers of operationally determinable qualities or quantities" any physical meaning. For instance, "it is possible to define, in terms of instrumental procedures, the charge, the mass, and the spin of an electron, but hardly the electron itself" (Margenau 1954: 38). This separation, in the understanding of meaning, between mathematical models and experiential materials

16. Upon such a concept, Margenau (1949: 298) explains, the whole theory of quantum mechanics is founded.

would, if carried to its consequence, as it is the case of operationalism according to Margenau, “dissolve the world into an unmanageable variety of discrete concepts without logical coherence” (Margenau 1931: 16).

These perspectives lead to the reversal of the operationalist condition. As Northrop (1947: 126) explains, the ambiguity of the word “operation” has been very confusing and has led to the belief in the plausibility of the operational theory of the concept. In fact, even when one speaks of experience in science, the operation involved is defined by the concept and not the opposite. For a theory to work, all concepts must be defined in the organized system that constitutes the theory, and the operational definitions, when they exist, are epistemic correlates of the concepts by postulation. “This means”, writes Northrop, “that a deductively formulated scientific theory must be constructed quite independently of one’s operational definitions” (1947: 129).

It is this independence that is at the foundation of a scientist’s creative freedom. There are no limits on the theoretical frameworks likely to serve as sources of meaning, other than the obligation that the theory be verified by way of epistemic correlates that associate theoretical concepts with denotative (intuitive) concepts. The quest for meaning develops across laws to attain principles, and often represents a quest for unity in terms of theoretical constructs. Northrop (1947: 23–25) explains, for instance, that the way modern science was born, with Galileo, cannot be rightly described by Dewey’s method, which would inspire nothing more than traditional assumptions. Understanding that the problem at stake—the description of the movement of a projectile—centered not on the projectile but on the failure of the Aristotelian concept of force, which was apparently confirmed in an infinite number of other empirical instances, was not a question, as Dewey thought, of sensitivity to the situation, discrimination of relevant facts and suggested proposals of solutions. It was a question of deep analysis of the theoretical source of the problem entailing a thorough redefinition of the conceptual constructs involved: Force is not what produces motion or velocity—because when it stops the movement should stop¹⁷—but change in velocity, that is, acceleration.

5.2. *The Conceptual Basis of the Objects of Knowledge*

According to the previous analyses, one of the criticisms of operationalism and Deweyan instrumentalism is that physical concepts must, for rational consistency, all be defined with reference to theoretical systems and in a derived way, when this is possible, with reference to operational relations.

17. Aristotle thought that when the forces ceased to act, the projectile was supported in its motion by the medium in which it moved. For a detailed study of the genesis of concepts in Galileo’s mechanics, see for instance Boccaletti (2016).

More generally, objects of knowledge, even if they do not have a representational function, are not constituted by operational links involving existential situations—which Dewey thought to be the alternative to the spectator theory of knowledge—but by logical links involving theoretically inferred knowledge.

First of all, let us recall the provisional and exclusively operational character of the symbolic mediation of knowledge in Dewey. For instance, the use of symbolic operations essentially serves the construction of models, in the sense of simulacra. The models aim to describe the structures of empirical phenomena they represent or, in other words, to simulate relations between identified factors. What they offer is a functional description of the phenomena, whose value depends on questions of instrumental effectiveness. In this sense, the model is descriptive. The understanding it arouses rests on the description of relations, and the frame of reference for the understanding of meaning is existential. On this subject, the cartography metaphor used by Dewey to account for the role played by theoretical constructs in the solution of a problem evokes this role of models. A map is a guide by denotation and not by postulate. On a topographical map, concentric curves represent the relief. The map's frame of reference is existential. In this respect, the map making metaphor is very specific and expresses the intermediate function of the symbolic constructs for Dewey. A model of *X* is a representation of *X* which offers an approximation of the actual situation, whereas a theory of *X* is an interpretation of the principles that govern *X* (Peter Achinstein 1968: 215). These principles help to approximate the truth and are therefore not to be thought of as ultimate. But the frame of reference from the point of view of the understanding of meaning, for a system of theoretical constructs, is the theory itself and this frame gives meaning to the reality it aims to describe.

We thus come back to the question of the frame of reference for understanding meaning. In Dewey, this frame is constituted by the contextual whole where immediate experience develops. Dewey has sometimes been criticized for confusing an object immediately experienced with an object as conceived in its relations because immediate experience must be devoid of any relations and any meaning (on this subject see, for instance, Shook 2000: 225). This criticism does not sufficiently take into account Dewey's own conceptions. On the contrary, as we have seen, primary experience or unified situation in Dewey maintain a form of existential thickness made of habitual behavior which differentiated it, for instance, from the aesthetic continuum of the immediately apprehended we find in Northrop, or the *P*-data or elements of the *P*-plane of nature in Margenau. To compare the points of view at stake here and establish a meaningful parallel, one must deviate from these borderline planes. Then, what constitutes meaningful knowledge and structures it, in Northrop and Margenau, is not constituted by

operational links but by theoretical ones. These involve the symbolic constructs which Dewey leaves at the door of existential knowledge.

As soon as you move away from the ultimate plane formed by immediately apprehended elements as conveyed by senses, even a little, it becomes impossible to separate these elements from conceptual forms of meaning construction involving theoretical constructs. As Northrop states,

The common-sense external object . . . is a concept by postulation, not a concept by intuition . . . described fact is observed fact brought under concepts and hence theory. (1947: 96, 137)

And in his more technical language,

When the man in the street interprets the yellow circular disc in the blue sky as a sign of the presence of a three-dimensional spherical object termed the moon, an epistemic correlation has occurred. (1947: 120)

This can be contrasted with Dewey's conceptions, as expressed for instance by one of his early commentators:

Things, like tables, chairs, and the thousands of other things that no one questions, are given and are there in perception with intrinsic meanings because they are the product of previous inquiries. No questions have arisen to bring us to doubt them. They are now had or enjoyed and used—had for what they intrinsically are, used confidently as signs of other things. (Piatt 1923: 131)

It is clear on the basis of the example of the meaning of ordinary objects, that understanding involves conceptual systems as a frame of reference, on one side, and existential meanings, involving the contextual whole of immediate experience as a frame of reference, on the other side. In the former case, human understanding follows a movement from the internal conceptual structures to the perceived or inspected data.

These points were developed by Ernst Cassirer and Margenau, for instance. We cannot, Cassirer explains, distinguish, as Kant does, the conditions of sensible intuition and the intellectual conditions under which objects are thought by means of laws, we cannot overlook their mutual interconnection and forget that “everything significantly factual is already theory” (Cassirer 1956: 35). In other words, we cannot gloss over higher levels of thought in order to understand its behavior at lower levels. As Margenau states,

Certainly, concepts and percepts can in general be distinguished, and we shall continue to regard them as discernible; but they merely form extreme representatives of activity, or results of activities integral to the process of knowledge. Most of this activity is in the field of concepts; what is immediately given in sensation lies, figuratively, in a thin limiting layer, or on a limiting plane of experience. (1949: 291)

On this subject, Margenau often uses the example of a simple form of objectification such as that initiated in the perception of a tree, showing that it implies an infinity of aspects not given in the sensation, pertaining to a construction triggering what may be called theoretical concepts or ideas.

Finally, we may note that Northrop and Margenau's, as well as Dewey's, theories of knowledge put into play, on one side, conceptual or symbolic systems and their interrelated meanings, and forms of denotation pointing to the elements of a continuum of experience—excluding theoretical meanings—on the other side.¹⁸ But in Margenau and Northrop, such denotation refers to a borderline continuum plane of sensorial qualities, and in Dewey, to a proximate existential whole involving habitual behavior. This difference significantly shows that the development of understanding is conceived in very different ways in the two cases. In Northrop and Margenau, it demands that you deviate from the denotation plane in question and use ideational relations. Whereas, in Dewey, it demands that you leave the ideational phase and experience existential connections.

5.3. *Causality Belongs to Theoretical Systems*

According to the principle of causality, “under the same conditions, nature behaves alike” or else, “a given state is invariably followed, in time, by another specifiable state” (Margenau 1931: 19). The notion of causality therefore appears as a methodological principle or, as Dewey explains it, a logical category. It expresses a kind of consistency expected of nature. According to Dewey, as we have seen, every event is existentially connected to others, endlessly, so that there is no intrinsic “cause” that might be unearthed. But the idea of cause, by the stability it establishes in the sequential order between two states, reveals more. Discussing the meaning of causality in scientific analysis, Margenau (1950: 167–171) makes a distinction between partial—i.e., counterfactual—and total causes—as does Meyerson (1908: 34–36). In ordinary language we tend to employ the concept of cause by speaking of partial causes. For example, pneumonia

18. With the notable difference that the notion of epistemic correlations, or rules of correspondence, which marks the distinction from worlds of discourse involving conceptual constructs and denotative meanings respectively, does not exist in Dewey.

(state C) is the cause of death (state B) of a person. No systematic link connects the disease to death. This does not express a sequential order. Here the logical connection is in reality the following: If (not C) then (not B); if the person had not caught pneumonia, the person would not be dead. An invariable sequence of events of the form, "If A, then B" assumes, Margenau explains, that we have examined the sum total of pertinent events preceding the set of given events represented by state B. In other words, the principle of causality requires for its application completely closed and finished systems of events. Such systems are the only ones capable of giving meaning to statements in physics. The principle of causality can therefore only logically apply to closed or self-contained systems. In such systems, concepts are defined by the relations they maintain between one another, and these relations fall within the framework of a defined theoretical corpus. Thus, for these reasons and in connection with what I have already established previously, physical reasoning does not imply defining all physical concepts in terms of experimental operations or observations, as operationalism used to state. However, it implies that all constructed concepts should be defined in the theoretical reference system.

The progress made in the understanding of meaning pertains, according to these views, to the domain of theoretical constructs. They mark a development of descriptive models moving in the direction of theoretical systems. This does not mean that the identified "causes" are final but that they mark progress in the direction of generality, such that initially modeled relations, or laws, are eventually deduced from more inclusive theories.

6. From Epistemology to Education: Dewey's Questionable Posterity

Dewey's naturalistic interpretation of human cognitive development and understanding represents a fundamental postulate in his works. As Richard Gale (2010: 75) explains, naturalism in Dewey was a metaphysical doctrine that unified his entire philosophy, involving his doctrines of continuity and organism, which do not admit of any objective verification. This postulate, we have seen, explains Dewey's agreement with operationalism, his critique of the spectator theory of knowledge and his conception of causality as a sequential order. Alternatively, following the views defended here, understanding of meaning should not be envisaged in a "behaviorist" way, underpinning the coordination of acts in reference to existential situations. It involves logical links derived from conceptual systems and only indirectly applies to operational control. Therefore, the mental role played by conceptual systems does not only serve an intermediary phase for the resolution of problems—aiming at revealing operational links be-

tween existential elements—but represents a support of meaning which remains inherent to the understanding that develops. While this perspective does not sustain the spectator theory of knowledge as criticized by Dewey, it does not accredit operationalist conceptions either, and assumes that causality belongs to theoretical systems.

The various criticisms of Dewey have not brought up this problem in a sufficiently explicit way, or have brought up in more detailed way problems that, in reality, are very often derived from it. Consequently, this debatable aspect of his conceptions was not prevented from having significant posterity in education. A manifestation of this posterity is the secondary role that tends nowadays to be conferred on theoretical constructs in intellectual learning. The diverse contemporary forms of educational progressivism mentioned in the introduction, which dominate the change of intellectual training methods in the West, very generally develop the idea that cognitive development must depend on reflection and social interaction from concrete problematic situations (Brown, Collins & Duguid 1989; Carraher, Carraher, & Schliemann 1985; Greeno 1989; Hall 1996; Kolb 1984; Lave, 1988; Lave & Wenger 1991; Resnick, Levine, & Teasley 1991; Rogoff 1990; Schön 1983). The influence of Dewey's philosophy on these currents and theories is acknowledged even if it remains scattered and not very "technical." Carl Bereiter (1997), referring to Wineburg (1989), notes that situativity theorists' educational ideas have not advanced notably beyond those of Dewey, while Garrison (1995) analyzes the deep but largely unanalyzed links between these various manifestations of constructivist epistemology and the tradition of Deweyan pragmatism.

As Northrop (1966: 151) notes, what has been retained by a number of careless teachers in education departments is not the truth of pragmatism, according to which the theoretical dimension of knowledge is given in a hypothetical and temporary way, and not in a categoric a priori way, as Kant believed, but the erroneous suggestions from his writings leading to an overestimation of practical and experimental work and an underestimation of the equally important and necessary role of construction and theoretical mastery; these ideas were popular in education—and still are—because they gave relief from what appeared to some to be difficult in intellectual activity and freed teachers in education departments from the obligation to master the subjects taught, "instead they learned the experimental 'scientific' method of teaching anything."

The relative analytical weakness of research in education, on the fundamental questions evoked in this analysis, is illustrated in a thought-provoking way by the connection of the Russian psychologist Lev Vygotsky's work with that of Dewey (see, for instance, Glassman 2001), even though, and especially on the points I have raised, the divergence between Vygotsky and Dewey is total (see

Gredler & Shields 2004). Vygotsky even declared that his instrumental method has nothing in common with Dewey's instrumental logic:

"It is impossible," Vygotsky writes, "to assimilate the role of the work tool, which helps man subject natural forces to his will, with that of the sign, which he uses to act upon himself. The tool is externally oriented whereas the sign is internally oriented. Attempts to equate the sign with the external tool, as it is the case in John Dewey's works, lose the specificity of each type of activity, artificially reducing them into one" (Vygotsky [1930-33] 1978: 53).

The internal use of the symbolic tools of thought evoked by Vygotsky disproves the restrictive operational function attributed to conceptual thought and acknowledges its essential and pervasive role in the understanding of meaning, the concealment of which constitutes the weakness of the Deweyan theory of knowing.

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