Emerson began one of his essays with the story of how "Man," once whole, was divided by the gods into "men," and separated from one another in a division of labor. As Emerson noted:

The old fable covers a doctrine ever new and sublime; that there is One Man,—present to all particular men only partially... and that you must take the whole society to find the whole man... But, unfortunately, this original unit... has been so distributed to multitudes, has been so minutely subdivided and peddled out, that it has spilled into drops, and cannot be gathered. The status of society is one in which the members have suffered amputation from the trunk, and strut about so many walking monsters,—a good finger, a neck, a stomach, an elbow, but never a man. (Emerson 1946, p. 52)

This fable relates to fields like psychology that are dedicated to studying human behavior because such fields all too often chop behavior into pieces in a way that makes it difficult to recompose a whole from the fragments. As Gordon Allport wrote, "psychological science partakes of the same general dismemberment" as the rest of modern culture (Allport, 1968a, p. 103).

While there are excellent reasons for utilizing a division of labor, the way a field is defined in relation to everyday life, distinguished from others, and further subdivided internally can be a source of some of its deepest difficulties. As the Danish mathematician/poet Piet Hein (1969) put it:

Our choicest plans are fallen through,
Our airiest castles tumbled over,
Because of lines we neatly drew
And later neatly stumbled over.

Sometimes the "lines," or conceptual distinctions, are drawn in the wrong places. At other times they adopted too rigidly or generalized beyond their proper sphere. For all of these reasons the basic distinctions utilized in a field may trip its practitioners up in subtle ways.

CONCEPTUAL CONFUSION AND PHILOSOPHICAL REFLECTION

One of philosophy's primary functions is to help identify and correct conceptual confusion. The working educational psychologist may well be skeptical that philosophy has much to contribute to his or her field. When one is engaged in an activity that seems to be going well the focus is on the activity at hand. Reflecting on whether the task is a good one, or whether it is being approached in the right way, seems an unwanted distraction from the business at hand. Adopting a "philosophical" attitude

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1I want to thank Ben Paxton, Denis Phillips, Ralph Reynolds and Phil Winne for many helpful comments and criticisms.
towards psychological concepts is not intended to be wantonly disruptive, however. Its aim is, rather, to assist in avoiding self-defeating patterns of thinking, valuing, and acting.

As the community psychologist, Edward Seidman, argued some years ago, psychologists pay a great deal of attention to type I and type II errors, but tend to ignore "type III" errors (Seidman, 1978). A "type III error," in Seidman's terms, is an "error of conceptualization." He illustrated this using the example of a puzzle that cannot be solved when approached in a conventional manner. In a familiar matchstick puzzle, for example, one is directed to take six matchsticks, and without bending or breaking them, or letting any matchstick cross over another, make four identical equilateral triangles. Most people attempt to solve the problem by laying the matchsticks flat on a table and trying various patterns with them, but the problem turns out to be impossible when approached in this way. It is easily solved, however, when one uses the matchsticks to build a three-dimensional pyramid with three matchsticks forming a triangle on the table and the other three going from each of its vertices to a common apex above them. In this case, the usual two-dimensional approach can be considered "wrong" or "erroneous" because thinking of the problem in that way makes it impossible to solve, while the three-dimensional conceptualization is "right" or "correct" because it makes the problem easily solvable.

"Type III" errors are related to familiar type I or type II errors, but are not the same thing. Saying that one has made a conceptual error is equivalent to saying that the propositions being considered are of the wrong class. It is not so much that they are false, although they may be, as that they are irrelevant, cumbersome, misleading, or otherwise inappropriate for the task at hand. As Carl Becker wrote of the medieval thinker, Thomas Aquinas, we can understand his work and perhaps wonder at it, nonetheless "Its conclusions seem to us neither true nor false, but only irrelevant" (Becker, 1932, pp. 11-12). Aquinas's thought is irrelevant because his way of thinking is virtually incomprehensible to us and of little or no assistance for the issues we care about. In conceptual error, then, one's propositions are composed of the wrong terms, like sentences using the wrong vocabulary.

Books on research methods commonly overlook type III errors because they take it for granted that one has the proper conceptualization of a problem, the only issue being how to proceed within that framework. Nevertheless, it is not uncommon for the initial conceptualization to be a poor one. Seidman cited the case of community psychologists who suggested that problems of structural unemployment could be addressed by retraining the unemployed. This involves a "conceptual error," he argued, because if the initial difficulty really is structural unemployment (too many people seeking too few jobs), then individual retraining will never solve it. At best, it will only alter which individuals are employed or unemployed. Approaching a structural problem in individualistic terms is an example of a "type III" error because it makes the original problem impossible to solve, resulting in policies that only reproduce or exacerbate the original difficulty (Watzlawick, Beavin, & Jackson, 1967; Watzlawick, 1974).

While philosophy has been greatly concerned with issues of truth and falsity, it has also been centrally concerned with conceptual confusion. All of the classical "great" philosophers can be viewed as attempting to reframe the problems of their times in less self-defeating ways. Wittgenstein's metaphor of helping the fly buzzing against the side of an open flybottle is apt here. With proper redirection the "fly's" difficulty is easily resolved; without it, its problem remains unsolvable. Even the logical positivists who focused narrowly on truth and logic were greatly concerned with eliminating conceptual confusion, such as confusion between descriptive and normative statements, or descriptive and metaphysical statements (Carnap, 1935/1966). While philosophy should not be reduced to any single task, redirecting the way people think about the issues of their times has been a central part of its mission historically. Or, as Ambrose Beirce wrote, "All are lunatics, but he who can analyze his delusion is called a philosopher."

Philosophers are, nevertheless, not the only ones addressing conceptual confusion. As Denis Phillips argued in a previous edition of this Handbook, there is no reason to think that only philosophers engage in critical reflection on the adequacy of the assumptions, models, or metaphors informing a field (Phillips, 1996). Some of the best "philosophical" work on psychology has been done by psychologists, just as some of the most influential philosophies of education have been developed by non-philosophers. The issue is primarily one of attitude or orientation, not job title. Thinking that questions deep and pervasive assumptions in a field and attempts to gain the most general possible perspective tends to be considered "philosophical" no matter who does it. As John Searle

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2One commits a type I error when accepting a claim as true that is really false. This tends to be treated as a cardinal sin in science because it results in directly stating a falsehood. A type II error, rejecting a claim as false that is really true, seems to be less frowned upon, perhaps because it does not lead to direct assertion of a falsehood. Nevertheless losing a truth may be as or harmful as asserting a falsehood if the truth is vital and the falsehood trivial.
notes, "recent philosophical discussions about quantum mechanics, or about the significance of Bell's theorem within quantum mechanics, reveal that it is now impossible to say exactly where the problem in physics ends and the problem in philosophy begins. There is a steady interaction and collaboration between philosophy and science on such philosophically puzzling questions" (Searle, 2003, p. 11).

### DIFFICULTY RECOGNIZING CONCEPTUAL CONFUSION

One reason that conceptual confusion is worthy of attention is that it is so difficult to recognize. Without attempting to review the vast literature on the subject one can suggest several reasons for this. The first derives from the invisibility of familiar habits or conventions. As Wittgenstein put it:

> The aspects of things that are most important to us are hidden because of their simplicity and familiarity. (One is unable to notice something because it is always before one's eyes). The real foundations of his enquiry do not strike a man at all. Unless that fact has at some time struck him.—And this means: we fail to be struck by what, once seen, is most striking and most powerful. (Wittgenstein, 1958, p. 50)

Einstein suggested, similarly, that:

> ... the scientist makes use of a whole arsenal of concepts which he has imbibed practically with his mother's milk; and seldom if ever is he aware of the eternally problematic character of those concepts. He uses this conceptual material, or, speaking more exactly, these conceptual tools of thought, as something obviously, immutably given; something having an objective value of truth that is hardly ever, and in any case not seriously, to be doubted. How could he do otherwise? How would the ascent of a mountain be possible, if the use of hands, legs, and tools had to be sanctioned step by step on the basis of the science of mechanics? And yet in the interests of science it is necessary over and over again to engage in the critique of these fundamental concepts, in order that we may not be unconsciously ruled by them. (Einstein & Jammer, 1953/1969, pp. xi–xii)

Conceptual confusion can also be difficult to recognize or acknowledge because it is emotionally gratifying. Concepts that are fashionable, politically acceptable, or useful for gaining status may be accepted despite their other limitations. Paradigm changes in education and the social sciences often seem to be driven more by changing political climates, for example, than by internal scientific considerations (Karabel & Halsey, 1976). Much the same may be true in psychology as successive waves of thought are over-generalized and viewed as the way things are. Behaviorism promised to put psychology on a sound, scientific basis at a time when physics was the preeminent science and logical positivism the dominant philosophy. Its neglect of mind led to cognitivism at a time when the computer was a high status novelty and educating the expert society a priority. Overgeneralization of the computational model led, in turn, to the rise of sociocultural theories at a time when educating across cultural differences was becoming a priority. Now genetics and brain scans are novelties, leading to a shift toward biological and brain based theories. Each of these changes could be viewed as a scientific advance, and something has certainly been learned from them, but their overgeneralization may well have been driven by extra-scientific considerations.

Enthusiasm for an approach may also lead to selective attention to data confirming its usefulness. Behaviorists and gestaltists often looked only at data that each approach could most easily explain, neglecting other phenomena (Hilgard & Bower, 1966). Research conditions may also be arranged that are particularly favorable to a given conception, much as a physicist convinced that light is a wave might arrange for only the wave-like aspects of light to become evident. Even educational psychology as a whole may be blinded if psychological concepts are institutionalized in schools in ways that make them real in their consequence, and educational psychologists look primarily at behavior in schools. If schooling is in important respects an institutionalization of psychological theory and then becomes the primary site for studying that theory, then educational psychologists may lose perspective on the wider limitations of their ways of conceiving things (McDermott & Hood, 1982).

Even when not driven by fads or emotions, conceptual overshoot can be difficult to correct because there is no way to get outside of one's conceptual universe to see how it relates to reality itself. Concepts are the beginnings, the points of conception, of an inquiry that provide the framework within which that inquiry takes place. Since the only way we consciously know about the world is through inquiry, we never have an articulate experience independent of some way of approaching or studying a phenomenon. As a result, the researcher is in a position analogous to that of a small businessman who has no idea whether to try harder with the current business model or give up and try another since the only way to test the model is to try it. For much the same reason, one of the principal ways to find the limits of a conceptualization is to push it beyond these limits. That is why judgments about the goodness or badness of a conceptualization tend to be a posteriori and relative, rather than a priori and absolute. Accumulating anomalies and lack of
progress relative to its competitors indicate that trouble is brewing, while "going from success to success" tends to indicate the opposite (Lakatos & Musgrave, 1970).

These introductory remarks are meant to suggest that reflection on the concepts used in educational psychology may be of considerable theoretical and practical relevance. Before marching off to correct conceptual confusion, however, it is important to consider some caveats that emerge from this discussion. If conceptual confusion is so hard to detect then it may be unclear whether one way of thinking about an issue is more "confused" than another. Since many conceptual disputes are tacit political struggles involving competing aims or values (Bruner, 1985), judgments about a given conceptualization may also be biased by partisan interests. For these reasons I will use the term conceptual confusion in what follows, instead of Scidman's conceptual error. I will continue to suggest that some ideas are more confused than others, but acknowledge that such claims depend on other assumptions that may not be shared.

CONCEPTUAL CONFUSION IN PSYCHOLOGY

While all of the human sciences can be accused of harboring considerable conceptual confusion, psychology has at times come in for specific criticism. As Ludwig Wittgenstein wrote:

The confusion and barrenness of psychology is not to be explained by calling it a "young science"; its state is not comparable with that of physics, for instance, in its beginnings ... For in psychology, there are experimental methods and conceptual confusion. The existence of the experimental method makes us think that we have the means of solving the problems which trouble us; though problem and method pass one another by. (Wittgenstein, 1958, p. 232)

Wittgenstein's point seems to have been that psychology is confused because psychologists often think that they can study mental phenomena directly or nakedly, without bias or interpretation, whereas in fact many of the phenomena being studied are constituted by the very linguistic distinctions and practices used to understand them (Searle, 2003, p. 9). In other words, confusion results from thinking (wrongly) that one has escaped the circle of language or culture, giving one's claims a specious certainty and universality.\(^3\)

William James described a very similar form of conceptual confusion that he believed occurred so commonly in psychology that he called it "the psychologist's fallacy." As he noted: "The great snare of the psychologist is the confusion of his own standpoint with that of the mental fact about which he is making his report. I shall hereafter call this the 'psychologist's fallacy' par excellence" (James, 1890/1950, p. 196).

In this form of conceptual confusion the psychologist believes that the concepts he or she uses to explain an organism's behavior are used by the organism itself. If behavior can be described as consistent with a certain rule, for example, then it is thought that the person is actually following that rule. This is like believing that if a person speaks grammatical English they must be using the rules of grammar to construct their sentences. This is conceivable, but it is more likely that most people most of the time use habit and example. Be that as it may, projecting rules describing behavior onto those one is studying tends to lead to considering people's behavior in overly intellectualistic terms, as in current talk about babies having "theories" of other persons. This is an understandable shorthand way of talking about the logic implicit in a child's behavior, but once this way of talking becomes familiar, invalid projection of the psychologist's concepts onto the child can become easy to overlook.

It is then only a small step from projecting concepts onto a subject to projecting them into the subject. Psychological concepts such as "mind," "intelligence," "schemata," and the like, being nouns, are often confused with concrete entities and considered to be inside of people. In this case not only is the standpoint of the observer confused with that of the observed, but, in addition, a concept is confused with a tangible thing. As John Stuart Mill wrote of such reification or misplaced concreteness,

The tendency has always been strong to believe that whatever received a name must be an entity or being, having an independent existence of its own. And if no real entity answering to the name could be found, men did not for that reason suppose that none existed, but imagined that it was something particularly abstruse and mysterious. (quoted in Gould, 1994)

Despite this tendency the one thing we can be sure of is that no such entities will ever be found among the neurons, blood-vessels, and other matter in a person's skull (Phillips, 1987). This is because they are concepts, not concrete things.\(^4\) Confusing the two is like confusing the

\(^3\)Physical phenomena are, of course, also affected by the scientist's instruments and procedures, resulting in similar indeterminacy. However, physics tends to take this point into account, whereas psychology has often ignored it.

\(^4\)To avoid confusion I should note that some concepts obviously refer to entities. The concept of an "atom," once hypothetical, refers to a class of material things that can now be observed. Nonetheless, the concept an "atom" is not itself a tangible thing.
map with the territory or attempting to eat the restaurant menu instead of the food (Bateson, 1972a).

Treating psychological concepts as reified inner entities is a problem because it results in "metaphysical explanation" that explains nothing (Comte, 1856/1957). One takes a pattern of behavior, gives that pattern a name, takes this named "thing" to be a physical entity or as having some of the properties of a physical entity, and then views the person's behavior as caused by having this entity inside of them. As John Dewey noted,

... such logic only abstracts some aspect of the existing course of events in order to reduplicate it in a petrified eternal principle by which to explain the very changes of which it is the formalization. (Dewey, 1910/1997, p. 14)

An example would be claiming that a volcano erupts because it has "eruptability" inside of it or that a student performs well because they have a high IQ.

Confusing psychological concepts or functions with entities not only results in mystified explanations, but also leads to inappropriate localization of causes. If one thinks of the "mind" as a thing, one is likely to view "it" as located somewhere, like a physical thing. But locating "mind" turns out to be difficult for the same reason that locating "health" in one's body or "driving" in one's car are difficult. Your "health" is not located in any particular organ because it has to do with the way your organs work together enabling you to thrive and survive in your environment. "Driving" is not located anywhere in your car, because it has to do with what you do with the car. Similarly, "mind" may be better viewed as a function or adaptive way of acting in or responding to the environment, than as an entity in one's skull.

These are clearly not the only forms of conceptual confusion in psychology or educational psychology. Other confusions frequently result when the same term is used with different meanings. The term "learning," for example, has been used for so many different kinds of change that some have proposed doing away with it entirely (Newman, Griffin, & Cole, 1989). Similar confusion occurs when words, like "intelligence" are used in a technical sense one moment and an everyday sense the next (see, e.g., Murray & Herrnstein, 1994). My focus in what follows will be primarily on the psychologist's fallacy, however, and on difficulties resulting from conceiving of psychological functions as entities. I will do so by considering three influential traditions in educational psychology: behaviorism, personality psychology, and cognitive psychology. While these are not the only traditions of interest today, showing how a form of conceptual confusion recurs in all of them will hopefully indicate that there is a persisting problem that needs attention if it is to be avoided in the future.

**STIMULUS AND RESPONSE**

A first example of an approach falling into the psychologist's fallacy comes from behavioristic psychology. Many behaviorists, like the early promoter of this approach, John Watson, reacted against the notion that mind is some kind of mysterious inner entity, like the soul or transcendental ego. Seeking to put psychology on a sound scientific footing, they focused on objectively observable physical events, such as changes in an organism's physical environment (stimuli) or changes in its behavior (responses). As Watson wrote:

I believe we can write a psychology... and... never use the terms consciousness, mental states, mind, content, introspectively verifiable imagery, and the like. It can be done in terms of stimulus and response, in terms of habit formation, habit integrations and the like. In a system of psychology completely worked out, given the response the stimulus can be predicted; given the stimulus the response can be predicted. (Watson, 1913, pp. 511-512, 514)

If "stimulus" and "response" could be defined as externally observable, objectively defined, physical events, and universal laws relating these events discovered, then a (positivistic) science of psychology might be developed analogous to Newtonian physics.

This was in many ways a commendable approach. A psychology aspiring to be a science should certainly be based largely on externally observable behavior (although a role for introspection may remain). It should also refuse to take mind to be a mystified inner thing or entity. Later behaviorists, B. F. Skinner in particular, criticized appeal to inner mental entities in a devastating way, correctly pointing out that it resulted in metaphysical explanations that explain nothing and offer no practical way of changing things (Skinner, 1953). To say that a person's nervous behavior is caused by an inner "neurosis," for example, merely repeats the observation that they tend to behave in a nervous way. Once one cleared the ground of such metaphysical claptrap it seemed possible to build a real science of psychology based on what was essentially an

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5Does it mean receipt of an item of information, such as "learning" that it is now 12 o'clock? Is it change in a pattern of response, such as "learning" to eat lunch at noon every day? Or, maybe it means "learning" a pattern common to a broad class of tasks, such as becoming familiar with tasks having an instrumental pattern of contingency? See (Bateson, 1972b) for a discussion of relations between these different forms of "learning."
input-output model of the organism. It also seemed as though a positivist psychology might make it possible to mechanize education and perhaps even create a scientifically managed social utopia (Skinner, 1976; Skinner and Epstein, 1982). Yet something went wrong with this attempt to develop a positivist science of behavior based on relations between externally observed physical events. And this “something” is directly related to the psychologist’s fallacy.

John Dewey criticized this kind of input-output psychology prior to Watson’s writing (Dewey, 1896; Bredo, 1998). In his critique of what he termed the “reflex arc concept” in psychology, Dewey argued that if a person really behaved in this way the result would be only “a series of jerks” rather than a coordinated, purposeful act. If a “stimulus” is just an external event that is unrelated to what the organism is already doing, in one way or another, then it may cause another independent event, such as startling the organism, but these separate events will not result in well-coordinated behavior. For that to happen, stimulus and response must be constructed in parallel, helping shape one another during their development, much as one might alter the way one shapes a question in response to dawning evidence of the way it is being received by another. In the conventional way of thinking evident at the time a “stimulus” was viewed as a sensory input, and a “response” as a motor output. The stimulus is then a prod to the organism’s sensory nerves, creating the motor response (the word “stimulus” comes from the name of a short Roman sword).

Dewey argued that this was all wrong, at least when one is observing routine, well-habituated behavior. “Stimulus” and “response” should both be viewed as acts, or “sensory-motor coordinations,” rather than as sensory or motor events. Viewed properly, a “stimulus” is an act of perception and not the mere bombardment of a nerve by external stimulation. Similarly, a “response” is a manipulatory act rather than a mere motor jerk. Seeing something involves turning one’s head, focusing one’s eyes, and so forth, until an object can be properly resolved. Reaching for something similarly involves physical activity guided by sensory input. Viewing behavior as a sequence of acts gives a more active interpretation of the organism’s role in it, since in an act the organism moves in order to change its stimulation, rather than being merely prodded by it. In other words, Dewey adopted something like a cybernetic interpretation of behavior in which it is governed by feedback.

Once one views stimuli and responses as acts rather than as sensory and motor events, respectively, then it becomes clear that they cannot be defined in interpretation-free, external physical terms. One cannot draw a line between organism and environment, taking stimuli as external (stimulating) events and responses as organismic responses since in the new conception stimulus and response involve both organism and environment. The organism has a role in making itself sensitive to different events, just as the environment has a role in guiding and regulating its response. As Dewey put it:

The fact is that stimulus and response are not distinctions of existence, but teleological distinctions, that is, distinctions of function, or part played, with reference to reaching or maintaining an end. (W)e may say, positively, that it is only the assumed common reference to an inclusive end which marks each member off as stimulus and response, that apart from such reference we have only antecedent and consequent; in other words, the distinction is one of interpretation. (Dewey, 1896, p. 365)

In other words, in the normal (well-habituated) case, both “stimulus” and “response” are acts which are themselves parts of a larger act, just as the act of looking for a cup and the act of reaching out to grab it are parts of the larger act of “taking a sip of coffee.” Approached in this way a “stimulus” is an act that serves to prepare the situation so that a later act, a “response” can complete the action for which the stimulus prepared the way. Given a sequence of such developmentally-related acts, it becomes somewhat arbitrary whether a given one is viewed as a “stimulus” or a “response,” because it will generally play both roles, having had its own preconditions prepared by earlier acts and preparing the way for further acts. Which sub-act is a beginning and which an ending depends on how you parse the sequence.

Dewey argued that the mechanistic (i.e., linear, deterministic) S-R model of his day was in error because it succumbed to the psychologist’s fallacy:

The fallacy that arises when this is done is virtually the psychological or historical fallacy. A set of considerations which hold good only because of a completed process, is read into the content of the process which conditions this completed result. A state of things characterizing an outcome is regarded as a true description of the events which led up to this outcome; when, as a matter of fact, if this outcome had already been in existence, there would have been no necessity for the process (Dewey, 1896, p. 367).

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6I use the term “positivist” to refer to a specific family of approaches to philosophy of science. It is neither an epithet nor as a description of quantitative research or scientifically oriented research in general. For an excellent discussion of the assumptions implicit in positivism and its post-positivist successors see Phillips & Burbules (2000).
Or, as Ward and Throop suggest, the psychologist who thinks that prior events cause later events without the activity of the organism helping to co-construct these sequences is like one who looks through a crack at a series of cats walking by and concludes that “whiskers cause tails” (Ward & Throop, 1997).

The implication of Dewey’s analysis was that a positivist science of psychology modeled on 18th century physics, is impossible. It is impossible because in order to understand how an event functions in an organism’s behavior one needs to observe how it is perceived. Similarly, in order to understand the function of a response one needs to observe what it is apparently organized to accomplish. In effect, the psychologist faces the equivalent of a hermeneutic circle, using an interpretation of what the organism is trying to do to figure out what the relevant “stimuli” and “responses” are, and a guess as to these sub-functions to figure out the activity of which they are a part. Such a psychology can still focus entirely on publicly observable behavior, but in cases where it is uncertain how to interpret a given behavior the psychologist must look at subtler aspects of behavior, such as the way a stimulus is sought or the way a response is enacted.

B. F. Skinner attempted to remedy some of these problems with earlier behaviorism (see Bredo, 1997). He recognized that “stimulus” and “response” have to be defined functionally and not merely as independent physical events. In his revised view, a discriminating stimulus is an environmental event that alters the probability of a response, while a response is a behavior whose probability is altered by a stimulus. A reinforcing stimulus was then defined as a stimulus that makes a response emitted in the presence of a (discriminating) stimulus more probable (or intense). Each term was defined, as it must be, in terms of its functional relationship to the others (Skinner, 1935). This raises difficulties, however, since a set of terms defined circularly in terms of one another does not give any of them a concrete interpretation. Skinner avoided this problem by imposing a set of contingencies whose relation to one another and the animal’s needs, he controlled. By starving an animal to 80% of its initial body weight, for example, he could be sure that food pellets would be “reinforcing.” By setting up a set of conditions in which reinforcement only occurs in the presence of an event he controlled, he could effectively define what counted as a “discriminating stimulus.” This approach recognized implicit the meaning, purpose, or “function” of the different events in the organism’s behavior, while maintaining the objectivity of a purely external description of it. In effect, the psychologist’s fallacy was maintained by so controlling the environment that the organism has to come around to the psychologist’s definition of things. In addition, behavior not oriented to these meanings could be ignored and interpreted as merely “random.”

This approach saved a positivist, interpretation-free psychology but at the cost of making it testable only under highly controlled conditions. As Noam Chomsky argued, in a well-known critique of Skinner’s work on verbal behavior, this puts the behaviorist in a very awkward dilemma:

If he (a behaviorist) accepts the broad definitions, characterizing any physical event impinging on the organism as a stimulus and any part of the organism’s behavior as a response, he must conclude that most behavior has not been demonstrated to be lawful…. If we accept the narrower definitions, then behavior is lawful by definition (if it consists of responses); but this fact is of limited significance, since most of what the animal does will simply not be considered behavior. Hence the psychologist either must admit that behavior is not lawful, or must restrict his attention to those highly limited arenas in which it is lawful…. Skinner does not consistently adopt either course. (Chomsky, 1959, p. 30)

In effect, the doctrinaire behaviorist has to choose between being “scientific” in a narrow, positivist sense only under highly controlled conditions, or generalizing to less controlled conditions in a merely metaphorical or interpretive way. Chomsky argued that Skinner could not have it both ways.

If this analysis is correct then this set of conceptual confusions has important implications for educational research and practice. Its implication for research is that a positivist science of behavior, modeled on a narrow interpretation of physics, is impossible. Psychologists can dispense with the need for interpreting the implicit meaning or function of behavior only under highly controlled conditions. If they do so they blind themselves to the processes by which the organism itself parses events, making its activity seem simpler than it is. They also limit severely their ability to generalize to less controlled settings. Psychologists studying behavior in less controlled situations may have more to say of practical relevance, but at the cost of greater interpretive ambiguity or unreliability. Valuable things may be learned in both ways, but neither should be regarded as the way things are.

The practical implication of this critique is that educators must be sensitive to what students are trying to do and how they interpret and respond to their experiences. This typically means they must be sensitive to the social relationships implied in the manner or style in which something is done, and not merely in their brute accomplishment. This is because an interpretation of the relationship is generally used to frame or interpret the
actions of others (Bateson, 1972b). A supposed “reward” offered in a patronizing manner will have different value than one offered sympathetically, for example, and may have still another value if offered in a humorous manner. Student responses will similarly have different meanings indicated by their form or style. Whether work is done just to get it over with, or is taken seriously in itself, can be empirically evident in the manner or style in which a student does it. Interpreting such signals may be difficult but is nonetheless necessary in order to know what is rewarding or punishing to a student in the first place. Although any successful educator recognizes this and attempts to act on such cues, a reductive theory based on confusing the observer’s and agent’s points of view tends to make one insensitive to them.

TRAIT AND TREATMENT

A second example of conceptual confusion occurs in traditional personality psychology. This branch of psychology, sometimes termed differential psychology, attempts to identify differences between individuals in personality “traits” or “aptitudes” which are viewed as inner causes of outwardly observable behavior. The trait or aptitude most commonly considered in education and elsewhere has, of course, been the traditional psychometric conception of intelligence, or “IQ.” This concept has frequently been treated as a kind of reified inner entity causing individual differences in school performance. As Richard Snow wrote,

In yesterday’s theoretical writing, the interpretation of aptitude differences typically relied on one or another kind of entity theory. Aptitudes were reified as things in the head of the person. They were not things actually—the old phrenology and faculty psychology had been soundly rejected....—but they were the products of things genetic and physiological, and they were described metaphorically as things in the head (e.g., mental energy, mental engines, functional unities, instinctive responses, and stimulus-response bonds) that the person possesses. (Snow, 1992, p. 7)

As Snow went on to note, “the picture of aptitude most psychologists and educators carried around with them was an entity theory of a fixed, single rank order, general-purpose cognitive trait called intelligence” (p. 8).

The defense of trait psychology relied on the fact that people’s behavior can sometimes be predicted by personality factors across a wide variety of environments (Allport, 1968b). A person who behaves in a relatively “defensive” manner in one environment may tend to behave similarly in others, for example. As a result a measure of relative “defensiveness” might predict much of the difference between people in certain aspects of behavior across a variety of environments, while environmental factors might predict little of this variance. Such predictive evidence was used to bolster the suggestion that behavior is caused by inner traits or aptitudes.

Problems with this type of explanation have already been noted. “Defensiveness” is a description of an observed pattern of behavior. To take this word describing a type of behavior and think that it is a cause of a person’s behavior is a form of self-befuddlement: Why does a person behave defensively? Because they are “defensive” or have lots of “defensiveness” inside! This is exactly like explaining a volcano’s eruption by saying it has a great deal of “eruptability” inside. Such “metaphysical” explanations explain nothing because the explanation merely repeats a description of the initial behavior, adding nothing to what one knows. The same point applies to the notion that IQ causes school performance. If IQ is measured by determining a person’s performance relative to others on a set of school-like tasks, then it should be no mystery that this measure predicts relative school performance: those who do relatively well on school-like tasks are, indeed, likely to do relatively well on other school-like tasks. The vacuousness of the explanation is concealed by pointing to a mystified inner entity, IQ or “g,” as the cause of the performance.

Thinking of aptitudes as entities also tends to lead to mislocating causes, as suggested earlier. If aptitudes are taken as concrete things then they must be somewhere. Because they characterize individual behavior they are apparently inside of the person. Therefore the causes of the form of behavior named by the aptitude must be inside of, or intrinsic to, the person. For example, if a personality variable such as IQ predicts more variance in performance than a set of environmental variables, then it is thought that IQ is the stronger cause of these outcomes. The error of this line of thinking has been pointed out by many scholars (Como et al., 2002; Cronbach, 1957, 1975; Lewontin, 1976; Snow, 1992, 1974). A personality variable might predict more variance in a particular population because there is little variation in the relevant environmental variables within that population. But whichever set of variables works best, this should not be mistaken for a proper understanding of how individual or environmental factors cause behavior (See Lewontin, 1976). As the statistics books say, prediction should not be confused with causation.

A second point is that personality and environmental factors may interact, rather than having merely additive effects. A person of a given personality type may be relatively more defensive in one kind of environment, but relatively less defensive in another. If
the relative "effects" of individual differences depend on the character of environments, and the relative "effects" of environmental differences depend on the character of individuals, then aptitudes and treatments need to be identified in terms of one another, rather than independently (much like stimulus and response in the preceding discussion).

Such thinking has led to reconceptualizing the concept of "aptitude." Terming the older view "a stultifying misconstrual," Snow noted that "in the (newer) line of research that has developed...thinking skills reside in the person-situation interaction, and not solely in the mind of the person" (Snow, 1992, p. 7, pp. 19-20). In this newer conception, aptitude is viewed as describing a behavioral tendency resulting from a particular relationship between person and environment, rather than a property of the person or environment alone. As Snow notes, an aptitude might be thought of as the relative "readiness" of a person to take advantage of certain environments in a certain way. Approached in this manner, it is illegitimate to talk of a person's aptitude without specifying the environment in which it functions or is relevant. Adopting this approach, one might reinterpret the traditional psychometric conception of IQ as a measure of relative readiness to perform well in schools as we know them. This interpretation is supported by the fact that what IQ tests predict best, other than other IQ tests, is school performance. Admittedly, some aptitude differences might be relevant to differences in performance over a wide range of environments, while others might be specific to a narrow range, but determining the degree of generality becomes an empirical matter rather than something presupposed at the start.

The traditional model of aptitude can be viewed as an example of the psychologist's fallacy because it projects the psychologist's explanatory concepts into the person whose behavior is being explained. It confuses the psychologist's viewpoint with that of the subject and, in addition, confuses a concept with a concrete thing. The newer approach based on aptitude x treatment interactions, undermines the older certainty about finding the causes of behavior in either the person or the environment, suggesting that both are always necessary to produce behavior. Once again, an attempt to cut up the problem into isolated parts, such as those inside versus outside of the skin, has failed with important implications for research and practice.

Wider implications for research came from subsequent investigation of aptitude x treatment interactions which found some relatively stable interaction "effects," but also many interactions that vary, apparently with changing social and cultural conditions. The complexity of this situation in which interaction effects appear to interact with other conditions, leading to an "endless hall of mirrors," resulted in Cronbach's concluding that the whole attempt to find universal laws of behavior analogous to Newtonian laws in physics might be in error:

Too narrow an identification with science...has fixed our eyes upon an inappropriate goal. The goal of our work, as I have argued here, is not to amass generalizations atop which a theoretical tower can someday be erected...The special task of the social scientist in each generation is to pin down the contemporary facts. Beyond that, he shares with the humanistic scholar and the artist an effort to gain insight into contemporary relationships, and to realign the culture's view of man with present realities. To know man is no mean aspiration. (Cronbach, 1975)

In other words, a positivistic psychology modeled on physics may be an unrealistic aspiration.

One of the practical implications of this shift in thinking is that there may be no "best practice" that is good for everyone. Different ways of teaching may have to be tailored to fit different types of students, rather than applied in a "one size fits all" manner. It also suggests that students should not be viewed as having general propensities to do well or badly, since their behavior may depend on the environments in which they are placed. Some may learn relatively well in one environment, but not in another, and so forth. Viewed in this way it becomes more difficult to blame the student's inherent nature for failure because they might do well in a different environment. Both partners in the teaching/learning relationship are likely to bear some responsibility for its outcomes, although the generality of an aptitude's implications for performance across a variety of treatment environments, or a treatment's implications across a range of aptitudes remains an empirical matter.

Even the newer aptitude x treatment interaction approach may face further conceptual difficulties, however. The problem is that the statistical interaction effects on which it is based focus on the average performance of different types of people in different types of environments. This leads one to think that the solution to educational difficulties involves matching types of students with types of treatments. But if people are unique when considered as a whole, then no student is a "type." As Dewey put it, "each individual constitutes his own class" (Dewey, 1916, p. 90). The statistically knowledgeable know this, but it is all too easy to turn a student into a type when using generalizations about learning styles, cultural differences, and the like that appeal to interaction effects based on average differences. The problem is that statistical differences between groups cannot be validly projected onto the behavior of a given individual, who may
well behave in a distinctive way. If nothing else, this reminds us that teaching is an art and not a science. Teachers may use psychological generalizations to inform their practice, but must ultimately practice their art using their own judgment regarding the particular situation at hand. As William James put it:

I say moreover that you make a great, a very great mistake, if you think that psychology, being the science of the mind's laws, is something from which you can deduce definite programmes and schemes and methods of instruction for immediate schoolroom use. Psychology is a science, and teaching is an art; and sciences never generate arts directly out of themselves. An intermediary inventive mind must make the application, by using its originality. (James, 1899/1992, pp. 7–8)

The point may seem obvious but judging by the frequency with which "definite programs and schemes of instruction" are proposed it has apparently not been absorbed.

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MIND AND MATTER

A third example of conceptual confusion in psychology comes from the adoption of the computational theory of mind. The leaders of the cognitive revolution that began in the late 1950s rejected both behaviorism and trait psychology. As Herbert Simon described the situation, from the time of William James almost down to World War II. American psychology was dominated by behaviorism, the stimulus-response connection, ... the nonsense syllable, and the rat. Cognitive processes—what went on between the ears after the stimulus was received and before the response was given—were hardly mentioned, and the word mind was reserved for philosophers, not to be uttered by respectable psychologists. (Simon 1991, p. 190)

Those, like Simon, who sought to "bring mind back in" tended to view it more dynamically than trait psychologists, suggesting that "mind" is not a thing or quantity, but a process or function. Rather than measuring its size one needed to understand how it does its job. For this purpose the development of the computer provided a helpful (and high status) metaphor.

One of the great philosophical advantages of the computational metaphor is that it offers a promising approach to the mind/body problem, a problem that goes back to Descartes (1637/1969), if not earlier. Descartes viewed the body as a physical entity or machine, while the soul or mind, was a meta-physical entity. This created all the familiar problems of mind/body dualism: How is the mind related to the body? How can the two interact given that they are entirely different kinds of "substances"? How can the mind know the external world? The whole issue seems to derive from the fact that we have developed two incompatible ways of explaining things. A materialistic account, drawn from the natural sciences, explains the behavior of things in terms of the interaction of material entities in accord with physical laws. Everyday moral accounts, on the other hand, explain behavior in terms of beliefs and desires, hopes and fears, wishes and intentions. As long as these two types of explanation are applied to different types of objects there is no problem. We can explain the movement of the planets in one way and the actions of our neighbors in another. But once these two kinds of things interact, as it seems they do in human behavior, we face the Cartesian problem of explaining how such different kinds of entities can possibly affect one another.

One approach to a dualism is to try to eliminate one of the sides, viewing it as unreal or as a side effect of the operation of the other side. Behaviorists tended to deny that "inner" mental phenomena are real, or even if existent, that they have any explanatory use, because they cannot be directly manipulated (Skinner 1953). The second approach admits that mental experiences exist, but equates them with physiological events in the brain. In this "identity theory" of mind, if one feels a pain, that's simply a
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certain set of nerves firing. This helps account for the possibility that two people may have different subjective experiences yet show the same outward behavior, which the behavioristic account cannot deal with. On the other hand it may relate subjective experiences too concretely to the operation of a specific physical substrate. Suppose that another species exists with a sensory apparatus materially different from but functionally identical to ours. Wouldn’t members of such a species also feel “pain.” The apparent plausibility of this suggestion is one thing that has tended to lead to rejection of the identity theory (Lycan, 2003, p. 178).

But if mind and matter, or mind and brain, really are different in some way that cannot be so easily swept aside, and yet are not different entities, one physical, the other metaphysical, then how can their relationship be understood? Here is where the computational model offers a solution. It views the “mind” as equivalent to the functioning of a computer running certain software, while the “brain” is equivalent to the computer’s hardware. In other words, “thinking” is like running an inner computer simulation of the behavior of outer objects using inner symbolic representations of the external world (see, e.g., Newell & Simon, 1972). This function is different from the material entity allowing it to be performed. The core of this theory, termed the “physical symbol system hypothesis,” was stated as follows:

The study of logic and computers has revealed to us that intelligence resides in physical symbol systems. This is computer science’s most basic law of qualitative structure. Symbol systems are collections of patterns and processes, the latter being capable of producing, destroying and modifying the former. The most important properties of patterns is that they can designate objects, processes, or other patterns, and that, when they designate processes, they can be interpreted. Interpretation means carrying out the designated process. The two most significant classes of symbol systems with which we are acquainted are human beings and computers. (Newell & Simon, 1976, p. 125)

In other words, any physical “system” (person or machine) that can store a structured pattern, alter such patterns under the control of another pattern, and “interpret” these patterns so that they control the behavior of the system, can, in principle, be “intelligent.” It does not matter what the machine is made of, if it can do these things it can exhibit “intelligent” behavior.

This view of “mind” does not deny that mental phenomena exist or are useful in explaining behavior, in contrast to radical behaviorism. It also does not reduce mental phenomena to brain events, like the identity theory. Rather, it views mind as the functioning of a computational system instantiated in a material system, the brain. Since the computational approach treats “mind” as a function rather than a thing the Cartesian problem dissolves. The mind is not a strange metaphysical entity, but a particular kind of useful process. The problem of how to relate mental functioning to the operation of the material brain remains, of course, but it becomes clear that these are just two different descriptions of what goes on when an information-processing “system” performs a task rather than two different things.

This approach, which is in some ways similar to that adopted by the earlier functional psychologists, appears more rigorous and “tough-minded” than the earlier work since it allows mental phenomena to be understood in terms of the operation of a well-understood machine, the computer. Nonetheless, many have concluded that something has gone seriously wrong with the computational model of mind, (Dreyfus, 1979/1972; Winograd & Flores, 1986).

The basic problem is, again, that it frequently falls into the “psychologist’s fallacy.” As Bill Clancey put it,

... in AI research we look at the structures of our models and we say, “This is the knowledge; this program is an expert; this is what the student knows....” In so doing, we have claimed an isomorphism. We have said that what is in the student’s head and these representations are functionally identical. But if people literally followed such grammatical patterns or shuffled them about grammatically the way our learning programs do, they would not be very intelligent. We have confused our representations with the phenomenon we are modeling. The map is not the territory. (Clancey, 1991, p. 6)

In other words, things that are meaningful to the observer, such as a problem represented in familiar mathematical symbols, are viewed as equally meaningful to the computer “solving” the problem. We project our sense of meaning onto the computer. But, unlike us, the computer solves the problem in an entirely formal or syntactic way that is insensitive to the meaning of the patterns it alters (Winograd & Flores, 1986). Thus the computer may appear “smart” in a certain sense, but only because we falsely attribute meaningful activity to it.

The roboticist Rodney Brooks argues that the computational theory of mind got things confused in this way because the field of artificial intelligence developed in a fragmented manner. Those modeling reasoning and problem-solving processes tended to work separately from those modeling perceptual and motor processes (Brooks, 1991). As a result, thinking was modeled independently of the process of functioning in the world, giving an overly formal or intellectualist view of mind.
Brooks and others like Clark (1997), have suggested that this perspective needs to be reversed by starting with activity in the world, and asking how thinking is stimulated by experienced problems of coordination and control. In this revised view, thinking is a process that reorganizes conflicting habits in context rather than a removed spectator on a world "out there." Such criticisms suggest that mind is better viewed in terms of organism/environment relations than as something "inside" of the organism or "between the ears," as Simon referred to "it."

Another criticism of the computational model of mind comes from asking for whom the symbols being used are meaningful. In the computational model, the "meaning" of "2 + 2" is a particular "interpretation" of this pattern in terms of lower-level machine instructions. But in what sense is this what the marks "2 + 2" mean? Saying "2 + 2" could have many meanings in everyday life. It might even be an oblique marriage proposal, suggesting that two adults, each with a child already, consider forming a blended family. As Wittgenstein argued, symbols may "mean" many different things depending on the occasions and social activities in which they are used (Wittgenstein, 1958). Words gain shared meaning because they are used in similar ways in mutually understood joint activities (Dewey, 1916). In this view, linguistic or symbolically represented "meaning" is not just the performance of a certain set of concrete operations. It is, rather, a signal from one person to another of a desired or intended line of conduct in a mutually understood "game" or social activity in which the participants are involved.

Summarizing these two points, the computational model of mind has tended to confuse a narrow view of function and meaning located inside of the "system" with a wider, interactive one. The limitations resulting from this view have often been hidden by studying problem-solving in well-defined or well-controlled task situations (Newman, et al., 1989). In such situations people are, in effect, made to function like computers. But this makes generalization to less well-defined or controlled settings difficult. Among other things, in "everyday" settings, tasks tend to be socially distributed in varying ways and meanings socially negotiated (Newman, et al., 1989). A model that does not take these processes into account is likely to be a model of an agent that is literally "out of it" (Bredo, 1994).

Criticisms of this sort, combined with changing practical interests, have led to the computational model being supplanted, in many circles, by socio-cultural or socio-historical approaches based on Vygotsky's theories, or on situative theories of cognition and learning with similar and other origins (Brown, Collins & Duguid, 1989; Greeno & Moore, 1993; Lave, 1988; Lave & Wenger, 1991). In these accounts, the focus is on person/environment dynamics in a context that is itself constructed at least in part by the interactants.

The practical ramifications of this shift from a computational to a practice-based, socially-collaborative model are substantial. The computational metaphor is consistent with the notion that thinking or learning involves working alone, sitting still, while solving abstract problems in one's head. In contrast, a view of mind that sees it as an interactive activity situated in the world, using symbols whose meaning is shared and negotiated with others, is more consistent with an active and collaborative view of learning based on "authentic" problems. At the very least, an education based on the latter model would seem more consistent with two important ways that people contrast with computers, their tendency to physically manipulate things and communicate with one another (Dewey, 1956/1900; Vygotsky, 1934). Whether these latter day models will eventually fall prey to similar confusions, such as reifying the notion of community (Ortiz, 1999), remains to be seen. What seems clear is that any attempt to claim that one has mind in a box will fall prey to the same fallacy.

CONCLUSIONS

In the foregoing I have attempted to trace certain forms of conceptual confusion through a variety of movements in psychological and educational theory. I have suggested that psychology gets into theoretical and practical difficulties whenever it attempts to enclose human psychic life in a watertight conceptual box. Attempting to capture psychic life in a closed system cannot be done because there is no place to stand from which it can be accomplished. It might be seen as analogous to trying to swallow oneself or catch the self that is observing oneself. Everything suggests that we are too close to our own behavior, too much a product of our own linguistic and cultural practices, too narrowly interested, to get the necessary distance. As a result our conceptualizations are partial "in both senses of the word," as James put it.

Nonetheless, there always seems to be a new effort on the horizon to identify the right conceptual level to capture thinking or learning in a scientific net. Although each new model or metaphor, or each new level of analysis—genetic, individual, socio-cultural, or some other—adds something to our understanding, each is limited. Problems arise when a given approach is confused with the way things are, as in the psychologist's fallacy. In effect, there is a confusion of map and territory, of representation.
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and thing represented. If the world just naturally and inherently is one's model, if nature speaks one's language, then that model or expression seems much more real and secure because it is founded in nature itself. But, as a former student of mine likes to say, "Don't paint yourself into your own picture."

Such confusion starts harmlessly by drawing a conceptual line around the "system" being studied, dividing it neatly into an inside and an outside. Having done this one can study the system by seeing how its inputs are transformed into outputs. This is what the behaviorists tended to do when they discriminated between stimulus and response, viewing the stimulus as coming from the environment and the response as coming from the organism. It is also what trait psychologists did when they drew a neat line between person and environment and then studied the "inner" causes of a person's behavior. It is, finally, what cognitive psychologists have done when they drew a line between brain and body and placed the mind in the cranium, viewing it as analogous to a computer. Each of these sets of "lines" might have remained harmless had they been treated as helping to constitute the phenomena being observed. If one recognizes that one's model helps create the data, not by creating it of whole cloth, but by altering the way one interacts with one's environment, then one takes responsibility for the effects of one's approach. But the tendency is strong to forget that one is using a model or metaphor, especially when it becomes familiar, transparent and, ultimately, literal. In the case of the computational model of mind, for example, what began as a metaphor tended to end up with the claim that people are computers. Adopting the latest metaphor, particularly a high status mechanical one, may seem tough-minded and scientific, but over-enthusiasm can also lead to overgeneralizing the approach, confusing the model with the world. Such overgeneralization can be disguised by limiting research to well-controlled settings in which people behave in a way that is consistent with the model, but this tends to break down when extrapolated to less controlled settings.

The attempt to reduce human behavior to a particular model may also lead to practical harm. It leads, primarily, to treating people as though they were limited in the ways in which the model is limited. If the model is one of behavioral conditioning, this may lead to ignoring people's aims and interpretations. But a "reward" offered in a patronizing fashion is likely to have a different effect than one offered humorously, making the issue more complicated than presupposed. Potentially harmful side effects of use of the trait model are also quite evident, principally the ease with which it shifts all responsibility to the character of the person being described (This is not to say that they do not bear some of the causal responsibility. Their degree of moral culpability is another issue.) Finally, the computational model may lend support to a passive and socially isolated model of thinking and learning. It may also tend to lead to confusing artificial or inauthentic "problems" and feigned thought with genuine thinking arising from uncertainty about how to act (see, e.g., James, 1896/1956), resulting in teaching superficiality and irresponsibility in thinking (Dewey, 1910).

One remedy for these difficulties would seem to be to adopt a situated view of educational psychology itself. In this view, educational psychology is a partial effort, based on a variety of untested and unrecognized assumptions, to understand the way things work for certain purposes. Conceived in this way, there is no one way the world is, for the world is many ways (Goodman, 1972). As William James put it,

... the truth is too great for any one actual mind... The facts and worths of life need many cognizers to take them in. There is no point of view absolutely public and universal. Private and uncommunicable perceptions always remain over, and the worst of it is that those who look for them from the outside never know where. (James, 1899/1992, p. 708)

The way to keep from losing the "whole man," then, is to acknowledge the partiality of one's view rather than confusing it with the way things are. Approached in this way, scientific and everyday points of view inform and correct one another, as do psychological perspectives focusing on different functions or different levels of analysis. No view should have the last word, because each represents a partial attitude or orientation, good for limited purposes.

References


