

Semiotic Inquiry in Education

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In this paper I present the view that inquiry in education can profit from insights from semiotics. Semiotics holds that cognition, or semiosis, is the building up of structures of signs from experience. We create a personal world, an Umwelt, that determines what we perceive and know. The environment also "affords" various structures and these affordances offer special ways to interact with the environment. In this model, inquiry is seen as the perception of affordance, a process whereby we come to read the environment as a system of signs. An example is offered.

In previous papers (e.g., Cunningham, 1987; 1992; see also 1998) I have presented summaries of semiotic models of cognition and compared them with the currently dominant information processing models of cognition. I have argued that semiotics offers a genuine new foundation for education and that to regard education as fostering semiosis, or sign use, promises to offer insights into the learning process which will revolutionize educational practice. A criticism which has been raised frequently about semiotics is that it appears to lack any contact with an empirical agenda. Colleagues have told me that they could be more comfortable with semiotics if it had clearer implications for research. Can semiotics promote any kind of empirical program? Are semiotics and empiricism compatible? This is an important issue and its resolution is related to the fundamental assumptions underlying semiotics. It will first be necessary to review those assumptions.

Deely's Umwelt Model of Cognition

For those unfamiliar with semiotic models of cognition, this section briefly describes John Deely's (1982) Umwelt model. Others may skip to the next section. Deely's Umwelt model, a term borrowed from the late 19th-early 20th century biologist, Jacob von Uexküll, applies equally well to humans and other animals and,

perhaps, also to life on earth (i.e., plants, microbes, etc.). Uexküll was interested in characterizing how animals picture the world in their mind and how they then interact with the world as they have circumscribed it. Since animals can only respond to a small portion of the total sensory information available, they create, both as a species and as individual members of a species, an Umwelt, a "subjective environment" which details only those aspects of the physical world which are important (i.e., to be approached, avoided, ignored, etc.). It is crucial to understand the difference between an Umwelt and an environment. An environment is a physical setting that can be conceived of independently of any particular organism and, in fact, is usually said to exist for all organisms. This separation of organism and environment is a fundamental tenet of behavioral and cognitive information processing models of cognition. The Umwelt of an organism, however, is not independent of the organism; in fact, it exists only in relation to the organism. Any particular physical entity can serve an enormous variety of Umwelts: the Empire State Building in New York City can create a shelter from the rain for humans, a nesting site for cockroaches, a landing site for pigeons, a landmark for cab drivers, a climbing post for King Kong, and so forth. In all cases, the environment of the building is the same; that is, the sheltered enclosure, the

crevices, the flat surfaces, etc. are available to each of the organisms, yet their experience of them is quite different.

Through experience in the world and mediated by the sensory and perceptual capacities of the organism, the Umwelt emerges; that is, the tools for developing an Umwelt are present from birth but each individual's Umwelt is developed by particular activities and by species-specific characteristics. Via this process, the animal comes to terms with the physical environment, creating and living in a world uniquely defined for that species and that individual. Yet the Umwelt is not static (i.e., in equilibrium) but in a constant state of flux both at the species and individual levels.

Semiosis in humans, while based upon the processes described thus far, is qualitatively different from that of other organisms. Humans can create signs which go beyond the immediate experience of the cognizing organism. Words, pictures, bodily movements, and the like generate signs for objects which need have no basis in the real world and which can be manipulated independent of that world. Yet these signs come to form a part of the Umwelt of humans in the same way that dark crevices do for an insect. It is the intervention of language, according to Deely, that allows humans to engage in this type of semiosis. Through language, we create culture: governments, armies, schools, art, professional associations, etc. Culture, in turn, impacts our lives by determining what is important, what makes sense, what is to be valued, etc. The arbitrary nature of these signs, their lack of true reality status, is not readily apparent to the human organism until they are exposed to cultural systems which depart from their own.

The fact that humans can utilize signs which are arbitrary and need have no existence in their immediate experience is what makes thought possible and distinctly human. Experience comes to be represented by linguistic signs that can be created

without any actual embodiments in the physical world. But these signs come to be part of our Umwelt—we tend to see the world anew once some aspect of culture is created or adopted.

Deely's account is essentially a model of inference drawing upon Peirce's trichotomy of abduction, deduction, and induction. Semiosis is a process of applying signs to understand some phenomena (induction), reasoning from sign to sign (deduction), and/or inventing signs to make sense of some new experience (abduction). These modes of inference are cyclic, characterizing the development of Umwelts throughout life: signs are invented to account for experience; these signs are linked to existing sign structures and then used to define the Umwelt for that organism. But the world is not infinitely malleable to our sign structures and the abductive process will be again instigated. Deely is here, in my view, incorporating growth into his model, both from the perspective of ontology and experience.

Semiotic Inquiry

In this paper, I argue that semiotic inquiry can be regarded as the perception of *affordance*. I have borrowed the term *affordance* from J. J. Gibson's (1979) ecological approach to perception. Gibson rejects sensation-based theories of perception which regard the perceiver as a passive receiver of impoverished stimulus energy which is somehow transformed from a retinal image into a percept. His ecological optics abandons the sensation-perception distinction and proposes instead an ecological model of an active perceiver confronting an information rich environment. Gibson's notion of environment is very compatible with the idea of the Umwelt. For Gibson, an environment is that which organisms perceive, not the physical world which a physicist might describe. The term refers to the "surroundings" of an organism on a scale appropriate

for terrestrial animals (i.e., in terms of terrains, objects, and events which are appropriate for organisms on this planet—sizes between centimeters and meters, times between seconds and hours, etc.). For Gibson, the words *organism* and *environment* are an inseparable pair ... each implies the other. One cannot talk of an environment in general, but only of an environment with respect to a particular animal.

The terrestrial environment, unlike the physical environment, consists of a medium, substances, and surfaces that separate the medium from substances. The medium for humans is the gaseous atmosphere, the “air” which permits unimpeded locomotion from place to place, seeing, smelling, feeling, and hearing of substances. In our world, the medium has an absolute axis of reference, the vertical axis defined by gravity. Substances are the “things” of the world, the objects or “furniture” which occupy the terrestrial surface. Unlike the medium, substances do not permit locomotion or transmit light. Substances are heterogeneous whereas the medium is relatively homogeneous. Surfaces separate the medium from substances. It is at the level of surface where all of the action in visual perception takes place. We do not perceive the medium or substances but only surfaces where the medium and substances meet. A surface is said to have a layout (form), texture, the property of being lighted or shaded, and the property of a certain fraction of the illumination falling on it.

To make a very long story much too short, visual perception arises when structured information from surfaces is perceived. The ambient optical array (this structured information available in light) is described by Gibson as visual solid angles with a common apex at the point of observation. They are angles of intercept which change as the observer moves or the surface(s) under observation move. But other aspects of the array do not change (e.g., the layout and reflectance). The perceptual system monitors

those things that change and those things that persist, and from this information perception is developed. Perception is thus a process which develops from the interaction of an active perceiver in an informationally rich environment which is constantly in flux. Perception can be understood as picking up or reading information available in the environment.

Of primary importance to our purposes here is Gibson's theory of affordances. As noted above, Gibson considers the environment to be the surfaces that separate substances from the medium in which animals live. But environments also *afford* things (such as shelter, locomotion, etc.). There is information in light for perception but also for the perception of what surfaces afford. To perceive something is to perceive what it affords, its value or meaning. To quote Gibson, “The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill” (p. 127). But affordances do not exist independent of an animal; the term refers to both the environment and the animal. “An affordance is neither an objective property nor a subjective property; or it is both if you like ... (it) points both ways, to the environment and the observer” (p. 129). The terrestrial surface, for example may be horizontal, flat, extended, and rigid, thus affording support to certain terrestrial animals. But this affordance is relative to particular terrestrial animals, not an abstract property of the physical world.

The process of perceiving affordances is called “information pick-up,” unfortunately the least developed aspect of Gibson's theory. Affordances are invariants available in the ambient optic array and perception of affordances results from monitoring those aspects of the ambient optic array which persist and those which change. Note that this conception places the affordance in the light, not in the needs or motives of the observer. The potential affordance of a paper clip as a replacement for a fishhook is

available whether or not it is perceived by a particular organism to which the affordance is relevant.

In my current thinking, the concept of affordance is very relevant to semiotic models of cognition such as those described above. In Deely's model, for example, abduction is a mode of inferencing whereby organisms attempt to make sense of the world by creating and using sign structures. In other words, abduction can be thought of as the perception of affordance. In essence this process has been likened by Shank (1987) to "reading" the environment. But is our reading free to take any possible form? Can the Umwelt we create be entirely independent of those aspects of the environment relevant to us as a species or as an individual? A fruitful area of research for semioticians will be to investigate the possibilities of affordance-like constancies in our worlds. Such an approach will, however, require a change in the concept of affordance as described by Gibson. Gibson's work was an account of visual perception and although he tried to extend his ideas to account for knowing and remembering, he was not successful, in my opinion. While it makes little difference to a cockroach whether the enclosure he perceives as affording shelter is a crevice in a cave or in a school building, these two enclosures have quite different import to humans. The extension of the notion of affordance to the social and cultural aspects of human semiosis remains to be worked out and will result, in my opinion, in some fundamental changes in its definition, away from its realist origin to an interactionist one.

Yet there is something compelling about this idea of "reading" the environment to determine what aspects of it persist and what aspects change over time and circumstance. Take a typical secondary classroom. Are there affordance-like constancies in this situation that can be read? Clearly the readings can be numerous and relevant to a wide variety of perspectives and contexts.

We can analyze the ideational character of the classroom discourse (e.g., Lemke, 1987), observe the social interactions among the students, chart the patterns of student and teacher questions and answers, and so on and so forth. To what extent do the particular events and circumstances we observe lead us to the identification of this as a classroom, a pedagogical technique of a certain type? What is essential (persistent) and what is changing (variable)? Do certain metaphors seem to account for our observations better than others?

The underlying motivation of such research is that over time it will eventually lead to ever more adequate conceptions of the affordances available in this stimulus information. Like Peirce, I believe that our inquiry will eventually lead us closer to reality, to an understanding of the world as it is, unmediated by signs. But since this quest is of the nature of *all* cognition, why should our inquiry be any different? Semiotics is quite compatible with empiricism but the metaphor guiding the inquiry is one of reading the affordances available in the situation/circumstance under study using methods undoubtedly more compatible with naturalist inquiry than experimental research. Where the latter seeks to identify the component variables which account for a particular observation, semiotic research seeks to provide a variety of interpretations and perspectives for understanding. While such an approach does not eliminate the threat of solipsism for semiotics, a more adequate account of the nature of the physical world will help insure that our inquiry has consensual validity.

An Example

Let me close with an example of a "reading" which I think raises some exciting and, for some, disturbing implications for educational practice. For over 25 years I have been haunted by a delightful little book by J. M. Stephens entitled *The Process of*

Schooling (Stephens, 1976). In his book, Stephens speculates on the very existence of schools, on the forces from which they arose and which account for the characteristics they possess today. According to Stephens, schools did not arise from any planned, deliberate decisions of any group or society. Rather, schools arose from some primitive, spontaneous tendencies for survival that emerged as mankind developed. To survive, any species must attain proficiency in certain behaviors and any group which is successful in nurturing these behaviors is more likely to survive. Human groups which neglect to inform their offspring of the dangers of playing in traffic or touching power lines, for example, are unlikely to survive very long.

One mechanism which has evolved to facilitate the acquisition of certain behaviors is the family. Typically, the family is responsible for nurturing those behaviors which have urgent survival value such as eating, bodily elimination, safety, and so forth. These behaviors are those which arise automatically in the course of interacting with the child and for which parents seem to give automatic expression.

Other behaviors which the child may emit, those which Stephens characterizes as “playful, manipulative tendencies,” receive less parental concern and attention: skipping stones on the water, drawing pictures in the sand, playing with one’s fingers, etc. While these behaviors may have no *immediate* survival value for an individual, Stephens argues that *groups* (e.g., societies) which nurture such frivolous behaviors are more likely to survive than those which do not. Thus, while “fooling around” with numbers or words or pictures is unlikely to influence the life expectancy of an individual, the long-range benefits to the survivability of the group may be enormous (e.g., Robert Goddard’s rocket experiments in the early 1900s eventually led to a number of important applications).

Schools have arisen to nurture just such tendencies. Whether a child can sing, write a

poem, or even read and calculate is of less urgent concern than whether the child could negotiate the basement stairs. Parents may feel some remote or indulgent concern over reading and mathematics and even undertake to instruct the child in these but, in the main, responsibility for such behaviors has been relegated to the school. Stephens holds that all or most societies which have survived have evolved something akin to a school and, in fact, the school has contributed greatly to the survival of those societies. However, schools did not emerge from a rational decision-making process within the group. Rather, schools are the outcome of the evolutionary demand of blind, automatic forces present in human beings, a bit more in some people than in others.

Stephens proposes two categories of these automatic forces which may have played a crucial role in the emergence of schools. First, he proposes a category of playful, manipulative tendencies in humans which might be akin to what others have called exploratory or curiosity tendencies (e.g., Berlyne, 1960). These behaviors are usually devoid of any immediate utility but often occur in preference to more utilitarian behavior (e.g., witness the recent video game craze). Second, Stephens proposes an “extremely powerful but unpremeditated tendency to communicate” (p. 8). Manifestations of this tendency include our spontaneous, seemingly unthinking attempts to tell others of our interests and to react to others who tell us their interests (witness the behavior of the participants at an academic conference, for example).

Societies which have survived across history are those strong in these tendencies and it is out of these particular tendencies that schooling has emerged. For Stephens, the essence of schooling is that it nurtures playful, manipulative tendencies in humans which may have long-range survival value for the society. This nurturance is accomplished by placing children in contact with adults who possess a high degree of com-

municative tendency, who enjoy expressing their interests and reacting to the interests and experiences of the children. A teacher interested in geography and possessed of strong communicative tendencies will presumably interact with students on these matters and induce some reaction on the part of the students. It matters little what particular content is communicated or the form which this communication takes. What is important, what schools *afford*, is the engagement of learning, of the interaction between students and highly communicative teachers about interesting, if nonessential, ideas. Whether that interaction concerns geography, gypsy moths, leprosy, or semiotics or is presented via lecture, textbook, computer-assisted instruction, or on opposite ends of a log is of little consequence relative to the fact that communication takes place among inherently curious people.

This is not the place to debate the merits of this “reading” of schooling. My purpose is simply to show that a semiotic view of education and educational inquiry can lead to interesting and testable hypotheses. This is the essence of abduction, a process as fundamental to an individual's cognition as it is to the inquiry process. For too long we have limited our inquiry to probing the implications of a consensual “reading,” the currently popular paradigm. My message is that we should step back and examine the bases of that “reading” and consider others, which may be equally valid. Semiotic inquiry is the best means I know to accomplish this.

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