Throughout its evolution, Piaget's theory has placed meaning at the center of all attempts to understand the nature and development of knowing.

For Piaget, all knowing – whether sensorimotor, representational, or reasoned, and whether directed toward successful problem solutions or toward general understanding – is necessarily a construction which arises out of meaning making activity. It was in this context that the editors of this volume, originally published in 1994, approached the board of directors of the Jean Piaget Society with a proposal to organize a recent annual symposium around the topic of the nature and development of meaning. In forming this symposium and in moving from symposium to integrated text, the editors wanted to insure both a breadth and depth to the analysis of the topic.

Addressing philosophical, theoretical, and empirical perspectives, this issue-oriented volume provides an integrated exploration of the current understanding of the nature and development of meaning. Contemporary issues that frame alternative understandings of the nature of meaning – nativist vs. constructivist positions, and computational vs. embodied mind contexts – are examined as they impact on the investigation of meaning. Comparative, cognitive, and linguistic developmental dimensions of meaning are described and discussed.
The Nature and Ontogenesis of Meaning

Edited by
Willis F. Overton and David S. Palermo

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The Nature and Ontogenesis of Meaning

Edited by

Willis F. Overton
Temple University

David S. Palermo
Pennsylvania State University

LEA LAWRENCE ERLBAUM ASSOCIATES, PUBLISHERS
1994 Hillsdale, New Jersey Hove, UK
We dedicate this book to our wives

Carol and Marion

with love and appreciation.
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List of Contributors

Professor Willis F. Overton—Department of Psychology, Temple University, Philadelphia, PA 19147

Professor Kenneth J. Gergen—Department of Psychology, Swarthmore College, Swarthmore, PA 19081

Professor George Lakoff—Department of Linguistics, University of California, Berkeley, CA 94720

Professor Mark Turner—English Department, 1125 Taliaferro Hall, University of Maryland, College Park, MD 20742

Professor Ellin Kofsky Scholnick (with Kelly Cookson)—Department of Psychology, University of Maryland, College Park, MD 20742

Professor Ray Jackendoff—Program in Linguistics & Cognitive Science, Brandeis University, Waltham, MA 02154

Professor John Macnamara—Department of Psychology, McGill University, 1205 Dr. Penfield Ave, Montreal, Quebec H3A 1B1 Canada

Dr. Terrance Brown—3530 N. Lake Shore Drive, 12-A, Chicago, IL 60657

Professor Jonas Langer—Department of Psychology, University of California, Berkeley, CA 94720
LIST OF CONTRIBUTORS

Professor Lois Bloom, Box 5, Columbia University Teachers College, 525 W. 120th St., New York, NY 10027

Professor Kathy Hirsh-Pasek (with Professor Roberta Michnick Golinkoff, University of Delaware, & Lauretta Reeves, Temple University)—Department of Psychology, Temple University, Philadelphia, PA 19122

Dr. Carol Feldman (with Professor Jerome Bruner, David Kalmar, Bobbi Renderer)—New York University, Fuchsberg Hall, 249 Sullivan St., New York, NY 10012

Professor Richard F. Kitchener—Department of Philosophy, Colorado State University, Fort Collins, CO 80523
Preface

Piaget’s theory, throughout its evolution, has placed meaning at the center of all attempts to understand the nature and development of knowing. The continuity of this project is evident from early works, such as the Origins of Intelligence, where Piaget repeatedly describes assimilation (i.e., the act of meaning making) as the fundamental process of all intelligent activity, to his last writings, such as Toward a Logic of Meanings, where acts of meaning describe the foundation for the development of logical deductive systems. For Piaget all knowing, whether sensorimotor, representational, or reasoned, and whether directed toward successful problem solutions or toward general understanding, is necessarily a construction and this construction arises out of meaning-making activity.

It was in the context of this centrality of the concept of meaning that the editors of this volume approached the board of directors of the Jean Piaget Society with a proposal to organize its 1991 annual symposium around the topic of the nature and development of meaning. In forming this symposium, and in moving from symposium to integrated text, we wanted to insure both a breadth and depth to the analysis of the topic. Meaning making arises in social, affective, cognitive, as well as linguistic contexts. Consequently, one of our aims was to insure that the symposium and this text reflected each of these contexts rather than being limited to a specifically linguistic context. To this end we invited Ken Gergen, a social psychologist, to discuss the social interdependency of individuals in the creation of meaning (chapter 2). Terry Brown brought a psychiatric background to the task and explores affective dimensions in the creation of meaning (chapter 7). And Jonas Langer (chapter 8) examines the developmental movement from instrumental or sensorimotor meaning making to symbolic or representational meaning making, from a comparative cognitive perspective.
George Lakoff sets the linguistic context with his presentation of cognitive semantics and his exploration of the nature of conceptual systems (chapter 3). Lakoff’s position, consistent with many other participants, is that rather than being located in language per se, meaning is located in the activity of mind and may be transmitted through words or gestures. Ellin Kofsky Scholnick and Kelly Cookson (chapter 5) expand on this theme and discuss critical developmental issues in the elaboration of cognitive semantics. Mark Turner (chapter 4) describes several issues in the theory of mind that are central to cognitive semantics.

Lois Bloom’s developmental approach to semantic development (chapter 9) expands and elaborates the perspective that infants acquire language in the effort to express and articulate mentally constructed personal, private meanings so as to make them public. Carol Feldman, Jerry Bruner, and their colleagues (chapter 11) explore the construction of linguistic narratives as a vehicle for the construction of meaning during childhood, adolescence, and the adult years.

While the constructivist thesis that meaning making is initially grounded in the general cognitive/affective activities of the organism is salient throughout the text, several participants introduce cautionary notes. Ray Jackendoff (chapter 6) begins from a discussion of the Piaget (constructivism)–Chomsky (nativism) debate. In that context he examines word meaning and argues the need for understanding conceptual structure as emerging from an innate combinatorial system. Kathy Hirsh-Pasek and her colleagues (chapter 10) argue that a successful understanding of the acquisition of semantics requires the postulation of innate mental language-specific biases. And John Macnamara (chapter 12), in considering the place of logic, argues for an objectivist stance that takes reference seriously, as opposed to either a constructivist or nativist cognitivist position. In a similar fashion, Richard Kitchener (chapter 13) presents a philosophical taxonomy of semantic theories and concludes by arguing for naturalized meaning by accepting an “external” point of view (realism) and abandoning an “internal” point of view (cognitivism).

Along with offering a wide range of approaches and rich depth of analysis, the text addresses major issues that constitute the foundation for dialogues that continue to frame theoretical and empirical investigations into the development of meaning. In an integrative overview, Overton (chapter 1) identifies and elaborates on the impact of several of these issues. These include alternative conceptions regarding the theory of mind (e.g., Lakoff’s concept of the embodied mind and Jackendoff’s concept of the computational mind) and alternative views on the locus of meaning making (e.g., the Lakoff, Jackendoff, Langer, Bloom et al. perspective of active mind as the agent of meaning making and the Gergen, Macnamara, and Kitchener perspective of the social and objective locus of meaning).

ACKNOWLEDGMENTS

We extend our thanks to the officers and board of directors of the Jean Piaget Society for their continuous support from the inception of this project through
the symposium that brought the authors together to share their observations, ideas, and intuitions about the development of meaning, and finally through the process of the production of this text. A special thanks also to Ellin Kofsky Scholnick, who, as series editor of the Jean Piaget Society symposium series, was most helpful in advancing this text during the publication process.

Willis F. Overton
David S. Palermo
The formulation and description of the nature and place of the concept of meaning in any psychological theory, and particularly in a psychological theory of cognitive development, is made exceptionally difficult by the multidimensional character of this concept. The task is rendered particularly difficult by the fact that meaning, like so many other fundamental concepts, is intensely relational in nature. “I mean”/“it means” constitutes the relational matrix from which all issues of meaning are generated. When we focus on the “I mean” pole of this relationship, we focus on the contribution of the person to meaning. The “it means” pole focuses us on the contribution of the manifest world of common sense. The “I mean”/“it means” relational matrix becomes elaborated across domains of inquiry and across levels of analysis as issues of intension and extension, sense and reference, connotation and denotation, semantics and syntactics, hermeneutics and realism. Regardless, however, of domain and level, the background problem that must be satisfied always remains how most productively to understand the underlying relational matrix. When the question “What is the nature of meaning, and how does meaning develop for the child?” is raised, the answer emerges from the way we choose to formulate the relational “I mean”/“it means” matrix.

In this chapter I examine the nature of meaning and its ontogenesis by first exploring ontological and epistemological strategies that function as background to a broad understanding of the concept of meaning. In essence, the argument is that different ontological and epistemological strategies—here referred to as isolationist and systems strategies—for how to approach the “I mean”/“it means”
matrix lead to different understandings of the fundamental nature of meaning. Further, it is argued that these strategies lead to alternative theories of mind; specifically the computational and the embodied mind. These alternative theories of mind in their turn then establish the conceptual base from which investigators explore issues concerning the nature and ontogenesis of psychological meaning.

**ISOLATIONIST AND SYSTEMS STRATEGIES FOR UNDERSTANDING MEANING**

Upon reflection, it is easy to see that there are two fundamental alternative strategies for understanding the "I mean"/"it means" or any relational matrix. The first strategy can be called an *isolationist* or *splitting strategy*, and the second, a *systems strategy*. The isolationist strategy divides or splits the relational matrix into isolated, inherently unconnected pieces and then searches for a kind of glue that can mend the split. The glue is traditionally some causal network. Here, one disconnected piece is assigned the role of cause, and the other piece the role of effect. From this strategic perspective, for example, it might be held that "it means" is fundamental and the cause of the "I mean." In this example meaning is formulated primarily as an entity that is lodged in an objective, natural world. The interpretative task of inquiry here is to deal with the remaining problem of how this world has generated the subjective world of "I mean." Scholnick and Cookson (chapter 5 of this volume) capture the developmental instantiation of this particular strategy when they note that today one popular approach to understanding development is to treat it as a knowledge-storing process. "It means" in this example constitutes the real, and generates "I mean."

A cardinal feature of the isolationist strategy is the linear either/or stance that it presents. Either the subjective intentional "I mean" constitutes the foundational real and generates the objective "it means," or the objective constitutes the real and generates the subjective. Here an ontological choice is demanded between the one or the other. Kitchener's description of efforts at naturalizing semantics (chapter 13 of this volume) illustrates this stance where naturalism asserts the fundamental ontological priority of the objective "it means." Kitchener's own conclusion that the task for psychology is to build a "naturalist psychological semantics: a theory of (psychological) meaning that continuances only naturalistic entities knowable by naturalistic methods" represents a further elaboration of this same strategy.¹ This position is further expanded by Macnamara's (chapter 7 of this volume) attempt to develop an objectivist cognitive psychology.

The either/or stance of the isolationist strategy is illustrated in a more subtle fashion by Gergen. Although Gergen (chapter 2 of this volume) argues for a relational communal approach to meaning, his argument resolves itself into a

¹For a detailed critique of efforts to naturalize meaning, see Katz (1990).
critique of approaches that focus on the individual as subject and a celebration of approaches that shift toward the social dyad. The primacy of the dyad over the individual becomes foundational and privileged for Gergen. Relational is identified with dyad and stands in ontological opposition to the individual from this perspective. However, even the dyad in Gergen’s approach constitutes two inherently isolated pieces that must be brought together to forge consensus. As with other isolationist strategies “I mean” evolves out of “it means,” but in this case “it means” is explicitly social. As Gergen says, “lone utterances [and presumably lone actions] begin to acquire meaning when another (or others) . . . add some form of supplementary action.”

The second strategy for understanding the “I mean”/“it means” relational matrix involves treating the matrix as a unified whole or self-organizing system that comes to differentiate itself into these contrasting features of “I” and “it.” From this perspective neither “I mean” nor “it means” is given ontological priority at any level of analysis or for any domain. “I mean” and “it means” become bipolar features that emerge from an organized activity matrix. Each feature of the matrix defines and is defined by the other. Here, no glue of associations or causes is needed to paste isolated unities together into a relationship. Instead, the relational matrix itself is primary and part-systems of “I mean” and “it means” become articulated through activity that results in these differentiations and further reintegration.

The systems strategy, then, accords no ontological priority to either subject or object. In taking this stance, the systems strategy describes a fundamentally monistic world. This is in contrast to objectivist or naturalist perspectives that proclaim themselves monistic but, in fact, simply suppress one term of a subject–object dualism. Naturalism attempts to be monistic by denying the subjective or, what amounts to the same thing, reducing the subjective to the objective. The systems perspective is monistic from the start. By taking a truly monistic stance the systems perspective can grant that meaning or knowledge is cultural in nature. Of course, it can also grant that meaning or knowledge is individualistic in nature.

As the systems perspective asserts a fundamental monism, paradoxes arise, including this paradox that meaning is entirely cultural in nature and yet meaning is entirely individual in nature. The systems stance accepts the fact that all understanding involves paradox, and therefore, self-reference and contradiction. In fact, the systems stance argues precisely against attempts at resolving such paradoxes at the level of analysis at which they occur. Such attempts at resolution necessarily involve splitting the relational matrix into independent parts and then deciding which one is really basic or basically real. The problem is that this attempt at paradox resolution is precisely the reintroduction of the isolationist alternative and, thus, a dualism.

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2 For an elaboration of the ontological and epistemological dimensions of the systems strategy, see Overton (1991a, 1991b, in press).
The major danger for the systems strategy is that if there were no way at all of resolving circularity and paradox, then thinking about a domain of interest—here, meaning—would become confused and muddled. If meaning is entirely cultural, and at the same time meaning is entirely individual, it is difficult to see how one could avoid vagueness and ambiguity or could arrive at any precise conclusions. The situation is not unlike a rather famous Calvin and Hobbes cartoon in which the little boy Calvin, following an argument with his father over a matter of right and wrong, discovers the neo-cubist world of unlimited perspectives. Although this world is liberating in insight, it paralyzes action. Calvin is saved only when he breaks out from this neo-cubist ontology and, imposing a single perspective, ends up telling his father that he is still wrong. In fact, the systems methodology for dealing with paradox and circularity is similar to Calvin’s. When faced with paradox, the systems methodology is to move to a more inclusive level of interpretation and examine the paradox in that frame or context.³

Moving to a more inclusive level of interpretation is an epistemological strategy. Thus, although there are no ontological priorities, the systems perspective adopts specific epistemological priorities for purposes of analysis and inquiry. As a consequence, in order to develop a line of analysis and inquiry, the systems perspective assigns a functional priority to either the subjective or the objective pole of the relational matrix. This is analogous to the physicist Niels Bohr’s solution to the paradox that light appeared to be both wavelike and particlelike in character. Bohr accepted that both views are correct and asserted the principle of complementarity according to which either perspective could be taken for purposes of a particular line of inquiry.

Consider the application of this epistemological device to the development of a system of knowledge about human activity. A psychological theory is a theory of the psyche. It is a theory of the individual. From a systems ontology, of course, individual and group are features of a relational matrix and so there can be no individual self without the group and no group without the individual self. From a systems epistemology, however, if we wish to understand the functioning of the individual, then the theory constructed will necessarily make the subjective pole of this matrix the focus of inquiry. The result will be a theory that describes individual processes and organizations such as Piaget’s theory, or Chomsky’s theory.

Concepts such as “organization” and “assimilation/accommodation” are concepts that describe the epistemic human agent and primarily articulate the sphere of “I mean.” There is no magic here and no imperialism. It is simply that if you set out to understand the epistemic individual, the individual will be the focus of inquiry, although the objective pole will not be omitted. The obverse holds as well. A sociological theory is a description of the social-cultural world. If explanation of this world is the goal of inquiry, then the objective pole will

³See Overton (1991a) for an extensive discussion of this strategy.
become the focus of inquiry. Here, a theory like James Gibson's presents concepts such as "affordances" that describe an environment, not an individual. As a consequence, Gibson's theory primarily articulates the sphere of "it means." From this vantage point, taking a perspective from the subjective pole, or from the objective pole, is not an either/or struggle for a correct or a best approach to meaning as it seems to be for Gergen, Macnamara, and Kitchener (chapters 2, 7, and 13 of this volume, respectively). The choice here is a functional one that is relative to purposes of inquiry.\(^4\)

The systems strategy can, as a whole, be summarized by the paradox that the child creates meaning, but meaning is waiting there to be created. The systems strategy accepts this paradox and enters into inquiry by formulating psychologically oriented theories that explore systems that create meaning and sociologically oriented theories that explore meaning waiting to be created.

The fundamental distinction between an isolation strategy and a systems strategy points to novel ways of directing inquiry to a number of issues involving meaning. For example, questions about the origin of intersubjectivity of meaning represent a classical problem (see Gergen, chapter 2 of this volume).\(^5\) From an isolationist perspective, shared meaning develops either from the individual or from the group or from some additive combination of the two. From a systems perspective intersubjectivity is the basic ground from which individual and group, self and other, differentiate. Thus, the primary question is not which one of the two is primary, or even how much each contributes to meaning. The primary question for investigation is how both individual processes and social processes lead to the kind of differentiations that continue and elaborate shared meaning.

The relation of constructivist theories and social constructivist theories is another classical problem that benefits from the isolationist/systems distinction. From the isolationist perspective one or the other of these types of theories must be correct or must contribute explanation of "greater amounts of variance" to understanding. From the systems viewpoint individual construction and social construction are two sides of the same ontological coin. Which is selected depends on the aims of inquiry. It is possible to ask from the systems epistemology vantage point how the individual constructs its world of meaning, and it is possible to ask how the social world operates to fashion the opportunities. For a fully adequate understanding of constructivism, specific readings of individual theories become critical. Both isolationist and systems perspectives use the term constructivism. However, the differing contexts lead to very different implications. G. H. Mead's theory is most often put forth as a prototype of social

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\(^4\)This is not to suggest that the systems perspective is a kind of relativism in which "anything goes." Theory choice is based on interlocking sets of criteria that can be articulated and, thus, evaluated (see Overton, 1991a, in press).

\(^5\)See Overton and Horowitz (1991) for an expanded discussion concerning a systems analysis of intersubjectivity and intrasubjectivity.
constructivist explanation. However, on virtually any reading, Mead’s theory is based on an isolationist strategy that offers a behaviorist ontology as fundamental. That is, Mead’s theory splits the subject–object relational matrix and offers the social or object as the ultimate source of meaning. Vygotsky is also—particularly in contemporary contextualist readings—often understood as offering a similar position. This becomes particularly the case when Vygotsky is presented as an either/or alternative to Piaget, or as one who in some way explains individual development better than Piaget. On the other hand, there are readings of Piaget and Vygotsky that offer these theories as a paradigmatic example of the systems strategy. In this latter reading both deny an ontological subject–object split. Piaget is read as focusing on the individual while respecting the social; Vygotsky focuses on the social while respecting the individual.

The issue of an individual mind and a group mind is yet another domain that benefits from an awareness of isolationist and systems approaches to meaning. Isolationist perspectives understand mind as either an individual subjectivity or a communally generated set of standards of action (see Gergen, chapter 2 of this volume). Systems perspectives understand mind ontologically as both. Historically, theories of mind have been offered as accounts (i.e., epistemological devices) of the organization and processes of human agency. From a systems perspective, the answer to the question Can there be an individual mind? is, of course there can. The individual mind, like the group mind, is an analytic device created to further the effort at knowledge building. That is, the individual mind is a set of concepts designed to frame a psychological theory. The systems strategy focus on individual mind does not represent an attempt to impose a kind of autistic or—to acknowledge the postmodern distaste for the role of the author as a device of authoritarian theory of meaning. A focus on individual mind is just that, a focus that permits the elaboration of a knowledge system called the psychological.

Contemporary theories of psychological meaning are, in fact, all formulated within the framework of broader theories of the nature of the individual mind. The type of theory of individual mind that gets formulated, thus, becomes critical to understanding the nature and development of psychological meaning. To state this in a slightly different way, the focus on the individual mind as a context for the understanding of psychological meaning does not necessarily implicate an isolationist strategy. However, some theories of individual mind are isolationist in conception, whereas others are systems defined. In order to examine some specific issues concerning the nature and development of psychological meaning we, therefore, turn attention to isolationist and systems approaches to theories of mind.

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6 An example of this ideological position is found in Rogoff and Morelli (1989) who claimed that Vygotsky’s stress on the inseparability of development from social and cultural activity “contrasts with the image of the solitary little scientist provided by Piaget’s theory” (p. 345).

7 Bidell (1988) provided an excellent account of this dialectical reading of the relationship of Vygotsky and Piaget.
THE COMPUTATIONAL MIND
AND THE EMBODIED MIND

Until recently, the only well-formulated and explicitly articulated theory of mind available to investigators was the computational theory of mind. This theory represents an unqualified isolationist approach that is replete with splits among its various components including mind and brain, self and other, intension and extension, semantics and syntactics. More recently, however, an alternative theory of mind, termed embodiment theory, has received increasing attention as a coherent alternative to the computational perspective. Embodiment theory rests on a systems approach and asserts that each of the features understood as independent components from the computational view, are more adequately, and productively understood as differentiations that emerge from a fundamental activity matrix.

The computational theory of mind draws on the analogy of the brain as a digital computer, and the mind as a computer program. Embodied theory understands the brain as a living, self-organizing system and the mind as a specific developmental emergent organization of this system. The computational mind has served, until recent challenges, as the conceptual foundation for that brand of cognitive science called cognitivism. The embodied mind has long been a fundamental feature—although only implicitly articulated as a theory of mind—of the cognitive developmental theories of Heinz Werner and Jean Piaget. It has recently received increasing articulation in cognitive science by investigators such as Johnson (1987), Lakoff (1987; see also chapter 3 of this volume), and Mark Turner (chapter 4 of this volume); in biology by Edelman (1992), and Varela, Thompson, and Rosch (1991); and in philosophy by Searle (1992) and Taylor (1991).

BRAIN AND MIND

A first important isolationist strategic split that cognitivism introduces simply echoes the split between body or brain and mind originally introduced by Descartes. If brain is conceived as computer and mind as program, then it is possible, and indeed reasonable, to study mind as an entity that is independent of brain

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8Not all authors listed agree on all points concerning embodiment theory. For example, although Searle (1992) rejected philosophical objectivism, he argued in favor of metaphysical realism, and argued that mind is ultimately physical. The present version of embodiment is based on a thoroughgoing interpretationism (see Overton, in press). For a sympathetic review of Searle which, however, is critical of his stance on metaphysical realism, see Feldman (1991). For a sympathetic review of Searle which, however, is critical on his stance concerning physicalism, see Nagel (1993).

9It was, of course, Descartes who created the dualism that defines the isolationist strategy and is responsible for all of the described splits.
processes or embodied action as a whole (see Turner, chapter 4 of this volume). The justification for this approach lies in the recognition that the realization of any software program is independent of the particular hardware on which it is run. All that is required of the machine, of whatever type—whether it be the most advanced digital computer or a series of cogs and levers of an old-fashioned calculator—is the achievement of the computational descriptions where the zeros and ones of the program get appropriately assigned. From the cognitivist perspective this split is not problematic. It simply derives from the underlying functionalism that forms an integral part of contemporary cognitivism.10

Embodiment theory asserts that mind and brain constitute a unified whole, a brain/mind relational matrix. Here, there is no attempt to reduce one pole to the other or to deny one of the poles. Both, in their interrelationship, are necessary to an understanding of cognitive phenomena. As Edelman (1992) suggested, for embodiment theory, “thought is not transcendent but depends critically on the body and the brain. This position is exactly opposite to that of functionalism . . . The mind is embodied, it is necessarily the case that certain dictates of the body must be followed” (p. 239). Rorty (1991) captured this fundamental characteristic of embodiment theory as it affirms the necessary nonreducible relationship between mind and body when he described mind as a web of beliefs, desires, and intentions that find their root in “habits of action” (p. 60). For embodiment theory, these habits are not, however, the contingent randomly emitted responses favored by behaviorists. They are brain-behavior self-organizing systems that transform and become transformed as they operate.

The assertion by embodiment theory that mind is rooted in systems of action is familiar to developmentalists who have attended to Heinz Werner’s and Jean Piaget’s organismic visions of cognitive development. The lesson is sometimes forgotten, however, by even sympathetic cognitive scientists who, although eschewing the functionalist position, still tend to isolate mind and meaning primarily to the realm of symbol manipulation and linguistic phenomena (see Lakoff, chapter 3 of this volume; Turner, chapter 4 of this volume). Scholnick and Cookson (chapter 5 of this volume) offer an extended critique of the problems and issues associated with this tendency to encapsulate meaning in the symbolic system. They also describe possible developmental remedies.

Langer (chapter 9 of this volume), supplements Scholnick’s critique with empirical evidence supporting the developmental assertion that meaning is not limited to symbol manipulation. He also demonstrates—using comparative evidence—that the embodied organization of the action systems offers constraints on the meanings ultimately created. Langer begins from the Wernerian and Piagetian

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10Jackendoff (1989), a major proponent of the computational mind, stated, “Just as we need not deal with the actual wiring of the computer when writing our programs, so we can investigate the information processed by the brain and the computational process the brain performs on this information, independent of questions of neurological implementation. This approach is often called functionalism” (p. 15).
position that all living systems produce meaning through their embodied sensory and physical activity and through resistances that this activity meets. For Piaget, meaning construction and meaning development are grounded in the relational embodied activity of the assimilation/accommodation process. From the subject "I mean" perspective, assimilation is the primary process that creates meaning.

Assimilation is the act of interpretation or meaning construction whether, as Langer points out, the resulting form of meaning is the embodied act of instrumental meaning, the embodied symbol of representational meaning, or the embodied symbol system of reasoned meaning. When viewed from the "I mean" perspective, accommodation is secondary to assimilation. It is embodied activity that is dependent on the resistances that assimilation meets. Accommodation is the act of differentiation. Although assimilation imposes necessity by projecting outward, accommodation opens possibilities through the partial failures of these projections as they are reflected inward. Thus, changes in the embodied system proceed by partial successes and partial failures of embodied activity. The progressive equilibration of assimilation/accommodation and reflective abstraction, in turn, explains the developmental movement from instrumental, to representational, to reasoned systems of meaning.

This developmental analysis of meaning construction is isomorphic with Lakoff's account (chapter 3 of this volume) of the nature of conceptual systems. Lakoff's theory includes two fundamental concepts: image schema and conceptual metaphor. These are designed to understand conceptual systems from an embodied mind rather than a computational mind orientation. Image schema describes the embodied organization of the individual. However, Lakoff, given his focus on the explanation of concepts, concentrates on the representational-symbolic level of this organization. But when image schema is shorn of its representational and symbolic trappings, and cast in a more generic frame, it is identical with Piaget's concept of action scheme. Action schemes describe the initial psychological organization that forms the base for the projection of the instrumental meanings that Langer describes. In Lakoff's terminology it can be said that action schemes structure image schemata, and in turn "conventional images are structured by image schemata" (Lakoff, chapter 3 of this volume).

With image schemata and conventional images as an organismic base for the construction of concepts, metaphor, for Lakoff, comes to describe the process of projecting these organizations and, thus, forming cross-domain mappings. Again, however, if this understanding of metaphor is cast into a more generic and less representational frame, metaphor becomes identical with Piaget's assimilation. In addition, a recognition that assimilation is always, in fact, assimilation/accommodation serves to solve an important problem for Lakoff. When Glucksberg claims that metaphor is simply categorization (Lakoff, chapter 3 of this volume), the appropriate reply is that it can never be simply categorization because ever present accommodation assures that novelty constantly enters the system in the sense of opening new possibilities. Indeed, in general, Lakoff's theory would be strengthened significantly by an explicit recognition that the progressive
equilibrations of cross-domain mappings offers a powerful explanatory tool for understanding the movement from action schemes to image-based reasoning to abstract reasoning.

A similar analysis of processes underlying meaning development also appears in Bloom's (chapter 10 of this volume) presentation of evidence for the thesis that the child moves from personal, private, mentally constructed meaning to conventionally constructed language. Bloom argues that this progression is explained by what she identifies as the principle of discrepancy and the principle of elaboration. According to the principle of discrepancy, progress occurs as constructed meanings become increasingly discrepant from the data of perception. This situation, however, is exactly the case of assimilation (i.e., a current meaning) meeting resistance (i.e., a partial failure or discrepant perception) and leading to accommodation. Further, as resistance leads to accommodation, accommodations are understood as elaborations or differentiations of the initial meaning. And it is this differentiation that constitutes Bloom's principle of elaboration.

To sum up to this point, a fundamental split introduced by the cognitivist computational model is that between mind and body or brain. This split isolates the role of body and brain from the formation and ongoing functioning of mind. For cognitivism, brain is not ignored in every proposal. For example, Jackendoff (chapter 6 of this volume)—from a computational mind stance—mentions the possibility of concepts being instantiated by neurons in the brain. However, this is clearly a distinctly separate problem that is isolated from the primary computational concern about "the properties of the combinational space available to the brain." From the computational perspective, brain is not, and cannot be, an integral part of the formation and functioning mind/brain matrix. From the embodied perspective, it is and must be such a feature.

MIND AND OBJECT

Following from the body–mind split, a second fundamental split that computational theory introduces into the study of mind is the split between mind and object. As body and brain are isolated from mind in the computer model approach, so also is the individual's world of social-cultural-physical objects isolated from mind. This ontological split of mind from the world of common sense has two critical implications for understanding the nature of meaning. First and foremost, by isolating the cultural context from mind, culture—like brain in the mind-brain split—plays no formative role in the development of mind.

Mind and Culture

In this mind–object relation we again have the image of two disconnected pieces. To join these pieces, form is divorced from content, and culture is treated as the source of the contents of mind. Thus, although the formation and, therefore, the structure of mind are disconnected from and impervious to the commonsense world, the contents of mind are understood as the reflection of this world. It is this
split that has led information-processing approaches to maintain that the only thing that develops in development is world knowledge or object meaning. Mind does not develop in the sense of becoming transformed through activity operating in a cultural context. Mind is a storehouse with a built-in apparatus for moving items from place to place. Reflections of culture and physical objects are the source of the items stored (i.e., what we know), but they are not the source of the creation of the operating structures (i.e., how we know). According to this perspective, "it means" is taken as foundational, and the ultimate source of "I mean." Mind participates in this process only through the manipulation (including encoding, storing, retrieving, etc.) of symbolic representations of the social-cultural-object world.

The claim of embodied mind theory with respect to the social-cultural-object world extends the stance it assumes for body and brain. Here, as in the general case where no ontological distinction is made between subject and object, mind is necessarily located as a systems relational concept. Ontologically, mind is neither a disengaged subjective concept emerging from an isolated and reified biology, nor a set of equally disengaged cultural and linguistic norms. To borrow a term from Charles Taylor (1991), mind is dialogical in character. Mind includes both body and other, as self and other are themselves bipolar systems concepts. The isolationist computational model is monological or a split representationalist picture of the human agent. It describes mind primarily as a subject of symbolic representations that parallel an objectivist mind-independent world. In the dialogic understanding, mind emerges out of embodied practices that both constitute and are constituted by the manifest world of common sense. Thus, the central core of embodiment theory is the claim that the web called mind is most coherently explained as a directional evolution that differentiates from the activity matrix termed the biocultural field. It is within this embodied frame that Bruner (1990) described the relation of mind and cultural in the co-construction of personal meanings called narratives; and it is within this frame that Bruner and his colleagues (Feldman, Bruner, Kalmar, & Renderer, chapter 12 of this volume) present developmental observations supporting the significance of narrative models in our understanding of cognitive development.

Syntax and Semantics

A second implication that follows from the ontological disconnection of mind and experienced world entails the forced split between syntax and semantics that cognitivism adopts (see Turner, chapter 4 of this volume). Semantics is, of course, the province of meaning. However, the computational mind is a syntactical machine that is limited to manipulating its own internal symbols. Cognition or knowing is defined within this framework as the manipulation of symbols. Computations are operations on, or manipulations of, symbols and these are governed by a system of rules that constitute syntax. Cognitivism also asserts
the claim that the rule system is a prewired feature of the human mind, just as the rule system that governs the computer program is part and parcel of that program. When Jackendoff (chapter 6 of this volume) refers to “states of a combinatorial system instantiated . . . in a system of symbols,” he is referring to just such a rule system.

Meaning or semantics becomes related to this syntactical system through the glue of representation. The symbol is taken to be both a physical code and a mental representation of something other than itself. As mental representations, symbols “reference” or are “about” (i.e., mean) something concerning an assumed mind-independent world. Thus, meaning is a symbol-to-object correspondence. Representations as mental states are intentional states and they include states of beliefs and desires as well as intentions per se. However, these states are not drawn directly from the posited mind-independent object world. Instead, cognitivism maintains these semantic states mirror, or parallel, syntax. By assuming this position, cognitivism is able to offer both a nativism and a naturalism or objectivism. The mind, even at the representational level, is prewired; however, semantic representations accurately correspond to objects and categories of the mind-independent (i.e., objectivist) world. The strongest form of this stance was introduced by Fodor (see Jackendoff, chapter 6 of this volume) and it proposes that all mental activity is a prewired language of thought called “mentalese.”

Varela et al. (1991) succinctly described the functioning of the glue of representations as cognitivism uses representations: “We assume that the world is pregiven, that its features can be specified prior to any cognitive activity. Then to explain the relation between this cognitive activity and a pregiven world, we hypothesize the existence of mental representations inside the cognitive system” (p. 135). They further illustrated this isolationist process through the metaphor of a cognitive agent who is parachuted into a pregiven but completely foreign world. The agent can survive only if it is endowed with a map, and learns to act on this map. The map is the language of thought, and the task of development is to learn to use this map.

Jackendoff (chapter 6 of this volume) illustrates a cognitivist theoretical argument applied to word meaning. The combinatorial system, as the defining feature of mind, is the universal frame within which word meaning is explained. As already noted, this is the computational program, universal grammar, or syntactical system. The particular subsystem of this program relevant to word meaning Jackendoff terms conceptual structure. Word meaning is conceived as states of this subsystem instantiated in a system of symbols. A specific conceptual structure, in turn, derives from “conceptual well-formedness rules.” These are composed of sets of primitives and principles of combination. Thus, it is conceptual well-formedness rules that constitute the innate base for the generation of conceptual structure and conceptual structure, in turn, is fundamental to word meaning. Specific word meanings are fragments of conceptual structure that are linked to
language, to perceptual and motor representations; and to other conceptual structures.

In Jackendoff’s argument, the combinatorial system is treated as background, “the only reasonable way anyone has been able to conceive of a word meaning within cognitive theory is in terms of states of a combinatorial system.” However, although the nature of primitives discussed by Jackendoff is itself a basic issue, it is exactly the combinatorial system that is the core issue in the debate between advocates of the computational mind and advocates of the embodied mind. Does the combinatorial system best characterize the nature and origin of mind, or is the combinatorial system itself the outgrowth of a directional development? Is the syntactical system fundamental or are syntactical and semantic systems differentiations that arise from a fundamental activity matrix. Langer’s (chapter 9 of this volume) discussion of the development of meaning from instrumental act to representational symbolic meaning suggests that both the primitives described by Jackendoff, and the combinatorial system itself, find their origin in early action meaning systems.

Bloom’s (chapter 10 of this volume) argument that both word meaning (semantics) and the structure of language (syntax) arise from a more primitive action defined meaning system also supports the embodied mind perspective. Further, Bloom’s debate with Hirsh-Pasek, Golinkoff, and Reeves (chapter 11 of this volume) is an extension of the core debate between embodiment and computational theories over the nature of meaning and meaning development. Bloom understands symbolic representational language meaning to be constructed from presymbolic mental organization. Arising from acts of interpretation (i.e., Piaget’s activity of assimilation), the child constructs intentional states and later representations within these states. Embodied representations, thus, constitute the personal and private meanings that underlie acts of expression and form the base for language acquisition. Hirsh-Pasek et al. argue, on the other hand, that the child must necessarily be prewired with language-specific lexical and grammatical biases in order for language acquisition to proceed.

For both Hirsh-Pasek et al. and Jackendoff—as well as for other cognitivists—acceptance of the categories of the computational framework render even the possibility of fundamental transformational change inconceivable. Although computer programs can additively rearrange pieces in a nearly infinite number of ways, programs do not change their identity. Emerging novelty in the sense of a metamorphosis from one form to a novel form is simply not a fundamental category of the computer or the computer program. Cognitivism’s need to find an identity of elements across development is a direct logical consequence of the categories it asserts as defining the human agent. When cognitivists study language development, they necessarily—not empirically—discover some language specific features available from the outset of development. When cognitivists study conceptual development, they necessarily—not empirically—discover some symbolic, representational capacities available from the outset of
development. Empirical evidence may increase or decrease the plausibility of these logical discoveries. It will not be foundational to the discoveries themselves.

As the cognitivist's vision is constrained by categories of the computational frame, embodiment theorists adopt constraining categories that are identified with self-organizing systems. Chief among these are the categories of differentiation, integration, and emergent levels of organization. From this epistemological stance, an initial organized whole that ontologically constitutes the biocultural field differentiates through activity into a body-mind-object system. Mind is an emergent organization just as water is an emergent organization of hydrogen and oxygen molecules.\(^\text{11}\) Mind as an emergent organized activity matrix initially lacks substantial psychological differentiation. It is characterized by the system properties of instrumentality and affectivity (see Brown, chapter 8 of this volume). As this system acts (i.e., assimilates, integrates, projects, constructs action meanings) and meets resistances that lead to differentiations (i.e., accommodations) these differentiations come to be characterized, as Brown suggests, as intentions and values. At some point in the self-organizing process, mind as action system becomes reorganized and representational mind appears as a new level of emergent organization. Representational mind does not lose its ontological underpinnings, but as an emergent organization it is characterized by the system property of symbolization. Here, as the child earlier constructed the world, in the context of a world waiting to be constructed, the child now constructs representations and language, in the context of a language system waiting to be constructed. At this level, as at the earlier level, and at later levels of reflective representation, progressive differentiations and reintegration operate through processes such as Lakoff's metaphorical projection (and the resistance it meets) and Bloom's principles of discrepancy and elaboration.

To this point the discussion has centered around two fundamental ontological splits that are introduced when the categories of the computational mind are affirmed. The first split isolates body and brain from the formation and functioning of mind. The second isolates mind from social-cultural-object world of commonsense experience. The categories of the embodied mind represent an alternative stance to these splits; a stance that understands body-mind-object as differentiations that arise from a self-organizing activity matrix. These alternative visions of the nature of mind impact in diverse ways on our understanding of the nature and development of meaning. A third and final fundamental ontological split that the cognitivist computational model introduces is the split between various spheres of mind itself. This is the mind-mind split.

\(^{11}\text{This position is neither a substance dualism nor a property dualism as all forms of ontological dualism are rejected in this position. The idea of emergent systems follows Edelman (1992) and Searle (1992). As Searle noted, "Consciousness is a higher-level or emergent property of the brain in the utterly harmless sense of 'higher-level' or 'emergent' in which solidity is a higher level emergent property of H}_2\text{O molecules when they are in a lattice structure (ice)" (p. 14).}
THE INFERENTIAL MIND AND
THE IMAGINATIVE MIND

For computational theory, mind constitutes a single uniform sphere of activity, the linear combinatorial sphere of computations. This is a sphere where linear logic not only reigns supreme, it defines the territory. This seemingly monistic position, however, hides a dualism, because it suppresses other spheres of activity known to commonsense but not accounted for by the conjunctions, disjunctions, negations, and propositions built from these atomic elements. The realm of mind in which there are no negatives, in which categories flow one into the other, in which affectivity as feeling is unframed by linear logic is just such a suppressed, and thus isolated, sphere for the computational mind. That this sphere is a necessary part of that web of intentions, desires, and beliefs called mind, and that this sphere contributes to meaning, has long been affirmed by philosophy and explored by those psychologists who have been centrally concerned with meaning making.

In Hegel's (1807) vision, mind is a differentiation into two dialectically related moments of consciousness, the subjective moment and the objective moment. Within the subjective moment, Hegel saw mind as a further differentiation into two primary relational modes or spheres of knowing—The Reason (Vernunft) and The Understanding (Verstand). Verstand is the analog of the computational mind. It operates in terms of exclusive either ... or categories. Every question put to Verstand is answered in terms of "either ... or." Either the phenomena involved are different and thus they are not identical, or they are identical, in which case they are not different. In this mode categories are static and fixed. In Verstand opposites are mutually exclusive and absolutely cut off from each other. The Aristotelian law of identity holds absolutely: $A = A$ and it is never the case that $A \neq A$. Both identities and differences are considered, but each is taken separately. As a consequence, concepts are either identical ($A = A$), or they are different ($not [A = B]$).

Vernunft or reason, on the other hand, is the mode of knowing that asserts the principle of the identity of opposites ($A = not A$). Here categories break up and flow into each other. Both modes consider identity and difference, but Vernunft rejects the exclusive nonrelational "either ... or," and considers identity and difference simultaneously. In Vernunft what is identical is also different, and what is different is also identical. Categories in Vernunft are both identical and distinct.

Contemporary philosophy—excepting analytic philosophy, which like cognitivism suppresses vernunft—has retained the distinction and describes these relational spheres of mind as the sphere of imagination (Vernunft) and the sphere of inference or inquiry (Verstand). Turner (chapter 4 of this volume) discusses the sphere of imagination as it impacts on meaning at representational and reasoned levels of construction. These relational spheres of mind have also been contrasted as the aesthetic and the theoretic; and the intuitive and the analytic.
When psychoanalytically oriented and object relations personality theorists have pursued their investigations into affective-conative-cognitive meaning constructions (see Brown, chapter 8 of this volume; Bloom, chapter 10 of this volume) they have found these relational spheres of imagination and inference to be indispensable descriptions of the process of meaning making. Freud characterized the spheres as primary and secondary processes; Melanie Klein described them as paranoid-schizoid and depressive positions; Harry Stack Sullivan discussed them in terms of prototaxic-parataxic and syntactic modes; and Donald Winnicott termed them object relations and object use. Each initial term in the bipolar pair of each conceptualization is understood as the sphere of the nonlinear, where action, affect, and impulse are minimally regulated, consciousness is unmediated, categories have permeable boundaries and flow one into the other, and a dialectical organization prevails. The latter term of each pair constitutes the sphere of linear regulated understanding described by the rules of inductive and deductive logic. From a systems perspective each sphere is a necessary part of the whole, and from a psychological perspective, the isolation of one sphere from another constitutes pathology.\(^{12}\)

Jackendoff (1989) has recognized—from his cognitivist viewpoint—that the computational mind is itself inadequate to account for a number of events that from a commonsense perspective would count as mind relevant distinctions. Jackendoff’s solution to this problem is to postulate a separate mind, the phenomenological mind. Having then created a dualist mind–mind problem, Jackendoff’s proposed solution to this additional problem is to glue the pieces back together. This is done by accepting the computational mind as fundamental and understanding the phenomenological mind as “caused by/supported by/projected from” (p. 24) computational distinctions. Embodiment theory, on the other hand, rejects this split, as it rejects other splits, and claims that (a) awareness or consciousness is a systemic property of mind as a whole; (b) computational distinctions are characteristics of the inferential sphere of mental functioning; and (c) the inferential sphere and the imaginative sphere simultaneously arise from an original relatively undifferentiated activity matrix termed the biocultural matrix.

Ontogenetically, embodiment theory proposes that mind initially differentiates through its activity and resistances into a subject pole and an object pole of consciousness. This is the psychological relational field of “me” and “not me” and, thus, the psychological basis for “I mean” and “it means.” It is also this differentiation that simultaneously establishes the embodied basis for the formation of a protologic. This protologic signals the beginning of a linear sphere of mind. Here the fundamental laws of linear logic (i.e., Law of Identity: \(A = A\); Law of Contradiction: not [\(A = not \ A\)]; Law of Excluded Middle: \([A \ must \ be \ either \ A \ or \ not \ A]\)) become established as an extension of the instrumental

\(^{12}\)See Overton and Horowitz (1991) for an extended discussion of these spheres of mind in relation to developmental psychopathology.