Two steps toward semiotic capacity: Out of the muddy concept of language*

KAREN A. HAWORTH and TERRY J. PREWITT

Abstract

As John Deely has suggested in his Four ages of understanding*, philosophia in practice is semiotic process, an engagement in the world through the action of signs. But this observation leads us to a point of contention with Deely's treatment of semiotic process itself and its connection with the more widely understood notions about language in our time. Specifically, there are major difficulties with the treacherous formal and popular nomenclature about the phenomenon of language and its philosophical connection to the ''semiology'' of Saussure and sign theory of C. S. Peirce. Our issue is with the formal use of the term ''language'' centrally and often in its technical sense as an analytical system — a way of ''seeing or looking at the world'' that is prior to and removed from the communicative sense of ''language'' — while at the same time also informally employing the term in its common and practical sense as a system for information exchanges. In fact, Deely's comprehensive annotated index helps resolve some of the issue. But taken in the context of Deely's broader argument, the problem with the definition and use of the term ''language'' somewhat stifles the attempt to revise appreciation of our arrival at the ''time of the sign'' as a species-specific capacity.*

Keywords: *language, evolution, cognition, Peirce.*

As an opening for the twenty-first century, John Deely presented his master work *Four ages of understanding: The first postmodern survey of philosophy from ancient times to the turn of the twenty-first century*, what we may suggest to be a culmination of at least thirty years of his contributions to the development of ideas pertinent to the Doctrine of Signs, and also the initiation of a formal discussion that will, no doubt, continue

Semiotica 178–1/4 (2010), 53–79
DOI 10.1515/semi.2010.005
0037–1998/10/0178–0053

through many of the coming decades. Deely's prodigious attention to detail in developing his argument is admirable, considering the enormity of the project; as one might expect, he shows an adept integration of ancient, Latin, modern, and contemporary/postmodern issues within an intriguing historical argument of the impacts of linguistic relativism on the course and emphasis of Western ideas. Yet the deeper argument of Deely's treatment of the subject resoundingly affirms that *philosophia* in practice *is* a fundamentally semiotic process. We may recognize today that even as early as the pre-Socratics *the sign* was instrumental in formal human inquiry, though certainly not explicit as a construct within that inquiry. As such, Deely can ground Western philosophy in a series of systems which differ with respect to their use or treatments of "the sign" and ideas about either "objective" or "inter-subjective" knowledge.

Deely's refiguring of the history of philosophy returns periodically to a key point: the accidental or sometimes intentional shifting of meanings in the process of either translating works from one cultural system to another, or reinventing parallel constructs working in the service of human understanding.[1] Both of these processes created capricious turns in the thrusts and results of inquiry through time, rendering it necessary in our time to renegotiate some texts we may now regard as prominently foundational. Even more interesting, it appears that at points along the way, especially in the modern period, philosophers inspired by ancient texts, aspiring to work in continuity with them, have sometimes projected quite new appreciations of the world onto them. In perhaps no other area of philosophy is this more true than in the modern development of the Doctrine of Signs (Deely 2001: 625–637, especially 629), the impetus for which we may attribute to John Locke and the first full systematization of which we may attribute to C. S. Peirce (see especially Deely 2001: 57, note 16, for a concise review of these connections). Throughout Deely's work, he stresses the unique semiotic capacity of humans, following Peirce's system and his own conceptual elaborations over a career devoted to a Doctrine of Signs and refinement of the idea of anthroposemiosis.

Arguments from diverse disciplines connected with human semiotic capacity are embedded in the more general treatment of the origins and evolution of *language* and *culture* — with the term "language" not always being employed from the perspective of a Doctrine of Signs. Specifically, in spite of great overlap in terminology and even method, one gets very different impressions about language from the points of view of historical linguists, psycholinguists, structural linguists, cultural anthropologists, and any of a number of philosophers of language — each with legitimate

points fit to different pragmatic ends. Perhaps the broadest distinction among the approaches is between those disciplines that include semantics within the system modeled, and those disciplines that *only* pursue "how" meaningful behaviors are created. This is certainly a "divide" within linguistics, and the differentiation can even be extended to diverse approaches to "culture" or "behavior" in areas of social science that are not focused on language per se. In anthropology, for example, Kenneth Pike's linguistically-based theory of cultural behavior (Pike 1971) employs foundational linguistic constructs for the systematic representation of cultural meaning. However, the sterile but influential revision of Pike's *etic* and *emic* concepts by Marvin Harris (1967), legitimized by reference to a then unpublished 1967 draft of Pike's work, founded a major line of materialist/behaviorist anthropology that essentially stripped *cultural meaning* from the representation of cultural patterns, and within American anthropology trumped the enormous impacts Pike's work otherwise might have had.

So the issue of what "language" is as a semiotic capacity, or whether it is a gloss for that capacity in its most fundamental sense, remains a major concern. And the topic taken up in this paper, inspired directly by Deely's book, is the use of the term "language" throughout our philosophical discourses, even in Deely's work, to represent two distinct phenomena associated with quite distinct historical, conceptual trajectories. The first of these, and the most common in usage across cultures and disciplines and central to Deely's line of argument about linguistic relativity noted above, employs "language" simply as an instrument of communication. Deely (2001: 301, note 106) designates this as the "vulgar" sense of language, and stresses that the system designated by common usage is "exapted from" the more fundamental, and we may presume more "valid," system of logical capacity. This second idea, highly emphasized by Deely throughout his work (see especially Deely 2001: 5, 9–12, 18, 55, 323, 417, 488) and consistent with Thomas Sebeok's treatments of the term, is that "language" is primarily the "human modeling system" that is uniquely manifest through the concatenation of capacities we have obtained in our evolutionary heritage.

In *Four ages* (2001: 662–667), Deely reviews a series of rules set out by C. S. Peirce in his "ethics of terminology." Among these Peirce urges: "Before proposing a term, notion, or other symbol, to consider maturely whether it perfectly suits the conception and will lend itself to every occasion, whether it interferes with any existing term, and whether it may not create an inconvenience by interfering with the expression of some conception that may hereafter be introduced into philosophy" (Peirce quoted in Deely 2001: 666–677).

While we may consider the warning unrealistic, given the nature of language (whatever the term might mean). We should note at this juncture that precision of terminological usage is itself a difficult demand in any event, as Vincent Colapietro pointed out in his review discussion of Deely's *Four ages* at the 2006 meeting of the Semiotic Society of America (Colapietro 2006). We certainly agree that efforts to arrive at precision of terminology often confound discourse, preventing meaningful sharing of ideas when the action of signs otherwise has the capacity to work through subtleties and traces of insight. In the present discussion, we would join Colapietro in suggesting that at many points in Deely's history of philosophy he has stopped short of realizing the depth of insights inherent in his work. But at least a part of the problem is one of "consistency" in usage.

1. The conceptual field

The confusion created by casual reference to "language" in Deely's argument, then, could be mitigated by strict adherence to terminologies already in existence, some substantially enhanced by Deely's own work. For example, in the leading discussion on sense and perception in *Four ages*, Deely carefully differentiates the *Innenwelt* and *Umwelt* as areas of species-specific cognitive activity manifest among the *anamalia*, and even more carefully derives the *Lebenswelt* as the human *Umwelt*, a world experienced as *Umwelt* "linguistically modified" (Deely 2001: 9–12). The discussion is complicated by the fact that Deely opens his idea of *Lebenswelt* as "*Umwelt* modified by understanding", though he notes that "language is of a piece with understanding" (Deely 2001: 9). The sense of "language" clearly intended in this equation is a human capacity for cognitive modeling of the surrounding world, and this is constantly reinforced throughout the work. Indeed, later in the *Four Ages*, Deely not only equates understanding and language, but also annotates the equation of "language" to the formal philosophical construct of "intellect", citing refinements from Aquinas that undergird and solidify that association, and additionally suggest a parallel realization of the significance of "being-as-first-known" as a construct like *Lebenswelt* (Deely 2001: 347–348). It is very clear in these passages that Deely excludes "language" as a "signal" or "communication" system in the definitions of understanding and intellect. One should also see Deely's early discussions of *Umwelt* and *Lebenswelt* in *Introducing semiotic: Its history and doctrine*, where he cites the *Umwelt* construct originally suggested by von Uexküll (1926), but states further:

I would suggest that the human *Umwelt* — the intellectualized perceptual environment — should rather be called *Lebenswelt*, the lifeworld of common human concerns within which all specialized pursuits arise. On this usage, just as intellection presupposes perception and rests on sensation as on a "reality core," so the *Lebenswelt* contains virtually within itself the *Umwelt* of animal life and rests ultimately on the incorporation of the immediately surrounding physical environment into an objective network of cognition-dependent (socio-cultural) relations. It is the *Umwelt* which is the adequate object of zoosemiotic study, while the expansion into a *Lebenswelt* is the concern of anthroposemiotics. (Deely 1982: 105–106)

Deely's notion of *Lebenswelt* might seem inconsistent with Husserl's (1970 [1936]) original usage and derivatives that emphasize the "pre-reflective" nature of the "lifeworld." However, Deely's broader point here is that intellect exists as an essentially reflective tendency different from the total sense-perception capacity of the human species. We understand Deely's intention as seeing the *Lebenswelt* as a construct essentially redundant with "language" understood as a modeling system, what we will tag "language-M" within our discussion.

This makes language taken as a communication system (or "language-C") an ambiguous interference throughout the arguments of Deely's book. The imprecision created by the generic term "language", sometimes employed as Deely's highly personalized reference to a technical and deeply philosophically embedded concept and sometimes not, compels him to constantly restate his point of "language as a modeling system", much as Eco (2002), no doubt with different intent, constantly and repetitively refers to one character in his recent novel *Baudolino* as "*Aleramo Scaccabarozzi* known as Bonehead."

In fact, Deely's comprehensive annotated index helps elucidate some of the issues raised by our complaint. A thorough review of the 137 most relevant references to "language" in the index reveals some 56 language-M references. The remaining 81 references, some possibly intentional, but most unintentional, we believe, present language-C usages that potentially muddy the argument being offered. Classifying the cases can be difficult, since at some points the common usage is employed in characterizing the technical sense of the term:

[concluding an argument about Fonseca's treatment of Augustine] When we speak of formal and instrumental signs, therefore, we are not speaking of two species under a common genus, for there is no genus common to the two. The word "sign" in the two expressions is an inexact way of speaking, a misleading use of language [sic], a *flatus vocis*. Exactly speaking, there are mental representations and verbal significations, and only the vehicles of the latter can properly and exactly be called *signs*. (Deely 2001: 417)

We have selected this example also for its metalogical significance, since not only are we uncertain which sense of "language" Deely intends (and for us, at least, the Latin is no aid), but Deely's argument about the "sign" offers the very same order of problem. We note, of course, that in the larger context of the arguments such difficulties may be a minor perturbation — that is to say, one can and will "work out" the potentials of Deely's larger program regarding the history of philosophy.

One source of confusion in all of this is the role of *semiology*, the linguistically derived approach to the sign initiated by Ferdinand de Saussure (1976 [1906–1911]), but much developed in the structuralist and post-structuralist movements of twentieth century Continental philosophy (see Deely 2001: 57, 620, 682–684). *Semiology*, though influential, remains quite focused on language-C in its discourses, methods, and results, so much so that a major part of the intellectual sense of "language" in the contemporary academy is dominated by semiological notions. Alongside this bias is the sense in which much of *semiology* either disregards or intentionally excludes the interpretation of meaning except as a ground for understanding "how" semantic differences are created. From our point of view, *semiology* is a theory of language ill-equipped to tackle semantic issues because it is not designed to model semantic aspects of language-M (in this regard, see also Culler 1986: 18–23).

On the other hand, Deely, following his teasings from the Latin philosophers, his gleanings from early modern thinkers like John Locke and Jean Poinsot, and the powerful foundations established by Charles S. Peirce, and later Thomas Sebeok as the "catalyst" of postmodern *semiotic*, has at his disposal a precise terminology for language-M, *anthroposemiosis*, which has its foundation in much of his own work. Now, anthroposemiosis may be an ugly word, and one not in common parlance outside of the Peircean tradition of semiotics, but that is a quality, as Peirce might have said, which provides for it a clear and exact utility. Would it not be easier to refer to language-M strictly as *anthroposemiosis*, the processual aspect of the *Lebenswelt* (or human *Umwelt*). We might, then, get on with the work of detailing exactly which elements of the "human *Umwelt*" retain much of their animal foundations in sense and perception (or zoosemiosis), and what aspects derive from a reshaping of the world by what Peirce called "the argument". For it is "the argument" that is also at the foundation of language-M, inasmuch as the Peircean argument is unique to our species (at least in human experience) and central to "semiotic" as a cognitive capacity (see Peirce's "On the natural classification of arguments" *W* 2: 23–48; "On a new list of categories" *W* 2: 49–59; and "Some consequences of four incapacities" *W* 2: 211–242).

To underscore these points, consider Deely in *Introducing semiotic*:

> ... we may expect the notion of "natural language," as something yet to be adequately explored within semiotic (or any other) perspectives, to become increasingly a focus of research and analysis in coming decades as we seek to understand the mysterious communion and compenetration of nature and culture that transpires in anthroposemiosis. For language in this basic manifestation (Wilden 1981: 10) "is neither a copy of reality, nor a misrepresentation of reality; it is part of human reality." What has up to now merely been labeled in order to contrast it with supposedly more interesting and important but in fact impoverished and strictly derivative phenomena of cognitive concern will assume its rightful place as the center and focus of the richest, most heterogeneous form of semiosis on our planet, namely, anthroposemiosis. (Deely 1982: 92)

And again in *Four ages of understanding*:

> ... contemporary philosophers at work on the development of the doctrine of signs according to the fullness of its possibilities have begun to speak, after Peirce, of the actions of signs as *semiosis*, and of the action of signs at each of the cosmological levels. At the broadest physical level of atoms, molecules, interstellar gases, galaxies, stars, planets, and geological development, the action of signs is called *physiosemiosis*. In the living world of plants, the action of signs is called *phytosemiosis*. Among animals generally, the action of signs has come to be called *zoösemiosis*. And the species-specifically human use of signs, rooted in language, as we have many times mentioned in crossing the centuries to this point, is an action of signs called *anthroposemiosis*. (Deely 2001: 629)

2. What zoösemiotics is not[2]

Let us at once recognize that all animals negotiate the world through "signs" which link sensed experience to memory and intention. This is what we mean by "semiosis", and we employ the term to indicate *any* form of "action of signs." From a Peircean perspective, the nervous system's processes of sense and perception are all aspects of sign process, and the total experience of these species-specific cognitive processes constitutes semiosis. Hence, we can speak of "anthroposemiosis" as human experience through signs. We may also speak of something like "gorilla-semiosis" or "pongosemiosis" to distinguish the processes defining experience in the gorilla and orangutan, respectively. Our work has even led us to suggest that there exist in biological structure something like "cognitive platforms" that differentiate species to create these independent semiosic effects in the world. This is all consistent with recent usage of

the term *zoösemiosis*, though we stress that there is a strong distinction between Deely's and Sebeok's usage of the term zoosemiotics.

In relatively plain terms, what zoosemiotics was originally proposed to entail was "... the discipline, within which the science of signs intersects with ethology, devoted to the scientific study of *signalling behavior* in and across animal species" (Sebeok 1986: 74, emphasis added). This original definition seems somewhat narrower in scope than Deely's *action of signs among animals generally*. By reason of Sebeok's original definition, taken in conjunction with Deely's arguments about language as a communication system, we have come to think of the "signalling behaviors" of any species as an "exapted system" derived (in the biological genetic sense) from the limitations of species-specific semiosis. This makes zoosemiotics in Sebeok's sense the study of animal *analogs* of language-C that, though different in function and structure, stand in the same relation to the overall semiosis of the species as language-C does to language-M in the human species. One premise of such a view is that human physiology and functioning, *no more or less than other species in our biological system*, presents a unique psychological and behavioral manifestation built from necessarily common elements of our "animal" nature:

> The task for the immediate future will be to treat, comprehensively and exhaustively the achievements of zoosemiotics from Darwin through J. von Uexküll to the present day; to arrange and display the data in a format relevant to the study of language, that is, by matching logical concepts derived from sociobiology with those developed in linguistics; and, using each species, so to say, as a miniature paradigm which throws light upon language observed as a peculiar combination of distinctive features of which all or most all components, considered alone, have their separate evolutionary roots (Koehler 1956), to consolidate and build upon what has been established about the proto-cultural foundations of human adaptation. (Sebeok 1986: 74)

We understand that an outgrowth of zoosemiotics has sometimes been to feed popular notions that anthropomorphize animal behavior, whether in the "believed" but inaccurate interpretation of the performance behaviors of circus animals (see Bouissac 1981), or the supposed "human language use" evinced in some Hominoid sign-language projects.[3] Peircean semiotics, we have found, resolves many of the issues raised by facile but inappropriate comparisons of symbol use in different species, and *zoösemiotics* holds promise of sorting out in exact terms the many unexpected and extraordinary things other species are doing. But it should be clear by this point in our discussion that there is a great potential for confusions and misinterpretations across disciplinary lines.

From a point of view focused on the evolutionary origins and development of human language, a less-anthropocentric accounting of inter-species and intra-species differences in signalling systems should extend to fossil species. Such a view, which has been long insisted upon by Sebeok and others in the field of zoosemiotics, offers the profound and critical recognition of the potential for distinctively-structured but homologous parallels in the areas of signalling behaviors, working in the service of very different overall cognitive systems. In short, we should not expect a simple and progressive emergence of evolutionary grades within the Primates leading to *Lebenswelt* and its derived human signalling system, any more than we now expect a simple and progressive emergence of different species within any biological genus.

We should expect in the fossil record of the hominidae parallels that involve relatively simple cladistic relationships of individual traits, with the later appearance of richer trait complexes and phenotypic expressions, selected under similar environmental pressures, in phylogenetically related populations that do not have direct connection through gene flow. But we should expect the functioning of such independently derived systems to be potentially quite distinct. Thus the "parallel" development of derived trait complexes, though temptingly similar to human functional systems, may in fact present only superficial similarities. This is very likely the case in later hominid evolution, so much so that a clear approach to *zoösemiotics* is exceedingly important to the interpretation of both the fossil record and ethological studies of signalling behaviors among the *Hominoidea* generally. We are certainly interested in shared, derived trait complexes, of course, but if complex physiological similarities do not necessarily imply that systems are functionally comparable, our discussion of *zoösemiotics* on the level of intra-specific comparisons is greatly complicated.

3. Zoosemiosis and anthroposemiosis

As an opening of this section of our essay, since we have explored the notion of *zoösemiotics*, let us take a moment to take stock of our three general terms: semiosis, semiotic, and language. "Semiosis" we can define simply as "experience through signs" or, as semioticians have come to commonly express it, following Peirce, "the action of signs." "Semiotic" is the ability to reflect upon "the role of signs in structuring experience and revealing nature and culture to our understanding" (see Deely 1982: 65). Peirce constantly employed "the sign" as the foundation of experience and logic (for a key text, see Peirce "Some consequences of four

incapacities'', *W* 2: 211–242), and we note that in terms of the Peircean sign classification, ''semiotic'' relies upon what Peirce referred to as ''the argument.'' *The argument* is a capacity to move beyond conventional references to ''things'' (symbolic rhemes) and basic propositions that link two or more ''things'' (dicent symbols) to more complex logical models,[4] constructed worlds, and all of the elements of the *Lebenswelt* that prompt Deely to make it a special form of *Umwelt* — species-specific and yet capable of diverse and distinct variations.

Thus, our preferred definition of *language* is as a communication system exapted — that is based upon some existing system — from the particular semiosic capabilities of our species (again, see Deely 2001: 301). That is, we want to reserve the word ''language'' for what we have tagged language-C. And so we have created the following equations among our terms and the terms defined by others in this area of inquiry:

Table 1. *Comparison of derived and exapted elements of anthroposemiosis and zoösemiosis*

	Derived, primary system (Innenwelt)	Exapted, secondary system of signalling behaviors
Anthroposemiosis:	The capacity for the ''Argument'' language-M	The symbolic system used in human signalling language-C = ''language''
after Peirce	The capacity for the ''Argument'' (argument-symbolic-legisign)	Dominance of symbolic rhemes and dicent symbols in signalling behaviors.
after Deely	''Language'' = ''Understanding'' = ''Intellect'' → Umwelt as Lebenswelt	''Language'' as ''Communication''
Zoösemiosis:	Qualisigns, Sinsigns, Legisigns, mostly of the Iconic and Indexical types, serving mainly Rhematic and Dicent functions.	Iconic and indexical calls, and in some species ''natural'' symbolic rhemes and dicent symbols
after Sebeok		The subject matter of Zoosemiotics
after Deely	Umwelt — object of Zoösemiotic study	

Though we will continue to use our language-M and language-C tags in this essay, we see these as referring, respectively to (M) *the capacity for the argument* and (C) *the symbolic system used in human signalling.* Thus, in our view, by resolving Deely's inconsistencies with Sebeok on zoosemiotics, one might be inclined to speak of the ''language'' of birds or of gorillas, not suggesting that the communication system is exactly

like "human language" but that instead it is exapted from a form of semiosis other than anthroposemiosis. Thus, "language" is extended in such instances metaphorically, as Sebeok noted (1986: 77). But we, like Sebeok, stress that it is important not to confuse the metaphorical or "analogical" extension of the term with "phylogenetic" or "systemic" homology. This will be tremendously helpful in the zoosemiotic problem of understanding how, for example, Gorilla "language" derives from the semiosic capacities of the gorilla and — while it possesses hints of cladistic cognitive parallels — remains distinct from human language.

The communication capabilities of any species, human or otherwise, is only a small subset of the overall cognitive system in each case, and to use the term "language" to represent the highly complex process of human "thought" is to hugely over-simplify and bias our appreciation of human understanding, and to miss the significance of animal semiosis as foundational to our capacities. Deely's inconsistent use of the term language in many cases simply undermines the clear exposition of his argument.

Given Deely's long term involvement in the philosophy of science as it pertains to evolution, we find his overall arguments about *Lebenswelt* and general cognitive manifestations in our species to be compelling. On this ground, then, we want now to employ the term *Lebenswelt* he has helped develop and refine in our own representation of stages in the development of semiotic capacity in our species. Taking the idea of *Lebenswelt* as the human *Umwelt*, a biologically driven sensed and perceived world *modified* by the action of signs in anthroposemiosis, we may begin to distinguish between the capacity for such a modified world experience and the specific forms a world experience may take. The "lived world" of the human being reflects different communities of experience we call "cultures." Hence the capacity for creating a *Lebenswelt* is the "capacity for Culture." Within anthropology, specific patterns of *Lebenswelt* are seen as "particular cultures" (and this is roughly paralleled in the notions of "field" and "habitus" in the work of Pierre Bourdieu; for example see Bourdieu 1977). This would suggest that "cultures" derive from the cognitive engagement of the surrounding world as a specific "adaptive" or "adjustive" process. A similar phenomenological point of view is reflected in the synthetic historical and comparative work by David Abram (1997), *The spell of the sensuous.* So the basic idea of the "lived world" of the human being constituting a parsed construction within a field of possibilities fits well within Deely's conception of *Lebenswelt*.

But within common academic usage, culture *also* refers to the products of such lived experience — to technology and identified patterns of behavior, and even to the significations that justify these impacts on the

world. As a product of *Lebenswelt*, material artifacts and technologies hold a status very similar to signals and the behavioral contexts within which they occur — they are signs in a non-random system.

The question is: What kinds of signs are they? When "signs" of the derived life system present consensus-driven patterns of behavior, we will usually comfortably identify the population as human. One critical point here is that the *material world*, including humanly produced artifacts, may actually constrain behavioral conventions — to create *Lebenswelt* — even in the absence of a signalling system built around calls or other vocalizations. Thus, in the chicken-and-egg approach to "language and culture" in anthropology, culture (or manifestations of language-M) does not require speech (or language-C) to exist. On the other hand, we recognize that technologies present very different clues about the behaviors that produced them — some show evidence of arbitrary, consensus-driven patterns of production, and some show only evidence of the direct practical concern, in the area of stone tool production for example, for obtaining an edge or a shape, here and now. The mere presence of stone tools, then, is not direct evidence of a reflective, logically-predictive modeling system. Tools may at times be nothing more engaging than the material impacts of any species — the nests of birds or apes, the warning chitters of squirrels, or the howling of wolves. Thus, stone tools may resolve the question of whether a prehistoric population shared our "capacity to Culture" *only* in the context of a refined pattern analysis. If tools become similar to speech from a semiotic perspective, even if the signaling, technological, and thought systems are coevolved, it is difficult to demonstrate the idea that "intellect" should form purely on the impetus of the ability to "name" or "call" or "warn" or "fabricate." Following these arguments, and recognizing the general absence of "signaling behaviors" in archaeological evidence, we emphasize that the presence of a human *Lebenswelt* should be distinctively manifest in the organization of the material record, and especially in the complexity of processes of tool production and use.

For, at the beginning, when biological consequences following chance events of mutation or gene flow brought together in a population the combination of factors necessary for more efficient, survival-linked, behavioral interactions in the world, these changes *primarily* enabled "semiotic" reflections in the form of "the argument" and only secondarily enabled sharing through signaling systems or technological conformity. There must have been a time when "semiotic reflection" was possible, while still largely absent from the manifest hominid behavioral repertoire and secondary to pragmatically direct interactive behaviors. Such a time would be the period of the "emergence" of anthroposemiosis, the

capacity to *Lebenswelt*, the capacity to create cultural difference, and the imminent arrival of the capacity we call *semiotic*, as reflective upon "shared" experience. Tool making and indexical use of symbols (population-specific calls), as they appear in many contexts, are more comparable to the behaviors of other hominoid species from a *zoösemiotic* point of view.

What would follow this emergence would be an expansion of a new, highly adaptive, population and an almost immediate elaboration of the content of its behavioral productions into distinctive, recognizable patterns. We would expect to see a system evolved to allow greater adapted efficiency that would produce local variants, and to the extent it exapted the variants into signaled expressions, codify the newly-achieved patterns of *Lebenswelt*. We believe that the underlying cognitive element in this transformation involves the shift from a primarily "holistic" means of processing information to a more "analytical" mode of processing, a mode consistent with both the step-by-step production of tools and the sequential nature of vocal calls serving symbolic associations (Dunn et al. 1992; and for similar arguments identifying expanded analytical processing to *Pan troglodytes* see Fouts and Waters 2001; Fouts and Jenswold 2002). These are all capacities we see widely, if mainly incipiently, in the animal kingdom (including the use and juxtaposition of symbols), but they are brought to a new synthesis by physiological changes, as well as feedback from patterns and units of the signal system itself. In our view, this later evolution of capacities is tied to a foundation of much earlier adaptive processes, some of which are unique to the hominidae and others more widely shared among the hominoidea. Let us consider the most foundational of these changes with respect to the hominidae, bipedal locomotion and expansion of the hominid brain.

4. Bipedalism and the brain

Efficient bipedal locomotion goes back at least 2.5 million years — the Pliocene-Pleistocene boundary — and extends back in less efficient forms to at least 5 million years.[5] The early bipeds in Africa illustrate one of the general trends of higher Primate evolution. They became differentiated into small and large bodied variants. The large-bodied forms died out at the mid- to late-Pleistocene, while the small-bodied forms appeared to be in the group of lineages that gave rise to the genus Homo. While the cranial development of these Australopithecine hominids was not beyond that of the modern apes — about 500cc brains in adults — the postcranial skeleton is comparable to humans in possessing a substantial

upright posture complex. This establishes that upright posture and pelvic modifications preceded enlargement of the hominid brain.

Upright posture in the Hominids restructured the pelvis into box-shaped form that has the effect of closing down the birth canal. Human osteology shows that one of the strong traits used in identifying sex among efficient bipeds is the greater sciatic notch of the Ilium, which keeps the birth canal somewhat more open in females, counteracting the much more prominent trend toward pelvic closure. This is a compromise with upright posture that enables a slightly more developed infant — that is, an infant with a slightly larger brain mass at birth than otherwise would be possible. Human and chimpanzee absolute fetal growth is roughly comparable at term, although the chimp already has erupting incisors and human cranial capacity already approaches small hominoid limits. The human, however, still has substantial brain growth and muscular development to achieve after birth, while the chimpanzee is born with much greater motor ability, reflecting major differences in the early timing of ontogeny. The slowed maturation process in the human accommodates later neural development (through the processes of synaptogenesis and myelination) that radically expands the brain after birth, but at a cost of early infant independence. This slowed ontogeny, a ''tolerative adaptation'' allowing greater neurological complexity, is often referred to as neoteny (Clark 1971 provides discussion of tolerative adaptations for several functional complexes in Primate evolution).

When we compare the famous ''Taung child'' (an A. africanus of perhaps three years of age) and a chimpanzee of presumed similar age, though we see in both a prognathic face and a less prominent cranial vault than in a human infant, there are some important differences. The proportions, general brain size, and several other features of the Taung specimen mark it clearly as a hominid — that is, as a member of a prominently bipedal species. We also know that the chimpanzee newborn will be much less comparable to a human infant within a few months, quickly attaining substantial motor skills. Though the brain of the human fetus is larger than either an australopithecine or a chimpanzee at birth, it still has yet to achieve a large part of its overall surface area growth and synaptic development. Some recent work in hominid genetics suggests that the actual difference in the human and chimpanzee genome is very small, and that the cognitive qualities in the two species emerge from vast differences in the quantity of neurons (see Sapolsky 2006). Such a generalization reinforces the idea that the differences among these related species involve timing of processes and genetic ''switches'' controlling an otherwise generalized neuronal growth process. Critically important, the trend to larger brains in the context of upright posture, from this point of view,

does not require the emergence of complex new kinds of neurons or specialized tissues. This certainly supports the "continuity arguments" for hominoid-hominid development of communication capacities, grounded additionally by behavioral evidence that is highly consistent with zoösemiotic approaches to animal capacities (see Fouts and Waters 2001; Fouts and Jenswald 2002).

Viewing the general size and size-range development of the Hominid brain, we see that there has been approximately 1000cc overall increase in adult brain volume since the time of the australopithecines. The first documented jump in size away from the Hominoid pattern came with *Homo habilis* some 1.8 million years ago, and it is appropriate for us to ask why this increase occurred. We suggest that the pelvic narrowing associated with upright posture had the effect of creating several simultaneous adjustments in the nervous systems of the populations leading to the genus Homo. First, there would have been at least moderate fetal-maternal incompatibility for all of the early bipeds, resulting in more premature births. Premature infants would have had less-developed motor abilities, and thus would have presented a major problem for the adults in the population. We know that modern gorillas and chimps remain dependent upon the mother for at least two years, but these young have well-developed motor abilities. If premature infants were motor-deficient for a long period of time, they would require greater attention and care from the adults.

There are two solutions for this problem of premature birth. One is a general increase in body size, thus producing an absolutely larger birth canal that counteracts the problem — this was the adjustment of the populations that became *A. robustus*, as well as probably for the genus Homo shortly after its emergence.[6] The second solution is also a general primate trend — under stress all primates have tended toward more complex nervous systems. In this case, a larger mass of cerebral cortex in adults would accommodate the cooperation and learning processes supportive of caring for premature infants. This would be exceptionally important, since the large-bodied Hominoid forms already had the number of offspring reduced to single infant gestations of long duration. The requisite post-natal care also slowed population replacement, so survival of infants became a major element of the demographic system. Such a situation is suggested by the very slow population growth of the entire Paleolithic.

Of course, this adaptive response of acquiring a larger brain only exacerbates the problem of pelvic disproportion. The balance between optimal cranial size at birth and the architecture of the pelvis, we believe, pushed the lineage into a deviation-amplifying adjustment of the

maturation cycle. The "problem-solving" trend for greater cortical mass might mean using more of the incipient neurons of the general hominoid brain in a sculpting process wherein neuronal attrition proceeds rapidly in tissues lacking synaptic elaboration (see Nelson and Luciana 2001: 3–44). But the number of problems involved in linking capacities to tissues is much more complex, involving "multifocal" neuronal circuits more than "function-specific" neuronal populations (see Lieberman 2002: 38–40 and 46–47).[7] Relevant to this discussion it is apparent that the hominid brain creates more neurons than other higher Primates during early fetal development, within a generalized nervous-system ontogeny involving relatively unspecialized mass reproduction of neuronal tissues (see Sapolsky 2006). Also, as Roger Fouts has observed, tissue assymetries in chimpanzee brains (Pan troglodytes) suggest homologous structures to Broca's and Wernicke's areas, as well as for the angular gyrus, reinforcing the idea that such structures are at least as incipient in the hominoid evolutionary grade, and potentially supportive of different but related species-specific capacities of cognitive processing (Fouts and Waters 2001). While subcortical tissues may also be important to language functions in humans (see Lieberman 2002: 40), this does not belie the service Broca- and Wernicke-like cortical structures may serve to complex sign functions in higher Primates.

The general effect of these adjustments was a continuing neoteny reflecting several tolerative adaptations that expanded the lifespan, increased body size, slowed ontogeny, readjusted the points of birth and sexual maturity in the populations, and greatly expanded the period of post-natal neuronal development, and hence, the intensive care by adults during infant/child phases of development. Thus, rather than upright posture being a response to gradual increases in cognitive potential, we see the brain increases among early hominids as a response to the constraints of the irreversible upright posture commitment. This cycle of events, we believe, resulted in the enhanced "modeling" capacities of the later genus Homo, capacities that are foundational to anthroposemiosis and the abilities that would later refocus the human mind on its secondary linguistic medium, a reflexive evolutionary development in which the cognized reality of the animal (the *Umwelt*) is adjusted by the behavioral and signal system it enabled (language) into a shared variant of species-specific experience (*Lebenswelt*) whose material consequences in the world are repeated, reinforcing "signs" of that experience. In short, *we became "cultural" beings as a secondary consequence of our premature infants.*

Our broader zoösemiotic argument with respect to infant care and ontogeny, we believe, should also account for demonstrated semiosic capaci-

ties in the great apes, abilities that remain somewhat behaviorally incipient in the wild, but that appear to parallel human symbol manipulation (language-C) in captive populations, and that also suggest capacities paralleling our language (M) abilities. We suggest this based upon the extended infant care necessary for these species, as well as the wide range of ethological and captive population observations that support the natural abilities for imitative learning, problem solving, and direct symbolic communication (among the general works, especially see Goodall 1986; Fouts 1997; Savage-Rumbaugh 1986; Savage-Rumbaugh et al. 1998). The biological foundation of emergent human abilities must take into account the close species parallels, behavioral and genetic, between humans and the African apes, if not also to the wider grade of the hominoidea generally.

5. Stages of hominid cognitive evolution

It has always been clear from gross morphology that brain evolution in the hominidae was at least a two-stage physiological process from the emergence of Homo to *H. erectus*, and then from *H. erectus* to *H. sapiens*. What has been perhaps less clear for many years is that within *H. sapiens* there may have been two, or perhaps even three stages of cognitive or performative development leading to the "modal" human of today. The ambiguous and often reinterpreted status of European Neanderthals reflects inklings of this staged process in different interpretations of the fossil record (see Aiello and Dunbar 1993; Stringer and Gamble 1993; Cunliffe 1994; Johanson and Edgar 1996; Tattersall and Schwartz 2001).[8] Current paleontology is much more open to the idea that there may have been several competing species of the genus Homo, each with different capacities of semiosis and different levels of "cultural" engagement in the world. It is very likely that most of the early fossil forms, especially those outside Africa, are only tangential to the culmination of processes leading to our species. *Homo erectus*, *Homo ergaster*, *Homo heidelbergensis*, and *Homo neanderthalinsis* (or *H. sapiens neanderthalinsis*) are actually sufficiently different in technology to warrant cognitive differentiation from *Homo sapiens sapiens*. And yet some of these and other identified populations in Africa, Asia, and Europe remain part of what was probably a genetically connected population, through cladistic parallels of development at the least, if not through direct sharing of local and regional developments through gene flow.

Viewing technology from a semiotic perspective, we are prepared to offer some direct parallels between developments in stone technology and

general sign capacities foundational to "language" in its communicative sense. Studies of technology suggest that in Europe and Africa the late "archaic" Homo sapiens and Neanderthal populations, possessing very late Achulean, Mousterian, and even Chatelperonean technology, used *technological equivalents* of symbolic rhemes (or "words") and dicent symbols, or the immediate juxtaposition of symbolic rhemes to form propositions (Prewitt and Haworth 2004). We base this in part upon the excellent work by Steven Kuhn (1995) on reduction processes in Mousterian lithic technology, and in part on a more general appreciation of the distinction between Achulean, Mousterian, and Aurignacian technologies. The idea behind this claim is that Mousterian tools, to focus on the most representative of the middle Paleolithic technologies, link visual/material forms to behavioral functions in at least partially "conventional" ways. That is, the user of the tool (like the later archaeologist) could look at the form and make the connection to a function, as opposed to seeking the "form" (or edge characteristic) on a multi-purpose tool. The association is also suggested in the production process that aligns certain edge and shape constellations to particular functional uses, beginning with a process selection of a flake blank conducive to the desired shape and edge. The overall process evinced by the artifacts is one involving multistage analytical cognitive processes similar to those at work in the unfolding of a simple sentence.

The remarkable changes in technology we see with Mousterian tools, dating from perhaps 120,000 to 40,000 years ago, are also notable in that they represent the transition between the Lower and Upper Paleolithic. The most interesting thing about these tools is the sense in which the reduction process is aimed at producing particular "shapes" and "kinds" of flakes that are then turned into functional tools of different types. This shape-to-function correlation is a major shift away from the "Achulean army-knife" approach of the Lower Paleolithic. First, it is more technically efficient because it produces more cutting edge from a piece of material, thus conserving resource. The tools also show an overall production process of much greater consistency and complexity. Most important from our point of view, is the evidence that a knapper could "read" the results in the knapping process and change strategy for achieving particular results. This staged production process, which we know characterizes stone technology from the Upper Paleolithic on in ways that precisely parallel language, calls for greater intentionality and "linear" cognitive focus of the knapping process while also taking advantage of accidental production of desired results (for a cognitively grounded exposition of this generalization, see especially Young and Bonnichsen 1984).

Of course, there are precursors for the Mousterian tool functions in the Achulean hand axe, but the Mousterian knapper did not have only one primary "form" upon which prepared edges and evidences of use would be associated as work progressed. Neanderthals made a "tool kit", meaning also that to accomplish a job they would seek or create a specific tool shape and edge. In effect, the implicit "propositions" entailed in the attributes of the Achulean axe were divested into separable units, and so the tool's "propositional" value in an instance of usage was specific, and apparently somewhat fixed. Mousterian tools are more explicitly like "words" than were their Lower Paleolithic counterparts. In context, such functional classes offer us very direct insights into how work was accomplished.

Thus, Mousterian tools show us two things we have not encountered in earlier technologies: (1) hierarchic linear processes, and (2) logical types (forms, symbolic rhemes) elevated to an association of functions to create incipient propositions (dicent symbols). A "user" of a particular "tool" (as we say, the "right" tool) is acting out the proposition created by the tool's attributes in relation to what it can accomplish. Production of a differentiated tool kit has strong implications for the analytical cognitive processing abilities of the animal.

But technology also suggests, and we have argued elsewhere (Prewitt and Haworth 2004; Haworth 2006; Haworth and Prewitt 2006), that the elaborations of technology, art, and other material patterns of *Homo sapiens* during the Upper Paleolithic, sometimes living essentially alongside Neanderthal populations, shows a very different quality of mind from both earlier species and from the populations who followed in the later stages of the Upper Paleolithic (after about 20,000 BC), Mesolithic, and Neolithic. Working with the earlier populations, Mithen (2006: 233) has come to very similar conclusions as ours based upon cultural and neurophysiological evidence.

When we graph elements of technology directly onto the system of Peircean categories, we discover in the process elements of the sign system we are studying and the ways we study it. From individual attributes, incidental or selected, we encounter logical "types" defined by constellations of features, differential signs of use and production that themselves fall into patterns or classes, and finally signs of use or function. A tool is not a "proposition" until it is picked up with intention, in the same sense that a word does not "mean" any particular thing until it is placed in a context, but in archaeological or living contexts, tools may be read as propositions about action sequences or intention in patterned motor behavior (Young and Bonnichsen 1984: 21–87). Moreover, to understand the "took kit" as a system of differentiated functions and processes is to

enter into the propositional nature of the technology. As the complexity of tools increases, including manufacture of compound tools from diverse materials, so also the elaborations suggest more than simple imitative modes in the learning of craft (see Mithen 1996: 208–216). What happens very soon after the inception of the Mousterian tradition, is that stone tools become "styled" within families of styles, offering signs of "convention" and the opening to all the symbolic complexity of our world. There is also evidence that the Neanderthals do not participate in this further technological elaboration, or even in the full genetic development leading to *Homo sapiens* (see Tattersall and Schwartz 2001: 207–209, 219; also see Mithen 2006). The stylistic explosion of the Upper Paleolithic, beginning with the Aurignacian and Magdalenian developments, is a speciation or replacement event with major cognitive implications. Specifically, arbitrary elaborations in stone tools beyond functionality indicate another important cognitive transition which, though it is undoubtedly of at least cladistic association with the physiology that produced the Mousterian, presents an even more richly complex behavior accompanied by clear physiological differences.

A key question about all of this technological transformation remains. At what point, and under what biological influences, does "semiotic capacity" emerge? Is there anything in the archaeological record that suggests more precise relationships of timing and capabilities for the genus Homo on the eve of physiological modernity. "Semiotic" consciousness, among other marvels, offers the ability to take experience through signs, reorganize it through signs into make-believe alternatives or potentials, and knowing that they are make-believe, act on those understandings as though they were real. It is the basis of myth, theory, and tradition. At what point do we step away from our Hominoid cousins and begin to negotiate life habitually through symbolic arguments, models, stories, myths, and empirical processes, all of which have become what anthropologists have called our "exosomatic" means of adaptation? At what point does the *Lebenswelt* emerge as the distinctive quality of our species?

6. Semiotic unfolding

We have discussed elsewhere the extraordinary similarity of Upper Paleolithic cave art and the artistic productions of autistic savants, and the cognitive implications of this similarity for the evolution of language (see Haworth 2006, 2007; Haworth and Prewitt 2006). Out of this work, we contend, regardless of the specific variations in the connections that may genetically occur in the human brain, that one aspect of autism is a more

holistic mode of brain functioning, and that this mode of functioning has something in common not only with other Primate species, but with our immediate ancestors. We are certainly not suggesting that Paleolithic people were autistic — instead, we are arguing that there are signs of holistic brain function that suggest an absence at least of habitual or dedicated verbal language in the experience of these people. But a brain allowing, or perhaps allowing emphasis of analytical functions over holistic processing is precisely the kind of organ that could ultimately give rise to the human *Lebenswelt* as Deely defines it, in the context of a communication system derived from the modeling capacity. Indeed, given the other indications of complex structure in technology and motor behavior, as well as physiological changes in the *Homo sapiens* brain supporting Aurignacian and Magdalenian cultures, we believe the authors of the cave art were cognitively capable of verbal language, and even used it to a limited extent. Very plainly, we think there was a stage where the human mind, though capable of constructing logical arguments in thought, did not extend this rational behavior to *habitual* use of speech.

In linguistic terms, we call this emergent level of capacities Language I (or human *Umwelt* without *Lebenswelt*).[9] This resulted in a brain still free to emphasize other important environmental interests. This is why, we argue, we encounter the extraordinary visual and technological manifestations of the Upper Paleolithic archaeological record — both the early stages of specialized stone technology and cave art. The Aurignacian is, for us, the "dawn" of semiotic consciousness, without those special abilities being exapted into a full-blown verbal expression of symbolic modeling. However, just as the Neanderthals and Mousterian culture represent a short phase of physiological transition — a step in a biological punctuated equilibrium process — the Cro-Magnon emergence and Aurignacian culture evidently represent an even shorter adjustment of cognitive style to the new brain physiology. From the Magdalenian period (18,000–10,000 BC) on through the Mesolithic to the beginnings of the Neolithic, we see progressive elaboration of technology moving toward plant cultivation, and simultaneously the establishment of narrative art executed in the form of abstracted, almost stick-figure representations (cf. Haworth 2006, figures 1–5 and 14–16; also see Rudgley 1999). In the later art, which may be easily represented by works from the early Neolithic period in the Spanish Levant (see Beltrán 1982), we encounter human figures hunting, dancing, and engaged in other activities. We see animals being hunted and killed. We encounter representations that depict "what is known" rather than what is a direct visual experience. There can be little doubt from these evidences that what we are viewing is "human" in the sense we experience humanity, that spoken language (Language II) is

dominating the brain functions, and that "shared culture" is now structuring the lives of diverse communities. With the later Upper Paleolithic, the *Lebenswelt* has arrived, and the human animal is realizing its species-specific potential.

We arrive, then, at a proposed sequence for the evolution of "language" based in the Doctrine of Signs and empirical studies of cognition, brain physiology, the fossil record, and paleo-technology:

1. (5M–2M) Separation of a small-bodied upright biped whose pelvic size provided the "kick" for a major nervous system expansion for its descendants in the genus *Homo*.
2. (2M–1M) An accommodation of bipedal, large-brained adaptations through increased body size, supported by a combination of cooler Pleistocene weather, social organizational changes, and a protein-rich diet.
3. (1M–175,000) Dispersal of the successful and genetically variable lower Pleistocene hominid population accompanied by differentiations of many small populations, with gene flow supporting some locally unique nervous-system adaptations enhancing natural Hominoid tendencies to symbol use, but producing highly variable sign capacities from population to population.
4. (175,000–35,000) A transformation in some populations, originally in Africa but ultimately expanding into Europe and Asia, to more linear and hierarchic technological processes reliant upon the use of tools, and likely manual symbols plus some conventional vocal symbols, deployed in limited combinations as "propositional" behavior. This stage involved brain expansion supporting various symbolic modeling functions in the emerging cognitive system. Neanderthals represent only a part of this general "Archaic *H. sapiens*" development, but are a population that clearly displays through technology some of the foundational cognitive developments necessary to, but not sufficient for "language" as the term applies to *H. sapiens*.
5. (40,000–20,000) Emergence of a restructured brain capable of verbal exaptation of propositional behavior into a signal system and reflecting shared "semiotic consciousness". The population may have relied upon basic speech forms (Language I), but still appears to not be specialized for habitual language use.
6. (20,000–present) The gradual habituation and elaboration of the brain to accommodate verbal expression of semiotic consciousness, involving the full-blown emergence of spoken language, language diversification, development of elaborate traditions, aesthetic abstraction and elaboration, and other cultural elements consistent with

ourselves (Language II). With this stage we see the beginnings of cultural differentiation we have identified with the *Lebenswelt*.

7. We offer yet a final stage, which may go back as far as Language II itself (and according to Marija Gimbutas certainly does), wherein the coevolution of physical symbols, sometimes derived from icons, are a major manifestation of cultural developments. We tend to think of "writing" as coming much later in time, but there is growing evidence that writing in various forms goes back to perhaps 10,000 BC, and that the symbols associated with writing are likely much older (see Rudgley 1999: 72–85). We offer this last note because it is consistent, we believe, with the general premise that there is a coevolution of verbal signals, other behavioral signals, and technologically produced patterns that take on symbolic significance for groups.

7. Conclusions regarding Deely's ambiguity, zoösemiotic, and language

Recognizing that our argument is a rather conservative one within the general field of Hominoid communication studies (after all, we are not giving "human language" in any sense to Neanderthals, much less to *Pan*, *Gorilla*, or *Pongo*), we should note that it has become a somewhat radical one within semiotic circles. The tendency of semiotic scholars to reserve "language" for *Homo sapiens*, and perhaps a few of our immediately antecedent species is very strong. What we have attempted, drawing substantially from Deely's ambiguity in dealing with language and his innovation with respect to *zoösemiotic*, is to tease out a middle ground that posits a close semiosic relationship between the cognitive underpinnings of all of the Hominoidea, and a precise notion of "language" within that group as the name for a family of species-specific exapted signal systems, all richly symbolic, accommodating the intra-specific (and sometimes inter-specific) sharing of experiences through whatever sign capacities each species possesses. It goes without saying that we will not be discussing Peirce, Poinsot or Deely with a chimpanzee any time soon (that is difficult enough to do among humans). Yet the full richness of our understanding of the communication behaviors of other species, especially within the mammalian orders, should not be delimited by a Cartesian prohibition against the idea of shared capacities among closely related species. What is clearest, when we view the physiology of the brain, is that there is no particular reason to posit some extraordinary or miraculous difference that accounts for anthroposemiosis, and on that basis there is no reason to exclude something close to anthroposemiosis as the cognitive ground for Hominoid behavior generally.

Notes

* A preliminary version of this paper was presented by Karen Haworth at the annual meeting of the Semiotic Society of America, Purdue University, October 2006. This much-expanded version also includes material developed for the SOAN Lecture, College of St. Mary's, Maryland, in March of 2006.

1. Deely (2001: 115, 134, 155, 182, 203) discusses influences of pagan Neo-Platonism and Latin language on Greek perspective, and ties this to the whole notion that the "language in which philosophy is conducted" may have influenced the definitions and expressions of the ideas. He also discusses impacts of modern language philosophies (2001: 491–492), and mathematical approaches to the language problem (2001: 523).
2. Throughout this discussion, we shall consistently distinguish between the two senses of "zoosemiotics" — first, the original sense of the term, characterized in the work of Thomas Sebeok (1986), referring to the study of animal signal systems and represented by the unmarked word; and second the sense provided in the elaborations by John Deely's more recent work and relating to animal sign capacities (especially 2001), represented by the gloss *zoösemiotics*.
3. For the early semiotic critique of ape-language experiments see Sebeok and Rosenthal (1981); for counter arguments that are most consistent with our own approach (and Deely's *zoösemiotics*), relating to natural-acquisition sign projects with *Pan troglodytes*, see Fouts (1997); Fouts and Waters (2001); Fouts and Jensvold (2002). Other projects and critiques, of variable intention and success, related to experimentally trained and home-trained Hominoids are generally recounted in numerous works, including Terrace (1979); Patterson and Lindon (1981); Savage-Rumbaugh (1986); Parker, Mitchell, and Miles (1999); Terrace and Metcalfe (2005).
4. For a succinct abstract of Peirce's sign classification, see "Logic as semiotic: The theory of signs" in Danesi and Santeramo (1992: 11–28), extracted from primary sources in the large corpus of Peirce papers.
5. Myriad classifications and discussions of hominid development are available. For this treatment we have used as general background, because of their accessibility to non-specialists, the recent work by Ian Tattersall and Jeffrey Schwartz, *Extinct humans* (2001), and the excellent synthesis of some key fossils by Donald Johanson and Blake Edgar, *From Lucy to language* (1996). We also provide occasional more specific technical citations relating to particular points made along the way.
6. One of the type specimens of Homo ergaster, dated at 1.6 million years ago, suggests an adult height well over five feet. Beyond Homo habilis, most of the fossil hominids are comparatively larger, an adaptation that may have occurred also to accommodate climatic changes (see Johanson and Edgar 1996), especially global cooling of the Pleistocene.
7. Philip Lieberman's synthesis of issues involved with neurophysiology and function relative to human language is a necessary ground for any zoosemiotic discussion of potentials for various kinds of sign use among the Hominoids.
8. We also encourage our colleagues and students to read, or re-read William Golding's provocative novella, *The inheritors* (1955) an early literary reflection upon the relationship between Neanderthals and Homo sapiens that, in spite of some of its dated descriptors, nicely explores the notion of a species on the brink of "language."
9. Let us note that Marcel Danesi's view of the evolution of language, based upon Giambattista Vico, offers a similar staged representation of the formation of semiosis, involving two cognitive levels and four chronological stages (see Danesi 1992: 106). While the particulars of Vico's theory of semiosis are different in purpose, they functionally relate well to the general process of language evolution we are suggesting here.

References

Abram, David. 1997. *The spell of the sensuous: Perception and language in a more-than-human world*. New York: Vintage.

Aiello, L. C. & R. I. M. Dunbar. 1993. Neocortex size, group size, and the evolution of language. *Current Anthropology* 34. 2.

Beltrán, A. 1982. *Rock art of the Spanish Levant*, Margaret Brown (trans.). Cambridge: Cambridge University Press.

Bourdieu, Pierre. 1977. *Outline of a theory of practice*, Richard Nice (trans.). Cambridge: Cambridge University Press.

Bouissac, Paul. 1981. Behavior in context: In what sense is a circus animal performing? *Annals of the New York Academy of Sciences* 364. 18–26.

Clark, W. E. Le Gros. 1971. *Antecedents of man*, 3rd edn. Chicago: Quadrangle.

Colapietro, Vincent. 2006. Nature, history, and norms: Peirce's postmodernism in light of deely's narrative. Paper presented in the ''Four Ages'' session of the Semiotic Society of America, Purdue University, October.

Culler, Jonathan. 1986. *Ferdinand de Saussure*. Ithaca, NY: Cornell University Press.

Cunliffe, B. 1994. *The Oxford illustrated prehistory of Europe*. Oxford: Oxford University Press.

Danesi, Marcel. 1992. Giambattista Vico: Signification as metaphor. In M. Danesi & D. Santeramo (eds.), *Introducing semiotics: An anthology of readings*, 95–111. Toronto: Canadian Scholars' Press.

Danesi, Marcel & D. Santeramo (eds.). 1992. *Introducing semiotics: An anthology of readings.* Toronto: Canadian Scholars' Press.

Deely, John N. 1982. *Introducing semiotic: Its history and doctrine*. Bloomington: Indiana University Press.

Deely, John. 2001. *Four ages of understanding: The first postmodern survey of philosophy from ancient times to the turn of the twenty-first century*. Toronto: University of Toronto Press.

Dunn, B., D. Dunn, D. Andrews & M. L. Languis. 1992. Metacontrol: A cognitive model of brain functioning for psychophysiological study of complex learning. *Educational Psychologist* 27(4). 455–471.

Eco, Umberto. 2002. *Baudolino*. New York: Harcourt.

Fouts, Roger. 1997. *Next of kin: What chimpanzees have taught me about who we are.* New York: William Morrow.

Fouts, R. S. & M. L. Jenswold. 2002. Armchair delusions versus empirical realities: A neurological model for the continuity of ape and human languaging. In M. Goodman & A. A. Moffat (eds.), *Probing human origins*, 87–101. Cambridge, MA: American Association for the Arts and Science Press.

Fouts, R. S. & G. Waters. 2001. Chimpanzee sign language and Darwinian continuity: Evidence for a neurology continuity of language. *Neurological Research* 23. 787–794.

Golding, William. 1955. *The inheritors*. New York: Harcourt, Brace &World.

Goodall, Jane. 1986. *The chimpanzees of Gombe: Patterns of behavior*. Cambridge: Harvard University Press.

Haworth, Karen A. 2006. Upper Paleolithic art, autism, and cognitive style: Implications for the evolution of language. *Semiotica* 162(1/4). 127–174.

Haworth, Karen A. 2007. Cognitive style and zoosemiotics. In Stacy Monahan, Ben Smith & Terry Prewitt (eds.), *Semiotics 2004/2005*, 78–87. Ottawa: Legas.

Haworth, Karen A. & Terry Prewitt. 2006. Semeiotic, the evolution of anthroposemiosis, and the meaning of ''language.'' Paper presented to the Southern Anthropology Society in Pensacola Beach, Florida.

Husserl, Edmund. 1970 [1936]. *The crisis of European sciences and transcendental phenomenology: An introduction to phenomenological philosophy*, David Carr (trans.). Evanston: Northwestern University Press.

Johanson, Donald & Edgar Blake. 1996. *From Lucy to language.* New York: Simon and Schuster.

Koehler, O. 1956. Thinking without words. In *Proceedings of the XIV International Congress of Zoology*, Copenhagen, 75–88.

Kuhn, Steven L. 1995. Mousterian Lithic technology: An ecological perspective. Princeton NJ: Princeton University Press.

Lieberman, Philip. 2002. On the nature and evolution of the neural bases of human language. *Yearbook of Physical Anthropology* 45. 36–62.

Mithen, Steven. 1996. Social learning and cultural tradition: Interpreting Early Paleolithic technology. In James Steele & Stephen Shennon (eds.), *The archaeology of human ancestry: Power, sex and tradition*, 207–229. New York: Routledge.

Mithen, Steven. 2006. *The singing Neanderthals: The origins of music, language, mind, and body.* Cambridge, MA: Harvard University Press.

Nelson, Charles A. & M. Luciana. 2001. *Handbook of developmental cognitive neuroscience.* Cambridge, MA: MIT Press.

Parker, S., R. Mitchell & H. L. Miles. 1999. *The mentalities of gorillas and orangutans: Comparative perspectives.* Cambridge: Cambridge University Press.

Patterson, F. & E. Lindon. 1981. *The education of Koko.* New York: Holt, Rinehart & Winston.

Peirce, Charles S. 1982–2000. *Writings of Charles S. Peirce: A chronological edition*, 6 vols., Peirce Edition Project (eds.). Bloomington & Indianapolis, IN: Indiana University Press. [Reference will be designated *W* followed by volume and page numbers.]

Pike, Kenneth. 1971. *Language in relation to a unified theory of the structure of human behavior*. The Hague: Mouton.

Prewitt, Terry & Karen Haworth. 2004. The minimal conditions of ''argument'': Semiotics of paleolithic technology, animal tool use, and ape signing in relation to human language origins.'' Paper at the annual meeting of the Southern Anthropological Society in Decatur, Georgia.

Rudgley, Richard. 1999. *The lost civilizations of the Stone Age.* New York: Free Press.

Sapolsky, Robert. 2006. The 2% difference. *Discover* (April). 42–45.

Saussure, Ferdinand de. 1976 [1906–1911]. *Course in general linguistics*, Wade Baskin (trans.). New York: McGraw Hill.

Savage-Rumbaugh, E. S. 1986. *Ape language: From conditioned response to symbol.* New York: Columbia University Press.

Savage-Rumbaugh, S., Stuart Shanker & Tylor Taylor. 1998. *Apes, language, and the human mind*. Oxford: Oxford University Press.

Sebeok, Thomas A. 1986. The notion of zoosemiotics. In John Deely, Brooke Williams & Felicia E. Kruse (eds.), *Frontiers in semiotics*, 74–75. Bloomington, IN: Indiana University.

Sebeok, Thomas A. & Robert Rosenthal (eds.). 1981. *The Clever Hans phenomenon: Communication with horses, whales, apes, and people*. New York: New York Academy of Sciences.

Stringer, C. B. & C. Gamble. 1993. *In search of the Neanderthals: Solving the puzzle of human origins*. London: Thames & Hudson.

Tattersall, Ian & Jeffrey Schwartz. 2001. *Extinct humans.* New York: Westview.

Terrace, H. 1979. *Nim.* New York: Random House.

Terrace, H. & J. Metcalfe. 2005. *The missing link in cognition: Origins of self-reflective consciousness.* New York: Oxford University Press.

Uexküll, Jakob von. 1926. *Theoretical biology*, D. L. Mackinnon (trans.). New York: Harcourt Brace.
Wilden, Tony. 1981. Semiotics as praxis: Strategy and tactics. *Recherches Sémiotiques/ Semiotic Inquiry* 1(1). 1–34.
Young, David E. & Robson Bonnichsen. 1984. *Understanding stone tools: A cognitive approach*. Orono: University of Maine.

Karen Haworth (b. 1953) is an independent scholar ⟨tprewitt@uwf.edu⟩. Her research interests include language evolution, autism, savant syndrome, and human cognition. Her publications include "Autism and the origins and development of language" (1999); and "Cognitive style and zoosemiotics" (2007).

Terry Prewitt (b. 1945) is a professor at the University of West Florida ⟨tprewitt@uwf.edu⟩. His research interests include semiotics, text analysis, critical theory, ethnography, and evolution. His publications include *Religious violence and abortion: The Gideon project* (with D. Blanchard, 1993); "Small world" (2001); "Introduction: The big house described" (2002); and "Themes in dynamic affirmations of culture" (2005).