

The evolution of talk and the emergence of complex society

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Introduction

The goal of this article is to reconsider explanations for the emergence of complex society in light of recent theories that separate the format of language or the 'way we talk' from the evolution of language per se (Stokoe 1996: 357–360; Armstrong 1983: 60–69). In the following sections, we will explore the following line of thought: Once language per se evolved through the medium of manual brachial gesture (hand talk), social selection favored the addition of vocal gesture (speech talk). This addition was complete with the appearance of *Homo sapiens*. However, this addition did not entail a transition to purely spoken languages (speech alone talk). Recent anthropological studies of native sign systems reveal traditions exhibiting both hand and speech talks, which suggests that speech talk may not have immediately replaced hand talk with the emergence of anatomically modern humans. Rather, a combination of these two ways of talking (hand speech talk) could have been the cultural product of the Late Pleistocene addition of speech talk to hand talk.

Looking at an imaginary time line for the format of language, with hand speech talk moving out of the Late Pleistocene and speech alone talk moving back from the present, we may propose a transition from one to the other sometime in human prehistory. Since historians have already associated changes in social organization with technical changes in communication and transportation (McNeill 1964: 13–15), we may look for a past change in social organization that would correspond to this technical transition in the format of language. The change from hand speech to speech alone talk was technical (or cultural) because no physiological or anatomical alterations were involved. Manual brachial gestures were simply marginalized or dropped altogether from traditional discourse. Since band level society remained the predominant mode of social organization from the first appearance of modern humans through

the start of the Developed Neolithic, the transition from hand speech to speech alone talk could be associated with the appearance of the earliest complex societies.

Semiotics provides one basis for an association between this transition in the way humans talk and the emergence of complex society. The semiotics of hand speech and speech alone talk differ significantly. A transition from one system to the other changed the speaker's *Lebenswelt*. The new *Lebenswelt* made new forms of social organization possible. We propose that hand speech talk constituted a semiotic system that favored the maintenance of band level society. In contrast, speech alone talk constituted a semiotic system that, compared to hand speech talk, reduced lower order social constraints stabilizing band level society and lowered the costs of higher order controls. Thus, the emergence of complex society may have been potentiated by the adoption of speech alone talk.

In addition, this cultural change would follow certain dynamics. A few sites could have initiated the transition to speech alone talk. This transition could have spread to hand speech talking cultures through contact, driven by marginal differences in wealth and power. Consequently, we should see patterns in the archaeology of the Early and Developed Neolithic that are consistent with the proposed transition.

The above line of thought is necessarily speculative simply because it will inspire professionals in a wide variety of disciplines to review published data and concepts from a new angle. The proposal that hand speech and speech alone speaking cultures participate in different semiotic systems is not new. Placing the difference in the context of human prehistory is not. Once we acknowledge that humans evolved in cultures talking in hand alone talk and that hand speech talking cultures were the ways of life for anatomically modern humans until the beginning of the current interglacial, we will begin to aesthetically appreciate the radical differences between the evolving, prehistoric, and historic worlds of experience. With the adoption of speech alone talk, our recent ancestors changed the dynamics of human evolution.

Separating the evolution of language from the evolution of talk

Thomas A. Sebeok identified many of the themes invoked by theories drawing a distinction between the evolution of talk and the evolution of language:

Modern man, like all our animal ancestors, communicates routinely and very effectively by means of ... motor signs, some of the latter being encoded in the

acoustic channel; and a subset of these signs is produced vocally. Language — or more precisely, grammar — a mute primary modeling system lodged in the brain, began, ... to emerge about three million years ago, in the australopithecine hominids. The device was surely present in *Homo habilis*, who appeared, rather abruptly, about two million years ago, with an increase in brain volume from 500 to 750 cc. Again, rather swiftly, only half a million years later, *Homo erectus* showed up, with 900 to 1,300 cc in cranial capacity.

One must assume that speech encoding and speech decoding abilities, i.e., the production of language in a vocal mode, in linear form, and its corresponding auditory reception, were developed and somewhat refined by about 300,000 years ago, with the arrival of an early form of *Homo sapiens*, boasting a 1,400 cc brain. In other words, language, as a primary modeling system, which conferred massive advantages for survival, then acquired additional social advantages, but much later in human evolution. (Sebeok 1985: 36)

In 'Gesture and the nature of language', David F. Armstrong and William C. Stokoe of Gallaudet University and Sherman E. Wilcox of the University of New Mexico (Armstrong et al. 1995), presented a comprehensive case for the early evolution of our language faculties through sign. That is, the primary modeling system that Sebeok identified evolved within the format of manual-brachial gesture (1995: 223). The reason why language became essentially spoken (as it is today) was explained in terms of the technical advantages of vocal over manual-brachial gesture (1995: 232).

Speech talk has been practiced since the earliest appearance of anatomically modern humans. Anatomical reconstructions of the vocal tracts of hominid fossils suggest that the human larynx is lower than expected from the standard primate anatomical plan (Lieberman 1991: 53–77). In addition, humans are capable of rapidly decoding speech through discrete categorization (1991: 57–63). This combination of vocal tract reorganization and universal perceptual trait indicates that speech talk was practiced by founding populations of *Homo sapiens*. Richard G. Milo and Duane Quiatt (1993: 577) also located the transition to speech in the Late Pleistocene, with the appearance of anatomically modern humans, arguing that the unprecedented increase in the pace of cultural evolution suggests the capacity for rapidly spoken phonemicized language.

The emerging picture is that, once language evolved through the medium of manual-brachial gesture, social selection pressures favored the exaptation of an acoustic mode, which was practiced since the Late Pleistocene. However, if the archaeological record is referenced to the behavior of modern human communities unexposed to Western post-Renaissance culture, the conclusion that speech replaced hand talk in the Late Pleistocene may be unwarranted. Rather, the format of language

could have been similar to native sign languages that incorporate both hand and speech talk.

Aboriginal sign systems

Thomas A. Sebeok and Jean Umiker-Sebeok reviewed Western studies of aboriginal sign languages (1989: 132–134). They found the languages to be representative of a type of semiotic system uniquely qualified to fill a gap in our Western conception of the order of human and animal sign systems. Unlike spoken languages, they are a complex of both natural and conventional sign relations, with iconic and indexal elements outweighing symbolic ones. But unlike animal sign systems, they are learned, open to change, and capable of synthesizing new messages. While hand talk was the focus of interest of the Sebeoks' review, in reality these languages rely on both manual-brachial and speech gestures, here called hand speech talk. Assuming that modern indigenous cultures practicing hand speech talk have more in common with prehistoric than modern Western culture, we may propose that aboriginal sign languages may be remnants and examples of the format of language practiced by humans from the dawn of the species until the advent of purely spoken languages.

The issue in terms of semiotics

Studies in the 1880s of North American Plains Sign Talk pointed out two characteristics of aboriginal sign languages; a highly 'natural' relationship between their signifiers and signifieds, which differed from spoken language, and a semantic openness similar to spoken language (Sebeok and Umiker-Sebeok 1989: 134–140). This conclusion suggests that hand speech talk favored a semiotic system different than speech alone talk while, at the same time, relying on the same grammatical and syntactical abilities (Damasio et al. 1986: 363). That suggestion may be formulated into a hypothesis: The format of language or 'the way we talk' constrains the type of experience evoked by language gesture.

The explanation for why this is so will probably require a combination of semiotics and cognitive psychology. Semiotics is the study of signs. John Deely (1990: 47) stated that 'the actual being proper to a sign is the being of an ontological relation taken into the experience of an organism, whether directly from the biological heritage of that organism (as instinct) or culled from individual experience, where it serves to connect objectively perceptual and sensory elements'. We can identify types or qualities to

these relations. For example, the common grounds of biosemiosis, or natural signs, are icon (quality of similarity), index (quality of symptom and of pointing), and symbol (quality of convention) (Deely 1990: 46). Each of these qualities shares other qualities, like holism, which pertains to icons and indices, but not necessarily to symbols.

Deely's definition calls to mind the field of cognitive psychology. Following the lines of Steven Pinker's thoughts on human cognitive development (1994: 20–24), we may construe that an 'ontological relation taken into experience' is facilitated by innate (instinctual), ready (instinct to learn), learned (once-learned, now automatic, as in grammar and piano playing), or trained (open ended learning and abducting, such as music appreciation) neural networks. These networks are activated by representamens and generate objects of experience. While the networks require training through experience, they are constituted within a neural matrix that is a product of our evolutionary heritage (Tooby and Cosmides 1992: 67–73). As such, many neural networks anticipate regular features of the social or natural environment at the time of evolutionary adaptation.

We may now tentatively propose a mechanism for why a particular way of talking would favor certain experiential qualities by recapitulating, in the framework of talk, Pascal Boyer's explanation for the inter-generational stability of religious representations (1994: 15–23, 73–88). Like religious representations, language gestures inspire conjectures that rely on assumptions that are positively and negatively cognitively constrained. Conjectures and assumptions may be regarded as different levels of 'ontological relations taken into experience'. The generation of a particular conjecture increases the salience (or frequency of recall) of its founding assumption and decreases the salience of other assumptions. The degree of change in salience is weighted by cognitive constraints, so that the more positively and less negatively constrained assumption is more readily reinforced.

Because visual and acoustic language gestures activate neural networks devoted to different sensory modalities, we may expect that the assumptions underlying the interpretation of hand speech and speech alone talk face different cognitive constraints. This difference might be regarded as different weightings to cognitive constraints on assumptions, but it is better expressed as different qualities to the conjectures interpreting a language gesture. Thus, different ways of talking favor interpretants with different qualities, which, in turn, yield different objects of experience. For example, we would expect that hand speech talk would generate qualities similar to natural sign, since iconicity and indexality are readily experienced in the visual mode. Speech alone talk, in contrast, should yield interpretants typical of symbols.

Our goal here is not to detail cognitive mechanisms and constraints that may be associated with the qualities of sign. Rather, our goal is to establish the plausibility of the claim that different formats of language generate different qualities of experience by stimulating different perceptual and cognitive mechanisms.

Furthermore, the objects of experience evoked by a way of talking should influence social perceptions and organization (Tooby and Cosmides 1989: 46–47). Typically, interpretations of self, society, and nature are provided by individuals in a group through ideologies and cultural representations. To re-iterate Pascal Boyer's point, but now on the cultural plane, ideologies and representations are stable because they evoke conjectures (interpretations) that increase the salience of underlying assumptions which are cognitively constrained (Boyer 1994: 84–88). If either assumptions or constraints (or both) are influenced by the qualities of interpretant of intentional signs, then we can associate a way of talking with ideologies of self, society, and nature.

In sum, we expect that hand speech talkers and their supporting communities would exhibit different qualities of sign interpretation and cultural expressions than speech alone talkers and their communities. The next two sections explore these differences.

The semiotics of hand speech talk

Recent studies of the native sign languages of the North Central Desert of Australia (NCD) and of the Plains of North America (P) suggest that holistic and play along qualities characterize the talking experience. We choose to focus on these qualities, instead of the qualities of icon and index, because one can readily imagine that the qualities of holism and play along would favor attitudes and ideologies that bind small communities together.

The pioneering works of Adam Kendon (1988) and Brenda Farnell (1995) emphasized three broad aspects to native sign talk: {status/history}, {social attitudes/application}, and {cognitive/semiotic}. Status/history concerned the present and historical trajectory of the practice. Kendon classified NCD hand talk as an alternate to speech talk (Kendon 1988: 2–6). Farnell viewed Plains hand talk as complementing speech talk (Farnell 1995: 232–238). Were it not for cultural revivals, these combined modality ways of talking (NCDT and PT) would fall into disuse due to the influence of surrounding speech alone talking communities (1995: 302).

In regards to social attitudes/applications, Adam Kendon observed that, in NCDT, use of hand talk and speech talk depends on social context (Kendon 1988: 447–459). Each way of talking affords a unique avenue for personal expression. Hand talk is objective, public, and used for negotiations and ceremonies. Speech talk is subjective, private, and used for social bonding. Each avenue of gesture balances the other in such a way that the group does not eclipse the individual (as might be the case for hand alone talk) or the individual does not take precedence over the group (as might be the case for speech alone). As such, NCDT would appear to facilitate the delicate interactions characteristic of the highly public life of band level society.

The social attitudes/applications of hand speech talk key into cognitive/semiotic qualities. In NCDT, signs formed by the hands can almost be treated as physical objects. In this depersonalized mode, one can speak of the sacred (Kendon 1988: 459). The renowned aboriginal Dreaming has the impersonal objective character of visible sign (1988: 447). These ways of interpreting hand talk and Dreaming point to holistic modes of interpretation where a subjective experience (giving rise to the gesture) becomes an objective experience (the gesture as representamen) and vice versa.

In addition to holism, NCD society exhibits play along qualities. Ceremonies are initiated when the responsible person begins to act out preparations (Kendon 1988: 454). Others determine the occasion of the performance by either joining in or not. This complex interaction plays on the affections and grievances of all, yet transcends these feelings as all begin to play along.

The signing natives of the North American Plains experience similar qualities. Plains Sign Talk (PST), the hand talk element of PT, serves as a reminder, through its own iconic and indexical nature, of communal beliefs such as the spatial/spiritual view of the world as interacting circles (Farnell 1995: 172–189), the egalitarian attitude that each person is a participant (1995: 188–202), and the coincidence of the physical/conceptual and the moral/ethical (1995: 120). These holistic views may be regarded as ideologies (1995: 119–139).

Brenda Farnell related the quality of play along while re-telling a particular story performed by Rose Weasel. As this storyteller spoke in PST, she shifted spatial orientation among several different possibilities, including the four cardinal directions and body coordinate systems, placed the actors in body centered locations, and assumed the roles of various actors in the drama (Farnell 1995: 193–233). The audience was expected to interpret the storyteller's body as a stage, with expanding circles of meaning and with shifting orientations and roles. The listeners

had to play along with the storyteller. Here, the quality of play along refers to a complex fugue of emotive and cognitive interactions where one individual cooperates with another.

Farnell explicitly associated the qualities of holism and play along with the concept of natural signs when discussing the symbolic, iconic, and indexal features of names in PST (1995: 125–133). However, we chose to emphasize the former qualities because of their obvious social implications. These qualities may be reflected on the societal level as ideologies that enhance intragroup cohesion. While recent literature on native sign talk was not written with these particular concepts in mind, this literature permits an appreciation of the qualities of experience fostered by hand speech talk and how those qualities would facilitate band level social cohesion.

The semiotics of speech alone talk

While speech alone talk enjoys some of the qualities of natural sign, it primarily exhibits qualities associated with symbols (qualities of convention and association). The objects of experience generated through convention are qualitatively different than the objects of experience characteristic of icons and indexes. For example, spoken words are not imbued with holistic or play along qualities as consistently as, say, analytical, synthetic, and mechanistic qualities. Regarding the quality of analysis, symbols may be assigned to any portion of a thing, in a manner quite different from the abstraction of iconic sign (Bellugi and Klima 1976: 514–537). Analysis breaks the whole into parts according to either intuitive or prescribed formulas. The synthetic recombination of parts calls to mind the concept of recipe. The quality of mechanism is sensed in explanations of how a recipe works.

Two hallmarks of complex society, rapid technical innovation and hierarchical social organization, are infused with the qualities of analysis, synthesis, and mechanism. Prescientific technological advance in complex societies may be regarded as fooling around with recipes, mainly in the technical and natural history realms (Wolpert 1992: 24–34). In ancient civilizations, recipes were often explained through mystical mechanisms that permitted substantial innovation (Eliade 1978: 52–55). Lewis Wolpert attributed the birth of science to the interplay of analysis and mechanism in a cultural climate open to the proposal of non-mystical mechanisms (1992: 35–55).

Similarly, the experiences of social order expressed in civilized cultures bear the imprints of analysis, synthesis, and mechanism. For example,

philosopher Leslie Stevenson (1987: 9) proposed that all theories of human nature address four questions: Where did the world come from? Where did humans come from? What went wrong? What is the solution? In civilization, these questions have always been answered with analytical, synthetic, and mechanistic ideas that interpret an existing hierarchical, not egalitarian, social order (Voegelin 1952: 27–51). The reason may be due to the semiotics of speech alone, which is based on differences, rather than on natural sign.

There are many ways to compare the qualities of hand speech and speech alone talk. Here, we have chosen to focus on qualities that would find expression in ideologies in order to establish the plausibility of the claim that the semiotic properties of each way of talking constrained assumptions underlying ideologies. Hand speech talk favored interpretants, such as ‘a part represents the whole’, that supported band level social constraints. Speech alone talk supported interpretants, such as ‘the whole is composed of parts’, that had a different psychological and social impact.

The potentiation of complex society

Anthropologists have long debated whether a prime mover could explain the formation of complex society (from band level society) (Wenke 1990: 277–318, 357–364). Irrigation, warfare, population growth, and trade were among the proposed causes of state formation. Rejection of these mechanisms led archaeologists to look for fundamental generators of social complexity, such as the implementation of higher order social controls with the failure of lower order subsystems (Flannery 1972: 399–426). From such a perspective, there are two possible aspects to a prime mover. One, a prime mover could remove social constraints sustaining lower order subsystems. Two, a prime mover could essentially lower the cost of higher order controls relative to lower ones. A prime mover with both facets could have set in motion those various social trends that, in some areas, resulted in early state formation (Wright and Johnson 1975: 267–289).

A transition from hand speech to speech alone talk would have reduced constraints on lower order subsystems (i.e., intragroup cohesion at the village level) and lowered the cost of higher order controls relative to lower ones. The transition would have potentiated the formation of hierarchical social structures, economic specialization, intergroup communication, and other hallmarks of social complexity. However, the transition by itself would not have caused complex society. Consequently, the

transition might be called a prime potentiator. While hand speech permitted complexity to some degree, it constrained development. Speech alone allowed unconstrained development. The earliest evidence of complex society is found in the archaeology of the Developed Neolithic. A review of the archaeology of the Developed Neolithic should reveal trends consistent with this proposal of a transition in the format of human language.

Impact of hypothesis on sign study

Now that the hypothesis has been completely presented, it is appropriate to digress to the present, the start of the twenty-first century, and consider the impact of the hypothesis on current thought. First and foremost, the hypothesis introduces a new context for examining the human condition. A change of sign system potentiated a global transformation from band level to complex societies. The change and transformation may constitute a change in the dynamics of human evolution. In this, questions concerning the semiotics of hand speech and speech alone talk come to the fore. Insights into these semiotic systems will permit us to explore the *Lebenswelt* of our distant ancestors as well as our own *Lebenswelt*, separated from our past by way of a semiotic chasm.

From the vantage point of this new context, we can evaluate the study of signs initiated in the modern era, independently, by Charles Sanders Peirce and Ferdinand de Saussure (Deely 1995: 71–79). I believe that we will find that Peirce's semiotics is pivotal for re-imaging the world of hand speech talk and for understanding our own universe of speech alone talk. Saussure's semiology illuminates a quality of speech alone talk and serves as an example of the crisis of meaning inherent in civilization.

Reconstructing the past

Once the transition from hand speech to speech alone talk is located sometime prior to the emergence of complex society, one becomes increasingly aware of how different the *Lebenswelt* of hand speech talk would have been from our own. The few remaining instances of hand speech talk briefly reviewed here appear like Archean cratons embedded within a modern continent, ancient but influenced (Kolig 1992: 9). Artful reconstructions of a prehistoric 'hand speech world' will necessarily step through these instances with acts of imagination. These acts must be based on the understanding of signs originally developed by Peirce (Deely 1990: 33–49).

Peirce's semiotics encompasses more than the icon/index/symbol trichotomy used here to describe the semiotics of hand speech and speech alone talk. Sebeok noted that this triad is 'but one set among a veritable cascade of triadic relational structures subsumed under firstness/secondness/thirdness: qualisign/sinsign/legisign, rheme/sinsign/argument, I/it/thou, abduction/induction/deduction, mind/matter/God, language/expression/meaning, sign/object/interpretant ... possibility/actuality/necessity, unity/plurality/totality, and so (with many variations) on and on' (1991: 62). The articulation of this cascade of triadic relational structures demonstrates our capacity to dissect signs using speech alone talk. The cascade may be regarded as a 'play of semiosis' (Deely 1994: 94–97) based on a quality of speech alone that permits one to exclude, or separate out, aspects of a unity.

This analytic quality of speech alone talk must be both utilized and transcended in the examination of the semiotic systems of our distant ancestors. As the long-lost signs of hand speech talk are increasingly understood in terms of these structures, a sense of flow must paradoxically emerge. For, in those times, these now-articulated distinctions were experienced without disarticulation, in a manner that evokes the circles of the natives of the North American Plains and the Dreaming of the Australian aborigines. Indeed, anthropological literature concerning the art of the Upper Paleolithic points to a type of shamanism that coheres with the perception of natural sign in intentional gesture (Conkey 1987: 413–430). In that distant world, word was magically related to meaning (Maritain 1956: 63).

Understanding the present

At the same time that we acknowledge the alien *Lebenswelt* of our ancestors, we recognize that our current *Lebenswelt* is alienated from our evolutionary history and from 'the way we were'. We now live in a world of symbols. Typical of *zoosemiosis*, the speaker is not aware of the semiotic system grounding speech alone talk. That is, the user of a symbol cannot easily separate the experience of semiosis itself and the semiotic system that identifies the structure of the experience. We humans cannot escape from acting as both participants and observers when it comes to the issue of words and meanings. The task of understanding our current semiotic system thus dovetails into philosophy.

One task of philosophy is precisely this participatory 'reflection at a distance' (Voegelin 1987: 48–108). The late political philosopher, Eric Voegelin, pointed to the semiotics of speech alone talk when he attempted

to understand the experience of order in civilized societies in terms of the formation and deformation of meaning (Franz 1992: 1–20). At the same time, the semiological systems of Jacques Derrida and others, who were inspired by the breakthrough analysis of linguistics by Ferdinand de Saussure, have influenced modern philosophy (Powell 1997: 6).

The trajectory of Saussure's semiology is typical of the path of philosophical and scientific discovery, where even incorrect concepts (Deely 1995: 73) prepare the way for new insights. Prior to Saussure, linguists did not regard the relations among word, meaning, and social construction as a subject of interest. However, both historical perspective and comparisons among different language traditions shifted awareness from the 'fixed frame' of language at a certain time and place, to 'among fixed frames', where the association of word and meaning appears arbitrary. Saussure was the first linguist to explore language 'among fixed frames'. His realization that language — as we know it — exhibited the quality of difference highlighted the apparently arbitrary relations among word, meaning, and social construction (Gordon 1996: 52).

Surely, the relation between word and meaning is associative and arbitrary. However, the relations among word, meaning, and social construction are not. Words, meanings, and social constructions are products of historically contingent factors that include, using Voegelin's terms, the formation and deformation of meaning. The factors are complex, primal, ambiguous, and self-referential (Franz 1992: 1–20). They rely on the qualities of speech alone talk to construct and influence personal and social meaning. As such, Saussure's arbitrary 'difference', intuited from a perspective 'among fixed frames' and pertinent to word-meaning associations, may have laid the groundwork for Derrida's 'différance', which applies to a fixed frame and to word, meaning, and social construction (Powell 1997: 32–48, 116–126). If Derrida's 'différance' indicates a quality of speech alone talk, then the illusion of arbitrariness is pierced by semiotics (Deely 1995: 79). Beneath Saussure's difference, there operates a form of intentional sign processing, or form of cognition, that inspired Derrida to 'construct' deconstruction.

The study of our current world may thus begin with the recognition that spoken words, as all symbols, construct 'reality' through imposition, that is, in the very act of naming. Michel Foucault investigated the very tangible construction of social meaning and imposition of order implicit in the act of naming (Fillingham 1993: 1–25). Voegelin sought to understand the civilizational crisis of modernity in terms of the experience of order — and disorder — that comes from word meanings (Franz 1992: 107–122).

This article participates in the social construction that commenced with the naming of semiotics by Peirce and semiology by Saussure even as it proposes a new context for appreciating their work. Once the semiotics of linguistic sign is placed into the context of human evolutionary development, we can see that: 1) the semiology of Saussure exemplifies and yields insight into the qualities of speech alone talk and 2) the semiotics of Peirce is key to understanding our evolutionary history, the magical world of our ancestors, and our present condition.

Thus, the hypothesis points to us, today, as surely as it points to 'us' in the Developed Neolithic, when the proposed transition in semiotic systems took place.

Examining the archaeological record

In order to appreciate how the archaeological record might reflect this proposed change in the format of human language, we need to delineate what types of society were potentiated by each 'way of talking'.

Hand speech signs were interpreted as icons and indices and perceived holistically and through play along. These traits no doubt permitted a degree of social stratification and economic specialization. However, they also constrained developments in these directions.

Which archaeological features of the Early Neolithic are consistent with the notion of cultures practicing hand speech talk? Early Neolithic village cultures spread by fission and colonization rather than conquest. New villages were recreations of the old, so that villages of a particular culture did not vary in tradition or size. Different village cultures might coexist in a single region by occupying different ecological niches. Village size could become enormous when geographical conditions did not favor division. However, a large village would still manifest architecture characteristic of a tradition-rich egalitarian society. Villages could build monumental buildings and protective walls, but these structures did not develop into more elaborate forms of monumental architecture. Finally, hand speech talk did not favor organized long distance trade. The exchange of goods proceeded by diffusion trading from rich sources to poor through paths of common cultural descent (Wenke 1990: 225–275).

Since speech alone words are ultimately interpreted arbitrarily or conventionally, speech alone talk lowered constraints on the formation of hierarchical social structures, on economic specialization, and on technical advance.

Archaeological evidence of a transition from hand speech to speech alone talk could appear as increasing social stratification, production of

elite goods, differentiation of village sizes, cultural dominance without total subjugation, conquest, construction of roads or canals between villages, monumental architecture that changed size or design with time, and organized long distance trade. These developments are signposts for the emergence of complex society (Wenke 1990: 277–369). The key is the qualifier ‘unconstrained’. Hand speech talk acted as a cognitive brake on these trends. Speech alone talk oiled the tracks.

Converting from hand speech to speech alone talk was technically easy, one had only to eliminate the use of manual-brachial gestures. Such a conversion would have been resisted because it involved a loss of tradition. However, conversion did not necessitate immediate cultural change. Band-level traditions could have been successfully maintained over many generations after the conversion. The short term advantages of speech alone were attractive and the long term consequences were hidden. To gain the marginal advantages of social stratification (power) and economic specialization (wealth), the group eventually had to accept the consequences (marginal increase in intragroup competition). Some cultures escaped the consequences for thousands of years, but only by foregoing some of the advantages. In the end, even the most isolated band level cultures have not been able to hide from speech alone talking civilizations.

The earliest instance of complex society found in the archaeological record is the Ubaid culture of southern Mesopotamia (Wenke 1990: 318–355). Southern Mesopotamia may not have been the only site to initiate the proposed change, but, for simplicity, we will examine the archaeological record from the point of view that this location was the first to experience a transition to speech alone talk. We can imagine that this transition then radiated outwards, initially carried by missionaries and traders, and eventually by warriors. New groups confronted by these emissaries either assimilated the technique by transforming their own hand speech to speech alone or were converted or conquered. With the adoption of speech alone talk, a group experienced an increase in population and wealth that local tradition could either constrain or not constrain. Either way, the new group then sent missionaries or traders or warriors on to groups further away from the site of initiation.

Radiocarbon dating

Before assessing the archaeological evidence, the reliability of radiocarbon dating needs to be mentioned. One of the assumptions of

radiocarbon dating is that carbon-14 is produced in the atmosphere at the same rate that it disappears, which is more or less the case (Damon 1987: 559–563). The more or less was found to be a long-term deviation and short-term ripples in a plot of radiocarbon years versus actual years counted from rings of long-lived trees (Pearson 1987: 98–103). Consequently, the dates mentioned in this article only roughly correspond to absolute chronology. Uncertainty, or the range of values represented by a given year, increases the further back one goes.

In addition, one must note that a tremendous amount of archaeological research has not been published. We will now examine the archaeological record of the Developed Neolithic for features consistent with the predicted social trends.

Mesopotamia

Between 6000 and 5500 B.C.E., two village cultures, the Hassuna and the Samarra, settled northern Mesopotamia. Each exhibited a distinctive pottery (Mellaart 1975: 135–159). They spread through fission and colonization so that villages did not vary much in size. The earliest traces of irrigation are found at Samarran sites. In southern Mesopotamia, the earliest levels of the Ubaid at Tell el’Oueili also date to this time (Oates 1987: 474–479; Huot 1992: 191–192).

Unfortunately, the geology of southern Mesopotamia was not conducive to preserving near coastal early Ubaid sites. Not only did a major sea rise occur around 4000 B.C.E., submerging the sites, but river silt filled in the shallow waters of the northern Persian Gulf, moving the coastline south and burying the same sites (Huot 1992: 190–191). One surviving site, Eridu, eventually became a city during the Uruk period. Eridu is one of the few sites where the entire Ubaid period has been excavated. The evolution of monumental architecture is attested to at Eridu by a superimposed series of temples of increasing size. By the late Ubaid (Ubaid 4; 5000 B.C.E.), Eridu was a large settlement of thirty acres with little social differentiation. The transition from Ubaid 4 to Early Uruk by 4500 B.C.E. marked a movement to socially stratified city life (Armstrong 1996: 453–455).

In northern Mesopotamia, the Halaf culture emerged prior to 5200 B.C.E. (Huot 1992: 189; Campbell 1992: 182–187). The Hassuna culture appears to have given way to the Halaf, which then expanded westward across the northern edge of the Fertile Crescent. Early on, the Halaf appears to have imported or copied Samarran ceramics. Later, Halaf villages produced their own beautiful stone bowls and polychrome

plates, probably for individuals with high social status (Watkins and Campbell 1987: 433, 440, 461; Campbell 1992: 182–187).

By 4000 B.C.E., the Ubaid ballooned northwards and appears to dominate the Halaf (Watkins 1992: 175). Excavations at Tepe Gawra, located in the foothills near Mosul on the Tigris River, exemplify the trend. The lowest level is attributed to Halaf, the next three levels yielded ceramics characteristic of both Ubaid and Halaf, followed by levels of solely Ubaid artifacts. A monumental temple based on the same floor plan as the temple at Eridu was constructed at Gawra (Oates and Oates 1976: 125–126).

Several developments of this period (5500 to 4000 B.C.E.) are new to the archaeological record, including the sudden social stratification, economic specialization and urbanization of Eridu, the rapid appearance and expansion of the Halaf culture, the possibly organized trade in Samarran ware by Halaf villages followed by Halaf production of wares of similar quality, and the sudden domination of northern Mesopotamia by the Ubaid culture. These developments could be explained by proposing that Ubaid villages converted to speech alone talk before or during the first half of the sixth millennium (6500–5500 B.C.E.). Traders and missionaries could have passed the technique to the Hassuna and the Samarra cultures before 5200 B.C.E.. With the adoption of speech alone, the Hassuna gave way to the Halaf culture that expanded rapidly to the west. By the time the Halaf culture was developing social stratification, the already complex Ubaid culture expanded north in domination.

The above scenario demonstrates how a single cultural transition could produce a variety of interacting trends. These trends need not be manifest at first. Rather, once manifest, they do not reverse. The Ubaid culture may have practiced speech alone for hundreds of years, slowly availing itself of its benefits, before crossing the threshold to social complexity. The Uruk period (4000 to 3200 B.C.E.) saw the construction of the first cities. Uruk invented the cylinder seal, written records, and the ziggurat. Uruk traded as far as eastern Afghanistan (gold, lapis lazuli) and Turkey (Anatolia: timber, olive oil, silver). With Uruk, civilization was fully established (Mellaart 1979: 29–30).

Regions adjacent to Mesopotamia

Indigenous civilization at the southwestern end of the Fertile Crescent, Egypt, was established by 3400 B.C.E.. One site, Hierakonpolis was initially settled around 4000 B.C.E., then experienced population growth

(starting 3800 B.C.E.) that culminated in a town of over five thousand. Differential grave goods testify to social stratification. Between 3400 and 3200 B.C.E., a large cobblestone foundation was laid for a monumental structure (Wenke 1991: 298–299).

Hierakonopolis is representative of the trend towards increasing settlement size and population density that was underway by the start of the Predynastic (4500–4000 B.C.E.) (Wenke 1989: 138–143). Prior to 4500 B.C.E., the Saharan climate was wet (Pachur and Kropelin 1987: 298–299). Increasing aridity of the region favored Egyptian Predynastic complex social development (Hassan 1988: 135, 144–145).

The Deh Luran plain, in the Zagros mountains, has been extensively studied and exemplifies trends to the east of Mesopotamia. The Early Village Period, 5500 to 4000 B.C.E., saw a settlement of the plain after the development of reliable food production techniques. The overall impression is one of egalitarian simplicity. A small-scale intrusion of nonlocal folk with domesticated barley, wheat, and cattle appeared around 5400 B.C.E., but did not displace the local population. The population of the plain declined during the Middle Village Period, 4700 to 4000 B.C.E., while certain villages on the nearby Susiana plain grew rapidly. By 4300 B.C.E., residents of Chogha Mish in the Susiana plain were constructing monumental structures. Then Chogha Mish was virtually abandoned with the construction of a new large center on the far western edge of the Susiana plain. As in Egypt, these developments appear to be indigenous. Around 4000 B.C.E., the Susa tradition collapsed, to be replaced by the Early Uruk (Johnson 1987: 283–285).

How could the above changes be viewed in light of the proposed transition? The far western and eastern edges of the Fertile Crescent exhibit evidence for the development of complex culture at slightly later dates than the Mesopotamian heartland. The highlands of western Iran were home to indigenous Neolithic populations which originally showed characteristics of band level society for centuries before the Middle Village Period. A transition from hand speech to speech alone talk, completed before 4700 B.C.E., could explain Middle Village Period developments. In Egypt, ecological conditions may not have favored settlement along the Nile, delaying the onset of complex society.

East of the Fertile Crescent

Starting 4900 B.C.E., the widely dispersed villages in southeastern Iran, including at Tepe Yahya, suffered a change in housing from communal dwelling to isolated houses. By 3700 B.C.E., a massive platform was

constructed at Tepe Yahya, possibly due to Uruk influences (Hole 1987: 139–140). If the earlier change were to be associated with the proposed cultural transition, then changes in eastern Iran would be near contemporaneous with changes in the western plains.

The planned cities of the Harappan culture were dramatically and rapidly built on the Indus River floodplain around 2500 B.C.E.. Prior to urbanization, the floodplain had been settled between 3200 and 2600 B.C.E. by villages of undifferentiated size (Possehl 1990: 270–273). This phase, the Regionalization era, was known for the large amount of trade between different areas in the region (Kenoyer 1991: 343–349). Further back in time, domestic food production in the foothills surrounding the floodplain was established by 5200 B.C.E.. Interaction with southeast Iran can be seen with the introduction of pottery around 5500 B.C.E. (Possehl 1990: 264–266).

From the perspective of this hypothesis, villages settling the Indus River floodplain starting 3200 B.C.E. would have practiced speech alone talk. The transition to speech alone could have passed through the region between 5000 and 3200 B.C.E., allowing the population increase and technical advances that favored settling the floodplain. The introduction of pottery from the region of Tepe Yahya around 5500 B.C.E. was not accompanied by cultural changes typical of the loss of constraint from speech alone. However, the introduction demonstrates that an avenue for diffusion trading existed. This type of cultural transition would tend to follow paths already laid down.

The past few decades have seen spectacular breakthroughs in Chinese archaeology (Pearson and Underhill 1987: 807–821). China could be considered a site for independent origination of the proposed cultural transition. Millet was domesticated in northern China by 6000 B.C.E., during the Middle Neolithic (8000 to 5000 B.C.E.). Some extraordinary finds during this period include a large structure at the Qin'an Dadiwan site in Inner Mongolia, dating to 5000 B.C.E. (Kessler 1996: 141–143). Semi-domesticated rice has been dated to 5000 B.C.E. and fully domesticated to 4100 B.C.E. (Li 1983: 73).

The Late Neolithic era is subdivided into early and late periods. The early period includes the regional Yang-shao (north central) and Ch'ing-lien-kang (coastal) cultures (5000 to 2600 B.C.E.). While initially band level, these cultures showed evidence of social stratification by the time they (and other cultures) were melded into the late period complex Longshan culture (starting 2600 B.C.E.) (Chang 1983: 512–515; Pearson and Lo 1983: 140). During this period, less extensive cultures such as the Liangzhu at the mouth of the Yangtze River (3300 to 2200 B.C.E.) produced fine jade luxury items (Huang 1992: 76). At the western end of China, the

Hongshan culture (4500–3000 B.C.E.) constructed large altar platforms (Kessler 1996: 142; Bahn 1988: 110–112).

As in western Iran, band-level Neolithic cultures were established hundreds of years before complex society emerged. Because of China's geographical extent and different agricultural domesticates, one might not expect synchronous cultural developments for the diverse regions. However, a transition to speech alone talk, starting between 5000 to 4000 B.C.E., might explain the coordinated developments.

Finally, a sea-faring eastward expansion of oriental peoples began, probably from southern China, around this time. The Ta-p'en-k'eng culture in Taiwan, with its mainland influence in pottery, dates to 4300 B.C.E.. The Neolithic pottery phase in the Philippines began around 3000 B.C.E.. Domesticated pigs were introduced to the island of Timor, between Borneo and New Guinea, by 2500 B.C.E. (Bellwood 1985: 212–231). The history of the Australonesian expansion into Indo-Malaysia, as well as the subsequent colonization of Polynesia, has been studied through diachronic linguistic analysis (Bellwood 1991: 90–91).

The Australonesians and the Indo-Europeans

One might wonder why the expansion of the Australonesian speaking peoples took place when it did. The expansion could have been propelled in two ways by a transformation from hand speech to speech alone talk. First, mainland groups that had completed the transition may have exerted territorial pressures due to population growth, pushing the original Australonesians against the sea. Second, the early Australonesians had just arrived at a format of language, speech alone talk, that allowed the social organization and technical flexibility to accomplish the migration. This line of thought illustrates how the proposed hypothesis might be applied to a variety of trends found in the archaeological record. With the transition to speech alone talk, some cultures eventually imploded into social complexity, while others exploded outwards into new territories, adapting to new ecological conditions within generations.

The remarkable Australonesian migration is reminiscent of the Indo-European language expansion that took place earlier on the other side of the Eurasian continent. This hypothesis casts new light on the assertion by Russian linguists Thomas V. Gamkrelidze and V. V. Ivanov that the proto-Indo-European homeland was south of the Caucasus mountains (Gamkrelidze and Ivanov 1990: 114–115). If the hand speech languages of the northern Mesopotamian Hassuna culture simultaneously gave rise to Semitic languages and the expanding Halaf culture, cultures

undergoing the transition to the north of the Halaf were trapped between the expanding Halaf (to the south) and the Caucasus mountains (to the north). Gamkrelidze and Ivanov saw the proto-Indo-Europeans as expanding and migrating west into Turkey, as well as east, south of the Caspian sea and onto the Iranian plateau. Later, some migrated north, east of the Caspian Sea, onto the Russian steppes. Technical innovation in the steppes (Anthony, Telegin, and Brown 1991: 98), combined with a clear transition to complex society, would have left the proto-Indo-European Kurgan culture poised for elite dominance of native European cultures who had adopted the speech alone talk later than the original proto-Indo-Europeans (Gimbutas 1988: 453–456). Many hypotheses on the origin of the proto-Indo-Europeans present variations on the theme of migration onto the steppes (Anthony 1995: 559–561; Mallory 1989: 143–185).

Archaeologist Colin Renfrew proposed a substantially different hypothesis: The Indo-European languages originated in Turkey (Anatolia) at the start of the Developed Neolithic and expanded into Europe as farming villages colonized the region (Renfrew 1987: 145–177). One criticism was that the horizon of the primary farming expansion was so far in the past that phonetic drift (at current rates) would have obliterated any similarities between related languages (Coleman 1988: 449–450; Sherratt 1988: 459). However, if one proposed a slower rate of change for hand speech talk, and that the primary farming expansion carried hand speech talk, then Renfrew's argument would coincide with Andrew and Susan Sherratt's proposal of a series of three language-changing expansions into Europe, the primary farming (6000 to 3500 B.C.E.), the secondary farming (4500 to 3500 B.C.E.), then elite dominance (starting 4000 B.C.E.) (Sherratt and Sherratt 1988: 588–594; Sherratt 1988: 460). Ironically, all three expansions could have carried proto-Indo-European, but in different ways of talking. A transition from hand speech to speech alone talk could have passed from east to west prior to the secondary farming expansion. The secondary farming expansion featured technical advances in farming, an increase in population, and warlike social conflict (Howell 1987: 149–158). The invasion of the Kurgan culture would have further transformed these newly realized spoken languages through the mechanism of elite dominance (Renfrew 1994: 120).

A slow rate of change for hand speech talk would explain the coincidence of genetic and linguistic boundaries in Europe (Sokal et al. 1990: 158–175) and in the world (Cavalli-Sforza et al. 1988: 6002–6006). As noted above, genetic boundaries were established so far in the past that phonetic drift at current rates would have randomized any relation. However, the rate of change could have been much slower in hand

speech talk. Consequently, the classification of languages into families and superfamilies (Ross 1991: 137–143; Foley 1991: 114–115; Cavalli-Sforza 1991: 104–110; Ruhlen 1994: 101–124) may actually be investigating Pleistocene dispersions of hand speech talking peoples. These hand speech languages became indigenous speech alone languages when the manual-brachial gestures were dropped.

Europe

Before surveying the European archaeological record, we should step back and look at some impressive cultures that pre-date the Ubaid and so would be hand speech talking cultures. Catal Huyuk was a large Neolithic village situated near a river in the obsidian rich Taurus Mountains in southern Turkey (Anatolia). First excavated in the 1960s by James Mellaart (Zohar 1996: 120–121), archaeologists have dubbed it ‘the world’s first city’ (Shane III and Kucuk 1998: 43). Instead, it should be regarded as one of the most illustrious hand speech talking communities. These excavations will not reveal the origins of urban life. Rather, they will reveal a people, identical to ourselves, but on the other side of a semiotic chasm. Because they lived adjacent to a concentrated resource, they developed a large and wealthy community. However, they did not take the step to complex society.

Dating as far back as 7000 B.C.E., Catal Huyuk grew to 32 acres. Its architecture was an intricate mix of rooms and courts having access to the roof. The presence of workshops for weaving, basketry, carpentry, and baking reveal economic specialization. The crafts and religious arts were evocative and beautiful. There is evidence of trade, but no roads were built to the site. Around 6000 B.C.E., the houses were damaged and, over the next few hundred years, the site was abandoned (Mellaart 1975: 91–134).

Throughout its whole stay, Catal Huyuk, despite its size and wealth, did not become something new. A similar story can be told for the pre-pottery Neolithic A of Jericho (PPNA: 8300–7300 B.C.E.). Excavations by Dame K. M. Kenyon in the 1950s found an impressive tower and town walls (Mellaart 1975: 18–69). But this culture did not give way to complex society, even though it shared attributes with other villages in the area (Gopher and Gophna 1993: 317–326). Rather, the village later changed significantly with the introduction of animal domesticates and the tower and walls were abandoned.

Similar tales for other Early Neolithic sites (Rollefson 1989: 171) indicate that hand speech talk fostered extreme degrees of cooperation,

but not the type of control that characterizes the organized labor of complex societies. Hand speech talking cultures could construct large buildings, trade, and engage in economic specialization while maintaining band level society. We might predict that the tradition of hand speech talk was strongly conserved, like other traditions in the band, but still flexible. Hand speech cultures could adapt to new conditions, but preferred the traditional.

The westward colonization of southern Europe by Neolithic farming villages and of north central Europe by the longhouse-building Brankeramik farmers shows no evidence of breaking the hand speech mode (Scarre 1996: 215–216). They settled along fertile floodplains in river valleys (Champion, Gamble, Shennan, and Whittle 1984: 112–151). Despite areas of high village density, they did not undergo state formation (Van Andel and Runnels 1995: 491).

Around 4500 B.C.E., the Brankeramik Period came to a close, giving way to regional development of the Michelsburg in the west and Trichterbecker in the east. Innovations in farming, geographic expansion of agricultural settlements into marginal areas, and fortified hilltop villages became common throughout central and northwestern Europe by 3500 B.C.E. (Howell 1987: 118–126). At the same time further southeast, increasing trade and an exponential population increase was contributing to the emergence of the Aegean civilization (Renfrew 1979: 193–213).

In western Europe, France was settled between 5500 and 4700 B.C.E. from the south by Neolithic impressed ware cultures and from the north by Bandkeramik. Between 4700 and 4300 B.C.E., a new pattern of western farming developed, and a new culture, the Cerney, spread from formerly Bandkeramik regions towards the Atlantic coast. At this point, multiple passage graves became common, perhaps inspired by the longhouses of old (Sherratt 1990: 151–157). The increasing elaboration of these communal passage graves serves as the earliest (although equivocal) evidence that social complexity was emerging in this area (Boujot and Cassen 1993: 485–487). Particularly striking is a large passage grave in Britain that was dated to 3750 B.C.E. (Saville, Gowlett, and Hedges 1987: 112). We can imagine that by the time this grave was constructed, the local population practiced speech alone talk.

The Americas

The languages of all the Americas fall into three superfamilies that follow lines of descent from original Paleolithic migrations from Siberia (Greenberg and Ruhlen 1992: 94–99). We have discussed previously that

the long time for word preservation necessary for this type of linguistic correlation might be more characteristic of hand speech than speech alone talk. Due to some odd coincidences, it may be difficult to answer the question of whether a cultural transition to speech alone was indigenous in origin.

Between 6000 and 1000 B.C.E., the northeast American coast was home to a Late Archaic maritime tradition (Fagan 1991: 378–393). Notably, unrelated contemporaneous coastal ‘Red Painted People’ grave sites have recently been associated with similar sites along the European coast (Timreck 1988). This implies the existence of a maritime Mesolithic culture spanning the rim of the North Atlantic that could have constituted a conduit for transmission of the proposed cultural change to North America.

An increase in the number of sites of the dispersed eastern North American populations (starting around 4000 B.C.E.) has been explained in terms of greater food resources due to climatic change. Down the line trading assumed year round importance during the Late Archaic (4000–1000 B.C.E.). Groups began living in defined and defended territories. Technical advance included the invention of pottery and adoption of cultivated plants, some deriving from Mesoamerica (Steponaitis 1986: 372–378; Fiedel 1987: 97–115; Fagan 1991: 390–393). The giant earthenworks at Poverty Point, Mississippi started around 1700 B.C.E. (Fagan 1991: 393–397). Another mound complex in Louisiana has been dated to 2500 B.C.E. (Saunders et al. 1997: 1796–1799; Pringle 1997: 1761–1762).

Along the coast of Ecuador, settlements of what was to be the earliest South American complex society, the Valdivia, were already established by 3500 B.C.E. Pottery appears at these sites as early as 3100 B.C.E. (Bruhns 1994: 82, 117–118). The notable similarity between Valdivia pottery and Japanese Jomon ceramic has been attributed to stylistic convergence rather than trans-Pacific contact (D’Altray 1994: 80; Bruhns 1994: 120). The site of Real Alto grew to thirty acres and began construction of a monumental structure by 2300 B.C.E. (D’Altray 1994: 89–93). Social ranking and inequality were fully evident by 1800 B.C.E., the same time that construction of planned cities in the Andes began (Pozorski and Pozorski 1994: 66–72). In nearby coastal Peru, monument construction and other signs of social complexity appear in the Late Preceramic period, dating between 2300 and 1500 B.C.E. (Quilter et al. 1991: 277–283).

The first evidence of complex society in Mesoamerica appears after 2000 B.C.E. (MacNeish 1986: 93–121). The beginning of agricultural life and the growth of social hierarchies are discussed together by archaeologists studying Mesoamerican prehistory because they occur contemporaneously (Blanton 1983: 245–257).

The timing of the formation of complex society in the Americas must be evaluated with geographical considerations in mind. The geography of eastern North America was less conducive to forming complex society than that of Ecuador and Peru. If complex society in both regions was potentiated by a transition from hand speech to speech alone talk, then evidence of complex society would appear slowly after the transition in the non-sedentary North American cultures and rapidly in sedentary coastal Ecuadorian and Peruvian cultures. The three possibilities for origination include indigenous discovery, cultural transfer from Europe to North America via the 'Red Painted People' and accidental trans-Pacific contact to Ecuador. The first possibility is most likely. However, since the proposed transition elevates the potential import of small encounters, the second and third possibilities cannot be fully discounted.

How well does the hypothesis fit?

The hypothesis that complex society was potentiated by a transition from hand speech to speech alone talk explains a variety of features observed in the archaeological record of the Developed Neolithic, from state formation in Mesopotamia, Egypt, India, and China to the proto-Indo-European and Australonesian migrations. The hypothesis also provides a perspective on word change that lends credence to research into the relatedness of world languages.

Conclusion

This hypothesis conforms to the intuition that changes in the format of language should be reflected by changes in the archaeological record. Human grammatical and syntactical abilities evolved through the medium of manual-brachial gesture. Hand speech was the cultural product of adding speech talk to manual-brachial gestures during the speciation leading to *Homo sapiens*. Speech alone talk was adopted as a technical innovation during the Developed Neolithic. Due to the semiotic properties of speech alone talk, that adoption potentiated complex society.

Significantly, these proposals point to the relevance of semiotics to the human evolutionary sciences. We can begin to appreciate two broad implications to the apparently disparate semiotics of Charles Sanders Peirce and Ferdinand de Saussure. Humans evolved and once lived in a world where intentional signs were perceived as natural signs. Today, we

live in a world where the meanings of intentional signs are whatever convention allows.

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