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Paleosemiosis

Abstract:
The transformation from a primarily holistic thinker to an analytical one has been suggested in my earlier works to be a fundamental part of the evolution of the fully modern *Homo sapiens*. This discussion will present a closer look at the mind of the human of the Upper Paleolithic as the impetus for an extensive, highly successful precursor culture. The paper will be an exercise in interpreting the archaeological record given a Peircean semiotic perspective and the assumption of the validity of the holistic/analytic dichotomy.

Keywords: Upper Paleolithic, Evolution, Intelligence, Semiotics, Cognition

Nascency

The semiotic world of any animal species is defined by its particular array of cognitive and perceptual capabilities. Ethographic studies can reveal levels of commonality between species, but ultimately the specific *Innenwelt*[1] will be unique to each species and with a degree of variability between individuals within the species (Haworth and Prewitt, 2010). Paleosemiosis, then, for the purposes of this paper describes very particular precursor populations of the Upper Paleolithic, who inhabited the European continent from approximately 40,000 to 15,000 years ago and who represent the nascent semiosis of *Homo sapiens sapiens* (anthroposemiosis).

Delineating the Paleolithic mind is an exercise in illustrating a mind in transition (Haworth, 2006), moving from the relative stability and very gradual change of Lower and Middle Paleolithic eras over several hundred thousand years through the surprising alterations evident in the Upper Paleolithic to the rapid change that marks the modern human species. The mind of the Upper Paleolithic

Homo sapiens is housed in an ostensibly modern human body, but with a brain that is apparently still undergoing some genetic transformations which underlies the still developing modern human cognitive process (Gazzaniga 2008, p. 7 - 37, Antinucci 1989, p. 8). To understand Paleosemiosis we must first develop a conception of the cognitive processes of the preceding populations of the Lower and Middle Paleolithic, the evolutionary antecedent for human intelligence.

In countless ways others have sought to discern the evolutionary progression of intellectual thought, invariably by dissecting human thought processes into types (epitomizing the analytical mind, but more on that later) and attempting comparisons of these types to observed behavior in other related species. This is necessarily an unwieldy process, particularly when dealing with non-primate species, whose intellectual evolutionary journey must have taken quite different roads. Still, the comparisons are all we have to work with. So, volume upon volume exists in the academic record with each attempt finding new ways to subdivide and categorize human thought and somehow map those types onto other species. The following is a very small sampling of these classifications and the types of thought processes that might be included in the effort. Jamieson (2002) speaks of content ascription and hyperintensionality; Russon and Begun (2004) discuss symbolic constructions, cognitive hierarchization, generativity, metarepresentation, tool use, self concept, imitation, deception, logico-mathematical reasoning, and fluidity of thought; Bering and Povinelli (2003) talk of intentionality, imitation, goal-directed tasking and reinterpretation; while Antinucci (1989, p. 3 - 9) takes up sensory motor intelligence, classification, and seriation.

Rarely in these categorizations have there been attempts to place types into hierarchies or arrays that might signal a progression through time, relying on the incidents of 'like-thinking' encountered in other species to provide the assumed evolutionary ascent. In essence, these analyses are actually inherently "speciesist", developing typologies derived from the human repertoire without first recognizing

the differing capabilities of other species. This form of segmentation doesn't really further the search for continuity and necessarily leaves us in the dark with regard to the specific cognitive faculties of other animal species, which then continually leave us awestruck when encountering feats of memory and cognitive function that don't fit within the limitations of the human cognitive realm. We seek out the forms of cognition where humans excel and ignore areas of weakness. Hence, we have the constant source of news media materials on the oddity of animal cognitive achievements or even of the so-called savant achievements of the some humans (see for example: http://blogs.discovermagazine.com/80beats/tag/animal-intelligence/, and http://www.newser.com/tag/31304/1/animal-inellignce.html?utm_source=ssp&utm_medium=cpc&utm_campaign=tag, Walker 2009, Morton and Page 1992, Treffert and Wallace 2002, Heaton and Wallace 2004, Howe 1989).

One obvious exception to this process of segmentation without hierarchy lies in Piaget's levels (Antinucci 1989, p. 11 - 17), which were derived from observations of human cognition as it develops in the ontogenic process. Given the assumptions behind the axiom that ontogeny recapitulates phylogeny, Piaget's levels could prove very useful in conceptualizing the evolutionary steps to human intelligence (human semiosis). This is exactly what was attempted in Antinucci's edited volume *Cognitive Structure and Development in Nonhuman Primates* (1989). But, the work instead determined that such a recapitulation across species does not, in fact, exist. Antinucci concludes (p. 251) that '. . . the evolutionary path leading to the structuring of human cognitive capacities . . . seems to have taken several independent 'turns' at various steps of its long course.'

Another approach to a possible hierarchical development in anthroposemiosis was presented by Terry Prewitt (2005) when he introduced applications of Peircean semiotic analysis to stone tool production processes of the Middle Paleolithic as a support for my arguments relating to later Paleolithic cave art. Although Peirce (1867, 1867a) presented his ten sign types through the intersection of three triadic

sets of categories (qualisign, sinsign, legisign; icon, index, symbol; rheme, dicent, argument), in his broader corpus Peirce's emphasis was on the dynamic of sign process working through these categories, culminating in humans with the symbolic argument[2]. Prewitt's discussion about the Paleolithic emergence of symboling merely stresses the hierarchical and simultaneous relationships among the categories as opposed to emphasizing the "symbolic" nature of anthroposemiosis. Keying on symbols in discussions of human semiosis, he observed, often misses the sense in which symbols serve iconic and indexical interests that in turn draw from natural qualities forming patterns of raw experience, which are part of anthroposemiosis potentially shared widely among mammals. He also devised several 3-dimensional graphs (adding to a large number of such illustrations in writings on Peirce by others) to provide a clearer demonstration of the hierarchical array, among which Figure 1 may be useful in furthering the present discussion. Prewitt goes on to demonstrate the system's utility for understanding human evolutionary cognitive development with examples derived from the archaeological record of lithic technology, culminating with the refinements of the Upper Paleolithic flake-reduction processes as reflected in lithic assemblages. Prewitt's discussion, referencing work offered by Kuhn (1995) that has now seen further expansion in the Brantingham, Kuhn, and Kerry (eds.) volume *The Early Upper Paleolithic beyond Western Europe* (2004), can give us a real glimpse into a possible timeline of cognitive function in the evolution of human cognition preceding the advancements of the Upper Paleolithic.

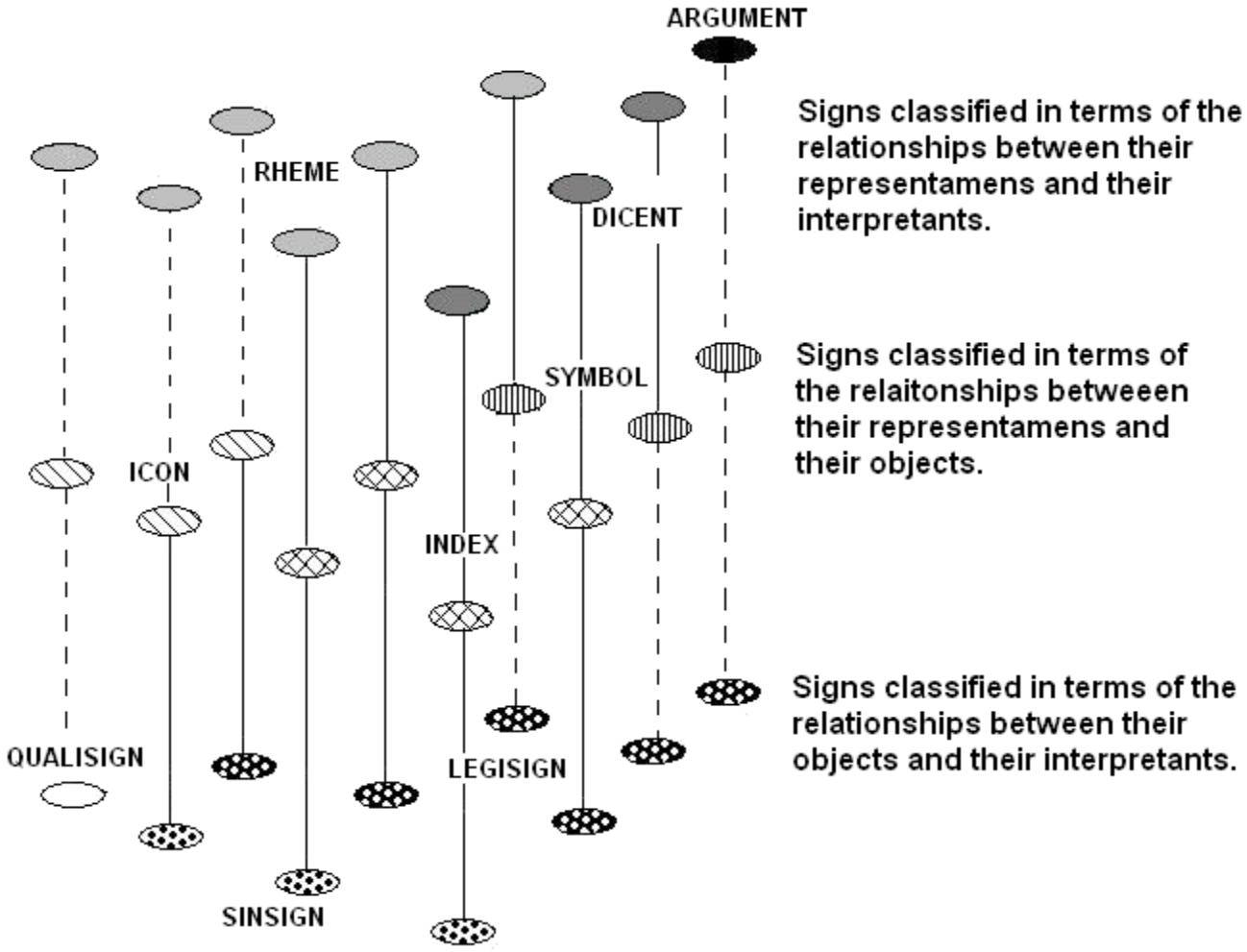

Figure 1. Peircean Sign Space. Each of the ten basic sign types is represented by a vertical column, connecting sets of categories relating to the relationships among representamens, objects, and interpretants (after Prewitt 2010).

In a recent brief lecture on Peirce's system of sign classification and Paleolithic tool production, Prewitt (2010) expanded on his earlier argument with examples to illustrate the overlapping functions of the sign categories in ongoing behavioral process. One element of this treatment is that extended complexity of decision-making processes in lithic-reduction sequences during the Middle Paleolithic, and

especially during the early Upper Paleolithic, signal propositional qualities that would be greatly facilitated by symbolic modeling rather than simple rhematic or dicent understandings on the levels of iconic or indexical sinsigns or legisigns (Prewitt 2010). He states:

> When cultural stylistic variation of tool form appears, as it does in limited ways with the Acheulian tools of Homo erectus and much more systematically with the Mousterian tools of Neandertals, we may project simple rhematic symbols in that the stylistic variation amongst tools fulfilling the same or similar functions is conventional. . . . . Steven Kuhn's (1995; also see Cunliffe 1994) work on the Middle Paleolithic details some of the production processes in terms of linear decision-making models and other complex processes. If we attend closely to the processes Kuhn described, "Neandertals" or populations employing the Mousterian technology seem to have been using dicent symbols, as manifest by the complexity of the production process for the assemblage of multiple tool types. In effect, each tool "type" in the Mousterian tool kit is a "rhematic iconic legisign" which could easily be referenced by an arbitrary symbol, and is also a "rhematic indexical legisign" referencing its function. Presuming that form and function are working closely together in the tool kit, then at the least the dicent potential of the association seems likely (Prewitt 2010).

Although it is difficult to posit the use of symbols in the Middle Paleolithic without evidence for the occurrence of arbitrary symbolic rhemes, Prewitt also argues that the minimal occurrence of arbitrary (hence, symbolic) inscriptions with cave art occurs alongside the emergence of great diversity in tool technologies in the Upper Paleolithic. The well-known Aurignacian patterns of technology are now understood to be only part of a rich emergent diversity of assemblages that suggest the earliest

symbolic differentiation of 'cultures' (also see Kuhn, et al. 2004). Considering the growing evidence of such diversity in the context of Prewitt's semiotic arguments, it seems likely that the transition to habitual symbol use comes with the Upper Paleolithic, and further, that it does not appear full-blown but undergoes some substantial evolution early in that period. Prewitt reinforces the point that the Peircean 'argument' is what distinguishes our species, not language as it is traditionally understood as a form of communication, since language is clearly built upon the logical capacities of the 'argument' and not visa versa.

Peirce's categories work well to build a common cognitive framework for comparative analysis of species, including evolutionary grades among the Hominoidea and cognitive steps within the specific evolution of the genus Homo. But the Peircean 'argument' presents a culminating *logical capacity* that must be fleshed out in order to adequately demonstrate the subtleties of the transformations suggested by Upper Paleolithic technologies. For Peirce, the 'argument' was a symbolic logical phenomenon (hence represented most efficiently through language, and seemingly co-extensive with language), while as a bio-cognitive phenomenon the 'argument' was not necessarily initially grounded in speech-communication. Still, in Peircean terms, the technological manifestation of the 'argument' becomes a relationship between cognitive capacities and behavioral habits, including *habituation* of the species to using verbal symbols to represent other cognitive routines. But beyond concern with language, simply noting the apex of Peirce's sign typology does little to illustrate the complexity of cognitive synergy that derives from the bio-cognitive emergence of the argument, or 'action-fixing' and 'belief-fixing' symbolic legisigns (see Peirce, CP2.462). For it is the human cognitive "result" of this level of sign construction (i.e., as we shall see, emphasis of linear information processing over holistic information processing) that tends to be the subject of the typologies derived in other studies on the evolution of human intelligence. My emphasis will be on an early stage in the emergence of

anthroposemiosis when our species possessed the capacity to 'argument' within a cognitive tendency toward holistic thinking.

Dichotomy of Styles

For my purposes here, I prefer to utilize the distinctions of cognitive style (holistic and analytical) to elucidate the evolutionary development of hominid semiosis, as I am convinced this differentiation is crucial to understanding the climax evolution of anthroposemiosis. I presented my initial argument on the importance of the shift from holistic to analytical thinking in anthroposemios in an article in *Semiotica* in 2006 and later, with Prewitt, provided an elaboration on the evolutionary aspects of the idea (Haworth and Prewitt, 2010). We stress in this other work that human thought always consists of aspects of both forms of cognition and that each individual exhibits a very variable combination of the two, ranging from high to low in analytic or holistic processing, as revealed in the research by Dunn and colleagues (1992). And, it should be noted that Kemeler-Nelson's (1984, p.735) review of psychological research into these two modes determined that "holistic processing . . . may be frequent, fundamental, and primitive in human cognition" (as quoted in Beyler and Schmeck 1992, p. 710).

My understanding of the holistic realm of thinking derived from reading works by and about those people who apparently represent in the contemporary human population the extreme high end of the holistic continuum, people with autism. The lives of Nadia (Selfe 1977), Temple Grandin (1995, 2005), Donna Williams (1992 and 1994), and Steven Wiltshire (Sacks1995) exhibit a common array of attributes that served to define this style of cognition. The mind of a high-holistic thinker has the capacity to seemingly photographically reproduce remembered sights in what seems to be a one-to-one correspondence with the external reality. In fact, this direct memory exists for perception in general, so that impressions of sound, smell, touch, and any other sensory experience of a particular event are remembered in

ostensibly complete fashion. Through these unusual memory skills, those autistic people who are not also encumbered by many of the other possible deficiencies that tend to accompany the autistic syndrome will exhibit the savant skills that cause their stories to be noticed and studied, such as the exceptional skills at artistic representation noted for each of the individuals mentioned above. In fact, Williams and Wiltshire are now professional artists (see, for example: http://www.donnawilliams.net/artist.0.html and http://www.stephenwiltshire.co.uk/). The exceptional memories of high-holistic individuals, however, are, as it states, very distinct wholes that are not easily partitioned. For example, Oliver Sacks (1995, p. 255) in his chapter on Temple Grandin in his volume, *An Anthropologist on Mars,* talks of his telephone conversation with Dr. Grandin when she is providing directions to her office. He interrupts her to ask a clarifying question and when she gets back to the directions, she starts over again from the beginning, repeating them *exactly* as before. Also, specific aspects of one memory do not easily relate to segments of other memories, so that generalized concepts are built out of a collection of very specific past examples. For instance, Grandin (2005, p.261) notes that the word 'bowl' calls to mind a large file of images of very specific bowls of past experience rather than a vague conglomeration of characteristics that might signify 'bowlness'. All in all, a holistic form of modeling the world is a very direct one that provides more of a living in the moment experience of life. As Grandin (2005, p.65) puts it, 'Normal people see and hear schemas, not raw sensory data.'

In addition to defining this form of thinking, Temple Grandin, who has written extensively on autism, has also surmised that holistic thought must be the primary mode exhibited by other animal species. And, the work of Dawn Prince-Hughes (2004) strongly supports this conclusion. Such memory systems, seen in this light as a particular cognitive style, can bring many feats of the minds of other species into much more easily understood terms, and in this sense Grandin notes that animals are also savants of a sort (Grandin 2005, p. 8). One must also realize, then, that

many of the analyses made across species in efforts to understand human cognition can end up comparing apples to oranges. Cross-species observations may serve only to confuse the progress toward understanding human evolution, and illustrates the need for defining the semiosis of animals in very particular terms. We should be very careful in seeking commonalities in, for example, pongidsemiosis and gorillasemiosis with anthroposemiosis. Each signing array must be delineated, not by whether or not they represent a holistic mode, but to what extent elements of holistic and analytical processing exist in the cognitive repertoire.

What, then, are the elements of analytical thinking we need to recognize? In an earlier paper presented at the Semiotic Society of America in 2007, 'The Bubble Analogy: Thoughts on Cognitive Transformations in the Evolution of Human Language'**,** I offered several characteristics of analytical thinking that seem to be relevant to the evolutionary trend in the hominid line. Again these distinctions are drawn from the writings of the autistic authors mentioned above, this time gathering inferences from their perspectives on what they consider to be their cognitive deficiencies – in contrast to more 'normal' individuals – rather than their forte cognitive skills. (Although I gathered this rendering of holistic and analytic thought from specific individuals, it does clearly coincide with delineations of these modes developed out of psychological research on the more general population [Beyler and Schmeck 1992]).

The analytical thinker takes the perceptions of the senses and alters the data in several ways, rather than storing a more directly iconic representation. The sensory input is broken-down, segmented, and organized into salient items of information. Detail of recall is reduced, but certain elements of the environment are considered more worthy of note, as nodes of relevant data. This is an essential element in the creation of symbolic rhemes, arbitrary signs that cue memory to a constellation of stored perceptions in the form of indexical sinsigns and legisigns. This segmentation allows, then, a second tier of data manipulation—a process of

interconnecting nodes within memory, which results in the construction of generalized concepts and logical types[3]. These concepts are then abstracted in a codified manner, what I consider to be a kind of mental shorthand. This process of abstraction is the ideation behind the stick-figure drawings of children and the stylized artwork of human culture (Haworth 2006). Unlike high-holistic savant artists, people in general tend to draw what we *know*, not what we *see* (Selfe 1977, p. 98). I use the word 'shorthand' here in referencing these abstractions to highlight very specifically the efficiency that this mode of thought must engender. Cognitive typologies, then, become the *natural* method used by the analytic thinkers of academia to segment the cognitive process in the effort to understand it.

Now returning to comparison with non-human species, the primary point I set up with the bubble analogy is that these aspects of analytical thinking exist, though to a lesser degree, for most species. The *relational* ideas about various abstracted elements in one's surroundings provides the creative, inventive, and general problem-solving behaviors we find in most species in one form or another, but typically operating only on the iconic and indexical level. I have suggested that the memory of the holistic thinker might be illustrated as a series of bubbles, wherein the entire set of perceptual data for individual events is represented in full-color tones, as the detail of recall is extensive and relatively complete. Within these bubbles certain elements can be seen as relational to other elements, and indicated by highlighted points connected by lines and representing aspects of analytical cognition within the holistic gestalt experience. But, in non-human semiosis those relations remain for the most part attached to the single experience essentially through iconic or indexical sinsigns and legisigns. This limitation on analytic thinking is similar to Merlin Donald's ideas of 'episodic memory' in his model for the development of human consciousness (1991, p. 149-153).

The bubble analogy can then serve to show that the enlargement of the neocortex in primate evolution could represent a rather simple idea that the bubble

enlarges to allow memory of events to encompass larger and larger amounts of time or space. As one possible example of the limitations of a species bubble, consider the problem-solving experiments with chickens noted in Kohler's *The Mentality of Apes* (1925, p. 12 – 16). The subject hens were unable to discern the path to food placed behind an L-shaped mesh barrier until chance movement led them to the edge of the barrier. Or, consider the situation presented in Rivas and Burghardt's article on anthropomorphism (2002, p.15) where mice released into a field could easily return to their forested habitat 20 meters away, but were unable to orient toward the forest when released 30 meters distant. However, as the bubble enlarges so do the attendant analytical capabilities, allowing for more interconnection between elements within the bubble, though still with the limitation of its confines. This simple enlargement argument can serve to explain the developments represented by the transformation of lithic technology considered in Prewitt's work. And, this reasoning makes the standard method of searching out characteristics of analytical thinking in others and then making a black and white—it exists or not—judgment to be a spurious method that can only lead us in circles. Anthroposemios does not hold the patent on analytic thinking (also noted by Langer 1989, p. 230). Instead, where the difference lies is in a matter of degree. And what makes the difference so dramatic is that it also entails a platform shift in cognition. Humans are – for the most part – analytic thinkers with a limited holistic capacity, while the norm for other species has always been, and still is, to be holistic thinkers with some analytic capacity.

Paleosemiosis

When discussing the transformation to a cognitive style that is primarily analytic, I believe we are looking at the unique time frame in the hominid record that was the Upper Paleolithic. Up to this point, the achievements of the hominid line might simply result from the brain enlargement that is a general trend in primate

evolution. Yet, through the physiological demands of upright posture, brain enlargement was forced to proceed on a different ontogenic schedule in later hominids than for any other primate species (Haworth and Prewitt, 2010; Kelley 2004, p. 285). In other words, contrary to most suppositions on the evolution of cognition, intellectual power was not the driving force behind the early stages of hominid brain growth, but is at most a steering mechanism on changes already underway through other simpler biological pressures.

However, at the advent of the Upper Paleolithic the archaeological data indicate that something new has been added. The Upper Paleolithic record attests to cognitive developments far beyond anything produced by earlier populations, while not yet exhibiting all the traits that appear in the Mesolithic, dating from about 12,000 years ago, through the Neolithic, from around 8,000 years ago, and into historic times (Mellars 1994). The Upper Paleolithic represents a time of invention. Mellars' title for his chapter on the Upper Paleolithic in Cunliffe's volume *Prehistory of Europe* (1994, p. 42 - 78) declares it revolutionary. Of stone tool technology Mellars (1994, p. 46) notes a 'proliferation' of blade forms and that 'significant shifts in stone tool production can be seen in the much greater dynamism and innovation shown by Upper Paleolithic communities in creating a much wider and more diverse *range* of tool forms than those produced during earlier periods.' He goes on to note that an even greater level of creativity and innovation is evident in bone and antler tool technologies (p. 51). The Upper Paleolithic aesthetic creativity also stems from the very earliest communities with a proliferation of carvings and decorative ornamentation, in addition to the famous cave paintings of southern France and northern Spain (Mellars, 1994, p. 51 – 52). Societal transformations are an equally important part of the Upper Paleolithic revolution, with the first indications of large settlement activity, group stylistic and technical variations, and emergent trading and exchange networks (Mellars, 1994, p. 59 – 67).

In keeping with the archaeological evidence, Gazzaniga (2008, p. 16) notes genetics research that indicates genes related to the development of the human brain have undergone mutation at least twice in recent times, relatively speaking[3]. I surmise that the change represented by one of these mutations involved alterations in neural networking that enhanced the extant analytical aspects of the left hemisphere of the neocortex, as noted in Gazzaniga (2008, p. 27 – 32). But, the plasticity of brain operations that allows functional areas to expand can affect strength in other areas. Comparative neurological research indicates the various configurations that allow for enhanced hearing or sight or smell, for example, are related to the size of those processing areas within the brain (Gazzaniga, 2008, p. 22 – 25). It seems the trade off for Paleolithic populations, as analytic cognition expanded, was that the holistic experience was diminished. (See Hopkins, Pilcher, and Cantalupo 2003 in *Primate Psychology* for a thorough discussion of the comparative structural similarities in the brain between human and other primates.)

Returning to the bubble metaphor then, the interconnecting nodes increase to a point where the remaining perceptual data are represented only as half-tones. The clear delineation of the bubble's confines begins to breakdown, defined, say, by a dotted line instead of a definite solid one. The mind illustrated by this bubble of half-tones and nodes is a mind relatively balanced between analytic and holistic thought. Note Paul Mellar's enthusiastic comment on the aesthetic creativity of the Upper Paleolithic (1994, p. 67)

> . . . the art stands in many ways as the most impressive and enduring testimony to the creativity of Upper Paleolithic culture – not only in terms of the sheer skill and aesthetic flair of the artists themselves, but also in their capacity to convey highly sophisticated, symbolic messages in a remarkable variety of forms.

I should note that Mellar's use of the term 'symbolic' here is probably somewhat at variance with what we can easily demonstrate, though essentially correct.

Elsewhere, Prewitt and I have (2010) set out a framework for the elaboration of communication systems for the Upper Paleolithic. In that model we differentiate between what we call Language I, a period when the species possessed the capacity for the Peircean argument, but did not habitually model the world with symbols, and the elaborated symbolic communication system like our own that we called Language II. In a similar arguments several authors have suggested that music may be very important in developing our sequential (analytical) modes of thinking (Patel 2008, Mithen 2006, Wray 2000), stressing the connection between music and language as structures unfolding in time. We stress the parallel balance of analytic and holistic qualities between musical processes and the production in time of the metaphorical realism (iconic representation) of the cave paintings. It makes sense that alongside transformation of visual perception to iconic representations that early auditory experiences might have been similarly manipulated in vocalizations. The song as imitation of natural sounds in the environment offers a ready medium for a transition to vocal symbolism, Such arguments are consistent with long held ideas of onomatopoeia as an aspect of the origins of language. In all these arguments, then, in essence the Upper Paleolithic instigates human cultural traditions as it codifies direct experience of the world into symbolic understanding.

It is interesting to note that a recent work surveying Upper Paleolithic societies of Eastern Europe, (Kuhn, Brantingham, and Kerry 2004, p. 242-248) concluded that the cultural markers so well understood by early research in Western Europe do not show a geographic expansion eastward through time as had been previously expected. Instead, what was found were culturally distinct areas throughout Europe. I consider this to be in keeping with the scenario of the transitional cognitive shift. Rather than transmitting an established cultural tradition over an extended space, what is shifting location are the individuals within the population. These are

populations of developing analytic capability, traveling and expanding their territory. And within each new settlement cultural invention takes place. There are commonalities in these new traditions, which indicate like-thinkers, as they represent the same developing level of analytical capacity (like the cultural universals for modern humans that represent our common cognitive traits).

The Upper Paleolithic is an exceptional period in human prehistory, as it establishes the bases for all the world cultural traditions to follow. The excitement of invention and new ideas is and has always been a basic element of human populations and gets its true beginning in the Upper Paleolithic, so that within a scant 30 thousand years, the entire planet is altered completely. Earlier incarnations of the hominid line (*Homo erectus* in its diverse forms, for example) existed for hundreds of thousands of years in relatively stable, unchanging cultures. Even *Homo sapiens neanderthalensis* did not show substantial behavioral evolution over tens of thousands of years. But, fully modern human populations, by definition, do not sit still.

The populations of the Upper Paleolithic were groups representing a huge diversity of cognitive types exhibiting talents in a wide array. Some behavior expressed out of these talents lent a greater level of success for some populations. Biocultural selection assured that particular talents became more prevalent in time and gene flow gradually expanded these capacities in space. This exant biocultural process was, no doubt enhanced by the pressures of the environmental transformations brought about by the warming of the climate at the end of glaciation periods of the Pleistocene (Mellars 1994, p. 75). This stimulus for change once again altered brain physiology and furthers the transformation begun in the early Upper Paleolithic. What I am suggesting, in plain terms, is that it is *at the close* of the Upper Paleolithic that analytical thought becomes established as the dominant cognitive style for the species, rather than being in balance with the holistic as before.

Anthroposemiosis

In terms of the 'human' bubble, analytical dominance is illustrated by the nodes of interrelated elements of perception interconnecting across bubble boundaries. For the first time connections from event to event are analyzed in a linear fashion, as a time line from past to future. This is the sequential aspect of analytical thought (Bering and Povinelli 2003, p. 224) that allows for planning and true evaluation of past efforts, the search for pattern and prediction of the future (Gazzaniga 2008, p. 367-268), time consciousness, and the awareness of results of changes through time. It allows for generating stories of our individual histories, our personal narrative, and the invention of narrative in general. At this point the human brain becomes involved with inventing cause and effect plots for personal experience and events in the external world (Bering and Povinelli 2003, p. 210, 228-9), and as a result, discerning annual variations in the environment and food sources leading to the first efforts at manipulation of those sources – plant and animal domestication. And, in my estimation this also marks the time of myth-making, the genesis of scientific thought, and the development of ruled-based behavior, such as the grammatical communication system that is Language II (Haworth and Prewitt, 2010). All of these markers manifest the underlying logical capacity Peirce called the 'argument', the ultimate cognitive integration of analytical thought with abstracted traces of holistic experience.

In terms of the archaeological record, the Mesolithic era (12,000 – 8,000 B.C.E.) seems to document this next level of transformation. The Mesolithic represents yet another progression in lithic tool technology with the appearance of microlith industries. The small blades were apparently hafted onto wood or bone elements to from a 'wide-range of multi-component tools' (Mithen 1994, p. 96). In addition to a varied stone tool assemblage, Mesolithic sites contain diverse tool forms of wood, bone, and antler, including points, barbed harpoons, fishhooks,

woven wicker traps, and bark containers. Many of the larger pieces are adorned with geometric designs and sculptural forms are highly stylized. These sites also provide evidence for structures and settlement sites. And the first cemeteries and burials with grave goods date from the late Mesolithic (Mithen 1994, p. 79 – 135). The range of variability in the Mesolithic leads Mithen to characterize the period as being a finale to the hunter-gather era, a prelude to the economic systems of later prehistory, as well as providing an identity unique to its time and to proclaim it 'one of the most critical periods of transformation in European prehistory' (1994, p. 133 - 135).

With this continued transformation in physiology, once again the holistic mind is diminished and those individuals within the population capable of the artistic achievements of the Upper Paleolithic ostensibly disappear (Mellars 1994, p. 78; Haworth 2007), leaving the predominant art forms for the Mesolithic and beyond to be the stylistic abstractions of human cultures still prevalent today (Mithen 1994, p. 127 - 132; Haworth 2007). Unlike the startling and relatively abrupt changes noted in the archaeological record for the advent of the Upper Paleolithic, the timeline for the transition to the Mesolithic and on into the Neolithic have 'blurred' and 'fuzzy' edges (Mithen 1994, p. 79). The rock art of the Spanish Levant presents a unique illustration of this continued progression. Some walls show the elegant animal figures of past traditions along with the stylized depictions of human activity and story that are common to contemporary populations. Often times the human figures are actually incised over the animal figures (Beltrán 1982). This art, and the archaeological record in general, are indicative of a population whose brain physiology is still undergoing transformation. The end result by the advent of the Neolithic is the established analytical mind of the contemporary human species.

Caveat

Each time I present a version of this holistic to analytic scenario for human cognitive evolution, I stress the point that there still remains a huge diversity of cognitive types throughout humanity with talents expressed in great variety. Although analytic thought introduced new perspectives on the world, the true uniqueness of human creativity lies in the power of the combination of styles within the population and within the individual. As I mentioned in my original publication on this subject, Dunn, et al. (1992) researched the extent to which individuals tended toward the low or high end of the continua of both analytical and holistic modes of cognition. Regardless of the general dominance of the analytic style for most, there still remains a vibrant interaction between the two styles in each of us, allowing for the tremendous diversity of human talents. Gazzaniga's studies on the comparative functions of the left and right hemispheres presents the hypothesis (2008, p. 296):

> . . . the left-hemisphere interpreter constructs theories to assimilate perceived information into a comprehensible whole. . . . In doing so, however, the process of elaborating (story making) has a deleterious effect on the accuracy of perceptual recognition, as it does with verbal and visual material. Accuracy remains high in the right hemisphere, however, because it does not engage in these interpretive processes. The advantage of having such a dual system is obvious. The right hemisphere maintains an accurate record of events, leaving the left hemisphere free to elaborate and make inferences about the material presented. In an intact brain, the two systems complement each other, allowing elaborative processing without sacrificing veracity.

But, there is great variability in the ways in which this combination of function may present in the individual. We are not all mathematicians, or musicians, or academics. And let's not forget that our so-called success as a species may also be the cause our ultimate demise, as our ability to connect between events seems limited after all.

We may plan over annual cycles, but we have obviously not yet mastered concern beyond a generational limit. Also, our analytical selves seem to recognize a loss, if only subconsciously, that is manifest in the spiritual ways we invent, though no one agrees as to what the something lost is, specifically. I suggest it may be the ability to take in what exists around us as it is and appreciate it without condensing it into preconceived concepts. This aspect of our predecessor past still exists within us, though for most of us not as a dominant force, but still there, enough to conflict within us and within groups, cultures, and nations.

One of the failures of the analytic process is a tendency to assume like cognitive systems in others, whether we are considering our neighbors or our neighbors' dogs. Our personal modeling system does not necessarily apply across individuals and species. It is part of the pattern recognition tactic that serves us well in many pragmatic ways (Gazzaniga 2008, p. 368) that sends us off the mark in this manner. We take limited data and apparent similar end results and assume the internal processes that underlie them, resulting in the anthropomorphism of comparative studies (Rivas and Burghardt 2002), not to mention just basic human misunderstandings in our daily lives. As noted by Bering and Povenelli (2003, p. 209)

> . . . the very mind (the human one) that seeks to analyze objectively the behavior of other species in order to determine the nature of their cognitive systems is already wired to interpret their behavior from a human standpoint—regardless of the objective reality. Put another way, here is one thing of which we can be sure: the human mind is extremely adept at seeing the world through its own lens . . . .

I go one step further to point out that we see through our own personal lens and that affects our interpretation of *all* others. The commonalities that we share with other species through common aspects of holistic cognition and limited analytic

capacities feed our tendency to over-generalize. And thus, even possessing the derived cognitive platform that enables anthroposemiosis, vigilant awareness of cognitive variability must underlie any efforts for understanding human behavior and evolution.

ENDNOTES

[1] *Innenwelt* in this paper is from the concept as developed by John Deely in his *Four Ages of Understanding* (2001).

[2] A very detailed technical assessment of this aspect of Peirce's writings can be found in chapters three and four of *Peirce and Triadomania: A Walk in the Semiotic Wildersess* (Spinks, 1991, 51-132).

[3] Kenneth Pike (1967) differentiated feature, manifestation, and distribution modes in his exposition of what he called *emic* units in culture. The feature mode represents descriptive attributes relating to the unit, while the manifestation mode represents the sense in which the unit forms a logical type. Pike's notion of the feature mode involved a selection of key attributes similar to that described here for the perceptual base of analytic thinking, while the manifestation mode fits well with the abstracted sign posited here as the foundation of fully human anthroposemiosis. The distribution mode for Pike represented the associations of context that different manifestations sometimes obtain as correlations of sub-patterns and situation in the generation and interpretation of the logical types.

[4] The two dates mentioned in Gazzaniga (2008, p. 16) for gene mutation are too recent (37,000 and 5,800 years ago) to directly jibe with the archaeological record. Possibly, there is some sort of lag between when individuals appear with the mutation and begin to develop the cultural artifacts that appear in the record and the point at which the mutation is permanently established in sufficient numbers to be evident in the DNA record of current populations.

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