

## The Power of the Word May Reside in the Power of Affect

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**Abstract** This commentary on Dan Shanahan's, *A New View of Language, Emotion and the Brain*, basically agrees with an emotion-based view of the evolutionary and developmental basis of language acquisition. It provides a supplementary neuroscience perspective that is more deeply affective and epigenetic in the sense that all claims about neocortically-based language modules need to be tempered by the existing genetic evidence as well as the robust neuroscience evidence that the cortex resembles random-access-memory space, a *tabula rasa* upon which epigenetic and learning processes create functional networks. The transition from non-linguistic creatures to linguistic ones may have required the conjunction of social-affective brain mechanisms, morphological changes in the articulatory apparatus, an abundance of cross-modal cortical processing ability, and the initial urge to communicate in coordinate prosodic gestural and vocal ways, which may have been more poetic and musical than current propositional language. There may be no language instinct that is independent of these evolutionary pre-adaptations.

**Keywords** Emotions · Language · Music · Gesture · Affect · Epigenesis · Neocortical functions · Modules

Dan Shanahan offers a welcome corrective to exceedingly cognitive views of language development. Having devoted most of my career to the study of the evolutionary nature of primary-process emotional systems and the affective states they engender (Panksepp 1982, 1998, 2005), as opposed to their relations to secondary and tertiary cognitive processes and learning that Shanahan (2007) prioritizes, I will provide a synergistic but distinct scenario for the emotional basis of language. Shanahan indicates that he is offering just one entry point into a complex and underdeveloped arena of thought; I will offer a complementary viewpoint on the

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“language-instinct” that arises from an affective neuroscience conception of basic brain emotional systems and their potential role in cognitive development.

It is becoming increasingly clear that the affective intensity of emotions arises more from the lower subcortical reaches of the brain (Panksepp 2005) than the various conditional, secondary-process high- and low-roads that provide learned control over emotional urges (LeDoux 1996). Adherents of classical conditioning models of emotion have rarely sought to understand the nature of their affective unconditional stimuli. In fact, the human cognitive apparatus rides upon the integrity of many primary-process subcortical attentional, emotional and motivational processes (Merker 2007; Panksepp 1998). Without those tools for living and learning, there would be no secondary-process learning or tertiary-process thoughts. Children born with practically no cortico-cognitive apparatus still possess phenomenal consciousness (Merker 2007) and deeply emotional minds that are affectively rather than cognitively oriented (Shewmon et al. 1999).

All mammals are born with brain potentials that elaborate many positive and negative emotional processes that guide the developmental trajectory of language acquisition. These processes include PLAY/joy, CARE/nurturance, and PANIC/separation distress which are especially important in motivating the inter-subjective dance between mother and child (Schore 2003; Trevarthen 2001). Such ancestral forces of mammalian brains guide much of cortical programming as children develop social brain/minds. Early affective communication may promote the programming of linguistic prosody within right cerebral hemispheres of developing children. Through a comparable leap of logic, we can envision that analytic–cognitive attributes, including various delusional potentials of language, promote left hemispheric dominance. Shanahan did not consider the sources of such cerebral specializations, even as he cultivated received wisdom concerning a basal-ganglia/amygdaloid participation in emotions, which is only a small part of emotionality within mammalian brains.

Although cognitive *High* and *Low Roads* to fear conditioning certainly converge on lateral amygdaloid areas (LeDoux 1996), the affective intensity of fear emerges from convergence on central nuclei of the amygdala where the *Royal Road* to FEAR, and hence primary-process angst, begins (Maren and Quirck 2004; Panksepp 1990). Meanwhile, corticomедial regions of amygdala promote aggression and sexuality. However, there is little empirical reason to believe that the phenomenal affective intensity of emotions finds its epicenter just within the amygdala, as some continue to believe (see Panksepp 2002, for a deconstruction of that simplification). It is more involved in the detection of environmental dangers. People with bilateral calcification (inactivation) of amygdala, as in Urbach–Wiethe disease, still have many internal worries (Damasio 1999). Other animals with bilateral amygdaloid damage still exhibit many anxieties, including elevated fear in social situations (Bauman et al. 2004; Kalin et al. 2001). The role of amygdala in the generation of affect (i.e., the feeling component of emotions) has been vastly exaggerated. In an extensive brain-imaging analysis of basic affects, the amygdala was activated only once among the 189 brain regions that exhibited significant arousal changes, and that occurred during the experience of happiness (Damasio et al. 2000).

An understanding of how fearful feelings are elaborated in the brain requires analysis of FEAR circuits coursing from the central nucleus of the amygdala to the periaqueductal gray of the midbrain (Panksepp 1990). Amygdaloid participation in

emotional *feelings* has been oversold in the popular literature. Such heuristic simplifications also permeate Shanahan's intriguing thesis. Indeed, humans with massive damage to higher limbic regions, including amygdaloid nuclei, are not deficient in perceiving fearful stimuli if dynamically portrayed; they are deficient mostly with static stimuli (Adolphs et al. 2003).

Amygdaloid-based, emotional learning is probably less important in language acquisition than motivation influences of primary social–emotional systems, including separation-distress (PANIC), maternal nurturance (CARE), ludic engagements (PLAY), and the socio-sexual dance (LUST), as well as SEEKING desires to engage with the world, all accompanied by a rich panoply of emotional sounds (Panksepp 1998, Chapters 12–15). It is among these limbic networks we are most likely to find the affective forces for human language development and ultimately the compelling power of music and poetry, love and empathy. Reptilian amygdaloid contributions to fear and aggression may promote swearing and other emotional expletives (Landis 2006).

The lilting, sing–song emotional–communicative dance between mothers and infants, where high-pitched melodic “motherese” prevails (Fernald 1989; Trehub 2003) is well designed for language acquisition (Trevvarthen and Aitken 2001; Trevvarthen and Daniel 2005). Musical affective prosody engages the communicative efforts of infants more than any imaginable cognitive–propositional thought. An intriguing case exists for the musical affective foundations of language acquisition (Panksepp 2008; Panksepp and Trevvarthen 2008):

1. Animals communicate with sounds, probably mostly affectively (Fitch, 2006; Panksepp, 1998) but with more subtlety than typically imagined (Burgdorf and Panksepp 2006; Panksepp and Burgdorf 2003).
2. Proto-musical competence precedes language in human mind development (Fernald, 1989; Trehub et al. 1984).
3. Music is the “language” of emotions and its affective power arises from subcortical emotional systems (Blood and Zatorre 2001; Menon and Levitin 2005; Panksepp and Bernatzky 2002).
4. Music and language capacities are tightly coupled, overlapping processes of the brain (Callan et al. 2006; Schwartz et al. 2003).
5. Evolutionarily human communicative urges may be linked to affective-musical motivations that guide emerging social–cognitive abilities. Indeed, mentally compromised children with Williams syndrome highlight how intrinsic musical talent and intense social communicative desires go hand in hand.
6. Thus, along with Shanahan, who has thought outside the cognitive box of the *language instinct*, I would more specifically suggest that language arose from our emotional nature through a musical–prosodic bridge.

Just as emotional communication may have been a pre-adaptation for human invention of music (Panksepp 2008), both may have been essential for the emergence of language. With the expansion of a random access, general-purpose multi-modal cognitive processor, namely the neocortex, more purely cognitive modes of communication may have gradually emerged. However, that transition was never completely liberated from the affective-musical motivational ground from which it arose.

With cortico-cognitive maturation, the diverse emotional–musical communications of infants begin to bifurcate into two seemingly distinct streams—propositional, logic-constrained, low-affect speech consolidates within the left hemisphere, while the prosodic–emotional poetic stream flows more forcefully through the right (Callan et al. 2006). However, in well-functioning brains, more so in females than males, the two remain functionally entwined. If one’s purely cognitive arguments are divorced from the affective–rhetorical power of emotional convictions, one’s ability to understand language and to attract the cognitive attentions of others suffers (Frazier et al. 2006). Likewise, when right-hemispheric prosodic and reality-principles are damaged, the left-hemisphere’s story-lines become more superficial and disconnected from the deep affective needs and life-stories of people (Ross et al. 1994).

Although propositional speech ultimately requires multi-modal symbolization—whereby the information acquired by vision, touch and the other senses is translated into sounds—the affective ground for communication remains strongly linked to emotional convictions. Perhaps this is why the sign languages of the deaf remain more strongly affective—it is more closely connected to the emotional–gestural proto-languages of our ancestral past (Gentilucci and Corballis 2006). When left hemispheric propositional language becomes decoupled from affective values, it readily confabulates, becoming untrustworthy and less authentic—generating semantic towers of delusional babble, often in attempts to manipulate the minds of others. This may indicate that the left hemisphere participates more in defense mechanisms than the right. Just consider that after right hemispheric damage, following paralysis of the left side of the body, patients readily deny their self-evident paralysis, a clear logical absurdity. They prefer to confabulate about their lives in affectively positive, self-protective ways (Turnbull et al. 2004). Only in the midst of the dizziness of middle ear irrigation (Ramachandran 1994) or the defense-breaking depths of psychoanalysis do such patients re-achieve short periods of contact with primary-process realities (Kaplan-Solms and Solms 2000). In sum, when the left hemisphere is less grounded in subcortical/right hemispheric emotional “soil”, it becomes more adept at self-serving rationalizations (Ross et al. 1994).

An ultimate question of the “language instinct” is where does the motivation to speak come from? It seems to be intimately linked to our social motivational urges. Bilateral damage to anterior cingulate regions commonly generates akinetic mutism (Devinsky et al. 1995)—a profound lack of desire to speak even though the motor capacity to speak is not severely impaired. Thus, the motivation for speech remains strongly linked to social motivational systems we share with other mammals. It is in these brain regions where we find some of the highest representations of social–emotional circuitry, especially our capacity to experience separation–distress and social attachments (MacLean 1990; Panksepp 1998, 2003). If so, our urge to speak may be more profoundly linked to social–emotional motivation than our need to promote logical ideas. Thus, it is not surprising that for most people, speaking remains more of a social–emotional act than a propositional–logical one.

Our intrinsic emotional abilities are built into widespread swaths of the limbic-system (MacLean 1990; Panksepp 1998). As Shanahan highlights, some have sought to convince us that such functional concepts as the “limbic system” have outlived their usefulness (e.g., LeDoux 1996), but see Panksepp (2002) for a deconstruction

of the motivation behind this claim. The failure to recognize that all words are symbolic concepts, has led some to believe that terms such as *amygdala* refer to more real entities within the brain than the *limbic system*. This reflects an impoverished understanding of language, and perhaps an intentional discrediting of past accomplishments. The amygdala is only a man-made term to designate an area in the brain that consists of certain neurons and surrounding supportive tissues.

There is no unambiguous biological dividing line between amygdala and the many brain areas with which it communicates (now known as the “extended amygdala”: Heimer 2003). Amygdala is a concept we created to facilitate neuroanatomical communication. Likewise, the limbic-system is only a man-made term to designate the midline regions of the brain that are essential for primary-process emotional processing. It is a concept that facilitated communication about the general regions of the brain that needed to be understood to understand emotionality, and as our understanding grew, various interconnected brain areas became known as the “extended limbic system”. In any event, the amygdala has less to do with the genesis of language than the rest of the limbic system.

In our desire to understand the emotional sources of language, we may be wise to recognize the diversity of basic social emotional processes that provide a foundation for our social life (Panksepp 1998). The cognitive revolution, like radical neuro-behaviorism, intentionally sought to put emotions out of sight and out of mind. Now cognitive science must re-learn that ancient emotional systems have a power that is quite independent of neocortical cognitive processors. Cognition will never be free from affect; raw emotional feelings arising from ancient neural substrates that are essentially pre-propositional—cognitively objectless. These emotional substrates promote cognitive object-relations, optimally through rich emotional experiences. It might be wise to recognize that the neocortex, that obligatory processor of linguistic abilities, has no intrinsic power to be conscious on its own. Without the basic attentional, emotional and motivational powers of the non-linguistic subcortical regions, it would be perpetually asleep. Meanwhile, the subcortical regions that elaborate affective consciousness, can generate emotional sounds, including ones as painful as crying and as delightful as laughter (Burgdorf et al. 2007; Panksepp 2007a, b) without neocortical participation (Panksepp 1998).

Despite the desire of Evolutionary Psychology to modularize higher aspects of the human mind (Pinker 1997), the neocortex has few intrinsic functional capacities of its own. Its major intrinsic abilities are to relate external events with each other (e.g., multimodal blending of experience into potential linguistic symbols) and the ability to generate certain actions. Most cortical–cognitive modularizations emerge through developmental experiences. Only through the epigenetic forces of learning, does the human brain develop foresight and hindsight. Prior to learning, the neocortex quintessentially resembles the Random Access Memory (RAM) that has made our desk-top computers so remarkably lively. Within the neocortex, the basic “chip” that needed to be repeated over and over—the ~3,000 neuron cortical “column” or smaller units now known as “minicolumns”—had been engineered long before cortically mediated symbolic “wisdom” prevailed in anthropoid apes. It did not take much additional genetic information to induce a massive proliferation of neocortical mass. Thus, it was genetically simple for evolution to expand human neocortex to the point where it had the potential for cognitive–linguistic communication. In fact,

it may have taken more genetic “effort” to expand the birth-canal and to create a voice box and oral articulatory apparatus, than to engineer a neocortex that could develop symbolic communication through learning. No gene for language has been discovered, although one (e.g., FOXP2) that is heavily concentrated in basal ganglia, which regulates smooth articulation, even in birds, has been identified (Balaban 2006; Scharff and Haesler 2005).

For those who would like to cling to the evolutionary-psychology “dream” (or “nightmare”) that the human cortex contains abundant evolutionarily-honed functional “modules” as opposed to enormous epigenetic potentials (for detailed discussion, see Panksepp and Panksepp 2000, 2001), consider this fact: When the visual cortex of a mouse is ablated before birth, *in utero*, mice still develop the capacity to see, which highlights that cortical functions are largely specified epigenetically (Hornig and Sur 2006; Sur and Leamey 2001; Sur and Rubenstein 2005). In other words, the ancient subcortical visual systems of the posterior thalamus (lateral geniculate) still fan out posteriorly into what would have been parietal touch cortex, inter-connecting “obsessively” with general purpose, RAM-type cortical columns so as to epigenetically establish visual competence (Sur and Rubenstein 2005).

This emerging understanding of higher brain development, whereby most cortical functions are epigenetically promoted by powerful subcortical processes, is rapidly approaching an established fact (e.g., Kuczewski et al. 2005). Likewise, it is possible that the powerful subcortical emotional systems (Panksepp 1998)—affect generating circuits that emotionally-oriented cognitivists are prone to ignore (e.g., see Barrett 2006; responded to by Panksepp 2007c)—may exert similar influences on the structuring of various higher executive mind functions of the frontal lobes. It is easy to envision cognitive functions as high as empathy arising from contagious primary-process social-emotional systems that may even epigenetically create mirror neurons when guided by more basic emotional systems (Bivin and Panksepp 2007; Watt 2007). Indeed, it is unlikely that basic learning and conditioning could proceed without affective rewards (Panksepp 2007b).

Shanahan, swimming against the tide of non-affective cognitivistic thought, has mapped important conceptual territory that needs to be empirically explored. The most fruitful directions, based on a different and more sophisticated view of the emotional brain than many cognitively oriented investigators have yet assimilated will, I believe, yield more abundant and solid knowledge about linkages to the emergence of language. I believe the general view advanced by Shanahan is correct. However, I have highlighted other paths through the developmentally acquired cognitive brambles that we should wish to consider. Many of our cognitive preconceptions have historically confused and shielded the way toward an evolutionary understanding of language and the associated heights of the human mind.

Still, many devilish complexities lurk in the details. And one set of details that should not be ignored is that the cognitive view of emotions, largely clarified through learning paradigms, often neglects one of the most important aspects of emotionality—the diverse and ancient primary-process brain operating systems that are initially largely pre-propositional energetic states of mind that help guide cognitive development. It will be most interesting to see how the epigenetic emergence of language cortex is programmed by our socio-emotional encounters,

especially those playful secure bases within which mothers coax their children to become affectively resonant creatures of culture. To do that well, it was essential for recent brain developments to have retained an implicit understanding that it is important to speak about the emotional complexities of our lives—the more poetically and musically, the better.

Language is just one exemplar of the general principle that the neocortex is modularized epigenetically by important life experiences. It is the organ of culture. Prior to engagement with primordial emotional and motivational forces, the neocortex knows little or nothing. There are good reasons to believe that tissue is born largely as a *tabula rasa*, with only certain abilities to associate sensory-perceptual events with the deeper evolutionary underpinnings of mind (Panksepp and Panksepp 2000, 2001). If so, then our musical–emotional nature, rather than being “cultural cheesecake” (Pinker 1997, p. 524), may be the very foundation for the epigenetic emergence of language. Rather than having no adaptive function, our gestural, prosodic–communicative musical nature may have been the wellspring of language. Thus, along with Shanahan, I suspect the emotional motivation for a “language instinct” lies deeper in brain evolution than cognitively oriented evolutionary psychologists have yet envisioned.

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