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COGS 184

Official Commentary Week (actually idk the week lol)

Donald describes three major transitions that have led to the rise of the ~~cognitive~~ systems and abilities of modern day humans. These transitions can be categorized as episodic to mimetic, mimetic to mythic (speech), and finally, mythic to theoretical (external memory).

The first transition occurred sometime between *Homo erectus* and *Homo sapiens*. This was characterized by an increase in cerebral volume (mainly in the association cortex, hippocampus, and cerebellum). In the fossil record, this was exemplified through tool use and hunting strategies. This transition led to the rise of two cognitive features: mimesis and voluntary retrievability.

First, mimesis allows humans (archaic and modern) to use their body as a representational system. This involves the ability to form gestures which is not unique to humans but primates and even other species (like the grouper fish!). Non-human primates like apes can learn and perform gestures and signs but do not invent many of their own. Humans are unique in our ability to invent an infinite array of gestures. This is only possible through rehearsal, refinement, and auto-cueing.

I think that this relates very well to the beginning of COGS 184. Johnson discussed how the ability to carry a spear or items for a long period of time without using it may have selected for self control. To be able to make yourself rehearse and devote time to refining movement would have taken a great amount of self control. As *erectus* had evident of complex hunts and migrations, it seems obvious that self control would have increased in importance and enabled mimesis.

Second, voluntary retrievability is our ability to fetch items from memory without the need for environmental cues. Apes have episodic memory but struggle to recall—or access this memory—without environmental cues. Our ability to retrieve when we want may have risen from rehearsing this action or from the nature of rehearsing gestures which set up a recall system.

The second transition occurred prior to *Homo sapiens* and is characterized by another expansion of the brain and descent of the larynx. Because of these

anatomical and cognitive developments, the capacity for speech capacity became more viable. This transition led to the rise of two cognitive features: lexical invention capacity and high-speed phonological apparatus.

First, Donald suggests that, due to the fossil record, it was unlikely that *erectus* had grammar but was restricted to one to two word utterances. Lexical invention capacity is our ability to map meaning onto words and to save that for future use. This must have come after the first transition because we would have needed a larger memory capacity to store mappings but also voluntarily retrieve them (and without environmental cues).

Donald also posits that the invention of a symbol involves, or requires, labeling and differentiating our perceptions and conceptions of the world. He ties this to Dunbar's description of narrative versions of reality via storytelling. While this may not be accurate, I can't help but relate this to the human imagination; humans are unique in being able to live in multiple realities. For example, small children will pretend to answer a block as if it's a phone. They understand that the block *is* a block but *is also* a phone. I wonder if it was at this point in history that imagination or multiple realities emerged.

Second, because our larynx dropped, it both came at the cost of life (oops choking to death) but the increase in size of our cavity. A larger cavity enabled us to have a wider range of sound production. Because of this, a virtually inline series of sound patterns are available for symbolic use. This is very different than mimesis in that we only have so many body parts and ways of wielding our limbs so our set of signs is limited. Phonological representations would have required a much larger retrieval capacity and storage.

Interestingly, we still needed mimesis before a phonological apparatus as is evidenced by mimetic structures being harnessed by the language system when prologue malfunctions. Donald suggests that this would have required a specialized mimetic substructure. Mimesis is already characterized by rehearsal, auto-cueing, and purposive refinement so strapping this as substructure to phonology would have also set up our vocal repertoire.

While Donald did not make this claim, I wonder whether babbling became important during this time. Babies often babble to grasp all of the sounds their mouths can produce. But because babies even babble alone—and do it consistently—I wonder

whether this is a form of rehearsal of this mimetic substructure. Babbling is free of linguistic reference (doesn't mean anything) so it may be more of this motor refinement (and possibly retrieval) than language.

The third transition occurred late in the Paleolithic era (archaic *Homo sapiens*). It was characterized by the use of external memory of visual symbols and is considered to be a cultural phenomenon rather than anatomical. Two cognitive features emerge during this period: external memory storage and working memory architecture.

First, external memory storage includes representational devices such as visual symbols, records, and theories. Of these representational devices, we have visuosymbolic invention (writing systems), external memory (external records), and theories (cultural products). These forms of external storage enabled humans to go beyond the limits of biological memory. Donald suggests that the uses of pictorial, ideological, and phonetic paths were only possible from the extreme plasticity of the neocortex and asymmetry,

I wish Donald had delve a bit more into the discussion of asymmetry and plasticity to defend our neoarchitecture than enabled more reliance on external memory or increasing internal lexical storage. He briefly mentions that by having an asymmetrical brain, one region can be taken over (by this memory) to do other work and—I assume—leave the other region to do what it was doing? This isn't very clear and I don't think we can just assume that asymmetric lets memory systems take over regions of the brain. I think Johnson would suggest that it was a result of specialization or temporal mappings across the brain to store information. Therefore, I'd like more clarification on these neuroanatomy claims.

Similarly, in this same discussion, Donald brings up the neocortex and how fine touch discrimination expands and contracts by a prolonged increase in stimulation or load changes. I feel like he just drops this tidbit in the middle of the discussion and doesn't relate it to what we're speaking of. Is he suggesting that there is a co-development in motor and external memory systems? Is this just because our primary sensory cortices (like visual) becoming coupled with memory given the rise of external records?

Donald goes further to talk about the traditional working memory architecture. He reminds us of the old theories of working memory with the central executive and

articulatory loop. While the articulatory loop does make sense as constant rehearsal is necessary, much of this model is out of date and flawed. Similar to a number of other critiques, I wish he would talk more about how we use external memory records.

In COGS 100, we learn that we often offload cognitive to the environment (e.g. writing on paper), how that offers us scaffolding (e.g. how to structure thoughts), as well as distributed cognition. I think there's a discussion missing on how situated and distributed cognition work. Our memory isn't just internal and I don't believe our cognition developed in isolation. Instead, we're always relying on others' memory, markings, landmarks in the environment, etc.

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In "Archeological Evidence for Mimetic Mind and Culture," Wynn focuses on the use of *Homo erectus* as evidence for these transformations and the development of mimesis. Wynn points out that mimesis is quite challenging, especially in pinpointing on the archeological record, because no culture exists today that is solely mimetic; apes are episodic and humans mythic/theoretical. Donald makes a number of claims of *erectus*' use of fire and ability to migrate on a vast scale as selecting for mimesis. Wynn notes that the emergence of fire and migrations actually came much later in *erectus*.

More interestingly, Wynn states that *erectus* does offer evidence of a need for mimesis not in fire or migrations but in their tools. The biface has an oval shape and bilateral symmetry. It would have taken care and consideration to shape it in this manner. It also would have required repetition and rehearsal to slowly chip away. Because the shape is so specific, tool makers must have shared the idea of the imposed shape. Language (verbal) would not have been necessary but mimesis would have. (They could've used their hands to gesture the curvature, size, or structure of the desired rock form). To go a step further in mimesis, we really do need some evidence of representation (like cave art?) but, unfortunately, that's something our fossil record lacks.

In "External Representation: An Issue for Cognition," Zhang primarily focuses on clarifying the meaning of external memory. He agrees that the cognition evolution undertook a number of transformations in representational systems. Those transformations can be categorized as episodic to mimetic, mimetic to mythic

(speech), and finally, mythic to theoretical (external memory). Zhang states that Donald focuses mainly on the external symbolic like writing systems but fails to delve into the importance of cognitive artifacts, environmental anchors, or even scaffolding. Therefore, Donald's discussion of external memory is lacking a number of examples.

Similarly, Zhang feels that the definition of external memory is functional (what it does) but doesn't describe its distributed nature. For example, symbols aren't inherently tied to a value, we must choose from available symbols in the environment (external) or create our own then memorize a mapping of symbol to meaning (internal). The internal and external did not grow or develop in isolation. Both these systems are a part of an integrated representational system. Many cognitive tasks involve externalizing elements of memory (e.g. like writing down numbers in match) and are updated internally (e.g. storing that number in working memory).