Creativity, Culture and Consciousness

What is the connection?

Could Meme Theory and Advances in Neuroscience Provide the Answer?

A preliminary investigation by

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Introduction

Although it was not my original intention to investigate cultural evolution, my interest in this arose when trying to understand what drives artistic creativity. I wanted to understand what could link my need to create “works of art” with our early human ancestors, who created the stunning dynamic cave paintings at Chauvet, approximately 35,000 years ago. (Herzog, W., 2011)

Figure 1 Lions, Chauvet cave painting, -35,000 yrs, discovered 1994

I had previously looked at this from a psychoanalytical and neurological perspective and then wondered what insight might come from evolutionary biology. Having found contemporary writers, with a scientific background

(Leader, D., 2004,2009,2010), useful guides into complex fields such as philosophy, I revisited the publications of Richard Dawkins (Dawkins, R., 1989, chapter 11). When I came across the elegant concept of the meme, which he first suggested in 1976, I was hooked, especially as this seemed to spark a creative burst of meme related work in my studio.

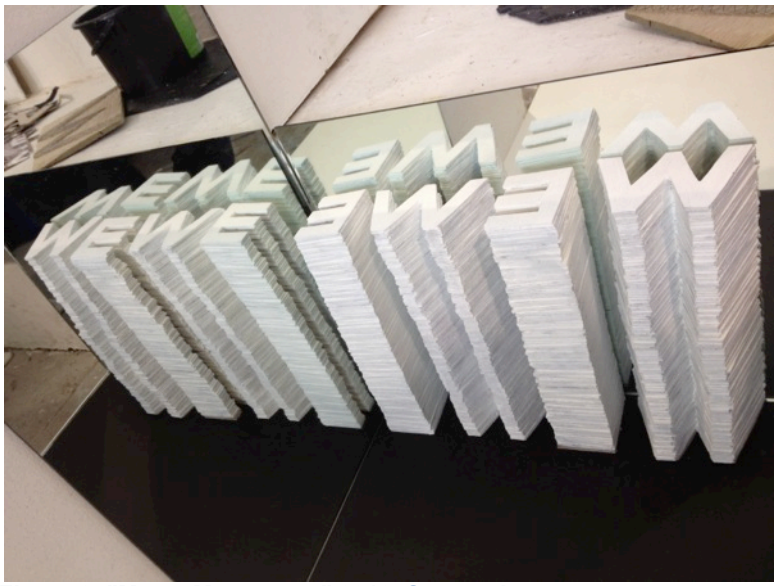

Figure 2: "Meme Monument," 2012, Sutton, A.

In this essay I intend to concentrate on key aspects of memetic theory, and how recent developments in neuroscience, relating to the organization of the visual brain and the motor system, begin to suggest a biological basis for the meme within the human brain, whilst providing interesting insights into artistic practice and the concepts of consciousness and free-will.

I will start by summarizing the generally accepted view of the main stages in human brain development that have been deduced from archaeological evidence, as described by Donald. (Donald, M., 1993, 738) I will concentrate

on points relevant to my investigation, since a large part of his paper concerns cultural evolution theory, which is beyond the scope of this essay.

In his précis of his book, *Origins of the Modern mind: Three stages in the Evolution of culture and cognition*, Donald suggests that there were two major "*breakpoints in hominid cognitive evolution*"(Donald, M., 1993, 738) which coincided with the periods when Homo erectus and archaic Homo sapiens appeared, approximately 1.5 million and 0.3 million years ago, respectively. The first evidence of major cognitive development and a sharp acceleration in brain size occurred in the transition to Homo erectus, whose brain was approximately 70% of the size of modern man. It is generally accepted across disciplines, that this first transition was based on the acquisition of a revolutionary motor-modeling skill, mimesis or imitation, which created a voluntarily accessible memory system and which is regarded as the necessary pre-adaptation for speech and language development. Donald explains:

> *"Only humans can recall memories at will; and the most basic form of human recall is the self-triggered rehearsal of action, the refinement of action by purposive repetition…. the whole body becomes a potential source of conscious representation." (Donald, M., 1993,740)*

The second major transition was marked by a further rapid brain expansion and the descent of the larynx, coinciding with the emergence of Homo

sapiens who, by at least 45,000 years ago, had fully developed speech and a complex oral culture.

He describes his decision to postulate a third transition in human cognitive evolution thus:

> *" My decision takes this …out of purely biological evolution… The likelihood that…such recent change is non-genetic should not distract us from exploring it to the fullest. Recent cognitive change is evident primarily in cultural artifacts… I have singled out the development of external memory as the critical issue. The third transition seems to have started in the late Upper Paleolithic with the invention of the first permanent visual symbols; and it is still under way. "(Donald, M., 1993,738)*

What marks human development since the Upper Paleolithic is the gradual emergence of three new representational devices, namely, visuo-symbolic invention from which complex writing and numerical systems developed; external memory records *"mediated by a literate class"* (Donald, M., 1993,745) and the emergence of large, external cultural products called theories. Once again there is agreement that these cognitive developments required a major change in the human brain, vastly increasing the neuronal capacity for processing data and memory, and that this acceleration in brain development proceeded at a rate far in excess of the relatively slow pace of genetic evolution. Donald and others believe, that this discrepancy can be explained by the "plasticity" (potential for functional adaptation) of the brain. He says:

> "*How could the highly complex functional subsystems necessary for reading, writing and other visuo-symbolic processing skills be accommodated by the human brain without genetic change? The*

answer seems to lie in the increased neo-cortical plasticity that came with the final expansion of the human brain."(Donald, M., 1993,746)

This is where the views of cultural theorists and memeticists diverge. Whereas Donald represents the view that culture is an adaptation that arose because it created a genetic advantage, the memeticist regards imitation as the adaptation, which allowed individuals to learn from each other, rather than culture. Whilst brain plasticity is not disputed, it is the propagation of a new replicator, the meme, which has driven the dramatic increase in complexity and size of the human brain (Blackmore, S., 2007, 3,4) (Dennett. D., 1990, 9).

The theory of the meme was first proposed by Richard Dawkins, an evolutionary biologist, in *The Selfish Gene*, published in 1976 and revised in 1989. He suggested the existence of a new independent replicator, a "*unit of cultural transmission, or of imitation*" (Dawkins.D., 1989,192) which he called a meme, an abbreviation of mimeme, derived from the Greek, to imitate. Criticism from within the scientific community led to this response in the revised edition:

"This makes me the more anxious to repeat that my designs on human culture were modest almost to vanishing point. My true ambitions-and they are admittedly large-lead in another direction entirely. I want to claim almost limitless power for slightly inaccurate self-replicating entities, once they arise anywhere in the universe. This is because they tend to become the basis for Darwinian selection which, given enough generations, cumulatively builds systems of great complexity" …I was trying to make the case for replicators in general…(I) will have succeeded if the reader closes the book with the feeling that DNA molecules are not the only entities that might form the basis for Darwinian evolution. My purpose was to cut the gene down to size, rather than to sculpt a grand theory of human culture." (Dawkins.R., 1989,322)

In Dawkin's view, culture is what sets human beings apart from other animal species and that this developed from the human skill of imitation. He gave the name meme to each unit of imitation such as: "*tunes, ideas, catch-phrases, clothes, fashions, ways of making pots or of building arches*." (Dawkins. R., 1989,189,192) In his view the qualities that make for high survival value in memes would be the same as for other replicators i.e. longevity, fecundity and copying-fidelity. Since the memes exist within the brain, longevity of a single meme is less problematic than for a gene as something such as a tune can survive the individual in written form and continue to be copied. Fecundity or the multiplication of copies is more important than the longevity of a particular copy, as a measure of success of the replicator. He gives an example of religious laws that continue to propagate themselves for thousands of years because of the permanence of written records (Dawkins, R., 1989, 194). In his conclusion he makes the novel suggestion that rather than looking for:

> *"…. advantages at the gene level (or the individual, the group, or the species level according to taste). What we have not previously considered is that a cultural trait may have evolved in the way that it has, simply because it is advantageous to itself."(Dawkins. R., 1989,200)*

Susan Blackmore, a psychologist who has written extensively on the subject since Dawkins endorsed her book The Meme Machine in 1999,

supports this with reference to Dennett, a philosopher, who stated that the ultimate beneficiary of any evolutionary process is whatever it is that is copied. (Blackmore. S., 2007,3) In her view this idea is what sets memetics

apart from sociobiology, evolutionary psychology and gene-culture co-evolution theory. She states:

> *"…Wilson, the founder of sociobiology, famously claimed "the genes hold culture on a leash" (Lumsden and Wilson, 1981) and took inclusive fitness (advantage to genes) as the final arbiter… Wilson still argues that myths and social contracts evolved because of their benefit to genes rather than to themselves (Wilson, 1998)…"(Blackmore .S., 2007,3,4)*

She continues:

> *"… the memes it (imitation) unintentionally let loose were not (adaptations). Culture did not arise for our sake but for its own. It is more like a vast parasite growing and living and feeding on us than a tool of our creation. It is a parasite that we cope with - indeed; we and our culture have co-evolved a symbiotic relationship. But it is a parasite nonetheless."(Blackmore. S., 2007,4)*

On a more positive note she later says:

> *"Without memes we could not speak, write, enjoy stories and songs, or do most of the things we associate with being human. Memes are the tools with which we think, and our minds and culture are a mass of memes."(Blackmore. S., 2007,6)*

This is a contentious concept, since the logical conclusion is that our idea of "free will" may be illusory.

The fundamental shift in outlook, which Blackmore suggests is necessary to assimilate the concept of the meme, is cited as one factor that attracts criticism. Others within the published literature are based on basic misinterpretation of the definition of the meme (Blackmore, S., 1998, 7) and fear of the implications for undermining the accepted views on free will, human creativity and consciousness; for example Richerson & Boyd and

Distin. (Blackmore, S., 2007, 6,7.) (Richerson, P., Boyd. R., 2005) (Distin. K., 2005)

She also observes that:

> *"Its (the meme) power lies in its ability to unify all creative processes, both biological and cultural, within the same Darwinian framework. Yet after more than thirty years memetics is still not a thriving science." (Blackmore, S., 2007, 6,7)*

Memetics gained considerable credibility in academic circles with the biological observation of motor neurons facilitating action recognition and replication, mirror neurons, in macaque monkey brains (Gallese, V., et al, 1996), and subsequently in the human. It is now generally accepted that the "mirror neuron system" is the motor component which allowed the acquisition of mimetic skill, required for development of culture and cognition, permitting "the first transition" in early human brain evolution, described earlier by Donald. (Donald, M., 1993, 78), (McNamara, A., 2011, 1) Many scientists now believe that mirror neurons are the basis on which we map out and copy other people's actions and also that they allow us to understand the intentions and emotions behind those actions. The explosion in mirror neuron research not only provides a basis for language development, (Rizzolatti, G., 2002, 1.) but insight into empathy and socialization through perhaps facial expression recognition, brain disorders where these human attributes are diminished, differentiation of our sense of 'self' and 'other' and is leading to new therapies for brain injury and autism. (Brain briefings, 2008,1,2); (Rizzolatti, G., 2002,

1); (Schütz-Bosbach, S., et al, 2006, 1); (Mukamel, R., et al, 2010, 1); (Berrol, F., 2006, 1)

In his paper, *"Can we measure memes?"* Adam McNamara, a psychologist states clearly that:

> *" Memes are the fundamental unit of cultural transmission and have been left upon the periphery of cognitive neuroscience due to their inexact definition and the consequent presumption that they are impossible to measure."(McNamara, A., 2011, 1)*

He argues that although the precise definition of a meme is difficult, it is still possible to perform: *"highly controlled experiments studying the neural substrate of their initiation and replication."(McNamara, A., 2011, 1)*

He also gives a detailed description of his own research study in which subjects were required to learn an abstract sound associated with novel gestures from a video and then to reproduce it, while functional brain activity was measured. In his view:

> *" The addition of requiring participants to imitate and generate a motor component transforms the stimuli into a concept that can be communicated, i.e., a meme" (McNamara, A., 2011, 5,).*

Significantly functional connectivity between multiple regions of the brain can be observed during this process, which allows researchers to identify changes in these interactions over time. He concludes with:

> *". even greater opportunity is now presented with the development of hyperscanning techniques (Montague et al., 2002). Hyperscanning is the running of two MRI machines with time-locked data acquisition and real time video link between the two participants"…"future studies can*

measure correlations between two individual's brain activity during the process of meme transmission"(McNamara, A., 2011, 5, 6).

" …one can envisage longitudinal (ranging from hours to weeks) neuroimaging experiments measuring changes in connectivity between brain regions as a component process to cultural evolution." (McNamara, A., 2011, 6)

Neuroimaging with fMRI (functional magnetic resonance imaging) has allowed a much greater understanding of visual perception, which is of interest to neuroscientists and visual artists. Patrick Cavanagh, a research psychologist recently expressed the view that visual artists were the first neuroscientists, since they have been experimenting for hundreds of years with how to represent 3-dimensional forms in 2-dimensions, so that they can be interpreted by the visual systems of the observer of their art. (Cavanagh, P., 2012) It seems that artists were already aware of the importance of edges, light and shade, shape, line, form, colour, motion and texture in achieving the desired effects in their images, before it was discovered that each of these elements of our visual landscape is separately coded within the brain. (Cavanagh, P., 2012); (Zeki, S., 2002, 918)

Both Cavanagh and Semir Zeki, a professor of neuroaesthetics, share an interest in art and in the neurobiology of vision. They see one of the fundamental characteristics of the brain as the ability to form internal concepts, models or ideals of the three-dimensional world by assimilating and processing information from the sensory organs. Zeki sees this as a process of abstraction, in other words breaking the visual information into its essential component parts in order to acquire knowledge about what is 'seen' (Zeki, S.,

2002, 1). He is interested in the variety of artistic expression, which presumably reflects variability in brain function influenced by cultural experience. In a review of 'Vision and Art' by Livingstone, he repeats the profound observation that:

> *" And yet these differences in brain organization, whatever they may turn out to be, are superimposed on a common plan that is characteristic of all brains. It is this common organization that allows us to communicate through art and about art without using the written or spoken word."(Zeki, S., 2002,918)*

And continues:

> *"…I hope that…visual scientists will come to realize what a rich resource they are provided with by artists who exploit the potential of the visual brain in their creations. Such material is well worth studying scientifically."(Zeki, S., 2002, 919)*

In my view, the proposed relationship between neuroscience and visual art should be reciprocal. The visual artist has much to learn from how the brain processes visual information.

Looking at a work of art has been assumed to be a conscious, sensory experience. A body of evidence now exists to confirm that, as in the visual system, we only have conscious awareness of the end result of a highly complex, multi-stage process, which is completed in milliseconds. Crick and Koch express this in their paper *'The Unconscious Homunculus, a discussion of intermediate level theory of consciousness*', thus:

> *". we suggested that the biological usefulness of visual consciousness in humans is to produce the best current interpretation of the visual scene in the light of past experience, either of ourselves or of our*

> *ancestors (embodied in our genes), and to make this interpretation directly available - for a sufficient amount of time - to the parts of the brain that plan possible voluntary motor outputs of one sort or another, including speech."(Crick, F., Koch, C., 2000, 2)*

In the body of the paper they discuss the nature of 'qualia', a philosophical term for the subjective conscious experience, or 'raw feel'; for example, blueness or saltiness. They describe how the term homunculus, (the little man inside our heads), has been given to our internal image of ourselves, where our consciousness resides. They state: *"We all have this illusion of a homunculus inside the brain (that's what "I" am)."(Crick, F., Koch, C., 2000, 6)* It is their opinion that the term unconscious homunculus is more appropriate, since we are unaware of most of the activity of our brain. Recently, a number of eminent contemporary neuroscientists appearing in a television programme examining free will unanimously agreed that we are only aware of a tiny proportion of our brain activity at any given time, although we have an illusion of consciousness, and independent control of our thoughts and actions. (Horizon, 2012)

When concluding their article, Crick and Koch summarise thus:

> *"…we are not directly aware of the outer world of sensory events. Instead we are conscious of the results of some of the computations performed by the nervous system on the various neural representations of this sensory world…. Nor are we directly aware of our inner world of thoughts, intentions and planning (that is, of our unconscious homunculus) but – and this is the surprising part—only of the sensory representations associated with these mental activities. What remains is the sobering realization that our subjective world of qualia—what distinguishes us from zombies and fills our life with colour, music, smells and other vivid sensations—is probably caused by the activity of a small fraction of all the neurons in the brain, located strategically between the outer and the inner worlds. How this activity acts to produce the subjective world that is so dear to us is still a complete mystery."(Crick, F., Koch, C., 2000, 8)*

So to sum up, am I any closer to understanding the link between the earliest artists in human prehistory and my own creativity? I am struck by how much the artist, who drew on the cave walls at Chauvet 35,000 years ago, already understood about line, colour, form and movement in order to produce such a stunning image of horses. (Figure: 3)

Figure 3: Horses, Chauvet cave painting, - 35,000yrs, discovered 1994

There is no doubt that we are linked by impressive visual perception within our nervous system, an ability to abstract images and to use imitative skills to increase our knowledge of our environment and to understand our fellow human beings.

What of memes? I find the concept of a new independent replicator, which uses the human skill of imitation to propagate itself, quite compelling. I have been impressed by the number of diverse disciplines, such as philosophy, psychology, neuroscience, anthropology, evolutionary biology and evolutionary psychology which now regard this as a significant area for research.

Even before mirror neurons, in 1989, the philosopher, Dennett, expressed the view that 'art' in its broadest sense of creativity and imagination, drives culture and through memes, it has *"virtually supplanted all other forms of evolution"(Dennett, D., 1990, 1,2)*

From my own experience, I do not find it difficult to accept that my creative ideas do not come from what I regard as my conscious brain. I made the sculpture of 'Monumental memes" with the prostrate human figure below, (fig: 4) before I had read about the homunculus, but presumably the meme for this concept was copied into my neural networks sometime ago, and was stored rather than being discarded. The relationship with memes seems to be, of necessity, a symbiotic one and a source of wonder.

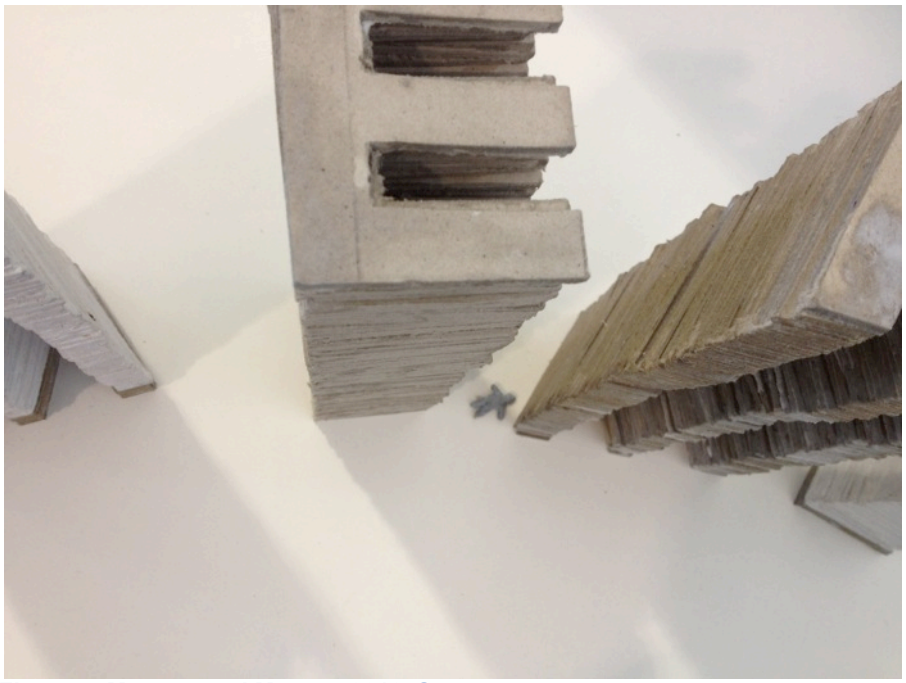

Figure 4: Monumental Memes, 2012, Sutton.

Finally, it is a sure sign of the power of the meme when the U.S. military commission a memetics compendium, with the stated purpose:

> *"…to provide an indication of the prospective value of memetics to the U.S. military for conventional and asymmetric operations, including counter- terrorism.*
> *The attempt to establish a scientific basis for memetics is critically important. For example, within a suitable memetics framework could be the means to prevent irrational conflict and promote rational solutions to endemic national and international problems."(Finkelstein, R., Kruse, A., 2008)*

Maybe these independent replicators do indeed have the limitless power Richard Dawkins imagined. (Dawkins, R., 1989, 322)

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Exhibitions

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"The Tomb of the Unknown Craftsman", 2011, Grayson Perry, The British Museum, London.

Yayoi Kusama, a retrospective. Tate Modern, London, February 2012.

DVD

Goya: Crazy like a Genius, DVD. Robert Hughes

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Horizon: Out of Control? People like to think they are in control of their lives – what they feel and think. But scientists are now discovering this is often simply an illusion. 2012, TV, BBC. (BBC 2,13/03/2012)

Jeremy Deller: Middle Class Hero – A Culture Show Special. 2012. TV, BBC. (BBC 2, 24/02/2012)

Presentations/Lectures

Cavanagh.P. “The Artist as Neuroscientist.”
Friday Seminar Series, 09/03/2012, Department of Psychology, Glasgow University.
Further information from-
URL:http://visionlab.harvard.edu/members/patrick/cavanagh.html

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