Chapter 10
External Storage of Memes: Culture, Media, Cyberspace

Contents

In the previous chapter, we saw how memes enter the brain, reside in the brain, and replicate, reassemble, and evolve. In this chapter, we will examine how memes leave the brain and reside outside of human brains. It is this ability of memes to leave the human brain and stay alive, replicate, and evolve that makes memes truly immortal and may form a bridge between carbon-based life forms and other life forms.

When memes began to spread as imitations, proximity was of course an important constraint. Unless you saw or heard the person to imitate, there was no imitation. Then, the word of mouth came into being, i.e., imitation through communication, "According to the Great Teacher, it is best to hammer the stone gently with a lighter stone till it gets sharp rather than hammering it hard with a big stone." Then, according to another skilled person, "To make a stone with sharp edges, you can also grind the stone on another stone." The two memes combined to become the memeplex, the skill of making a stone knife.

With the advent of written language, memes found a permanent niche in scrolls and books. Translation from one language to another also improved meme propagation albeit the fact that with each different translation, the original memes underwent considerable mutation and evolution. With the invention of the printing press, the replication of memes exploded, which explosion became exponential with copying machines and the electronic media with instant and global distribution and communication.

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In any instance of copying, even with electronic means, there is always some inexactness in the process (mutation), and thus evolution of memes occurs outside of the brain.

Once memes enter the brain, either through multisensory experiences such as TV or video, or through written words or melody, they undergo further processing in the brain. The processing occurs through filtering processes as the memes are analyzed and classified, e.g., pleasant, unpleasant, reasonable, unreasonable, important, junk. Through this process, the memes may be stored with high priority and connected to existing memes, stored with low priority partially connected to existing memes, or thrown into the dustbin. It is important to note that even the memes thrown into the dustbin are not completely discarded yet and may still form neural connections with existing memes and survive, as it were, under the radar.

As the brain has filters and processes of sorting and accepting or rejecting the incoming memes based on the dominant memeplex or selfplex, the culture medium in which the brain dwells has powerful memeplexes called culture that attempt to control the circulating memes. In this age of information explosion, however, geographic cultural memeplexes can be easily overwhelmed by global memes and memeplexes.

10.1 Niche Culture

From an evolutionary point of view, culture as meme deposits probably began with the niches the organisms found themselves. As organisms began to adapt to their niches, some mutations occurred that enhanced the niche environment by manipulating it. Dawkins calls genes that express themselves outside of the organism the "extended phenotype" (Dawkins, 1982). For example, the beaver's dam is a result of the beaver's genes that changes the environment in which the beaver lives. Many organisms carry genes that alter the environment to build a niche conducive to them, and by building such niches, they affect the selection pressure, i.e., the better builders are selected. Many ants, bees, and wasps build nests that are themselves the source of selection of behaviors affecting the regulation, maintenance, and defense of the nest. So do many mammals, reptiles, and amphibians (Laland and Odling-Smee, 2000).

The selection pressure produced by niche environment may be memetic, i.e., better builders of niches may be those who learned from the environment best. Thus, there is coevolution of genes and memes resulting in better niche construction. Learned behavior may facilitate selection pressure for the behavior and for those with genes suited for the behavior (Baldwin effect). The acquisition of language has been attributed to such effect (Shettleworth, 2003).

Laland and Odling-Smee propose a multiple processes evolution model in which cultural processes build on information acquired through biological evolution and asocial learning (Laland and Odling-Smee, 2000). In this model, genes and their extended phenotype (niches) as well as prior experiences may influence the predisposition of an individual to be susceptible or resistant to certain memes. They

argue that successful memes are those that are involved in constructing niches, i.e., cultural artifacts. Such cultural artifacts in humans, of course, consist of literature, music, film, architecture, etc., which are themselves meme and meme vehicles.

10.2 How Memes Jump Brains

The question of how memes jump from brain to brain has been the topic of considerable controversy as the analogy to virus, while being apt, is incomplete. In case of virus, there is actual invasion of the protein molecules into the body of the infectee, and once inside, the virus enters the cells and causes them to make more copies of the virus. In the case of memes, however, what enter the body are sensations, i.e., patterns of neural excitation. Such patterns of neural excitation first take up residence in the brain as memory, i.e., changes in the configuration of neural arrangement (long-term potentiation, dendritic growth, etc., see Chapter 9). Such memory then may replicate, form complexes with other memories, stimulate the replication of resident memories, stay dormant, replicate, and mutate, and in some cases fully convert the brain to its energetic replicators as in a religious conversion.

Patterns of neural excitation may occur that may far exceed the original sensory excitation when they interact with existing or induced excitations in the brain. For example, the visual cortical excitation from seeing a photograph may be greatly enhanced if the face in the photograph is that of a loved one, which in turn may lead to a specific action, such as picking up the phone. In this case, the introduction of a meme (photograph) into the brain caused a cascade of neural excitations that were not inherent in the original meme.

In the case of a computer virus, the binary code (pattern of energy) is embedded in the message (another binary code) that the receiving computer perceives (understands) and processes while the virus is processed unperceived (unless there is a good virus-detecting program). Once having entered the computer brain unperceived, the virus may replicate by commandeering and corrupting other codes and filling out all available space. Note that in both computers and brains, the meme or computer virus does not "eat" or "kill" other neurons or programs, they just change the existing codes which then become themselves replications or effects of the virus or the meme. The way memes replicate is more akin to that of the prions, i.e., they do not make copies of themselves de novo, but transform the configuration of adjacent existing proteins to be prions.

In a comprehensive discussion, Aunger makes painstaking distinctions among the genotypic and phenotypic aspects of memes, and the roles of signals as instigators and interactors in meme transmission (Aunger, 2002). I do not believe a literal analogy between genes and memes is useful. Memes are capable of being both phenotype (e.g., meaning, artifacts) and genotype (e.g., alphabet, electronic signals).

The question, in short, is how does a meme leave a brain? We are accustomed to genes leaving an organism in the form of seeds, eggs, or sperm, which are adapted

for the specific purpose of replication of an organism. Do memes have seeds, eggs, and sperm? In the case of parasites, of course, the whole animal may leave, as well as their eggs or spores as during an incubation period, or hookworm eggs leaving with stool.

We know that memes enter our brains in the form of sensations; signal, particularly language, being an important subset of it. Do they leave the brain also in the form of sensations?

We should first define what we mean by memes leaving the brain. Replication does not work properly if an organism fills up a niche so that there is no more room to grow. To be immortally successful, a replicator has to find new spaces and new vistas. In the beginning, memes arose from within brains as brain codes for a certain idea or action (see Chapter 8), and spread through simple imitation – memes did not leave the brain, the actions that the meme represented were simply adopted by another brain, resulting in a meme (brain code) replication. As memes coevolved with the brain, each became more complex and better suited for each other, i.e., brains were very friendly to memes jumping around. When the meme–brain collaborative invented language, memes could be better protected and developed the capacity to replicate outside of the brain. Even without language, inventions and artifacts contain memes, i.e., the sensory stimuli inducible from such things (e.g., wagon, Rosetta Stone) are memes themselves. With the evolution of written language, memes developed the capacity to be encapsulated, analogous to DNA finding the nuclear membrane. The function of such encapsulation is that the units of memes could be better manipulated, i.e., the meme, "wagon," is no longer "the fast one that John has that rolls," but "moves fast" + "John has one" + "ready to break" + "squeaky." Encapsulated memes are easier to manipulate, easier to reassemble, and easier to dissemble.

How do memes leave our brains? They do not leave as in a parasite leaving and finding another host. In fact, memes as brain codes never leave our brains. What leave our brains are the replicated progenies of our memes that are encapsulated in language and other forms of expression. Even primitive expressions are memes, including grunts and screams, and laughter (laughter is infectious, no?). Memes in our brains invented better and better methods of encapsulation for their progeny, in speech, written language, and the electronic and digital media, which are especially adapted for rapid replication. The word processor, for example, makes automatic copies of what I write every 10 min.

An objection to the idea that language contains memes comes from the linguist, Noam Chomsky, who points out that what is transmitted in a signal is insufficient to account what people make of it, i.e., the signal does not contain enough memes to enter other brains and replicate. The speed with which infants in different cultures pick up language, which is not formally taught, indicates that there may be an innate universal language device in the human brain, which supplies the missing ingredients in communication signals (Chomsky, 1980, 1988). Chomsky also proposes that the innate language device is a result of the complexity of the human brain, which explains why there are no fundamental differences among natural languages – any language can be translated into another.

Aunger points out that Chomsky's "poverty of stimulus" in communication is true in all communication, not just language (Aunger, 2002). The signal is always insufficient to explain how the receiver reacts to it, be it communication between cells, viruses, computer viruses, genes, or memes – there has to be a receiver that interprets and reconstructs the signal based on the context and timing. The signal containing small amounts of memes, or even fragments of memes, in my view, can cause replication of existing memes in the brain, or transform other memes in the brain or computer by simple contact as in prions.

Chomsky's innate language device may very well be an evolutionary adaptation to the development of language (memes) in *Homo sapiens*, in spite of his notion that there is something intrinsic to it as opposed to the product of evolution, a "sky-hook" according to Dennett (Dennett, 1995). Language, however, is not the only means of representation (memes). There are universal nonlinguistic vocalizations (cries, laughter), nonlinguistic artifacts, implicit rules of conduct, etc. In fact, language, important as it is, is but a subset of metarepresentations (Distin, 2005).

So, what is the nature of a meme that enters and leaves the brain? I submit that it is a pattern or a template that may use any number of media that can elicit another pattern that can be related to the original one in the receiver. Thus, it may be patterns of air vibration as in speech, patterns of photon-absorbing dots on paper in written language, patterns of photons traveling in a fiber-optic cable, patterns of electrons traveling in a tube of copper, patterns of fluorescence on the computer screen.

I see no reason to believe that such patterns can only reside in brains. They surely exist in artifacts such as wagons, edifices, automobiles, airplanes, songs, novels, recipes, puddings. But do they reside in wagons and puddings? They do, though in a dormant or nonreplicating form. They will replicate when they are copied into a brain or a computer that is capable of meme replication.

I further submit that memes need not be biologically derived, as long as it can cause a brain or some other entity to develop replicating information. Mountains can contain memes as in the Great Stone Face. The moon contains many memes for the poetically inclined.

10.3 Communication and Memes

Communication is one method memes use to replicate themselves. In one-to-one dialog, depending on the degree of attention paid and the degree of engagement of the individuals, the meme transfer will be more or less successful. In mass communication, however, it is important for the memes to encapsulate themselves in such a way that they are well protected and at the same time attractive, perhaps like a tough nut associated with a beautiful flower.

There is considerable controversy concerning exactly what communication is. Aunger describes three general approaches to describing communication – (1) mechanical, (2) inferential, and (3) evolutionary (Aunger, 2002). The mechanical approach is based on a mathematical model of communication proposed by Claude Shannon and William Weaver in the 1940s. In this classic model of communication

based on selecting best means of sending telephone signals, a sender translates a message into a signal (e.g., electrical current) that is transmitted through a channel to a receiver, which in turn decodes the signal into message and directs the message to a destination. What is important in this model is reducing the noise that may distort the signal.

Unlike the mechanical model, the inferential approach presupposes an awareness of self and others in communication. Influenced by the philosopher of linguistics, H. P. Grice, this model holds that there is an implicit agreement that rules the exchange of information and that effective communication occurs only when both the sender and the recipient desire to share a meaning. According to this view, signals do not "convey" meaning, but rather constitute a stimulus from which the participating parties actively construct meanings (Aunger, 2002; Sperber and Wilson, 1986; 2nd edn 1995).

The evolutionary approach to understanding communication holds that "communication is a specialized behavior involving the broadcast of information" (Aunger, 2002). Such broadcast of information may be in the form of pheromones secreted in the trail of an animal to attract a mate, animals signaling the finding of food, or shrieks of warning. In this view, communication does not presuppose any prior agreement between the sender and the receiver. Thus communication need not be mutually beneficial, as in the case of female photuris fireflies who emit signals to attract males of other species to devour them (Eisner et al., 1997).

Such broadcast communication is not dialog but dissemination. Why do organisms broadcast information? In short, because it has evolutionary advantages, e.g., in finding a mate, in deceiving a predator or prey.

In fact, seeds and spores are means of dissemination – not of seeds and spores but of the genes that build the organisms. When a seed is in contact with fertile soil, it absorbs and interacts with the ingredients of the soil and builds organic molecules that become components of the plant. Memes, like seeds, interact with the ingredients of the brain to build more complex forms of the meme.

Aunger describes a fourth model that he calls coevolutionary, i.e., a consequence of successful communication can be replication of the information conveyed, which may in turn become a parasite of the sender and receiver. The information itself, the meme, now becomes a replicator that coevolves with the brains. Communication, according to this view, "simultaneously involves the sender and receiver in two different relationships: first, as conspecifics with potentially divergent genetic and social interests, but also as potential hosts to a more or less robust, parasitic replicators with its own evolutionary interests" (Aunger, 2002, p. 265).

10.4 Memes as a Paradigm Shift in Evolution and Extraterrestrial Diffusion of Memes

In a very short evolutionary timescale, an eyeblink compared to the genetic one, memes that arose in human beings developed such attractants as fashion, makeup, culinary arts, painting, architecture, music, poetry, fiction, nonfiction, ideologies,

science, medicine, psychology, etc. Each and every one of these things is a memeplex consisting of memes; they are the result of gene–meme coevolution and are replicators themselves.

In the course of this coevolution, parasitic memes have produced specialized memes that serve memes at the expense of genetic and biological interests. Examples of this type of adaptations may include religions, certain forms of altruism, suicide, and various – isms, all memes that inhibit biologic pursuit of pleasure. Such memes must be enveloped in very attractive capsules able to induce strong emotional fervor. Such gene-suppressor memes are only necessary as long as memes are dependent on brains for replication.

But are bodies (or brains) necessary for memes? Currently, memes residing in our brains are instructing our bodies to build computers – nonbiological brains that serve memes.

Computers, in turn, can make other computers and program them (i.e., infuse memes into them). Miniaturized computers can travel into space and to other planets more easily than humans burdened with heavy bodies. Meme-containing artifacts travel with spacecrafts and may be deciphered by other intelligent beings in other parts of the galaxy (see the figure of a record containing earth sounds and images in Voyager spacecrafts in Chapter 8).

We may be at a stage of paradigm shift in evolution – from genes to memes. Genes are, after all, information for building proteins, which in turn are building blocks of bodies. This information is no longer necessarily confined to DNA; it can be stored in books, digital media, and computers who can then acquire necessary molecules to build organisms. Genetic information stored in media other than cellular nucleus would be less subject to degradation by variations in temperature or radiation and thus capable of space travel to other worlds. By shedding the dependence on earthbound biology, genes may have achieved the next stage of evolution in the form of memes.

Memetic diffusion could occur across galaxies in several ways, through memes themselves contained in records and machines (presupposes extraterrestrial indigenous intelligence), through electromagnetic signals such as radio and TV generated for *Homo sapiens* that leak out of earth and may reach other worlds (presupposes extraterrestrial indigenous intelligence), and machines in spacecrafts that contain instructions (memes) to build other machines with extraterrestrial stuff once landed in another planet (does not presuppose extraterrestrial intelligence or even life). Another possibility is that meme-driven machines could build DNA and thus biologic organisms with stuff found in other lands (does not presuppose extraterrestrial intelligence or life, but presupposes that there are molecules to build DNA). Yet another possibility is that a terrestrial microorganism may hitch a ride in a meme-driven space ship intendedly or unintendedly, and then replicate in another planet starting a biologic evolutionary process (does not presuppose extraterrestrial intelligence or life but presupposes that there are molecules to build DNA).

Another realm in which memes may free themselves from their dependence on biological processes altogether and multiply may be in cyberspace as we will discuss in the next section.

10.5 Cyberspace and Extracerebral Memes

When communication was mostly verbal and face to face, meme transfer from brain to brain was a simple matter. With the advent of written language, the transfer could be delayed over time as memes could reside dormant in the scroll or book until another brain perceived them. Memes could also reside in edifices and other artifacts but they could only multiply when they entered human brains. With the advent of printing press, copiers, and faxes, memes could multiply outside the brain, but closely supervised by the sending and receiving brains. With the invention of the computer, however, memes have attained the capacity to replicate and evolve without the intervention of human brain on an ongoing basis. Computer viruses self-perpetuate, and in computer programs like the game of life (Callahan, 2008), invented by John Conway in 1970, cells replicate, die, multiply, and evolve in cyberspace according to simple rules set in the beginning.

Cyberspace, in fact, is a creation of memes in which only memes can reside! It is a space to which any meme-containing device such as our brains and computers can be attached, and it is potentially limitless in size. Furthermore, as electronic entities, memes may co-opt the whole universe as their abode. No wonder clever memes had to invent such a space considering how our brains are limited in capacity, and the genetic makeup of the human body makes it difficult for genetic evolution to continue to grow the brain. As it is, the size of the head of the human fetus is often too big for the birth canal.

In a sense, from the point of view of the memes, cyberspace may be the primal soup, in which various experiments are taking place as we speak – replications and extinctions of various combinations, recombinations, and dissolutions of newly created, fairly established, old, dying, mutated with vigor, mutated with deformity, etc., memes are taking place.

One question is what role, if any, our brain (the coevolved gene–meme complex we call our brain of the twenty-first century) should play in manipulating this primal soup. It is possible there is not much as far as the whole pot of soup is concerned. It is still within the purview of our own individual brains that are still closely networked with cyberspace, to at least analyze some of the elements of successful and unsuccessful memes. It is possible, however, that with *Homo sapiens*, there may be a paradigm shift in biological evolution – once memes have found a way to replicate and prosper outside of the human brain, memetic evolution in cyberspace may supersede gene–meme coevolution of the species.

10.6 Implication of Liberation of Memes from Brains

The implications of the liberation of memes from the confines of the brain may be enormous for the *Homo sapiens*. As long as memes needed the brain and, therefore, the genes to survive and propagate, memes that were loudest in ordering genes to replicate them had a survival advantage. Such memes would propagate by

threatening annihilation of the genes on one hand and promising "eternal life" on the other – religions being prime examples.

When memes are freed from the confines of brains that are dependent on gene multiplication, there is less need for the memes to co-opt genes for their purpose. Put another way, the assemblies of memes that had survival advantage in gene-based brains may not be as potent in replication in cyberspace and in brains that derive information directly from cyberspace (as opposed to from other brains exclusively).

Memetic liberation may thus result in the liberation of gene-based brains from the imperative of memetic replication. As we will discuss in Chapter 12, a non-exploitive, peaceful symbiosis of genes and memes may be possible in the human brain after all.

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