

# Chapter 11

## Culture and the Individual

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### 11.1 Culture as Memetic Niches

Humans live in niches of memes called culture. Culture consists of memes such as language, rules, morals, religion, beliefs, traditions, and esthetics. It also consists

of matter–meme complexes like food, buildings, edifices, etc. In any meme pool we call culture, there are prevalent or dominant memes and nonprevalent, recessive, and/or latent memes.

Niches, by definition, tend to be stable habitats, and memes that form a particular niche are those that made copies of themselves over time, i.e., did not change much. Memetic niche culture, therefore, tends to be conservative, i.e., resistant to change. The conservative meme pool incorporated within it built, over time, memetic infrastructures to support the existing gene–meme social power structure, such as hereditary caste, wealth, and access to information. Social customs, religions, rituals, and other codes of conduct are such memeplexes that support the dominant culture. Cultural artifacts such as books, scripture, churches, tombs, all embed such memes.

## 11.2 Individual Brain in a Petri Dish of Culture

Individual brain may be likened to an organism in a petri dish of culture medium. The petri dish culture medium, of course, consists of chemical molecules that are under osmotic pressure to enter the organism (brain) as well as microorganisms such as bacteria and viruses. Some of these chemicals and microorganisms enter the organism (brain) either because the organism permits such entry, or because of sheer numbers or osmotic pressure. Once entered, they either change the organism or multiply within the organism. The brain in the culture medium also emits molecules and microorganisms that have replicated within the brain, which in turn may seek opportunities to infect other brains in the culture.

Does this analogy actually apply to real brains? No one would doubt that the brain absorbs culture in which it grows. But what is actually “culture” that the brain absorbs?

J. B. Tylor, who is considered to be the father of modern anthropology, defined culture as “learned patterns of behavior that includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits” (Tylor, 1871, 1924). In this context, “learning” involves social learning, or learning from others, i.e., imitation. Thus, what are absorbed by the brain are the memes, which reside as binary-coded memory in the brain (see Chapter 9).

Some object to this notion by arguing that culture is not particulate but rather an organic whole (Bloch, 2000). It is true that cultural artifacts such as buildings and poems seem to have significance only when considered as a whole, but the way the brain perceives them is only through binary nerve impulses that are stored in binary memories. Culture, to the extent that they exist in the brain, is particulate. The particulate components of a culture, therefore, can be used as a part of another culture.

In some parts of the Middle East, bricks that were used to build Jewish temples were reused to build Christian churches, which were in turn demolished to build mosques. Likewise, the particulate components (memes) that comprise a particular culture may be co-opted for another by becoming a part of a new memeplex. An

example may be the meme of a winter holiday, which was Saturnalia during the Roman times, then it became Christmas, a religious holiday, which, in turn, evolved into a secular holiday. Another might be the meme, “ends justify the means,” used by both communism and fascism.

### 11.3 Memes, Culture, and Anthropology

The idea of memes as cultural replicators has been criticized by a number of anthropologists (Bloch, 2000; Boyd and Richerson, 2000; Kuper, 2000; Sperber, 2000). Anthropology as a science began toward the end of the nineteenth century stimulated by Darwin’s theory of evolution. Early anthropologists considered their job to be “filling in the gap” between the emergence of *Homo sapiens* and the beginning of written history, at which point historians would take over (Bloch, 2000). Study of “primitive” non-Western people, such as the hunter gatherers of Africa and Pacific Islands, was to provide information about earlier stages of cultural evolution. This approach of studying “living fossils” had many difficulties and gave way to the “diffusionist” schools in the early twentieth century. These schools, such as Kultur Kreise school in Germany, the “children of the sun” school in Great Britain, and the “culture contact school” in America held that cultural traits diffused from person to person and from groups to groups. Tracing the migration of cultural traits then became a major task of anthropology.

The cultural diffusionists held that culture needed not go through “stages of evolution” but could evolve through absorption of information from another culture, which idea is very similar to the later idea of meme contagion.

Criticism of the “diffusionist” school came from those who believed in “consistency of culture” (Bloch, 2000). There were American and British versions of the “consistency criticism” of the diffusionist model. The American version was greatly influenced by Gestalt psychology and held that cultures form consistent wholes, that there is a psychological need for integration of cultural elements into an organic “world view,” and that elements of culture “diffused” from another culture has to be molded into this organic whole (Benedict, 1938). The British school, often labeled “functionalist,” is a social structural approach that emphasizes the practice aspect of culture, i.e., there is coherence of mental attitudes and beliefs because of the need to engage in coherent practices necessitated by social structure (Radcliffe-Brown, 1952).

Bloch argues that the criticisms against diffusionist ideas also apply to memes, i.e., as the American school argues, memes, like traits, will be continuously integrated and transformed by the receiver of information, and further, as the British school argues, information cannot be understood outside the context of practice of life. Consistency arguments essentially deny the existence of memes as discrete particulate building blocks of culture.

The idea that there are cultural replicators has been challenged. Such challenges are mainly based on the notion that cultural information is reproduced rather than truly replicated (Boyd and Richerson, 2000; Distin, 2005; Sperber, 2000).

In general, the “consistency” arguments emphasize that elements of culture must interact with the “coherent” (or dominant) culture that includes implicit or nonlinguistic practices such as social structure, rituals. In my view, this is in no way an effective argument against memes, particularly if one understands that memes need not be explicit and that culture consists of dominant memes that impose a sense or direction of coherence as well as subcultures that may contain nondominant memes in defiance of the dominant ones. Just as in the brain, there are latent, often labeled “pathologic,” memes in the society that may gain ascendance by further infusion from another culture.

I believe arguments concerning whether memes are true replicators are largely pointless and a result of pushing the analogy to genes excessively. Clearly, memes do replicate (by copiers, by mass printing, faxing, etc.); they also are reproduced, synthesized, and transformed. Defined as particulate information stored in the neurons in binary fashion, memes are bits of information. Because of brain evolution that favored meme production and replication, more memes do replicate. As memes are dispersed into the outside world as codes, they are absorbed by other brains and other interactors such as computers and may replicate, stimulate another meme, stay dormant, or disintegrate, just like any virus or seed.

The vehemence with which some social scientists attack memetics seems to arise from a sense of boundary violation – natural sciences infringing on the territory of anthropology and sociology. They seem to feel threatened that memetics may replace the elaborate and well-constructed structures of their fields. It seems to me that their concern is misplaced – memetics do not replace the knowledge base of these disciplines but would rather complement and enrich them by elaborating their infrastructure, just as atomic science does not replace chemistry and quantum physics does not invalidate Newton’s laws.

#### **11.4 Dominant and Nondominant Memes in Cultures, Zeitgeist, Devious Memes**

Culture as a meme pool consists of many different memes and memeplexes that reside in various niches – subcultures. Nevertheless, there are usually certain memes that are dominant, i.e., more numerous and, therefore, more available for infecting new brains. Such dominant memes maintain their dominance by building supporting memeplexes whose primary purpose is to watch for and suppress the emergence or entry of memes that might threaten their dominance. Culture is fraught with institutions consisting of such supporting memes – traditions, rituals, religions, etc. These memes usually combine with other memes that serve their purpose of maintaining the existing power structure. Memes co-opted by such dominant memes may be positive ones such as beauty and love, or of punishment for allowing forbidden memes, such as ostracism and damnation.

Dominant memes described above form the prejudice that exists and may even be essential in cultural understanding (Balkin, 1998; Gadamer, 1975). According to

Gadamer, such prejudices or “pre-understanding” is necessary to understand new ideas.

Just how stable are the prejudices reflecting dominant culture in the face of new meme entry? For those who believe that the psyche is a unitary whole, and every experience and learning affects it in a fundamental way, such cultural traditions may seem to be ingrained and not subject to modification to any significant degree in later life. On the other hand, like me, if one believes the mind to be a reflection of brain function and that the latter results from the processing of often conflicting evaluations of perception and memory (memes), then the dominant memplexes in the brain can be significantly altered with new memes (ideas) at any phase of individual development.

What is the agent, then, that actually evaluates new ideas against existing prejudices? Is it a meme that also does this work? As we discussed in Chapter 9, memes are *representations* or codes, not actions themselves. What does act is the brain, or more precisely the parts of the brain that are involved in processing sensory input, comparing them with stored memory, and signaling the limbic system and the motor cortex – what is called the executive (ego) function of the brain. The efficiency of the executive function is determined by both genes and memes in the course of human evolution and individual development. While memes introduced in early life may greatly enhance it or suppress it, all *Homo sapiens* are endowed with this capacity.

A subset of the executive function is the *human reasoning*, the exercise of the brain muscle in evaluating a situation and making rational plans. Reasoning is based on considerations of two main elements – genetic and cultural valuations. Such valuations are accompanied with emotional arousal, involving pleasure, anger, fear, sadness, disgust, and combinations thereof. Valuations based on genetic imperatives are pretty obvious and perhaps stable over time – survival and procreation. Cultural valuations, on the other hand, are not at all obvious or stable. Consider the consumption of beef and pork by religious (Christian, Orthodox Jewish, Moslem, Hindu) vs. secular persons in America, India, Pakistan, etc. Over time, cultural expectations over behavior changed significantly. As late as 1804, dueling was practiced even in the United States: Alexander Hamilton, former secretary of Treasury of the United States, was killed in a duel by the Vice President of the United States, Aaron Burr on July 11, 1804. Of course, such things would be unthinkable in the twenty-first century. *Zeitgeist* consists of representative memes of the times and can often be represented by catchy memes such as “Tune in, Turn on, Drop Out” of the 1960s.

Cultural attitudes toward race and gender changed dramatically over the latter part of the twentieth century as well as political ideologies such as nationalism, socialism, and communism. In the age of instant electronic communications, memes literally travel at the speed of light, and the diffusionist theories discussed in the previous section seem to be fully justified given current conditions. There just is not enough time for dominant memes and the elaborate infrastructures to ward off the onslaught of memes for any given locality. Even China is becoming a mimetically open society in spite of the attempts of the power structure to control it. What about

religious fanatics who seem to be immune to new ideas? I believe even the brains of such fanatics contain islands of newly entered memes that are recruiting others and vying for opportunities to replicate. It is the violent reaction of the existing dominant memes that manifests itself as fanaticism – even to the point of suicide bombing, an act of murdering defiant memes within the brain by killing the brain itself.

## **11.5 Pathologic Memes**

There are several types of pathologic memes:

1. Memes that inhibit or attenuate the brain's executive (ego) function, thus making it difficult for the individual to absorb, process, and integrate new information.
2. Memes that are devious, entering under false pretenses, then causing disease or destruction (e.g., esthetically pleasing religious music).
3. Memes that replicate virulently, often bypassing the executive function.
4. Memes that are virulent because they arouse passion, bypassing executive function.
5. Memes that cause an indolent infection, to become virulent later.

### ***11.5.1 Memes That Inhibit or Attenuate the Brain's Executive (Ego) Function: Tradition and Prejudice***

Culturally dominant memes are often memes that infect the brain early and form the basis of prejudice vis-a-vis new incoming memes. These memes are infused to the child, usually by parents or caregivers, as a matter of routine practice. Children, of course, learn by imitation the memes parents practice. Memetic attitudes are also transmitted, e.g., blind obedience, do not ask questions. "Why is the sky blue?" "Because God made it so."

### ***11.5.2 Memes That Are Devious, Entering Under False Pretenses, Then Causing Disease or Destruction***

The prejudice-forming memes are often associated with cooperating memes that render them more attractive through esthetic qualities (church buildings, hymns, socializations, vision of heaven, immortality of soul, etc.) and/or threatening qualities (ostracism, hell, etc.). Because the function of the prejudice or tradition memes is solely the preservation of their own dominance, they may come into conflict with the genetic imperative of pleasure, which is the indication of brain's valuation of gene-oriented well-being.

Civilization itself is a memetic enterprise, an edifice of memetic replication, refinement, and evolution. As civilization became more complex and more interactive with civilizations of other areas, the status quo-oriented memes also became more complex and more reinforced and rigid. These tradition-sustaining memes are only for themselves and are no longer concerned with the survival of the individual or the civilization. Enveloped in the scrolls, edifices, and priestly robes, these tradition memes infect the young or vulnerable brain.

Though containing and cooperating with tradition-maintaining memes, the esthetic memes can be truly catchy and beautiful, such as Christmas carols, hymns, as well as Da Vinci's Last Supper. Once lured into a church (or a mosque or an art school), the brain may be further exposed to more memes of the particular tradition.

### ***11.5.3 Memes that Replicate Virulently, Often Bypassing the Executive Function***

These are the explosively catchy phrases, jingles, or fashions that sweep across large areas, like a viral epidemic. Most brains exposed to them catch them, usually over TV or word of mouth. Fortunately, like viral epidemics, they tend to be short lived. Some examples are, "Baaad!," "Whaaatzup?," "It's the real thing (coke commercial)," "chemical sensitivity syndrome."

These memes are pathologic only in the sense that they bypass the executive function, i.e., they come under the radar for scrutiny for acceptance or rejection.

### ***11.5.4 Memes that Are Virulent Because They Arouse Passion, Bypassing Executive Function***

Another type of meme that bypasses the executive function is the emotion-ridden meme, particularly abundant in large group settings such as a political rally or a religious service. The frenzied emotional and memetic state participants enter during a Pentecostal service, during which they speak in "tongue," is an example. The mindless repetition of "Sieg Heil!" during a Nazi rally seen in film is a reminder that these memes were parts of memplexes that caused mass murder and destruction of civilization.

### ***11.5.5 Memes that Cause an Indolent Infection, to Become Virulent Later***

As opposed to the dominant and virulent memes discussed above, certain nondominant or nonvirulent memes may enter the brain in varying qualities, often through active processes such as reading a book or conversing with a friend. These may

be ideas that are not readily accepted, empathic feelings, or images of persons or events.

One may also encounter criticisms or demeaning words by others, “You are stupid!,” “You are ugly!,” etc. These phrases, while bothersome, may be soon put away and forgotten. Some of these memes, while being processed by the brain, perhaps while dreaming, may be attached to other memes that are emotionally significant (valuated) and may occupy a niche within the brain either in a dormant state or with minimal proliferation.

If there is a new infusion of similar emotion-arousing memes in later life, these dormant or minimally replicating memes may be stimulated to replicate rapidly, inundating the brain. The brain, then, may be full of “You are stupid!,” “You are ugly!” memes as well as the newly introduced similar memes, “You are a failure,” “There is no hope,” “Nobody loves me,” “Life is not worth living,” etc.

## 11.6 Protective Memes and the Placebo Effect

It should be made clear that not all memes are pathogenic or pathological. In fact, many memes are *protective* against stress and pathological memes. These protective memes are generally well recognized for their salutary affect, such as the effects of such memes as love and attachment. A sense of belonging, or spirituality, may be protective as well. Even grooming and licking in rats, which experience persists as memory, a precursor to memes, have protective effects against stress as discussed in Chapter 2.

The placebo effect is a prime example of a protective meme. Placebo, meaning “will please” in Latin, is a substance or a procedure prescribed by a physician with the expectation of relief. When it is a drug, it usually contains an inert substance, the “sugar pill.” Placebo is obviously a meme representing the cultural expectation of relief.

Placebos are powerful. At least one-third of patients with any illness respond to placebos, and up to 50–75% of depressed patients respond to placebo. It is generally accepted that the effectiveness of most active drugs represent the effect of the active ingredient plus the placebo effect.

How does placebo actually work? The meme that the placebo represents, i.e., relief, enters the brain (even though the pill may enter the gut) and takes up residence in the brain as memory of an event, i.e., changed neural cluster, which, in turn, infects (or causes) other neural clusters resulting in a cascade of brain signals and connections. How was the meme, placebo, formed in the first place? Early personal learning, i.e., conditioning, plays a role, such as mommy kissing the boo-boo away leading to relief at the touch of a caregiver, or taking an aspirin for headache leading to taking a pill for pain. In modern societies, however, the meme that there is a pill for every ailment is ubiquitous. In certain indigenous cultures, however, what the witch doctor orders may have a similar function.

Even though the ingredient of the placebo may be identical, placebos used for different conditions seem to result in different neurobiologic responses, i.e., the



mechanism of action of the placebo may be specific to the illness. This implies that the memplex formed by the placebo meme and the illness meme may form new connections of specific neural clusters in the brain, giving rise to illness-specific responses.

In depression, placebo response was shown to have a different brain mechanism than pharmacotherapy, involving mostly the prefrontal areas having to do with the executive function and planning. Depressed patients who responded to placebos also showed certain EEG characteristics in the prefrontal areas (Leuchter et al., 2002; Hunter et al., 2009; Leuchter et al., 2004). Mayberg and her colleagues found that, on PET scan, placebo response was associated with regional metabolic increases in the prefrontal, anterior cingulate, premotor, parietal, posterior insula, and posterior cingulate and metabolic decreases in the subgenual cingulate, parahippocampus, and thalamus. Regions of change overlapped those seen in fluoxetine responders. Fluoxetine response, however, was associated with additional subcortical and limbic changes in the brainstem, striatum, anterior insula, and hippocampus, sources of efferent input to the response-specific regions identified with both agents. They conclude that the common pattern of increases in cortical glucose metabolism and decreases in limbic-paralimbic metabolism in placebo and fluoxetine responders suggests that these changes may be necessary for depression remission, regardless of treatment modality (Mayberg et al., 2002).

A positive placebo response is seen in up to 50% of patients with Parkinson's disease and pain syndromes. The response is more pronounced with invasive procedures or advanced disease. Placebo was shown to cause a substantial release of endogenous dopamine in the striatum of Parkinson's Disease patients through activation of the damaged nigrostriatal dopamine system on PET scan in one study (de la Fuente-Fernandez et al., 2001).

In the immune system, the ingestion of a placebo resulting in boosting antibodies against cholera that was greater than active oral cholera vaccination has been reported (Wasserman et al., 1993).

In pain syndromes, endogenous opioid release triggered by cortical activation, especially the rostral anterior cingulate cortex, is associated with placebo-related analgesia and can be reversed by opioid antagonists (de la Fuente-Fernandez and Stoessl, 2004; Wager et al., 2007; Zubieta et al., 2005). Covert treatment of an analgesic is less effective than overt treatment, suggesting an expectation component to clinical response (Diederich and Goetz, 2008).

The opposite of the placebo effect is the *nocebo effect*, indicating noxious effects of inert substances. Nocebo effects represent the unexplainable side effects of placebos, such as headache and nausea often seen with placebo administration. It may also account for considerable amount of side effects associated with active drugs.

There may be different mechanisms for placebo and nocebo effects. Scott et al. studied the placebo and nocebo effects in a pain situation using the PET scan. Placebo-induced activation of opioid neurotransmission was detected in the anterior cingulate, orbitofrontal and insular cortices, nucleus accumbens, amygdala, and periaqueductal gray matter. Dopaminergic activation was observed in the ventral basal ganglia, including the nucleus accumbens. Regional dopaminergic and

opioid activity were associated with the anticipated and subjectively perceived effectiveness of the placebo and reductions in continuous pain ratings. High placebo responses were associated with greater dopaminergic and opioid activity in the nucleus accumbens. Nocebo responses were associated with a deactivation of dopamine and opioid release. Nucleus accumbens dopamine release accounted for 25% of the variance in placebo analgesic effects. They conclude that placebo and nocebo effects are associated with opposite responses of DA and endogenous opioid neurotransmission in a distributed network of regions. The brain areas involved in these phenomena form part of the circuit typically implicated in reward responses and motivated behavior (Scott et al., 2008).

An interaction between the genes and the placebo effect has been reported. In one study, patients with social anxiety were genotyped for the serotonin transporter-linked polymorphic region (5-HTTLPR) and the G-703T polymorphism in the tryptophan hydroxylase-2 (TPH2) gene promoter, and brain function was assessed during a stressful public speaking task before and after an 8-week treatment with placebo. Results showed that placebo response was accompanied by reduced stress-related activity in the amygdala. However, attenuated amygdala activity was demonstrable only in subjects who were homozygous for the long allele of the 5-HTTLPR or the G variant of the TPH2 G-703T polymorphism, and not in carriers of short or T alleles. Moreover, the TPH2 polymorphism was a significant predictor of clinical placebo response, homozygosity for the G allele being associated with greater improvement in anxiety symptoms. This study suggests a link between genetically controlled serotonergic modulation of amygdala activity and placebo-induced anxiety relief (Furmark et al., 2008). This is an example of a direct interaction of genes and memes in specific brain areas.

Placebo is a ubiquitous meme that is found in all cultures where illness occurs. Placebo memes coevolved with the brain, and there may be an increasing fit between placebos and brain function.

## 11.7 How Memes Come in Under the Radar

How exactly do some memes elude the executive function and be absorbed into the brain? Aircraft flying under the radar evade detection because the altitude is too low for the radar to discern its shape. Memes that evade the screening by executive function do so by coming in disguised, i.e., pretending to be harmless or familiar (and thus already accepted).

The signal itself, regardless of the content, is important here. The sound of the word, the melody of the jingle – in essence, the esthetics of the incoming meme is the disguise that the memes wear. Certain combinations of musical notes are inherently pleasing and relaxing – one could attach words to these that ask you to suspend reason, i.e., the meme screening process. Religions tie in the idea of immortality, a genetically pleasing notion, albeit of the “soul” rather than the body, with suspension of reason (e.g., miracles) and are introduced into the brain often in early life. Once religious memes establish themselves in the brain, it becomes off-limits to

reason. Anything that is religious is now acceptable without the screening of the executive function.

Certain memes arouse genetically determined anticipatory pleasure, e.g., food and sex. So, a meme that promises 72 virgins is tempting to someone who is already infected with fanatical Islam, with eternal life in paradise thrown in, which can happen *now* if you just martyr yourself.

Empathy is another mechanism through which memes may enter the brain under the radar of the executive function. In empathy, the perception of someone with an emotional arousal causes a direct stimulation of the mirror neurons in the frontal cortex resulting in muscle tones of the observed person, then the emotional reaction. Memes encapsulated in empathy memes, thus, may enter the brain before conscious scrutiny of the meme can take place. Thus, the sadness of a mother whose child was killed by a gang member in Los Angeles may evoke a meme in the reader of both sadness and anger toward the gang. The murder and anger memes against the murderer entered the reader's brain encapsulated in the empathy meme.

In the course of the gene–meme coevolution, persons who were better meme producers and meme spreaders were favored and thus selected. One attribute of a person well-endowed with memes is that he/she is famous, i.e., other people copy them. Memes coming from such persons are thus more valued, i.e., more easily accepted.

Of course, the predisposition of the individual brain, in turn determined by early gene  $\times$  meme interaction, is important in favoring certain types of memes than others. For example, persons with the s/s allele of the 5-HTTLPR gene may be more susceptible to fear/anxiety memes coming in under the radar. On the other hand, those with a variation in MAOA gene may be more susceptible to violence/antisocial memes (see Chapter 1).

## 11.8 Spread of Memes

I discussed earlier that memes spread more like seeds and spores, rather than by negotiated exchange as in a dialog (see Chapter 10). Just as seeds may come wrapped in attractive packages, such as delectable fruits which are vehicles of their dispersion, so do memes wrap themselves in attractive packages, which may be themselves memes. Thus, memes packaged attractively, e.g., esthetically pleasing, spiced with sex and/or violence, will be memes that are more easily swallowed by the consumers.

Once memes reach a certain density in a population, it spreads exponentially as “fashion,” which is truly an often imitated, “successful,” meme. Fame is an attribute of persons whose memes are fashionable.

As seeds and spores are often blown in the wind and dispersed widely, so are memes blown in electronic winds across oceans and continents. Electronic dispersal of memes, especially through the Internet, has become the most effective means of global distribution of memes.

Direct contact is still a means of meme transfer. Face-to-face conversation, classroom teaching, live demonstrations of techniques, etc., are still effective, especially if the meme transfer also involves emotional arousal, either through empathy or by deliberate induction (e.g., speech inciting anger and violence). The person to whom memes are transferred in direct contact may not realize the memes' entry or may in fact reject it. Even feelings of loathing generated by being in contact with someone indicate that the memes that are the object of loathing have entered the brain. As any Washington lobbyist knows, access means influence.

### **11.9 Internal Processing of Memes and Consciousness: Thinking as Meme Manipulation**

What happens to a meme that has entered the brain? Let us be more specific here – a meme enters the brain as sensation, patterns of excitation of sensory nerves. These patterns undergo the process of perception which involves considerable amount of filtering. What gets filtered out? Stimuli that are insignificant – the brain evaluates the significance of the stimuli. Through the process of habituation, even strong stimuli may lose significance and be ignored. Stimuli that convey meaning, i.e., those that can stimulate neural circuits connected to already existing memes, are more likely to be recognized. Thus, the new stimulus may energize existing memes or may infect existing memes and build modifications and become parasitic in them, just as a virus changes an existing cell and make it cancerous or a prion transforms a protein on contact.

At a neural level, the patterns of nerve firing represented in the sensory cortices, and the subsequent firings in the association cortices, would result in several combinations of possibilities – replication of existing memes, modification of existing memes, and creation of new memes that may be only associated with old memes, for example, a concept that may be the opposite of an existing one. The new memes thus created would be a memeplex, a complex formed from existing and the newly introduced memes that may be particularly conducive to acceptance and replication in the brain.

The incoming meme, then, results in two parallel outcomes; stimulating existing memes and the deposit of memory of the incoming event in the episodic memory pool. Both results are dependent on both the strength of the incoming meme and the response of the host.

According to the concept of neuronal group selection, the clusters of neurons representing memes undergo Darwinian selection within the brain, and the dominant, more replicated memes cohere to form the selfplex, the sense of I, that also determines what is compatible with the ego and what is ego-alien. However, the coherence of the selfplex is seldom complete, as there are still competing and coexisting "I"s in each individual. Seen as a memetic pool, the brain has many competing memes, some of which may have cohered into several different clusters. New,

incoming meme may upset this balance of power by energizing the nondominant memes or attenuating the dominant memes.

The host brain responds to the incoming meme by applying a filter that either strengthens or attenuates it. This filter is the perceptual process, i.e., the incoming signal being compared to contents of the association cortices and limbic structures which contain resident memes. This evaluative process of the brain that includes the executive function of the frontal cortex is the process of meme manipulation – making the incoming stimuli interact with existing memes and genetic imperatives including emotion.

It should be noted that the process of meme evaluation involves enhancement or multiplication of memes used in the evaluation process, i.e., the memes associated with reasoning and logic as well as the resident memes that are memories of past experiences and learning. This enhancement occurs as the neural clusters that contain the memes receive attention and thus value, probably through dopaminergic mechanisms. Thus, the exercise of meme-evaluative process called thinking will further strengthen the “thinking muscle.”

We discussed earlier (see Chapter 9) that memes are stored as memories in neural clusters. We know that the brain is an active organ, consuming fully 20% of the oxygen intake. Neurons in the brain are constantly in action and are constantly in interaction with the memes – memes as implicit and explicit memories, both declarative and episodic, and as memplexes such as schemas.

So, what is the brain activity that consumes so much energy? Much of the activity must be manipulating memes – recognizing, sorting, and classifying incoming memes, comparing incoming memes with existing memes, determining the location of newly introduced memes, negotiating the fit (salutary, neutral, conflicting, etc.), etc. When this process of meme manipulation becomes conscious, i.e., requiring enough attention to recruit a concerned effort of the working memory and executive function, we call it *conscious thinking*. Of course, meme manipulation occurs without reaching consciousness much of the time, thus thinking occurs without reaching consciousness much of the time.

In this view, *consciousness* merely represents the brain activity that reaches a certain level of synchronization through what Edelman calls *reentry*, i.e., recirculation of the sensory input through the neural pathways for further processing (Edelman, 2004). The level of consciousness is gradual – from totally unconscious, automatic brain activity such as respiration and processing of insignificant memes to low-level conscious activity such as reflex withdrawal of hand before a sensation may or may not reach consciousness or being semiconscious of low-level background music to self-awareness and intention.

A competing view point concerning consciousness is that of Crick and Koch, which argues that consciousness arises when the activity of brain reaches or activates a small specialized subset of neurons, perhaps the claustrum, the sheet of brain tissue located below the cerebral cortex that connects extensively with wide areas of the brain including almost all of the sensory and motor areas and the amygdala (Crick and Koch, 2005).

Whether consciousness arises when sufficient numbers of neurons are involved in a synchronized activity, or whether it represents a spotlight that claustrum (or some other bunch of neurons) directs at memes that require concerted processing, it seems clear that consciousness is an evolutionary adaptation to deal efficiently with the complexity of memes.

### 11.10 Free Will

Making a conscious choice has been shown to be preceded by unconscious brain activity that has already made the decision. For example, Libet asked subjects to flick their wrist randomly but indicate when the decision was made by watching a clock. He found that subjects' decision to move the hand was preceded by brain activity about half a second before the stated decision, though the subjects perceived the decision to be simultaneous with the action (Libet, 1999, 2002, 2006; Libet et al., 1983; Libet and Mochida, 1988; Libet et al., 1979, 1982).

Haggard and Eimer measured brain activity (lateralized readiness potential, LRP) while the subjects decided which hand to move. The LRP preceded the conscious decision, indicating that the decision was made before it reached consciousness (Haggard and Eimer, 1999). Furthermore, it was possible to influence which hand the subject would choose to move by a single transcranial magnetic stimulation that was subthreshold for movement. Right-handed subjects would normally choose to move their right hand about 60% of the time, but when the right hemisphere was stimulated, they chose their left hand about 80% of the time. The hand preference was influenced only when the coil was positioned over frontal cortex. Thus, it appears that a single magnetic stimulus which does not evoke movement can alter high-level motor planning (Ammon and Gandevia, 1990). Such influence by magnetic stimulus was effective only when the response occurred within 200 ms of the "go" signal, which corresponds to the time delay between decision and consciousness observed by Libet (Brasil-Neto et al., 1992).

It seems, however, that the conscious will may be able to "veto" an action in the last few milliseconds (Libet, 2003). In this model, unconscious impulses to perform a volitional act may be open to suppression by the conscious efforts of the individual, sometimes referred to as "free won't." Such "free" suppression may, however, have as much unconscious neural antecedents as "free will" (Velmans, 2003).

So, what is free will in memetic terms? The unconscious neural activity for action predating conscious decision is clearly a memetic process. The sense of conscious free will occurs when the memetic processing impinges on the selfplex, i.e., when the action is strong enough to reach a level of importance for the selfplex. There are many actions that we take, including muscle movements that do not reach consciousness, such as shifting position in a chair. If we pay attention, however, then we may be more readily conscious of such movements.

Decision making may be seen to be the act of memetic processing, in which various memes, as it were, vote on a course of action among the choices presented. Only when the voting is over an important issue will the process become conscious.

Does free will influence decisions? It appears immediate decisions are made unconsciously and not by free choice. However, as with free will not we may intentionally and consciously limit our future choices through memetic manipulation. If enough memes in our brain are persuaded to incline in one direction long before the election, then the outcome of the election may be more predictable. As in an election, the outcome of the secret ballot is by definition unpredictable, but based on the campaigns and polls preceding it, one can make an educated guess.

### 11.11 The Unconscious, Collective Unconscious, Freudian Unconscious

From the above discussion, it should be apparent that most brain activity including meme manipulation occurs without reaching consciousness. It is when the processing requires some *thought*, i.e., the synchronized activity of sufficient parts of the frontal lobes (and perhaps claustrum) does it become conscious.

The Jungian concept of *collective unconscious* can be interpreted as the memes in the meme pool called society, that are so pervasive that they enter the brains almost automatically, i.e., without undergoing the filtration process for new memes. Such memes are usually introduced in early life and form the basis of a priori prejudice or predispositions that we call cultural traits. Sense of beauty, taste, right and wrong, how justice should be carried out – all these form part of the collective unconscious. These cultural memes naturally co-opt genetic imperatives for food, sex, and dominance and form strong mutually supporting memplexes. Such cultural traits do change with introduction of new memes, e.g., sense of beauty changes as fashion changes, at one time eating raw fish was “disgusting” in the Western culture, and burning at the stake was an accepted means of execution during the middle ages. It is my contention that even memes in the collective unconscious, as long as they reside in the neural clusters, can be made explicit and be reprocessed through the executor of memes – reason.

What about the Freudian unconscious as a product of repression? Repression can be conceptualized as a process by which the dominant memplexes prevent incompatible memes that are strong enough to become memories (i.e., meme-containing neurons) from receiving attention and thus reinforcement (Edelman’s reentry) necessary for replication. Thus, the repressed memes are outside of consciousness except when they exert influence on other unconscious (or automatic) processes such as association with incoming memes or in internal processing such as dreaming.

In this view, most memes except those recruited by working memory are unconscious (or preconscious). Such unconscious memes may be (1) nonproblematic memes that require little processing, such as new factual information that are routinely stored, (2) culturally pervasive memes that enter the brain automatically

(under the radar) that form prejudices and the *collective unconscious*, and (3) memes that are in conflict with dominant memes and have been rendered unconscious and hard to reach through deprivation of reinforcement.

### **11.12 Selfplex and the Shadow: We Are All Multiple Personalities**

Self-awareness is the idea of self as a unitary entity and is often attributed to the development of the Theory Of Mind (TOM). TOM is the ability to see others as having minds, i.e., thoughts, intentions, and feelings. The most commonly used test of TOM ability is the false-belief task (Perner and Wimmer, 1988), a version of which is the “Sally-Ann task.” A child is shown two dolls, Sally and Anne, who are playing with a marble. Then, Sally puts away the marble in a box (Box A), and Sally leaves. After Sally leaves Anne takes the marble out and plays with it, then puts it in another box (Box B), then leaves. Sally returns and the child is asked in which box Sally would look for the marble. If the child has TOM, then she will say Sally would look for the marble in Box A, where she had put it when she left, even though the child knows that the marble is now in Box B. TOM involves that another’s state of mind may be different from their own and be able to predict behavior based on that understanding.

The development of mirror neurons as an evolutionary achievement may have contributed to the ability for TOM. As discussed in Chapter 7, mirror neurons in the brain in the frontal and anterior cingulate cortex fire when observing another chimpanzee or human engage in an activity or show an emotion. This ability to empathize, to feel, or to act in other’s shoes, may eventually induce the ability to see oneself as if the self was an object, i.e., self-awareness (Oberman and Ramachandran, 2007; Ramachandran and Oberman, 2006). As you understand how others are feeling, you also understand how others might feel about you, or think of you. You also can see yourself, think of how you would feel under certain circumstances, i.e., predict your own feelings and behavior using self-empathy and TOM.

The problem is, of course, that you are not sure about yourself, that you are not always consistent. In fact, you often say, “one part of me would like to do x, and another part would like to do y, and most likely, y will win out.” Self-awareness shows us that the self is not unitary, but is often divided into many parts.

Emotions often catalyze the assumption of dominance of one selfplex over another. We are familiar with our “pleasant personality” and our “aggressive personality.” The emotional brain state precipitated by an external stimulus may thus favor one type of selfplex over another.

We have seen in previous sections of this chapter that our brain contains many memeplexes comprising of neurons that have evolved over time, in constant interaction with genes and memes, existing and incoming. No wonder the memeplexes have cohered into at least several clusters that we call self (or personalities within the self).



Selfplex is the sense of my own personality, who I am, what I am like, what I believe in, what I would and not do. It is known in other terms such as ego, self, self-schema, and identity. Selfplexes within a given brain develop over time in the course of the epigenetic development of genes and memes and may cohere into several selfplexes with varying degrees of inherent compatibility. The incompatibility between two selfplexes within the same brain may be especially pronounced if they are formed at two different periods, say in an immigrant's life in two different meme pools or cultures with two different languages. Thus, there may be some individuals who hold American values and behave like Americans when living in America and speaking English, and when they return to their native lands, revert back to their old values and behave like the natives, speaking the native tongue. In this case, the dominant selfplex may be dependent on the location, and thus the surrounding meme pool of the brain. In this case, two selfplexes are not in conflict at the same time, and not much effort is required to switch the dominance. Much of the time, the different memplexes in our brains coexist without serious conflict.

Among the memes that form selfplexes, there are those that are in direct conflict with the dominant selfplexes and therefore are particularly inhibited from replicating. These "unacceptable" memes and memplexes form the "shadow" of Jungian psychology. If the shadow becomes empowered, either through the weakening of the dominant selfplexes or through incoming memes that facilitate the shadow, there may be conscious conflict, experienced as anxiety and psychological turmoil. If there is a revolution in the republic of memes that is our brain, then the shadow may take power, resulting in a complete change in personality, which may be in the form of psychosis, dissociation, or depressive and manic syndromes.

How strong the dominant selfplex is, and how well it harmonizes and cooperates with the nondominant selfplexes and shadow may determine whether the individual is a flexible and adaptive person who can feel and behave appropriately (and thus differently) depending on situations as opposed to one who is rigid and fragile, or frankly show incompatible personalities, often in outbursts or episodes of dissociation. Our brains contain multiple personalities almost by necessity as we have absorbed many memes from different personalities. The job of harmonizing the many selfplexes and utilizing them as the occasion demands, of course, falls on the executive function of the brain. (See Chapter 12 for further discussion of this topic.)

### **11.13 Transcendence**

Transcendence, the phenomenon of rising above individual needs and concerns in favor of spiritual or higher purpose, may be a remarkable example of gene-meme coevolution. The experience of transcendence seems to involve two components: an altered state of consciousness and recognition of an entity that is beyond the interests of the individual, whether it is a god, a spirit, or a cosmic order.

Altered states of consciousness accompany the activation of strong stress reactions such as fight/flight and “freezing” (or conservation/withdrawal, playing dead). The so-called adrenaline rush of fight/flight can be intoxicating. Relaxation and accompanying EEG changes bring out changes in self- and other awareness. Altered states of consciousness certainly seem to have adaptive significance as under these conditions the brain may be spared of the time-consuming reasoning process.

Altered state of consciousness often occurs with the activation of the dopaminergic pleasure/reward system previously described, often occasioned by drug use or situations causing strong emotional arousal.

While often associated with an altered state of consciousness, the act of transcendence seems to be more in the service of memes rather than genes. In fact, the notion of arising over one’s individuality contains within it a subjugation of the genetic bodily demands. Memes developed the capacity to tweak the neurons such that pure activities serving the memes act as rewarding activities resulting in injection of dopamine into the pleasure center.

Memes seem to have coevolved with the genes such that there are variants in dopamine receptor genes that build brains particularly welcoming transcendence memes. In one study, a higher level of dopamine 4 receptors in the frontal cortex predicted spirituality and transcendence (Comings et al., 2000). The gene coding for vesicular monoamine transporter 2 (VMAT2), an integral membrane protein that acts to transport monoamines, particularly the neurotransmitters dopamine, norepinephrine, serotonin, and histamine, into synaptic vesicles, has been called the “God Gene” as those with polymorphisms that enhance its function scored higher on a “self-transcendence” scale (Hamer, 2005).

Transcendence is possible only with the help of the memes as the idea of rising above one’s bodily needs. Memes are, in fact, transcendental entities as they transcend the brains by migrating from one another and infecting one another. Through the cooperation of the memes, genes achieve the experience of transcendence, and, though tied down to a particular brain, the genes can vicariously experience the wonderful exploits of memes in other worlds and other brains. From the meme’s point of view, the human brain is a territory to conquer; from the brain’s perspective, memes are invaders that show the way to a promised land. In the course of coevolution of genes and memes, values or emotions were attached to them, as the values code for nurturance and survival. As the experience of pleasure is genetic, but appraisal of value is memetic, different endeavors have acquired different valuations, i.e., studying is good, god is good, sexual desire is bad, brotherly love is good. At the fundamental level, as memes were in charge of the valuations, whatever served the memes were good, and whatever served the genes more than memes were somewhat bad, whatever served only genes and not memes were very bad. Thus, spirituality, a purely meme-oriented activity, acquired the most value.

Individuals that adapted to the spirituality meme–gene coevolution then may have spiritual needs that are beyond the understanding of those without the DRD4 or VMAT2 genes.

### 11.14 The Individual as a Pawn in the War of Memes

We discussed in the previous chapter how memes are stored in external devices as well as in the brains of human beings. We also saw that there are conflicting memes and mutually incompatible memes, and in our brains they tend to cohere into different personalities vying for dominance. From the meme's point of view, all human brains are like islands for colonization, and the more brains like memes dominate, the more the speed and breadth of their replication. Thus there is a constant state of conflict among competing and incompatible memes in the meme pool called human society.

For certain memplexes, such as certain religions and political ideals, dominance may mean the extinction of competing incompatible memes and the brains that contain them. Such memplexes may then breed cooperating memplexes such as fanaticism and patriotism in the service of stamping out competing memes through massacres, wars, and book-burnings. In these circumstances, individuals who kill and who are killed are but pawns of the toxic memes in the society.

How to prevent the individual from being the pawns of toxic memes? It is only through the strengthening of the reasoning powers of the brain, i.e., appropriate sorting, filtering, and processing of memes that it encounters that such toxic memes can be isolated and controlled rather than being controlled by them. Only when sufficient numbers of brains in the society are equipped with such reasoning ability will the society be safe from the unchecked proliferation of toxic memes. In addition to the reasoning powers, the brains must develop early warning mechanisms for the introduction of the toxic memes so that the likelihood of their coming in undetected is lessened.

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