

# Communicating Computer Music Memes

Author: Dr. Mladen Milicevic, Loyola Marymount University, Los Angeles, [mmilicev@LMU.edu](mailto:mmilicev@LMU.edu)

What makes the primary difference between our species and all others is our reliance on cultural transmission of information, and hence on cultural evolution. Animals do interchange information but in a biological rather than a cultural context. Bird mating calls certainly fall under the category of sonically transmitted information that is specific to a given species, but those species have limited intelligence and undoubtedly no bird culture. This does not mean that animals have no minds, it simply means that *by human standards* those “primitive” minds produce no cultural history.

Dawkins' meme has a peculiar but powerful role to play in our understanding of human culture. This is the way he defines it:

Examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches. Just as genes propagate themselves in the gene pool by leaping from body to body via sperm or eggs, so memes propagate themselves in the meme pool by leaping from brain to brain via process that, in the broadest sense, can be called imitation. If a scientist hears, or reads about, a good idea, he passes it on to his colleagues and students. He mentions it in his articles and his lectures. If the idea catches on, it can be said to propagate itself, spreading from brain to brain. [1]

The important rule for memes, as for genes, is that they must constantly replicate. This replication is a mindless process not necessarily for the good of anything; replicators that are good at replicating flourish—for whatever reason. Meme X spread among the people, because X is a good replicator. [2]

Let's take a moment and look at the case of one particular meme—the success of a four-note meme at the beginning of Beethoven's Fifth Symphony. Certainly, it has much less to do with the absolute value of its pitch-set “internal” design, i.e. the way a musical piece is compositionally structured, and much more to do with the design this meme presents to the world. What is important is its phenotype, the way it affects the minds and other memes in a particular socio-cultural environment.

It is very logical to assume that humans intelligently create musical pieces (potential memes) rather than producing them as random innovations. But, looking at the state of affairs in computer music, one sees more examples of innovations than creations. Let me clarify the distinction. The quality of computer music, and for that matter the quality of anything does not depend exclusively on its structural organization, but rather it is rooted in the transaction that occurs between the music and the audience. To evaluate music is to find the quality of transaction between the musical configuration and its cultural response. If that response is positive, meaning ecologically prudent for

the given cultural environment, then it may be called creation. On the other hand, an innovation that is just randomly new and not holistically related to the environment, will certainly produce a negative cultural response.

In order to expand the audiences for computer music it is necessary to look at the minds of the people who constitute those audiences. Why in the minds? Because the minds are the habitats of the memes. Minds are in limited supply, and each mind has only a limited capacity for the support of memes; therefore, there is considerable “competition” among memes for entry into as many minds as possible. This competition is the major selective force in the infosphere, just as it is in the biosphere.

One way to look at music, is through the memetic competition among musical compositions for admission into the minds of the audiences. Randomly presenting new musical pieces (potential memes) to these minds can be compared to, playing by the rule of evolutionary biology known as *the survival of the fittest*. It is well known that this game is ruthless and will in its process discard the vast majority of its participants. Being the only intelligent species on this planet, it is certainly wise not to play by the rules of the very game that created us. If we continue to do so, we may easily become a casualty of the same mindless evolutionary process. For that reason, it would be preferable to turn this game around to our advantage, redefining it slightly, and call it *the survival of the wisest*. Since humans have the brain that is capable of intelligent thinking, it would be a tremendous waste not to use it in determining our own future, and the future of our music. How can this be achieved?

Wrestling with this problem may appear to be an insurmountable task, but the situation is not that hopeless albeit. For the sake of clarity, let us imagine continuation of our inquiry as an academic course in music composition. In this case, instead of teaching our students the elements of compositional structure such as counterpoint, harmony, orchestration, etc., we would teach them the basics of understanding the sonic entities towards which human minds show increased interest when listening. After the completion of such a course in music composition, our students would then be ready to learn the elements of musical structure that may represent the best tools in achieving our intended goal. In other words, students would use musical structure in order to compose pieces that will appear interesting to the musically inclined human minds of our audiences. As a consequence of this process, the successful musical pieces will have a much better chance of becoming the memes that reside inside the human minds. Once situated there, the memes will get a chance to

replicate, which is their sole function, as it is the function of the genes.

It is dangerous to make generalizations, but I am going to offer the following anyway. Nobody cross-culturally educated would agree any more that music represents a universal language. However, research tangibly shows that there are some things that appear universally. In order to make sense from the vast sonic events that enter its auditory cortex, the brain had to become a master of simplification. This process is nothing like filtering unwanted information, because such a mechanism would be tremendously complicated and utterly inefficient. In actuality, the brain searches for familiar devices and patterns. [3] It latches on things that are in some respect already known, disregarding most of the unfamiliar information. The reason that human (but also animal) brain is doing this; lies in the fact that previously processed information can be very quickly reconstructed from the data stored in brain's long-term memory. Then, that reconstruction can be efficiently processed and compared with the similar incoming information, giving it the most pragmatic interpretation that fits the situation at hand.

To create a musical pattern in the human brain, it is necessary to have repetition of the sonic event in question, thus it can be remembered and used in the future. Composing a piece of music (a latent meme) which appeals to the minds of the audiences outside the narrow and highly specialized computer music niche requires the existence of some sort of a clearly recognizable musical reference. If there is a single negative point about the avant-garde approaches in music, then it is the lack of reference and use of discontinuity and disjunctness without any historical or compositional reflexivity. Human beings, in large part, will not find appealing anything which produces one unconnected innovation after another, never going back and reevaluating what has gone before in relation to what is going on now. Let me use an example to illustrate this point.

Digital sound sampling and computer technology of the nineties, readily allow computer music composers to manipulate and transform organic sounds through myriad methods and possibilities. This technological might inevitably renders countless numbers of musical compositions that deal with so-called sound exploration. Unfortunately, most of these pieces remain just that—sound explorations—and never present themselves as memes with faculty to catch on to the audiences. Why is this so? Most of these pieces suffer from a syndrome that may be called "no point of reference." What I mean is that if one is to make a computer music composition which deals, say, with sonic transformation of the sound of a baby crying, one may consider it interesting to do the following. First, it would be wise to ensure that the audience listening to such a piece can clearly discern where this sonic manipulation is coming from, and be able to hear and refer to from time to time to the

original sound source. Second, throughout the piece the audience should be reasonably prepared for the direction these manipulations may take. The human brain perceives by anticipation. It formulates perceptual hypotheses and then confirms them. [3]

Thus, when the brain receives sequences of musical tones, it does what it does with other "new" information: it attempts to "interpret" it by using the "old" already processed and digested information stored in its long-term memory about previous, similar music experiences. This information may allow some aspects of a future musical signal to be anticipated—as it happens when we hear the first line of a familiar song. The ability for predicting incoming patterns of information, in our particular case musical information, on the basis of past experience is one form of what we call "intelligence"; it can dramatically enhance an organism's chances of survival. Knowing what is coming is always much more profitable than being caught by total surprise.

The way human brain handles this comparison-based process is grounded in the workings of neural mappings that correlate to a specific sonic event. For the sake of simplicity, let's say that there is a sound of an oboe playing A=440 Hz. Now, in most of the musicians' brains there is a neural correlate for A=440 Hz sound. These neural mappings are physical representation in the brain of a "formula" for the reconstruction of person's memory about an A=440 Hz. This "formula" will be put in use when the ear receives an external stimulus of an oboe playing and passes this stimulus to the auditory cortex. Then, in turn, the auditory cortex would use the "formula" to reconstruct the memory of the closest similar experience and its context stored in the long-term memory that matches the one of the external stimulus just being received. Through the process of semantically matching the new and the old mental image of an oboe playing A=440 Hz, the brain would assign the meaning to the event in question, based on the context in which the new information was received. If that context happens to be tuning an orchestra, rather than starting the first note of an A-minor scale, the brain will call up the semantic correlate for the given context and react appropriately.

Since we know that humans constantly judge by comparison, and our judgment of any item depends upon what we are comparing it to at that moment, let's be wise and use this knowledge in composing music. If there is a pattern that reflexively reoccurs throughout the musical composition it will create its memory in the brain and that will become a "point of reference" to which future transformations of the same pattern may be compared to. If humans are able compare, then in return, they will be also able to evaluate. If this evaluation process keeps going on, that probably means there is a growing interest in what is going on. This still does not mean by any means that a musical composition containing reoccurring patterns of some sort and their transformations will be

a guaranteed recipe for the creation of a successful music. It simply means that unless there is a point of reference, which may be just about anything previously digested and recognizable to the ear-minds of the audience, there is a significantly much lesser chance for produced musical piece (a meme) to catch on and make people react with positive feelings. How successfully one may play with music patterns will, in the end, always remain a matter of human musical talent.

It very important to understand that it is no accident that the music memes which replicate tend to be good for humans—not for reasons of our *biological* fitness, but for whatever it is that we hold dear. This is an unsettling observation for a person, who believes in absolutes. However, the situation should not be viewed as totally desperate. Let me again put everything in computer music terms. It is amazingly fascinating to see what Super Collider, Csound, Cmix, Kyma, Sound Hack, Lemur, and countless TDM, VST and MAS plug-ins can do to sound samples, as well as what MAX can do to musical structure when applied to fractals, neural nets, fibonacci numbers, solar systems, palindromes, permutations, interpolations, pitch-sets, and population growth algorithms. It is crucial to make sure that those fascinations that we hold dear, do not remain the exclusive possessions of the composers who indulge themselves in playing with their technological marvels. It is extremely important that the audience also get to share some of our unique thrill. There must be some significant overlap between what the composer holds dear and what the audience holds dear.

This is a very demanding and difficult task to put into reality, but if it is not done soon, the computer music memes are not going to find their habitats and replicate themselves any further beyond the narrow, technically-oriented facilitators. Unless established compositional approaches are changed, the question will still remain: Do we compose only for our idiosyncratic selves or for the audiences of our culture?

On the other side of this argument Charles Rosen claims that survival of any music is independent of the audience's response.

The music that survives is the music that musicians want to play. They perform it until it finds an audience. Sometimes it is only a small audience, as it is in the case so far for Arnold Schoenberg (and I am not sure if it will ever be a large one), but he will be performed as long as there are musicians who insist on playing him.  
[4]

As much as I personally disagree with Rosen's basic assumptions about survival of the music, I can pretend for a moment that Rosen is right having the following question rise: Who are the performers of the computer music? The answer: Computer music composers themselves. The only computer music composer that I came across who publicly performs other composer's

computer music is Neil Rolnick. And here we arrive again at the inescapable conclusion that we are playing our music for ourselves.

Isn't it obvious that it is not feasible to continue clinging to the notion that music is exclusively a form of personal self-expression through which the composer produces a piece of music without regard to the response from its socio-cultural environment. Paradoxical notion of releasing musical memes in front of an audience and saying: "Take it or leave it, I did not write my music for you at all, but I want you to listen to it anyway" makes very little sense. Evolution works on the same principle—the survival of the fittest—in which case 99.99% of the answers to the question raised above is certainly going to be "LEAVE IT!!!" On the other hand, if a composer is interested in a socio-cultural response to her/his music, it could make a wise decision and figure out what are the perceptual and cognitive mechanisms that make audiences to like something. Using the proposed approach may certainly prove to be more successful in sharing the computer music with people who don't know what word MIDI means.

#### REFERENCES:

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- [1] Richard Dawkins. *The Selfish Gene*. Oxford University Press, Oxford, 1976.
- [2] Daniel C. Dennett. *Darwin's Dangerous Idea*. Simon & Schuster, New York, 1995.
- [3] Robert Jourdain. *Music, the Brain, and Extasy*. William Morrow and Company, Inc., New York, 1997.
- [4] Charles Rosen. *Classical Music in Twilight*. Harper's Magazine, Vol. 296, No. 1774, March 1998.