# Music Evolution: The Memory Modulation Theory

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## Solving the Mystery of Music

The evolutionary basis for the development of advanced musical capabilities in humans has remained a mystery. Whereas language clearly confers obvious fitness advantages, music has resisted such an easy explanation. Current explanations tend to fall into the categories of either music as a by-product of the evolution of other facilities that do directly confer fitness benefits, or music as a sexual selection fitness indicator (Wallin, Merker & Brown, 2000).

We have found neither of these classes of explanations, nor any other of the previously proposed explanations compelling. Rather, we argue that advanced musical capabilities evolved because they directly confer specific fitness advantages. In particular, we argue that human musical capabilities are precisely those set of specialized mental capabilities that co-evolved with language to enable the sophisticated memory modulation of the receiver of information by the communicator of a message. In other words, music enables individuals and groups that are communicating messages to have a degree of control over how the messages will be retained in the memory of the receiver(s). Particularly in the pre-literate world, such abilities have obvious, direct evolutionary advantages.

## Memory Modulation and Music

The consolidation theory of memory (McGaugh, 2000) continues to guide current memory research. The theory suggests that it takes time for long-term memories to consolidate. "Considerable evidence suggests that the slow consolidation of memories serves an adaptive function by enabling endogenous processes activated by an experience to modulate memory strength". In other words, it is optimal for long-term memory processes to be highly selective.

Key facilitators of memory modulation are emotional arousal, repetition, and structure. And these are exactly the essential attributes of music -- making it the ultimate vehicle for fine-tuned memory modulation.

In particular, music enhances the probability of long-term memory of coincident events and communications. It appears that music facilitates long-term memory primarily through the evocation of emotion, and with contributions from repetition and additional structure (Schulkind, Hennis & Brown, 1999)

## An Information Theoretic Approach

From an information theory point of view, the generalized issue at hand is precisely how communications modes would co-evolve with increasing intelligence, given specific memory storage architectures.

If the architecture of the human brain had been such that there existed only one type of memory, then a communications capability relying simply on syntactical structures would have been sufficient. However, the durability of memories in the human brain (and other animals) can, as a first approximation, be divided into two categories: short-term and long-term memory. Syntactical structures of language alone offer limited ability for the sender of a message to effectively influence the strength of memory of the receiver.

However, the ability of communicators to directly influence strength of memory in receivers would be of exceedingly high fitness value as intelligence and the sophistication of associated messages increased. Indeed, the encoding of a message in very long-term memory significantly increases the probability that the message will be re-transmitted with high fidelity by the original receiver to others. This cascading of the original message vastly increases the evolutionary value of preferential memory selection by the message sender.

We argue, music is, therefore, just that (expected) mode of communication that co-evolved with language and overall intelligence that enabled finer and finer control of the memory modulation of message receivers by message sender(s). Music has all the right characteristics to fit this critical (and expected) role, and there is no other such communications mode that fills such a role as effectively. Nor do we find any other explanation for the evolution of musicality in humans that is as comprehensive and compelling.

## References

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