Art and neuroscience

(On evolutionary meaning of art and its neurobiological relevance).

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Abstract:
Neurobiological hypothesis of the evolution of art suggests that it was the size of social groups what determined the development of the human frontal cortex. Social cohesion is accomplished by mutual grooming. The cohesion of the groups of hominids larger than 100 individuals could not be secured enough by "face-to-face" grooming up to 20-30% of time available. More time, however, could not be allocated for grooming, because other, life-important activities would be dangerously shortened. Instead, an additional effective way to maintain the social cohesion had developed in forms of vocalizations and drumming, which can be understood as a "social grooming". Here the direct line to singing and to language can be traced. (In the Czech language, for example, *drbat* means both to tattle and to tickle). The gene *FOXP2*, which occurs roughly 500-200 thousand years before present, seems - together with neo-cortex (social brain) and social grooming - to be a precondition to the language development. Music and language employ to some extent identical brain structures. Play (both music and game) activates also mirror cells. Mirror neurons play important role in empathy and in a prediction of behaviour of others. Prediction of behaviour of others is a fundamental precondition of survival and represents a substantial selective advantage. "Useless" childish games, and adult gossip, as well as "barren" activities like music, singing, drumming, and dancing are altogether operations employing and training the life saving mirror neuronal systems, which are essential for our ability of insight.
Art, sport, game and play have therefore crucial importance for the development of our abilities to empathise and to predict the behaviour of others, to recognize their emotions, to maintain a social cohesion and therefore alliances, and last but not least of our capacity of a self-reflection. Art and games thus represent a common condition for the development of language, "motions" and e-motions. From the evolutionary perspective, as "coaches" of our capacity to predict they represent a substantial selective advantage.

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