Exploring the scientific basis of mimesis

Imagine that you are standing inside a subway at 9 am, and you witness a woman dressed in business clothes attempting to dart through the subway doors just as they are about to close. The woman is a step too late; as the train pulls away, you see her throw her hands up in exasperation and frustration. A feeling of sympathy surges through your body.

What accounts for your gut level reaction to the woman's actions? How are humans, as social animals, able to understand the thoughts, feelings, and intentions of others? The answer lies in concept of mimesis -- the imitation of existing or non-existing worlds that has been part of Western culture since the time of Plato and Aristotle. Though mimesis has traditionally been restricted to discussion of aesthetics and art, German philosophers Gebauer and Wulf emphasize that mimesis is not constrained to the boundaries between art, science and life – in fact, mimesis appears to transcend these boundaries to encapsulate all aspects of society and humankind (10). In recent years, the way in which mimesis plays a critical role in all areas of human thought and action has prompted the neuroscience committee to propose a scientific explanation for mimesis. Indeed, a quick Google search of "mimesis and neuroscience" returns 216,000 results in just 0.19 seconds, providing a stunning indication of the vast amount of research dedicated to identifying the scientific grounds of mimesis.

The discovery of mirror neurons in the pre-motor cortex of the macaque monkey brain by Giacomo Rizzolati and his team was key in providing one of the first neuroscientific explanations for mimesis. Using single-cell electrodes to record neural

activity, the team identified a class of neurons that responded to both direct motor movement as well as purely visual information of the same motor sequence. In 2010, further research by Roy Mukamel, et al. confirmed that the same mirror neuron system is also found in humans and is directly involved in the imitation of simple movements and learning of complex skills. Neuroscience research thus provides compelling evidence that the function of mirror neurons is responsible for dissolving barriers between individuals, providing a social 'cement' that holds groups together and allows strangers to simulate actions and mental states.

The effort to relate mimesis to neuroscience extends beyond mirror neuron systems, however. For instance, research by Lebreton, et al. has shown that in addition to the mirror motor neuron system, the brain's valuation system also plays a critical role in explaining the desires explained in René Girard's mimetic theory. This second system overlaps with reward related areas, including the medial prefrontal cortex, and helps determine the value of a given item. Using fMRI studies in 116 subjects, the research by Lebreton, et al. indicated that participants rated objects as more desirable once perceived as the goals of another individual's action. Regions of the brain involved in the mirror neuron system as well as the valuation system were activated in the process of observing goal-directed actions, suggesting that the interaction of these two systems provide a fundamental mechanism in mimetic desires.

Mimesis is often accepted as the "elemental expressive force that binds us together into closely knit tribal groups," but only recently has empirical brain science research provided explanatory depth on human mimesis (Donald 2001). Nevertheless, it is important to keep in mind that representation in the brain does not necessarily align

with representation in culture. Specifically, mimesis has traditionally been regarded as a form of intersubjectivity uniquely described at a personal level in culture that is not reducible to the activation of neural networks in the brain. That is, mimesis is represented in the brain as a series of neuronal networks, but the only things neurons "know" about the world are the ions constantly flowing through their membranes (Gallese 2007). What higher-level neural circuits are involved in receiving outputs from mirror neuron systems and forwarding them into a wider cognitive map of the social environment? All of this is not to discourage the efforts of brain science to explain mimesis, however. On the contrary, a scientific basis for mimesis has the potential to fill in gaps that exist in mimetic theory as well as make available new domains of research.

References

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