

Pier Francesco Ferrari - selected references

- 1 Ferrari, P. F., Tramacere, A., Simpson, E. A., & Iriki, A. (2013). Mirror neurons through the lens of epigenetics. *Trends in Cognitive Sciences*, 17, 450-457.
Notes: The consensus view in mirror neuron research is that mirror neurons comprise a uniform, stable execution-observation matching system. In this opinion article, we argue that, in light of recent evidence, this is at best an incomplete and oversimplified view of mirror neurons, where activity is actually variable and more plastic than previously theorized. We propose an epigenetic account for understanding developmental changes in sensorimotor systems, including variations in mirror neuron activity. Although associative and genetic accounts fail to consider the complexity of genetic and nongenetic interactions, we propose a new evolutionary developmental biology (evo-devo) perspective, which predicts that environmental differences early in development should produce variations in mirror neuron response patterns, tuning them to the social environment
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- 2 de Waal, F. B. & Ferrari, P. F. (2010). Towards a bottom-up perspective on animal and human cognition. *Trends in Cognitive Sciences*, 14, 201-207.
Notes: Over the last few decades, comparative cognitive research has focused on the pinnacles of mental evolution, asking all-or-nothing questions such as which animals (if any) possess a theory of mind, culture, linguistic abilities, future planning, and so on. Research programs adopting this top-down perspective have often pitted one taxon against another, resulting in sharp dividing lines. Insight into the underlying mechanisms has lagged behind. A dramatic change in focus now seems to be under way, however, with increased appreciation that the basic building blocks of cognition might be shared across a wide range of species. We argue that this bottom-up perspective, which focuses on the constituent capacities underlying larger cognitive phenomena, is more in line with both neuroscience and evolutionary biology
- 3 Ferrari, P. F., Coude, G., Gallese, V., & Fogassi, L. (2008). Having access to others' mind through gaze: the role of ontogenetic and learning processes in gaze-following behavior of macaques. *Social neuroscience*, 3, 239-249.
Notes: In primates the gaze conveys important information about what others attend to and about their intentions. The ability to follow the gaze direction of conspecifics has been established for several primate species. It has been proposed to be a precursor for more complex cognitive skills related to mind reading. Studies in humans and other primates have shown that this behavior develops during the period between infancy and adulthood; however, the mechanisms responsible for its emergence are still unknown. In a series of experiments we investigated such mechanisms in macaques (*Macaca nemestrina*). Results show that juvenile macaques improve their ability to follow the gaze of a human experimenter and that adults' ability to follow gaze is more

accurate than that of juveniles. Our data also show that this behavior can emerge as the result of learning processes. The discrepancy between the relatively long period of time needed for the full establishment of the gaze-following behavior and its high sensitivity to conditioning procedures may suggest that social experience and integration of this behavior with other social-cognitive skills are required for its development
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