

Perspectives on Imitation: From Neuroscience to Social Science

Volume 1: Mechanisms of Imitation and Imitation in Animals

edited by Susan Hurley and Nick Chater

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or realization that one's interlocutor has understood one). If so, understanding can perhaps be regarded as an intrinsic reinforcer, for the obvious reason that what is understood is the content of the dialogue. If an interlocutor received a reward for successfully participating in a dialogue, but successfully communicating a message was not really the interlocutor's goal (e.g., in an oral examination of linguistic competence), then imitation might be less likely.

Pepperberg's classification of levels of imitation is particularly interesting because, as she says, language involves considerable reference, functionality, and social interaction, and must involve higher-order imitation. She therefore suggests that it must be very different from the unconscious replication of others' motions in social settings (Chartrand & Bargh, 1999). It is not, however, exactly clear whether imitation needs to be improbable. I think that this depends on precisely what is being imitated and what is regarded as improbable. As I have said, interlocutors tend to refer to objects in the same way. If it is 60% likely that I will refer to an object as a "sofa" on first mention, but 90% likely after my interlocutor has called it a sofa, then this is surely imitation, even though it is not improbable. In contrast, it is of course extremely unlikely that I will utter "sofa" at a particular point, or that I will utter "sofa" with a particular set of acoustic characteristics. That said, the suggestion that most forms of linguistic imitation are higher order is almost certainly correct.

Overall, the connection between vocal imitation in Grey parrots and imitation in human dialogue may seem a distant one, but I suspect that some common principles relating to levels of imitation, type of social interaction, and perhaps nature of reinforcement can be found. I also hope to have demonstrated that studies of imitation, whether in humans or non-humans, need to address the question of exactly what is being imitated. In this respect, linguistic imitation is particularly helpful because the levels of representation involved are (fairly) well defined.

12.5 Breathing New life into the Study of Imitation by Animals: What and When Do Chimpanzees Imitate?

Bennett Galef on Whiten, Horner, and Marshall-Pescini

It took a hundred years, more or less, for behavioral scientists to come even close to a generally accepted demonstration of learning by imitation in any nonhuman animal (Galef, 1998). Whiten et al. now take it for granted that he, and others, have provided compelling examples of imitation in chimpanzees. Consequently, Whiten has moved on to a new stage in the study

of imitation. He asks, not whether chimpanzees can imitate, but what chimpanzees do imitate (acts, portions of acts, sequential structures of acts, hierarchical structures of complex sequences of acts), under what conditions chimpanzees imitate, and in what ways, if any, imitation differs in chimps and children.

Well, have they done it? Have Whiten et al. demonstrated imitation in chimpanzees? Personally, I am convinced that if the present evidence of imitation by chimpanzees in two-action procedures is replicated in other laboratories (and there is every reason to believe that it will be), the answer is "yes." Imitation in our great ape cousins will have been demonstrated.

We skeptics have thrown challenge after challenge to those claiming to demonstrate learning by imitation in animals. Happily, one after another those challenges have been overcome. It would be churlish to continue to demur, without solid grounds for demurrals. The view that evidence of imitation is unacceptable unless an "imitated" act is novel (see Pepperberg, vol. 1, ch. 10) seems to me to foreclose the possibility of demonstrating imitation in species other than those that, like African Grey parrots, can produce an effectively infinite number of distinct outputs. We have no way of knowing whether an act "imitated" by an animal with a restricted behavioral repertoire is truly novel or a modification of a familiar act.

Why were we skeptics so hard to convince? It is not, as some have implied, that those who refused to accept early evidence of imitation in apes had a philosophical commitment to an unbridgeable gap in intellect between humans and apes. Nor are we unreconstructed radical behaviorists, unable to accept evidence of cognition in animals. Rather, until recently, the evidence for imitation in apes was not compelling (Galef, 1988), and if the scientific community were to accept weak evidence of imitation in animals, there would be no motivation to seek stronger evidence. In my view, if the field of social learning is to continue to move forward, as it has so remarkably for the past 30 years (Galef, 1998), it will do so only by parsimonious interpretation of strong evidence.

Whiten et al.'s chapter makes a convincing and substantial contribution to that forward momentum. It celebrates the opening of a new era in studies of imitation, the importance of which can best be understood in historical context.

Nineteenth-century naturalists considered imitation to be characteristic of women, children, savages, the mentally impaired, and animals, all believed to have little ability to reason for themselves (Darwin, 1871; Romanes, 1884; C. Morgan, 1896). Creative problem solving, what we today call individual learning, was considered the hallmark of rational minds.

and was believed to be more or less restricted to mature European males who, because they could reason, only infrequently needed to imitate.

In the late 1890s, Edward Thorndike (1898), among others, started to see things the other way round. Thorndike felt, as most do today, that imitation required cognitive abilities beyond those needed to learn for oneself about environmental contingencies.

As is well known, Thorndike (1898) was unable to find evidence of imitation in the chickens, cats, dogs, and monkeys that he brought into his laboratory, though all learned by trial and error. He interpreted this failure of animals to imitate and their ability to learn by trial and error as revealing animals' inability to manipulate representations to solve problems. His views formed the basis of the behaviorist revolution.

The continued search for evidence of imitation in animals for the first 70 years of the twentieth century reflected an implicit questioning of the behaviorist *Zeitgeist*. For, in the Thorndikian view, if animals could imitate, then they must be able to manipulate representations.

The antibehaviorist revolution (Baars, 1986) of the past 30 years led to broad acceptance of the view that the behavior of animals as lowly as pigeons and rats is supported by cognitive activity. Consequently, the quest for evidence of imitation in animals lost its theoretical rationale in the search for evidence of animal cognition. The quest became a somewhat intellectually hollow, self-perpetuating enterprise.

That is why it is particularly important that Whiten and his colleagues have taken the next step. They have moved study of imitation in animals beyond an atheoretical, autonomously motivated search for evidence of a phenomenon to ask what is imitated, who imitates, and under what conditions is imitation most likely to occur. Such investigations have already breathed new life into a classic problem area in animal psychology that had been stagnant for decades.

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12.6 Why Don't Apes Ape More?

Susan Jones on Whiten, Horner, and Marshall-Pescini

The larger context of the research by Whiten, Homer, and Marshall-Pescini is the question of the phylogenetic origins of imitation. A cross-species