

shew's commitment is to downplay such analysis and present the riches of the story in the terms that psychologists will themselves perhaps most easily recognize, the contributions of individuals. This he does with verve and knowledge. □

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We're All Nativists Now

Imitation in Infancy

by Jacqueline Nadel and George Butterworth (Eds.)

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Review by Cecilia M. Heyes

Western psychologists study imitation in children and animals. Imitation tests are also used to assess neurological patients, but studies of imitation in typical adult humans are very rare indeed. This may reflect a platonic tradition in which, as Nadel and Butterworth explain in their Introduction, imitation is viewed as a primitive tendency antithetical to individual identity and self-consciousness. Whatever the reason, this volume provides a valuable source for any psychologist or psychology student who wishes to understand why, contrary to the platonic view, contemporary developmentalists regard imitation as a complex and productive cognitive and social phenomenon. The book is also a useful outline for specialists in animal imitation, like myself, of the state of play in research on infant imitation.

The most striking feature of this collection is one of unity in the face of diversity: There is broad variation between authors in their usage of the term *imitation*, and there are signs of polarization over the issue of whether imitation is an individual "cognitive" or a social "intersubjective" phenomenon, but nearly all of

the contributors agree that imitation is innate. This review first considers the book's sources of diversity and then focuses on its resounding nativism.

What Is Imitation?

In everyday English, one individual "imitates" another when he or she copies some aspect of the model's appearance or behavior—their clothes, posture, hair style, kitchen gadgets, facial expression, or golf swing. The chances that all of these phenomena are mediated by common psychological processes or that they fulfill a common function are miniscule, and therefore imitation must be fractionated for research purposes. For example, researchers distinguish immediate from deferred imitation, imitation of object use from imitation of gestures, imitation of novel versus familiar, or conventional gestures, sequences versus single acts, vocal versus motor behaviors, and visible versus invisible actions. All of these distinctions, and many more, are used in *Imitation in Infancy*, but not with a great deal of consistency or deliberation. Several chapters (Meltzoff and Moore; Kugi-mutzakis, Bard, and Russell;

Heimann and Ullstadius) report research on imitation in human and chimpanzee neonates using Meltzoff and Moore's mouth-opening and tongue-protrusion cross-target procedure. This procedure acts as an anchor maintaining a focus, in the field as well as in the book, on immediate imitation of familiar facial gestures. However, once this anchor is lost, the reference of "imitation" tends to float free. This freedom is most extreme in a long, querulous chapter by Trevarthen, Kokkinaki, and Fiaminghi who frequently use imitation as synonymous with "Mimesis, the ability to mimic or 'become' objects, natural events, animals, human purposes, remembered actions of other persons, even fantasies that go beyond possible real experience, to represent experiences for oneself and to others in metaphorical simulation" (p. 127). Nadel, Guerini, Peze, and Rivet's contribution is much more conservative in its usage of imitation, but it elides the distinction between imitating gestures and imitating object use to a point where it is not clear whether, when toddlers play together, they imitate only object use, or as these authors suggest, whether object imitation supports gestural imitation in this age group. Butterworth's scholarly chapter (which may have served better as an introduction) addresses problems of classification and definition but misses the opportunity to comment on and clarify the usage of other contributors. Fortunately, however, the chapters by Uzgiris and Rogers are each characterized by such clear and careful use of key distinctions that they are sufficient to save the volume from terminological confusion, and nonspecialists would be well-advised to read them first. Rogers provides both a masterful review of recent research on imitation in autistic children, and

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a balanced reevaluation of the Rogers and Pennington (1991) hypothesis proposing that an imitation deficit is at the core of autism. Uzgiris argues persuasively that consistent trends in the normal development of object and gestural imitation will be detected only when imitation is viewed as an intrinsically social and goal-directed activity.

Individual Versus Social

Uzgiris's chapter also provides a guide to the theoretical and methodological conflict that divides investigators of infant imitation into two fairly distinct groups. One approach, represented in this volume only by Meltzoff and Moore and by Rogers, casts imitation as a cognitive capacity possessed by individuals. The cognitive process is characterized by its achievement of perceptual-kinaesthetic matching and is investigated through carefully controlled experiments that are designed to distinguish imitation from coaction, chance occurrence of matching behavior. The alternative view, supported with varying degrees of exclusivity by Kugiumutzakis, Bard, and Russell; Trevarthen, Kokkinaki, and Fiamenghi; Uzgiris; Nadel, Guérini, Pezé, and Rivet; and Heimann and Ullstadius, portrays imitation as an intrinsically social-communicative or intersubjective phenomenon, and favors observational and experimental methods which, treating the behavior of the infant and its model as the unit of analysis, do not distinguish clearly between coaction and copying action.

It is tempting to assume that this conflict merely reflects different epistemic priorities; that the primary objective of the cognitivists is to understand the internal, proximal causes of imitative behavior, whereas the social-communicative school is devoted to understanding the social consequences of imitation. But this characterization both ignores the cognitivists' concern with the role of imitation in developing knowledge of personal identity (Meltzoff and Moore's chapter) and theory of mind (Rogers' chapter) and underestimates

the depth of the disagreement. At least some proponents of the social-communicative view, including Trevarthen et al. in this volume, reject contemporary cognitive-mechanistic explanations generally, and assert that awareness of self and other, and the intention to communicate, are the origins of imitative action, even in neonates.

Imitation in Infancy includes little genuine exchange between proponents of the individual and social views. Meltzoff and Moore and Rogers pursue their approach and do not acknowledge any conflict. Whereas supporters of the social intersubjective view often claim the existence of empirical evidence favoring their position, I could not find in any chapter a simple statement of the relevant findings and why they are thought to be incompatible with the cognitive conception of imitation. Rather than being a weakness of the book, this may reflect the nature of the conflict. To the extent that it is rooted in assumptions about psychological explanation and is accompanied by different methodological standards, the exchange between the cognitive and the social-communicative views is unlikely to be resolved, or even to progress, through empirical enquiry. If a proponent of intersubjectivity chooses not to distinguish goals or functions of behavior from causes, or rejects the idea of psychological (as opposed to neural) mechanisms, experiments showing that infants achieve perceptual-kinaesthetic matching, however carefully designed, are not going to persuade them otherwise. Presented with data showing that infants copy actions that give rise to different sensory inputs when observed and executed, a supporter of intersubjectivity can deny that this is an important or essential characteristic of imitation simply by enlisting the premise that psychological phenomena are to be individuated and explained with reference to their goals or functions. Similarly, no amount of evidence that imitation is sensitive to social context, effortful and communicative in its effects, will compel the cognitivist

to reject the idea that imitation is also mediated by a mechanism matching sensory input to motor output. He or she can always point out that, whatever its operating characteristics, social consequences, and adaptive function, gestural imitation typically consists of matching visual with kinaesthetic sensory input, and hold fast to the assumption that proximal causes are to be distinguished from functions and explained in terms of psychological mechanisms.

Nativism

Meltzoff and Moore have made two immensely valuable and influential contributions to research on imitation in childhood. The first, their theoretical claim that perceptual-kinaesthetic matching is the basic mechanism of imitation is, as we have already seen, highly controversial. The second, their evidence of facial gesture imitation by neonates (e.g., Meltzoff & Moore, 1977; 1983; 1989), is the bedrock of the belief, supported by nearly all contributors to this book, that whatever drives imitation throughout development (cognitive faculty and social-communicative purpose), it is innate. The relevant experiments, which were carefully controlled and which have been replicated by others (including Kugiumutzakis, this volume), apparently show that infants as young as hours or days old can imitate a range of adult facial expressions, including tongue protrusion, mouth opening, and lip protrusion, as well head and hand movements.

In the case of imitation, the "innateness question," unlike the individual versus social issue, and in spite of being an old chestnut, is empirically tractable. However, *Imitation in Infancy* gives little space to consideration of the alternative view that "imitation is learnt" (Piaget, 1945/1962, p. 80). The chapter by Uzgiris is the only one that represents this view explicitly, and, rather than concentrating on evidence, it rejects nativism on the grounds that it "leads to an adevelopmental conception of imitation" (p. 195). The only other dissenting voices, those of Heimann and

Ullstadius, report data that are incompatible with the nativist consensus, but do so very tentatively and without elaborating an alternative hypothesis. Their important findings are that individual differences in frequency of facial gesture imitation at three months and at one year of age are correlated, but that frequency at birth does not predict performance at either of the later tests. This is consistent with the idea that neonatal imitation is mediated primarily by subcortical processes, whereas later imitation is cortically mediated (Vinter, 1986).

To provide a lively exchange about the origins of imitative competence, or even a compelling defense of the nativist position, *Imitation in Infancy* would have had to include a chapter by Anisfeld (1991, 1996), or at least to engage with his critique of the data on neonatal imitation. Anisfeld's careful reanalyses of these data suggest that the imitation effect is reliable only for one gesture, tongue protrusion. If this is correct, there is no reason to suppose that neonatal imitation is mediated by the same processes as that which occurs later in development. Neonatal imitation could be based on an innate releasing mechanism, whereas subsequent imitative achievements are products of learning.

Unfortunately, although the contributors to *Imitation in Infancy* clearly reject Anisfeld's critique, they do not tell us what they think is wrong with it. Anisfeld's name does not appear in the index, and his 1996 article is mentioned just twice, and briefly, in the text. Trevarthen et al. (p. 139) erroneously attribute to him the idea that imitation arises from intermodal matching, and Butterworth merely notes that there is "one isolated critic [who] acknowledges only the case of tongue protrusion and he considers this to be a triggered response" (p. 72). Even if Anisfeld is isolated, does this necessarily mean that he is wrong?

Over the past few years, and possibly under the influence of "evolutionary psychology's" nativism, greater integration has been achieved

between research on imitation in children and animals. Several chapters in this book refer to the comparative literature. Butterworth discusses animal research at some length and Bard and Russell both provide a clear, balanced review of studies of imitation in nonhuman primates, and report their own findings of imitation in neonatal chimpanzees. As far as I can see, their results do not exclude the possibility that chimps match tongue protrusion only, but they are a good deal stronger than previous reports of neonatal facial gesture imitation in apes. Looking over the comparative-developmental fence at the book as a whole, I found two surprises. First, there was no mention of recent, compelling evidence of motor imitation in birds (e.g., Akins & Zentall, 1996; Campbell, Heyes, & Goldsmith, 1999; Lefebvre, Templeton, Brown, & Koelle, 1997). Second, relative to those working with animals, developmentalists seem to be less vigilant in distinguishing imitation from phenomena such as emulation and stimulus enhancement, in which the observer is influenced by the locus or object of the model's activity and not by the behavior itself.

In their introduction, Nadel and Butterworth express the "hope that this book will serve as a positive testimony to the importance of imitation in human development" (p. 4). In my view, *Imitation in Infancy* achieves this purpose, not as a cohesively balanced unit, but by virtue of a few excellent chapters that illuminate the whole. □

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