

## *Introduction*

### Immediate imitation rehabilitated at last

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*Jacqueline Nadel and George Butterworth*

This collection of papers offers a timely summary of the ‘state of the art’ in contemporary research on imitation in human infants. The book brings together, for the first time, the foremost researchers on imitation in babies, and it addresses the topic in normal, comparative and psychopathological perspectives.

Until the 1970s the term ‘imitation’ did not even appear as a keyword in reference bases such as Psychological Abstracts. The word was simply taken to be synonymous with observational learning, which, as Bandura (1971) defined it, occurs without incentives, without trial and error and does not require reinforcement. The development of imitation was most readily captured under the keyword ‘symbolic play’ and referred in particular to the ability to imitate after a delay and without the model being present (so called deferred imitation). The existence of immediate imitation in development was hardly suspected and its role was ignored.

Valentine (1930) quite early on noted the chaotic state of research on imitation and proposed that the ambiguous definition of imitation might explain this disagreement in results. Forty years later Aronfreed (1969) made the same statement, although by then three systematic approaches to imitation could be distinguished in current research. The first approach considered imitation to be a particular case of instrumental learning. A second approach viewed imitation as allowing the acquisition of new responses on the basis of social experience, and a third approach explained imitation as a form of cognitive development (Piaget 1945). In their review of research on imitation, Hartup and Coates (1970) summarised results obtained within a learning theory perspective and emphasised how meagre was the number of studies. When defined in terms of comparisons of imitation ability at different ages, only ten studies were available in 1970. Eight years later, Yando, Seitz and Zigler (1978) identified seventy-six new studies but this hardly amounted to a dramatic increase in interest in the field.

How can we explain this neglect? Yando, Seitz and Zigler (1978) attributed it to the long-lasting imperialism of learning theories in the United

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## 2 Introduction

States. Learning theories as a group tend to assimilate microgenesis and ontogenesis into a single explanatory system, thus offering learning as an explanation for development. Within this framework, developmental studies are not necessary, since learning accounts for development. However convincing this explanation may be, it does not explain why immediate imitation was neglected in countries where developmental theories were strong, as in Europe, and, especially, Francophone Europe. In the European case, there are at least two explanations for this neglect, the first related to the Platonic tradition in philosophy and the second to the influence of Piaget in developmental psychology.

An insidious influence on imitation research had been established for centuries in the Platonic tradition. Girard, Oughourlian and Lefort (1978), in their book *Des choses cachées depuis la fondation du monde*, analysed the negative influence of Plato on the study of imitation. Plato characterised imitation as holding danger for individual identity and for self-consciousness. Mimesis was seen to limit intelligence, destroy identity and even to lead to murder or suicide! This mythic fear was so universal that in some cultures it resulted in forbidding similarity as, for example, in the compulsory disappearance of one of a pair of identical twins, or when the son was too much like the father. Even today, conformism, lack of initiative and submissiveness are associated with imitation. In developmental psychopathology, immediate echolalia in children with autism is still considered by some psychiatrists as a negative symptom, rather than as a positive basis for the development of communication.

This led to generations of psychologists following Guillaume's (1925) definition which implies that imitation requires at least an elementary level of representation. For instance, the famous French psychologist Wallon (1942) adopted this restrictive definition, claiming that imitation does not occur prior to eighteen months. Wallon used the term 'mimetism' in the case of immediate matching of emotional models, and in the case of partial imitations, 'echopraxis' or 'echolalia'. He did not make any direct theoretical link between these 'pseudo-imitations' and 'real' that is to say, deferred imitation. By contrast, in the same period Piaget criticised Guillaume's definition. He proposed to define imitation as an action by which a model is reproduced, whether the process depends on perception or representation. Step by step Piaget noted any matching behaviour that occurred during sensorimotor development, including reflex-like matching. The systematic follow-up of his three children led Piaget to consider immediate imitation as separate from the process of intelligent adaptation. In intelligent acts there is a kind of equilibrium between accommodation and assimilation, whereas in immediate (or direct) imitation it is conceived exclusively as a mechanism of

accommodation, whereby the organism ‘bends’ to the demands of the environment.

References to imitation are found in several places in Piaget’s work, and there is one book devoted to the topic (Piaget, 1945). In this work, the development of imitation is described in parallel with that of sensorimotor intelligence. Piaget found no evidence of immediate hetero-imitation in the first two stages of development (0–6 months). During stage I (0–1 month), some reflex-like behaviours were noted followed by sporadic imitation during stage II (1–5 months), if the experimenter modelled behaviours which had just been displayed by the baby. At this stage, imitation is still governed by circular reactions. During stage III (6–9 months), Piaget noted that babies will now imitate sounds and gestures which are part of their repertoire. For Piaget, imitation only becomes interestingly intelligent between 9 and 12 months (from stage IV to stage VI) as the capacity for deferred action arises. The first indices of this capacity emerge during stage IV, when the infant becomes able to imitate movements, such as facial movements, of parts of the body which she cannot see. This implies a kind of representation in action, in its proper meaning of a second presentation. This capacity increases during stage V when new movements can be imitated. Piaget argued that deferred imitation available at stage VI marks the beginning of representation and is a key aspect of the symbolic process. This is revealed by the concomitant development of symbolic play, words and drawing from 18 to 24 months. Until the 1970s, the exciting question of the emergence of the semiotic function as framed by Piaget led Francophone studies to focus almost exclusively on the role of deferred imitation in the acquisition of symbolic processes.

Developmental studies carried out since the 1970s have progressively changed this climate of opinion. Notice, for instance, that Piaget had regarded imitation as a single ability, an assumption questioned by later researchers who found that gestural and vocal imitation develop differently (Užgiris and Hunt, 1987). Many important discoveries have been made and these have completely altered the theoretical basis for understanding the contribution of imitation to development. This book addresses the major issues arising from recent research with contributions by the foremost researchers in the area.

The chapters in the first section of the book reassess the Piagetian tradition especially concerning the relation between immediate imitation, deferred imitation and mental representation. We begin with the seminal work of Meltzoff and Moore who make particular reference to the innate origins of a theory of mind, to the precocious appearance of both immediate and deferred imitation in human development and to the mechanisms

4 Introduction

which may serve the innate ability to imitate. The importance of imitation as a precocious index of preference for human stimulation and communication is also stressed by Kugiumutzakis in his chapter.

The second section moves on to theoretical issues concerned with the ontogeny and phylogeny of imitation. Butterworth considers the history of research on neonatal imitation, problems of definition and theoretical issues concerning the mechanisms and motives for imitation in ontogeny and evolution. The comparative study of imitation is further discussed by Bard and Russell with particular reference to chimpanzees, our closest primate relatives, animals who are often considered to be the prototypical mimics.

In the third section, which focuses on the social and emotional motives for imitation, Trevarthen, Kokkinaki and Fiamenghi stress especially the role of primary intersubjectivity or the meeting of minds in early imitative interaction sequences. In her chapter, Uzgiris considers imitation in the context of activity theory, as a form of interpersonal goal-directed action.

The final section of the book explores the value of imitation as a marker for normal and atypical communicative development. Nadel, Guérini and Rivat propose that spontaneous imitation is an evolving format which first allows mutual attention and exchanges and later scaffolds intentional aspects of communication, such as turn taking and topic sharing. Children with autism showed spontaneous imitative behaviour and answered to being imitated. The prevalent cognitive models of autism disagree on the question whether imitation is a primary deficit. The predictive value of neonatal imitation for subsequent social development is addressed by Heimann and Ullstadius with particular reference to differences in social competence between autistic and Down's syndrome children. The link between impairments in immediate imitation and impairments in communication in autistic children is addressed by Rogers. She is the co-author of a theory which proposes that a central deficit (executive function impairment) hinders the development of immediate imitation in autism. In her chapter, she develops the hypothesis that a praxic deficit causes disruption in social co-ordination.

We hope this book will serve as a positive testimony to the importance of imitation in human development and re-establish immediate imitation as a fundamental mechanism of communication in humans.

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*Part I*

Imitation in human infancy

# 1 Persons and representation: why infant imitation is important for theories of human development

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*Andrew N. Meltzoff and M. Keith Moore*

A complete theory of early development will have to account for infants' understanding of both people and things. There has been a plethora of research on infants' perception and understanding of the physical world. A distinguishing feature of research on infant imitation is that it informs us about infants' understanding of *persons*. Just as inanimate objects and their movements in space are presented to infants in studying their understanding of the physical world, people and dynamic human acts are presented to infants in studies of imitation. Imitation is one of the most sensitive tools available for investigating the foundations of infants' understanding of people.

There are also other means of investigating early notions of persons – for example, the perception and discrimination of human faces and biological motion. Research on imitation complements this work and enriches it in two ways. First, infant imitation not only tells us about perception (events must be perceived to be imitated), but about linkages between perception and action. Second, imitation provides information about infants' notions of self, other and the mapping between the two. By the very act of imitating, infants show us that they relate their hands to our hands, their faces to our faces, and their specific acts to similar ones of ours. We will argue that infants' apprehension that adults are at some level 'like me' and that seen acts are 'like the ones I do' are equivalence classes that have some of the most far-reaching implications of infancy, ones foundational for later developments in intersubjectivity, communication and social cognition.

In the modern era, infant imitation has been underutilised as a source of information for theories of human development.<sup>1</sup> This can be traced to two misconceptions. One wide-spread misconception is that infants learn to imitate – either by reinforcement of matching behaviour, acculturation, or through Piagetian stage-like mechanisms. It has now been shown that newborns only a few minutes old can imitate human acts (e.g., Meltzoff and Moore, 1983). Imitation is an innate capacity in the human species.<sup>2</sup> Imitation is something infants bring to

their very first interactions with other people. It is not the product of learning, but rather a species-typical mechanism for social learning and the transmission of acquired characteristics from one generation to the next.

A second misconception is that early imitation is rote, mindless and automatic. Because imitating motor movements is so easily accomplished by adults, it is assumed to be so in infancy. But surely this is mistaken reasoning. Even if adult imitation does not require focal attention, this may be the result of age and practice rather than the initial state of infants. We will argue that infant imitation consists of effortful, intentional acts. This view is buttressed by new empirical evidence showing that when infants make mistakes imitating, they correct their behaviour to match the seen behaviour of others. What is crucial about infant imitation, then, is not so much *that* infants imitate, but the manner in which they do so, which provides clues to the psychological mechanisms which mediate it and the functions it serves.

### **Janus-like character of imitation: social and cognitive perspectives**

The Roman god Janus was depicted as having two heads that enabled him to look in two directions at once. Imitation has the Janus-like quality of providing perspectives on both cognitive and social domains.

#### *Cognitive perspective*

Infant imitation bears on questions of perception and the control of action. This is a straightforward theoretical connection, inasmuch as infants see a modelled act and spontaneously produce an action based on this perception. Described in this way, imitation bears resemblance to a host of other phenomena showing early perceptual-motor coupling. For example, young infants can catch moving objects (Van der Meer, Van der Weel and Lee, 1994; Von Hofsten, 1983), make postural compensations to shifts in the visual framework (Bertenthal, 1996; Butterworth and Hicks, 1977; Jouen, 1990) and act to protect against looming objects (Bower, Broughton and Moore, 1970). Gibson (1966, 1979) argued that such cases show a tight coupling (he called it ‘resonance’) between visual perception and distally appropriate output without requiring learning to associate the stimulus with the adaptive response. Imitation might be a similar case, one that reveals an *interpersonal coupling*. Infants are regulating their actions to bring them in line with a dynamically changing animate display, rather than an inanimate



object or visual framework, but many of the same issues about perceptuomotor regulation arise.

Imitation also informs us about preverbal representation. The key evidence derives from discoveries about deferred imitation, in which infants are imitating a person or action that has disappeared from view. In deferred imitation, infants are not calibrating their actions to what is before their eyes, but according to their memory of a now-absent event. In certain cases of deferred imitation to be discussed, the target act may have disappeared a day or week previously. In other cases, we will show that infants *override* their current perception and are motivated to imitate an action from the past even though presently seeing a contradictory act.

Facial imitation raises issues of representation and invisibility in a different way. In facial imitation, infants see the adult's facial expression but cannot see their own face. If facial imitation is performed after the model has disappeared, there is a kind of double invisibility. Infants must match a gesture they no longer see with an act of their own that they cannot see. Such distancing from the here-and-now world was thought to be impossible for young infants as classically conceived. New evidence suggests that even very young infants can successfully perform deferred facial imitation (Meltzoff and Moore, 1994, 1997). Once again, it is not just *that* infants imitate but the conditions under which they do so that provides insights for theory construction.

Taken together – the phenomena of immediate, deferred and facial imitation – provide a rich evidentiary basis for describing the origins, mechanisms and development of imitation within a cognitive perspective.

#### *Social perspective*

According to everyday folk psychology (sometimes called 'theory of mind'), people are special entities in the world of moving objects. People are viewed as sentient beings who wilfully pursue their intentions and deserve special moral status. Even the most intelligent machines are not treated in the same way. Where does this construal of people come from?

We think that infants are launched in their career as folk psychologists with the primary perceptual judgment, 'Here is something like me.' The apprehension that others are *like me* is the foundation on which our more mature folk psychology is constructed. Even our moral sense is anchored here. We 'do unto others' in a special way because there is a deeply felt equivalence between self and other. Without a sense of like-me-ness, we do not think our folk psychology and moral judgments would take the form they do.

Theories of development from Freud to Piaget explicitly denied that young infants could apprehend equivalences between self and other. Among the experiments that changed this view are those showing that newborns imitate facial and manual movements. These findings suggest that young infants can, at some level of processing, recognise equivalences between body-transformations as felt in the self and body-transformations as seen in others. This has profound implications for the origins of understanding persons.

These findings bolster nativist claims. Modern nativists sometimes pit the existence of initial structure against development, however, as if these are either/or propositions. In fact, a powerful original state does not preclude developmental change. For example, we think that developmental change is prompted by social interactions in which parents imitate infants, mirroring their actions and emotional expressions back to them. The experience of being imitated has special significance for infants not only because of the temporal contingencies in the mutual behaviour, but because infants recognise the adult's acts as structurally similar to their own. Many things in the world can move contingently on my action, but only other humans can generatively act like infants, whatever they choose to do. We will argue that reciprocal imitation games serve as private tutorials in folk psychology, giving infants input about interpersonal mutuality that allows them to transcend their initial state.

*Looking in two directions at once*

Imitation is fundamentally an act of social cognition, and so any assignment of imitation into 'cognitive' or 'social' camps, however tempting for theorising, does not occur for the baby. In this essay, we will try to bring both perspectives to bear (see also Užgiris, 1981). First, deferred imitation will be examined, with the aim of uncovering what this tells us about early memory and representation. The way deferred imitation is used in the real world for acquiring culturally relevant adult behaviour patterns will also be considered. Second, facial imitation will be examined, with special emphasis on the psychological mechanisms which mediate it. We will argue that facial imitation is based on a cross-modal matching between self and other and consider the social implications of such intercorporeal correspondences. Third, we examine what prompts young infants to imitate in the first place and the adaptive functions subserved by such behaviour. Fourth, we examine the role of reciprocal imitation games in extending interpersonal understanding beyond the initial state. In each of the four sections, we first pose the problem we plan to address before marshalling the relevant empirical evidence.