

## RESOLVING THE DEBATE ABOUT EARLY IMITATION

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Facial imitation presents a puzzle. Infants can see an adult's face but cannot see their own faces. They can feel their own faces move, but have no access to the feelings of movement in another person. Developmentalists have known for 50 years that 1-year-olds imitate facial gestures. In 1977, Meltzoff and Moore reported that neonates imitate facial gestures. The report engendered a lively debate, and basic findings of early imitation have now been replicated and extended in 25 different studies from 13 independent laboratories.<sup>1</sup>

The field has now moved on to address four questions: (a) How is it done? (b) Why is it done? (c) Does it develop? (d) Why should we care? A recent review of the literature has identified 10 characteristics of early imitation (table 12a.1).<sup>1</sup> These can be used for addressing the foregoing questions.

TABLE 12a.1 Ten characteristics of early imitation

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1. Infants imitate a range of acts
  2. Imitation is specific (tongue protrusion leads to tongue not lip protrusion)
  3. Newborns imitate
  4. Infants quickly activate the appropriate body part
  5. Infants correct their imitative efforts
  6. Novel acts can be imitated
  7. Absent targets can be imitated
  8. Static gestures can be imitated
  9. Infants recognize being imitated
  10. There is developmental change in imitation
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Source: Table from Meltzoff and Moore (1997). The paper provides the references reporting each of the 10 characteristics.

## HOW IT IS DONE

The 1977 report considered three mechanisms that could potentially underlie early imitation – early learning from social interaction (EL), innate-releasing mechanisms (IRM), or active intermodal mapping (AIM). Further research excluded EL as an account, because studies demonstrated that newborns imitated.<sup>1,2,3</sup> The IRM view made three predictions: (a) matching occurs for only a few evolutionarily-privileged gestures, (b) the form of the response is fixed and stereotypic, (c) the matching response is time-locked to the triggering display. Research has disconfirmed each of these. First, although it was once thought that only tongue protrusion was imitated, several new studies have documented imitation for a wide range of gestures, not only tongue protrusion.<sup>1,3</sup> Secondly, the imitative response is not fixed or stereotypic. Infants imitate novel facial acts and correct their initial attempts to home-in on an accurate match.<sup>4</sup> Finally, the response is not rigidly time-locked. Infants can imitate when the model is not perceptually present, with studies documenting deferred facial imitation after delays of up to 24 hours.<sup>4,5</sup>

The new findings support the third view, the AIM account (figure 12a.1). On this view early imitation is intentional, goal-directed intermodal matching. The central notion is that imitation, even early imitation, is a matching-to-target process. The goal or behavioral target is specified visually. Infants' self-produced movements provide proprioceptive feedback that can be compared with the visually-specified target. AIM proposes that such comparison is possible because both perceived and performed human acts are represented within a common framework. This allows correction of imitative attempts toward a more faithful match. A paper elaborating the AIM account provides a detailed description of the metric infants use for establishing the intermodal equivalence of human acts.<sup>1</sup>

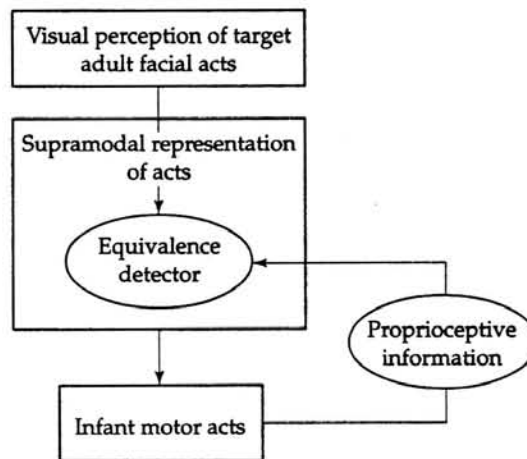


FIGURE 12a.1 The “active intermodal mapping” account (AIM) (reprinted from Meltzoff and Moore, 1997)

WHY IT IS DONE

Any behavior as complex as imitation is multiply determined. However, new findings have suggested that early imitation serves social and communicative functions. In particular, it has been argued that infants deploy imitation to probe whether an encounter with a person is a *re-encounter* with a familiar person or a new encounter with a stranger.<sup>5</sup> Using imitation for this purpose serves a social-identity function.<sup>4</sup> On this view, infants treat a person's non-verbal behavior as an identifier of who the individual is, and use imitation as a means of verifying this identity. The fundamental idea is that the distinctive behavior and special interactive games of people serve as markers of their identity. If infants are uncertain about the identity of a person, they will be motivated to test whether this person has the same behavioral properties as the old one by imitating her behavior and re-creating the previous social interaction. In a recent paper, the social-identity function of early imitation has been articulated in more detail and related to infants' understanding of the identity and permanence of inanimate objects.<sup>6</sup>

DEVELOPMENT

A popular way of assimilating the 1977 article was to treat early imitation as a specialized phenomenon, disconnected from later forms of imitation. The idea was that early imitation existed, but then "dropped out" of the infant's repertoire until about 1 year of age. New empirical findings have shown there is no necessary drop out of early imitation. Studies showed that the apparent drop was not due to change in competence, but rather to performance changes that were easily reversed using novel designs that posed cognitive challenges to these older infants.<sup>5</sup>

Nonetheless, there are important developmental changes in imitation.<sup>1,7</sup> Whereas the newborn is focused on the act ("Can I do that?"), the 6-week-old treats facial displays as posing a problem about the identity of the actor ("Are you the individual who does behavior *x*, not *y*?").<sup>2,4,5</sup> Further development moves infants toward the more abstract notion of a matching relationship between actors. This change is illustrated by studies in which adults purposely imitate the infant, rather than the other way around. Fourteen-month-olds seem to recognize the interaction as a "matching game," and gleefully test whether they are being copied, by abruptly changing acts while staring at the adult to see what he will do.<sup>8</sup> Younger infants show no such testing behavior.

Subsequent development allows imitation of an inferred act. One study presented 18-month-olds with an adult who tried, but failed, to perform an act on an object.<sup>7</sup> Infants imitated what the adult was attempting to do, rather than what he did do. Imitation has developed to the point that infants no longer imitate what they literally see, but what the adult was striving to do. This moves beyond seeing other people solely in terms of behaviors to seeing them at a deeper level – in terms of the goals of their acts and the intentions they hold.<sup>7,9</sup>

## WHY WE SHOULD CARE

Early imitation reveals a more sophisticated initial state than classical theories assumed. The 1977 article suggested that neonates were capable of: cross-modal matching, perceptual-motor coordination, and representation. Although these inferences were considered surprising 20 years ago, empirical discoveries by a host of researchers, using both people and things, has supported them. The modern empirical findings lend increasing support to the most far-reaching conclusion of the 1977 report: "The ability to act on the basis of an abstract representation of a perceptually absent stimulus becomes the starting point for psychological development in infancy and not its culmination" (p. 78).

Current debate in the field now concerns what is implied by such a rich initial state. One popular view is that the innate psychological structures are adult-like – what is built in and available to newborns remains essentially unchanged in the course of development. However, the developmental changes discussed above and elsewhere<sup>6,10,11</sup> do not support the view that infants are born with adult-like knowledge.

We favor an alternative to strong nativism. The notion is that evolution has bequeathed human infants not with adult concepts, but with initial mental structures that serve as "discovery procedures" for developing the more comprehensive and flexible concepts.<sup>6,11</sup> Imitation is deployed as a discovery procedure in understanding persons. Through interactions with others and the concomitant growth in self-understanding, infants are engaged in an open-ended developmental process. If one adopts this developmental view, it becomes tempting to hypothesize that the foundation for developing an "understanding of mind" may be grounded in the initial equivalence of "self" and "other" manifest by early imitation.<sup>1,9</sup> Moreover, the discovery procedures used for understanding of inanimate objects may be deeply connected with those used in the social world.<sup>6,11</sup>

## NOTES

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