

# Imitation of Televised Models by Infants

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MELTZOFF, ANDREW N. *Imitation of Televised Models by Infants*. CHILD DEVELOPMENT, 1988, 59, 1221–1229. Studies indicate that infants in our culture are exposed to significant amounts of TV, often as a baby-sitting strategy by busy caretakers. The question arises whether TV viewing merely presents infants with a salient collection of moving patterns or whether they will readily pick up information depicted in this 2-D representation and incorporate it into their own behavior. Can infants “understand” the content of television enough to govern their real-world behavior accordingly? One way to explore this question is to present a model via television for infants to imitate. Infants’ ability to imitate TV models was explored at 2 ages, 14 and 24 months, under conditions of immediate and deferred imitation. In deferred imitation, infants were exposed to a TV depiction of an adult manipulating a novel toy in a particular way but were not presented with the real toy until the next day. The results showed significant imitation at both ages, and furthermore showed that even the youngest group imitated after the 24-hour delay. The finding of deferred imitation of TV models has social and policy implications, because it suggests that TV viewing in the home could potentially affect infant behavior and development more than heretofore contemplated. The results also add to a growing body of literature on prelinguistic representational capacities. They do so in the dual sense of showing that infants can relate 2-D representations to their own actions on real objects in 3-D space, and moreover that the information picked up through TV can be internally represented over lengthy delays before it is used to guide the real-world action.

There is an increasing interest in the experimental study of imitation in infancy, with heightened attention to the possibility that imitative processes may play a role in the early development of speech (Kuhl & Meltzoff, 1988), language (Snow, 1981; Speidel & Nelson, in press), and early motor, cognitive, and social skills (Meltzoff, 1985, 1988a, 1988b, 1988c; Uzgiris, 1981). As imitation is elevated to a more prominent role in early learning and development, a question arises about the possible impact of TV on infants, because research has shown that television is a prominent part of the natural ecology of modern-day infants.

Of today’s American homes, 99% have at least one television set (Singer & Singer, 1981). Much has been made about the viewing appetite of adults (Comstock, Chaffee, Katzman, McCombs, & Roberts, 1978), but the data also indicate that television viewing begins quite early. According to a recent Nielsen report (1987), the average 2–5-year-old views about 28 hours per week of television, a figure compatible with a previous study showing that preschoolers spend over one-third of their waking hours viewing TV

(Friedrich & Stein, 1973). There is evidence for purposive, selective, and systematic viewing in children between 2 and 3 years of age (Anderson, Alwitt, Lorch, & Levin, 1979; Anderson & Lorch, 1983), and it has been shown that by 3 years three-quarters of the children can name their favorite TV program (Lyle & Hoffman, 1972).

Although little work has been done concerning the amount of TV viewing by children under 2 years of age, one study found that they were exposed to an average of about 2 hours of television a day (Hollenbeck, 1978; see also Anderson, Lorch, Field, Collins, & Nathan, 1986). Systematic home observations of infants reveal that TV viewing is interspersed throughout the infant’s day, including during eating, diaper changing, and other ordinary routines (Lemish & Rice, 1986). Perhaps the most striking evidence for the impact of TV on infants comes from work concerning TV exposure and early language. In the Lemish and Rice (1986) study, a 23-month-old watching a commercial was observed to repeat: “Coke is it, Coke is it, Coke is it.” Another 23.5-month-old, whose father was sit-

The research reported here was supported by grants from NICHD (HD-22514) and the John D. and Catherine T. MacArthur Foundation. I am indebted to Craig Harris for assistance on all phases of this project and to Pat Kuhl for making helpful suggestions on an earlier version of this paper. Requests for reprints should be addressed to Andrew N. Meltzoff, Department of Psychology, University of Washington (WJ-10), Seattle, WA 98195.

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ting with a bottle of beer, pointed to the bottle and exclaimed: "Diet Pepsi, one less calorie."

While this suggests that material from the audio track of TV may be directly incorporated into infants' repertoires, it does not show that the visual images have a similar effect. Perceptually there is little or no difference between "real" and "TV" speech (subject only to the fidelity of the TV speaker), but this is not the case with the visual channel. Television presents a two-dimensional depiction of actions in three-dimensional space, and questions may be asked about infants' tendency to duplicate a 2-D representation of reality. Can infants relate the activities they see on television to their own behavior? There has been little research on infants' imitation of televised action patterns, the only experiments having been done on 1.5–3-year-old children (McCall, Parke, & Kavanaugh, 1977). One aim of this study is to test imitation of televised actions by prelinguistic infants. Another goal is to assess the possible long-term effect of TV viewing on infants' behavior.

As pointed out in the social-learning literature (Bandura, 1977), a necessary prerequisite for TV playing a substantive role in everyday life is that subjects not only be affected during the TV depiction itself but also have the ability to observe an action on TV at one point in time and then direct their behavior accordingly at a significantly later time. This type of phenomenon is termed "deferred imitation" in the developmental literature, and it has been investigated under two different procedures when using live models. (1) Infants have been exposed to a display and been allowed to imitate on-line; they have then been tested later to see if they will repeat this imitation at a later point in time (McCall et al., 1977). (2) Infants have been confined solely to observation of the display and no action at Time 1; then a delay interval has been inserted and they have then been tested to see if they will imitate for the very first time after this delay (McCall et al., 1977, experiment 3; Meltzoff, 1985, 1988a, 1988b). Although successful imitation has been reported using both procedures, the latter task is widely agreed to be the more cognitively demanding of the two (Flavell, 1985; Meltzoff, 1988a; Piaget, 1962) and within the context of TV studies it would most closely approximate normal viewing conditions. When children see an adult manipulate an object on TV, they may not have immediate access to the object. What is hoped by television advertisers and designers of educational programs

alike is that the viewer can absorb the information upon first viewing and then apply it appropriately when the opportunity presents itself at a significantly later time. The present study evaluated infants' ability to perform deferred imitation using the second type of procedure described above—one in which no immediate imitation of the model is allowed before the delay is inserted.

Reported here is a laboratory experiment of the imitation of televised models at two different ages, 24 and 14 months. Infants were presented with a TV representation of an adult performing a simple action on a novel toy and tested to see if they would imitate that act when subsequently presented with the "real" three-dimensional toy to manipulate. Infants were tested immediately and in a deferred-imitation procedure using a 24-hour delay.

### Method

#### *Subjects*

The subjects were recruited by telephone calls to parents based on birth announcements in the local newspaper. Criteria for admission into the study were that the children be healthy, with no known physical or mental handicaps, and that they be of normal birth weight (2,500–4,500 grams) and gestational age (greater than or equal to 37 weeks gestation by maternal report).

Three groups of infants served as subjects. Each group consisted of 40 subjects and included equal numbers of males and females. The groups were tested consecutively, but for ease of exposition are reported as one large-scale study. The subjects in Group 1 were 2 years old at the time of test ( $M = 2$  years, 6.78 days;  $SD = 4.00$  days). The subjects in Group 2 were 14 months old ( $M = 61.14$  weeks;  $SD = 4.14$  days), and the subjects in Group 3 were also 14 months old ( $M = 61.33$  weeks;  $SD = 6.09$  days). In addition to the 120 subjects who completed the study, others were tested but dropped from the study for the following reasons: six for refusal to sit at the test table, or touch the toy, or look away from the parent; two due to equipment failure; and 20 due to parental procedural error. The latter group consisted chiefly of parents showing or telling subjects what to do as they presented them with the 3-D test object. (Other than through prior instruction, which was used, the experimenter could not regulate parental behavior on-line, because he was present only as a TV image.)

*Stimulus.*—The object used in this test was not a commercially available toy with

which the children may have had previous experience, but a novel toy fashioned from materials around the laboratory. It was a dumbbell-shaped object 12.5 cm in length. The object could be pulled apart and put back together again, an action that previous work with the same object (Meltzoff, 1985) showed was of great interest to children of this age. The object consisted of two unpainted wooden cubes ( $2.5 \times 2.5$  cm), which were connected by short lengths of hollow tubing (7.5 cm). The tubing extending from one cube was slightly narrower (0.95 cm) than that from the other (1.3 cm), so that the two halves of the object fit snugly together. The two halves fit firmly enough that they did not simply fall apart when the toy was picked up and handled or was banged on the table.

*Test environment and apparatus.*—The test took place in a laboratory suite consisting of two adjoining rooms that were unfurnished except for the test equipment. The infant and parent sat in the test room and the experimenter in the control room.

Each infant was seated on his or her parent's lap in front of a small table. Directly across the table was a black-and-white TV monitor (Setchell Carlson 22-inch monitor), which was used to present the model. The TV screen was situated at approximately eye level and at a distance of 1.2 m from the subject. When the experimenter appeared on the screen, he was shown from about 2.5 cm above his head to just above his waist, much as a television newscaster might appear. The resulting picture was a reduction of approximately 40% from life size. Slightly to the right of the television was a video camera that recorded the infants' reactions.

In the adjoining control room the experimenter sat in front of a video camera situated at about eye level. The signal from this camera was fed to the TV monitor viewed by the infant. Directly below the camera was a small monitor that displayed the infant's behavior to the experimenter. The experiment was electronically timed by a character generator that mixed the elapsed time in 0.10-sec increments onto the videotape record.

*Procedure.*—Upon arriving at the university, the families were escorted by an assistant to a waiting room located close to the test suite. Infants were allowed to acclimate for approximately 10 min while their parents completed consent forms and had the experiment explained to them. Parent and infant were then escorted to the test room and positioned at the table facing the television set.

Next, in the control room the male experimenter walked into the camera's field of view and sat down in front of it. He thus was seen to emerge from "off camera" and to appear on the infant's TV. The parent had previously been instructed to point to the TV and to say, "Oh look at that" as the experimenter appeared on screen, and the experimenter returned this greeting, saying, "Can you see me? Now I want to show the baby something I hope will be interesting." If the subject did not immediately look at the TV when the experimenter appeared, which was rare, the parent and experimenter directed the infant's attention to it—the parent by pointing to the TV and repeating "Look," and the experimenter by repeating "Can you see me?" or "Look over here." Most often the infant was visually attracted to the movement on the TV and little other prompting was needed. In any case, no language associated with the task at hand was permitted; thus words like "copy," "duplicate," "imitate," and so forth were excluded, while visual attention words like "look" and "see" were permitted to ensure that the infant was at least fixating the TV when the target action was demonstrated.

Within each group of 40, infants were randomly assigned to either the imitation ( $n = 20$ ) or control conditions ( $n = 20$ ), with the restriction that each was composed of an equal number of males and females. Because the procedure for testing immediate imitation was identical for both age groups (Groups 1 and 2), this is described first. In the imitation condition, the experimenter brought the test object up from his lap (thus it first appeared at the lower edge of the TV) and held it at mid-chest height. Once the infant fixated the toy, the experimenter pulled it apart with a very definite movement. He then reassembled it and repeated the action two more times. The duration of this stimulus-presentation period was 20 sec. At the end of this period the experimenter lowered the toy to his lap, and thus it moved off camera at the bottom edge of the TV screen. For all infants, whether in the experimental or control conditions, the experimenter wore the same solid blue sweater to provide a homogeneous background for his target action.

The parent had been previously instructed that at the end of the TV presentation she was to pick up an identical toy, which was hidden next to her seat, and place it on a spot on the table directly in front of the infant. If the parent did not do so immediately the experimenter verbally reminded her to "place the object on the table." A 20-sec response

