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Children's Imitation With Varied Demonstration And Reproduction Delays

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Abstract

Imitation is both a simple (Fadiga et al., 1995) and a complex matching (Wohlschläger et al., 2003) for transforming visual inputs into motor outputs. These matching types determine what and how observed behaviors would be matched and imitated. The current study tests the children's ability to imitate transitive and intransitive action's course demonstrated by an adult model involving necessary and unnecessary sequences for performing goal-directed actions immediately or after varied delays. The goal-directed actions imitation is depended on imitation form (Labiadh et al., 2013) and calling (Meltzoff & Moore, 1998) process. For instance, in immediate imitation, the ability to recall is easy and requests a low memory load (Wohlschläger et al., 2003). In short-term deferred imitation, the delay between demonstration and reproduction is short and the retention of actions is limited and requests a short-term memory (Rumiati & Tessari, 2002). While, in long-term deferred imitation, the demonstration and reproduction delay is long and requests a long-term memory (McDonough et al., 1995).

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Introduction

Recalling and imitating observed behaviors would also depend on certain factors. The first one concerns the goals and means process. Wohlschläger et al. (2003) demonstrated that the model's action-goal was imitated correctly but the means (e.g., how to touch the ear) were neglected and considered as unnecessary for goal. The second factor concerns the nature of observed behavior. Rumiati & Bekkering (2003) showed that healthy individuals imitated better meaningful actions than meaningless ones, because they had a concrete goal. The third factor concerns the encoding and memory systems (White et al., 2009). For example, in certain imitation form, imitator is not informed

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of what he/she will have to reproduce later. In such a case, incidental encoding is susceptible to intervene in short-term memory because he/she does not expect a further imitation test. In other imitation form, the imitator is informed about later reproduction. In such a case, intentional encoding is susceptible to intervene in long-term memory because he/she is warned to a further imitation test.

The alignment of these factors (e.g., incidental *versus* intentional encoding, short-term *versus* long-term deferred imitation and meaningful *versus* meaningless actions) determines the involvement of cognitive resources. Tessari et al. (2007) explained the decline of meaningless actions imitation both in apraxic patients and healthy individuals by a breakdown of the direct route and by reduced cognitive abilities. De Agostini et al. (1996) found in testing demonstrated action items in 3- to- 8-year-old children that, the recalling performance increased from 2 items in 3-year-olds to 5 items in 6-year-olds and to 6 items in 8-year-olds. The recalling ability governed by a chunk process allowing the decomposition of actions, events, or objects on sequences (Schank, 1982; Schank & Abelson, 1997; Verwey, 1996).

In testing the imitation of transitive and intransitive actions course, it was first predicted that all age groups accomplished the goal-directed actions by respecting only the necessary sequences, whereas the unnecessary ones would be neglected or forgotten. Second, it was predicted that the imitation form and age would determine the involvement of encoding and memory systems to accurately imitate the demonstrated course.

2. Method

2.1. Participants

Eighty-five healthy children were divided into five groups between exactly 3 years 5 months and 7 years 5 months of age, respectively and asked by a human adult model to reproduce a composed intransitive and transitive actions course. Each age group comprised 17 children ($M = 5.5$ year-olds, range = between 3.5 and 7.5-years of age). The parents of all children signed an informed consent form to participation of their children.

2.2. Apparatus and procedure

Children were tested in their school sports room. Videotape equipment, namely a JVC VHS/DV digital video camera operated by a cameraman was set up to film their executions. The adult model individually asked each child of each age group *to observe and do alone the same course he had just done*. Child had to start with both feet in circle N°1 and walked on the first two obstacles. Upon arriving on the second obstacles, he/she jumped into circle N°2 situated between two symmetrically placed boxes. Each box contained one umbrella. A container was placed behind each box with four tennis balls in it. From circle N°2, he/she turned the body to the right-hand side, took two tennis balls in the right container, carried them to the left side, and put them in the left-hand side container. With both feet still in circle N°2, he/she opened the right hand-side box, picked up the umbrella, and carried it to the left side. With the umbrella, he/she pointed to three holes drilled in the box, and afterwards he/she put the umbrella inside the left box. From circle N°2, he/she walked and jumped between the last two obstacles and landed on both feet, into circle N°3.

Each child of each age group individually performed in three different imitation forms over two separate experimental series. The first series was reserved for two successively realized imitation forms in the same day:

(1) Immediate and simultaneous imitation (ISI): the adult model and the child were positioned side by side. The adult model asked each child of each age group to observe and perform at the same time and in the same direction, but each in his own course. Each child had one trial. This imitation did not require a recalling mechanism.

(2) Short-term deferred imitation (STDI): just after finishing the previous imitation, the adult model invited each child of each age group to reproduce alone the same course without accompanying him/her. Each child had one trial. This imitation would require a short-term memory using an incidental encoding because he/she did not expect a further test.

(3) The second series of tests was reserved for the long-term deferred imitation (LTDI) during six successive sessions (one session per week). Each child of each age group was individually asked to reproduce alone the course, after each adult model's demonstration at each session without observing others. This imitation would require a long-term memory using an intentional encoding because he/she was warned to reproduce later.

2.3. Data collection and statistical analysis

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