A Meta-Analysis of Imitation Abilities in Individuals with Autism Spectrum Disorders
Laura A. Edwards
Harvard Graduate School of Education, Cambridge, MA
Boston Children’s Hospital, Boston, MA

Introduction
Impairments in imitation are considered a risk factor for developing autism spectrum disorders (ASD), and the ability to imitate is a hallmark of success in clinical and educational interventions for these individuals. Despite longstanding attention to imitation in individuals with ASD in the empirical literature however, mixed findings across studies have made it difficult to ascertain the nature and extent of imitative abilities in autism [1]. Where deficits were found in a systematic review of action imitation undertaken by Williams, White, and Singh [2], they were unable to calculate effect magnitudes, which is essential to understanding how these deficits may affect the daily functioning of individuals with ASD. Here I am carrying out a meta-analysis of existing literature on imitation in ASD. Specifically, I seek to answer the questions:

1. Do individuals with ASD show impairments (as compared to non-ASD individuals) on tests of imitation?
2. What is the magnitude of any between-group differences in imitative abilities between individuals with and without ASD?
3. Since the answers to the above research questions are likely to depend on (and conceal) significant variability, I also seek to assess the extent to which within-group differences in imitation in individuals with and without ASD vary by:
   a. Gender
   b. Age
   c. Severity of ASD
   d. Verbal Instruction
   e. Demonstration format (live vs. video/static)
   f. Study setting
   g. How imitation is operationalized

Method

Literature Search
• Journal of Autism and Developmental Disorders, Autism Research, Child Development for search terms:
  Electronic Databases
  - Academic Search Premier, ERIC, Education Abstracts, Dissertation Abstracts, PsycINFO, PubMed, Web of Science

Exclusion Criteria
• Studies had to have at least 1 matched (developmental age/chronological age) comparison group to enable calculation of effect sizes
• No fewer than 5 subjects in each group
• No deferred imitation (to avoid memory confounds)
• No vocal imitation (to avoid confounds with language)
• Experimental data only (no parent report)
• Behavioral imitation only (no neural correlates)
• No studies of contagion or mimicry (e unconscious imitation)
• Excluded imitation only (no spontaneous/naturally occurring)

Coding Effect Sizes
• Hedge’s g (adjustment for small samples)
• Effect sizes were given a confidence rating depending on the information from which they were calculated
  • Data that was treated as continuous in studies were treated as continuous in this analysis
  • In cases of multiple replication studies of the same (or overlapping) cohort, the first time point was coded
  • Effect sizes for different types of imitation tests on the same cohort were combined as one effect size by simple averaging

Overview of Study Characteristics
• 56 studies, 2462 subjects (1016 ASD, 854 TD, 708 DD)
• Publications from March 1, 1984 to November 16, 2012
• Age of subjects: M = 9.35 yrs, SD = 6.55 yrs, Range = 4.6mths – 37yrs
• 86.08% male in ASD groups
•ADOS Scores:
  • M = 11.17
  • SD = 4.04
  • 32 live, 11 video/static
  • 21 lab, 11 school, 4 home studies

Results: Study Design
Studies in which subjects were explicitly told to imitate the experimenter did not have effect sizes that were significantly different from studies that did not employ specific instructions to imitate.

The format of the imitation demonstration (live vs. video or static display) did not significantly predict the magnitude of the imitation deficit.

Results: Overall Imitation
Individuals with ASD performed significantly worse than subjects without ASD on tests of imitation conducted in laboratory settings (g = 0.81 [-1.22, -0.41], I² = 80.9%). However, subjects with ASD only performed marginally worse than subjects without ASD on tests of imitation carried out in familiar settings such as the school and home (g = -0.26 [-0.45, -0.07], I² = 12.0%).

Results: Participant Features
There was a significant association between averageADOS total scores and the magnitude of the imitation deficit in samples for which this data was reported. (5 studies, r² = 0.92, p = 0.027).

There was no significant association between average age or gender of participant samples with ASD and the magnitude of the imitation deficit.

Conclusions
• Compared to subjects without ASD, those with ASD show deficits in imitation. The average subject with ASD performs in the 27th percentile of non-ASD subjects.
• The average magnitude of the imitation deficit was large when mimicry was inherent in the ways that studies did not perform differently on tests of imitation (g = -0.02 [-0.19, 0.15]).

References

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Email
laura_edwards@mail.harvard.edu