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Preschool's Children's Learning Proclivities: When the Ritual Stance Trumps the Instrumental Stance

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Abstract

Previous research has demonstrated an efficiency bias in social learning whereby young children preferentially imitate the functional actions of a successful group member over an individual. Our aim in the current research was to examine whether this bias remains when actions are presented as conventional rather than instrumental. Preschool children watched videos of an individual and a group member. The individual always demonstrated a successful instrumental action and the group member an unsuccessful action that was either causally transparent or opaque. Highlighting the selective nature of social learning, children copied the group at higher rates when the demonstrated actions were causally opaque than when they were causally transparent. This research draws attention to the influence of conventional/ritual-like actions on young children’s learning choices and emphasizes the role of this orientation in the development of human-specific cumulative culture.

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42 No other mammal, living or extinct has successfully colonized more diverse
43 environments than *Homo sapiens*. It is often posited that a key component of this success is
44 our unique proclivity for high-level cooperation with others (Shipton & Nielsen, 2015;
45 Whiten & Erdal, 2012). Indeed, as a species, we show strong desire for group cohesion and
46 belonging (Baumeister & Leary, 1995; Deutsch & Gerard, 1955). We are also unique in our
47 tendency and willingness to imitate (Legare & Nielsen, 2015). It could thus be reasonably
48 expected that imitation is an adaptive solution to these social problems, such that we default
49 to copying and accepting everything members of our social ingroup do, even when we know
50 the actions or behaviors engaged in are instrumentally invalid or inefficient.

51 Several studies have provided empirical support for this, demonstrating that adults
52 and children consistently prefer to copy a majority action or conform to a majority decision
53 (see Haun, Rekkers, & Tomasello, 2012; Haun & Tomasello, 2011). For example, in one of
54 psychology's classic studies, adults conformed so strongly that they openly agreed with a
55 discernibly incorrect judgment of relative line length made by confederates (Asch, 1951).
56 Subsequent studies have documented this same effect in young children (Corriveau & Harris,
57 2010; Walker & Andrade, 1996). However, there may be a limit to the boundaries of this
58 conformity bias. Our success as a species also pivots on our capacity for cumulative culture,
59 where innovations are progressively incorporated into a population's stock of skills and
60 knowledge, generating ever more sophisticated repertoires via a process of ratcheting
61 (Tennie, Call, & Tomasello, 2009). However, as Kandler and Laland (2009) propose, an
62 extreme bias towards following the majority limits the potential for the wide-spread adoption
63 of innovation, thereby restricting cumulative culture (see also Carr, Kendal, & Flynn, 2015).
64 What then are the circumstances where we choose not to follow the herd?

65 Seston and Kelemen (2014) found that 3 and 4 year-old children will agree with a
66 two-person majority over an individual on the function of a novel artifact if both functions
67 are equally plausible. However, when the majority claimed an implausible function, 4-year-
68 olds actively eschewed their opinion for the plausible minority function. Hence, while there
69 may be a baseline majority bias in social learning endeavors, it may be trumped by a
70 proficiency bias: The tendency to copy the individual who is most competent or proficient in
71 a given context. Brody and Stoneman (1985) provide empirical support for this,
72 demonstrating that 7 year-old children prefer to copy peer models who appear more
73 competent than those who are not (see also Buttellmann, Zmyj, Daum, & Carpenter, 2013).

74 Recently, Wilks, Collier-Baker, and Nielsen (2014) pitted the majority bias against
75 the proficiency bias in young children who were shown two methods of opening a puzzle
76 box: One performed by an individual and another by a group of three. The individual always
77 demonstrated a successful action, while the group demonstrated either a successful or an
78 unsuccessful action. Children copied the group – but only when the group’s actions were
79 successful: When the group method was not successful children copied the individual (even
80 when affiliated with the group), suggesting children prioritize proficiency over conformity.
81 However, the actions employed by Wilks and colleagues were functional: They had a clear
82 goal and reward. Their study therefore addressed questions regarding causally transparent,
83 instrumental actions, but not questions of causally opaque, potentially cultural actions
84 (Legare & Nielsen, 2015). Such actions are common in ritual and ritualized behavior
85 (Bulbulia & Sosis, 2011; Kapitany & Nielsen, 2015; Legare & Souza, 2012; Rossano, 2012).

86 Rituals are a causally opaque series of coherent actions featuring formality, repetition,
87 redundancy, and stereotypy, in which performance is more important than outcome, and little
88 variability is permitted in the action’s execution (Bulbulia & Sosis, 2011; Kapitany &
89 Nielsen, 2015; Legare & Souza, 2012; Rappaport, 1999; Rossano, 2012). According to the

90 ritual stance, when individuals perceive causally opaque actions they tend to attribute a
91 rationale of cultural convention to the actor and the actions, rather than a rationale based on
92 physical causation (Kapitany & Nielsen, 2015; Legare & Souza, 2012; Nielsen, Kapitany &
93 Elkins, 2014). According to Legare and Nielsen (2015), reinforced by a willingness to rely on
94 faith in cultural traditions over personal experience or intuition, the causal opacity and social
95 stipulation of rituals make them ideally suited to high fidelity cultural transmission. As such,
96 we consider that the characteristics of rituals, and causal opacity in particular, may align with
97 the inherent motivation behind children's imitative fidelity.

98 Children interpret behavior instrumentally if the physical-causal basis is potentially
99 knowable, even if it is currently unknown. Conversely, if actions cannot be understood via
100 potentially knowable physical causal processes, children instead see them as social and rely
101 on a conventional interpretation (Herrmann, Legare, Harris & Whitehouse, 2013; Kapitany &
102 Nielsen, 2015; Legare, Wen, Herrmann & Whitehouse, 2015; Watson-Jones, Legare,
103 Whitehouse & Clegg, 2014). This leads us to ask whether children will prioritize efficiency
104 over group belonging if they are presented with an action that lacks a clear practical goal or
105 reward?

106 Following Wilks et al. (2014), here children saw an individual performing a
107 successful, instrumental action and a group member performing a series of unsuccessful
108 actions, which were either causally transparent or causally opaque. If children routinely adopt
109 the ritual stance they will copy group actions that do not lead to a reward when the modeled
110 actions are instrumentally opaque. Conversely, if children favor the instrumental stance
111 (Legare & Nielsen, 2015; Legare & Souza, 2012; Nielsen, Kapitany & Elkins, 2014) they
112 will copy the successful individual action in all conditions. There is a wealth of research
113 showing that children have a strong tendency to copy successful group actions in practical
114 contexts (Corriveau & Harris, 2010; Turner, Nielsen, & Collier-Baker, 2014; Wilks et al.,

115 2014) and as such, we chose not to include a condition where children were exposed to a
116 successful group.

117 **Method**

118 *Participants*

119 A total of 83 children participated in the experiment. Thirteen children were excluded,
120 seven due to shyness, three due to technical issues and three due to experimenter error. Our
121 final sample included 70 children (34 female), between 4-5 years of age ($M = 56$ months, SD
122 $= 179$ days), split approximately evenly between the four conditions described below. All
123 participants were recruited from a database of parents who had previously agreed to
124 participate in developmental research with their children. The majority of participants were
125 Caucasian, from middle-class socioeconomic backgrounds. All participants received a small
126 gift and certificate for participation.

127 *Apparatus and test environment*

128 Testing was carried out in a dedicated child-friendly test room of a university-based
129 child development research facility. The room contained a chair and a desk for the
130 participant, which faced an 80cm flat-screen television. The child sat approximately 75cms
131 from the television. Sessions were videotaped using a camera mounted on a tripod positioned
132 in the right hand corner of the room (*see Figure 1.*)

133 Two distinct wooden puzzle boxes (all 20cm x 20cm x 20cm) were used throughout
134 testing. Each box had two distinct operating mechanisms; one that opened the box and one
135 that did not (*See Table 1*). Each mechanism was painted a unique color, and the remaining
136 sides of each box were also painted a different color. The experimenter revealed a toy reward

137 inside the box when successfully opened (either a zebra or platypus soft plush toy). The
138 apparatuses were concealed behind a black curtain next to the experimenter when not in use.

139 To test for any potential relationships between levels of sociability and willingness to
140 engage with a group's actions, parents of all children were asked to complete the Child Social
141 Preference Scale (see Coplan, Prakash, O'Neil, & Armer, 2004). The CSPS is an 11-item
142 questionnaire, comprising 7 items assessing shyness (e.g., "My child seems to want to play
143 with other children, but is sometimes nervous to.") and 4 items assessing social disinterest
144 (e.g., "My child is just as happy to play quietly by his/herself than to play with a group of
145 children."). For each item, parents respond on a 5-point Likert scale to the question "How
146 much is your child like that?" (ranging from 1 – Not at All, to 5 – A Lot).

147 *Stimulus*

148 Wilks et al. (2014) demonstrated actions using live actors; however, due to practical
149 constraints, video stimuli were used here. Children watched four videos two times each
150 during the experiment. The videos ranged from 12 to 28 seconds in length, with an average
151 length of 20.93 seconds. Each video showed footage of demonstrators acting on one of the
152 apparatuses. All demonstrators were Caucasian women aged 19 – 22 years and of similar
153 height. The demonstrators were divided into an individual and a group (of three), and
154 consistent with the individual condition, only one member of the group acted on each box.
155 Individuals and groups were differentiated by the color of their shirt - group members wore a
156 yellow shirt while the individual wore green. The experimenter also wore a yellow shirt to
157 further highlight the majority group and to enhance the associated social pressure. However,
158 children were not aligned directly with the group in any way.

159 Children watched each video of the individual and a group member acting on each
160 box twice. In the videos the individual always acted on the mechanism that could open the

161 box, while the group member always acted on the mechanism that could not. The
162 demonstrators faced the camera during all videos, with the individual on one side and the
163 group on the other (see Figure 2a). This physical separation was to further enhance the
164 distinction between the group and individual. In all videos, a close up of the model's hands
165 and the apparatus was shown to enhance clarity (see Figure 2b). The presentation order of the
166 boxes and demonstrator (individual first or group member first) was randomized for each
167 participant, as was the location of each demonstrator relative to the boxes (standing on the
168 left or right). In each condition a different combination of videos was presented to the
169 participant, as detailed below.

170 In Conditions 1 and 3, children saw the individual demonstrator open the box and
171 retrieve a toy. Viewing the model retrieving the reward emphasized the goal of the action,
172 and as such, indicated success. As this could influence children's behavior, Conditions 2 and
173 4 cut the video as the model began to open each box's door (i.e., success was only implied).
174 Further, we did not include a condition where children saw the unsuccessful group action
175 endorsed by other group members. Prior research has demonstrated that group endorsement,
176 even with live actors, has little impact on children's imitative behavior when faced with
177 decisions regarding the efficacy of copying specific actions (Turner et al., 2014). Given this,
178 we felt that examining the impact of endorsement of unsuccessful group actions was
179 unnecessary, both from a practical perspective and theoretically as it addresses a separate
180 research question.

181 *Condition 1 – Conventional, Explicit Success*

182 *Individual Video:* The individual stepped forward and successfully manipulated the
183 mechanism to open the box. The individual then conveyed success, exclaiming “yes”. The
184 individual then used the handle to open the box, retrieved the toy and placed it on the table
185 and returned to her original position.

186 *Group Video:* The group members all stood side-by-side holding hands. This
187 emphasized group membership in this condition. One group member stepped forward to
188 engage with the apparatus. The group member did not open the box, but acted on it in a
189 purposeful manner (i.e. tapping on each of the operating mechanisms). The group member
190 then placed her hands together in a praying motion, and hummed briefly while making a short
191 bow. The group member then placed two fingers on the front of the box and paused for
192 approximately 2 seconds. She then turned to the other members of the group and all three
193 repeated the pray/bow/hum action. The group member then rejoined her group and linked
194 hands with them.

195 *Condition 2 – Conventional, Implicit Success*

196 *Individual Video:* The individual stepped forward and successfully manipulated the
197 mechanism to open the box. The individual then conveyed success, exclaiming “yes”. The
198 individual then reached down and placed her hand on the handle to open the box, but the
199 video is cut before the door handle is physically opened, so success is not explicitly
200 demonstrated and the toy is not seen.

201 *Group Video:* As per Group Video in Condition One.

202 *Condition 3 – Instrumental, Explicit Success*

203 *Individual Video:* As per Individual Video in Condition One.

204 *Group Video: Group Video:* The group members all stood together with their hands
205 dropped at their sides. One group member stepped forward to engage with the apparatus. The
206 group member tried to open the box by manipulating the non-opening mechanism and failed.
207 The group member then raised her hands in a shrugging motion and made a confused “hmm”
208 sound with an upward inflection. The group member then rattled the handle of the box,
209 attempting to open it. She then turned to the other members and all three members repeated

210 the shrug and confused sound. The group member then rejoined her group, standing again
211 with their hands at their sides.

212 *Condition 4 – Instrumental, Implicit Success*

213 *Individual Video:* As per Individual Video in Condition Two.

214 *Group Video:* As per Group Video in Condition Three.

215 A core aspect of ritual action is that it is causally opaque, and as such the
216 conventional condition does not have an obvious practical outcome (i.e., it has start- end-state
217 equivalency). Therefore, the current study did not include a condition where both groups are
218 successful as, in terms of ritual cognition, having a ‘practical conventional condition’ would
219 be paradoxical

220 *Procedure*

221 After arriving at the university, the research assistant escorted children and their
222 parent(s) to a warm up room, where the children were familiarized with their environment.
223 During this time, parents were briefed and filled out a consent form, demographic
224 information questionnaire and the CSPPS. Once children appeared comfortable, everyone
225 moved to an adjacent test room.

226 Upon entering the test room the child was asked to sit at the desk and face the
227 television, which showed a blank screen. Children were presented with the first box, and told
228 they could look but not touch. The box was placed in the center of the desk, approximately
229 28cms from the child. The experimenter explained: “Here is the first box we are going to play
230 with. See how there are two sides you can play with?” while gesturing at each side. The box
231 was then placed behind the curtain and the experimenter said: “Let’s see how everyone in the
232 videos plays with the box, then it will be your turn to have a go.”

233 A still of the first video was presented on the screen, ready to be played. Before

259 and aggregated if they performed the group action (no = 0 and yes = 1): Thus, scores ranged
260 between 0 (copied individual twice) and 2 (copied group twice). To evaluate whether the time
261 children spent engaging with the apparatus varied as a function of condition (ie., whether any
262 of the condition-based manipulations inadvertently led to differential levels of engagement
263 with the apparatuses) we also measured the duration in seconds from when each apparatus
264 was first touched to (a) when it was opened, or (b) when the child stopped engaging with it
265 for more than 10s, or (c) if the 60s response period expired. A second coder blind to the study
266 aims and hypotheses coded 20% of the sample. According to intra-class correlation
267 coefficients, inter-rater reliability was high for both dependent variables; first action selected
268 $k = .90, p < .001$ and total time engaged with apparatus, $r = .88, p < .001$.

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Results

270 Due to the limited range of scores associated with copying the group action statistical
271 analyses for this variable were conducted using logistic regression. Preliminary analyses
272 revealed no effect of sex or box type on either of the dependent variables, thus, these factors
273 were not analyzed further. There were no association between the Shyness or Social
274 Disinterested subscales of the CSPA and any of the other measures of interest - they are not
275 considered further.

276 A linear regression revealed that neither video type (explicit vs. implicit), ($\beta = 11.07,$
277 $p = 0.092$), nor demonstration type (conventional vs. instrumental), ($\beta = -2.240, p = 0.730$)
278 statistically accounted for children's time spent engaging with the apparatuses. Following
279 this, the overall equation was found to be non-significant, $F(2, 61) = 1.54, p = 0.222,$
280 indicating that the model did not provide good fit for the data.

281 The mean response rates of the children across conditions are presented in Figure 3.
282 Due to the categorical nature of the dependent variable, and the linear relationship between

283 levels of the DV, an ordinal logistic regression was used to determine which factors predicted
284 children's willingness to engage in the group action. All analyses presented met the
285 assumption of proportional odds. Pearson's Goodness-of-fit statistics did not fall below the
286 threshold for rejection ($p < .05$). We did not find an effect of Video type (explicit vs implicit)
287 in predicting children's likelihood of engaging with the group action, $\chi^2(1) = .289, p = 0.591$.
288 However, we did find an effect of demonstration type (conventional vs. instrumental)
289 significantly predicting children's willingness to engage with the group action, $\chi^2(1) = 6.71,$
290 $p = 0.010$. That is, children in the conventional condition were 3.38 times more likely to copy
291 the methods of the group than those in the instrumental condition (95% CI, -2.142 to -.297).
292 Pseudo- R^2 values range from .048 (McFadden) to .106 (Nagelkerke). Overall the model
293 provided good fit for the data, $\chi^2(1) = 7.035, p = .030$.

294 Discussion

295 Cumulative culture relies on the high fidelity transmission of group-specific
296 instrumental skills and social conventions to future generations (Dean, Kendal, Schapiro,
297 Thierry, & Laland, 2012; Nielsen, 2012; Schillinger, Mesoudi, & Lycett, in press; Tennie et
298 al., 2009; A Whiten, McGuigan, Marshall-Pescini, & Hopper, 2009). As part of this process,
299 children need to learn how to perform the kinds of functional tasks required for survival and
300 success alongside the group-specific practices that function to increase cohesion and
301 cooperation among group members (Legare & Nielsen, 2015). Children's capacity for doing
302 so develops early, a capacity that is context-dependent and requires early-developing
303 flexibility in social learning (Herrmann et al., 2013; Legare et al., 2015; Watson-Jones et al.,
304 2014). A key component of this learning is knowing when to copy and from whom. Past
305 research has found that children favor learning from a competent individual over a member of
306 an incompetent group (Wilks et al., 2014). This could be interpreted as evidence that the

307 proficiency bias trumps the majority bias in young children. However, our data paints a more
308 nuanced picture.

309 Children will copy a group member's actions over an individual's so long as the group
310 actions lead to success. Indeed, this bias is so robust that even reduced efficiency does not
311 eradicate it (Haun, Rekers, & Tomasello, 2014; Haun, Rekkers, et al., 2012; Haun, van
312 Leeuwen, & Edelson, 2012; Turner et al., 2014; Wilks et al., 2014), although an ultimate lack
313 of success will (Wilks et al., 2014). The current experiment showed that when children saw a
314 lone individual achieve an instrumental goal and a group member who did not, children were
315 more inclined to copy the individual than when the group member's actions were causally
316 opaque, even though the individual's actions remained more causally efficacious.
317 Importantly, under the latter circumstances, children were less inclined to copy the causally
318 transparent over the causally opaque actions (e.g., when the actions of both models were
319 instrumental 65% of those tested copied the individual on both trials whereas when the
320 actions of the group member were instrumental this dropped to 33%). In essence, children
321 showed a willingness to engage in conventional, normative behavior rather than acquire a
322 functional skill. We argue that, consistent with the ritual stance, children interpret causally
323 opaque actions as socially informative and normative, and will opt to copy these when they
324 are performed by the group rather than copying explicitly successful causally transparent
325 actions of individuals.

326 The performance of rituals can help distinguish devoted in-group members from
327 imposters or interlopers (Ensminger, 1997; Henrich, 2009; Irons, 2001), and facilitate group
328 cohesion and cooperation (Ruffle & Sosis, 2007; Sosis & Ruffle, 2003; Wiltermuth & Heath,
329 2009). Engagement in and commitment to ritual action has thus become a fundamental
330 feature of our behavioral repertoire, something highlighted by the children in the current
331 experiment: When faced with the choice of copying a group-oriented but failed action and an

332 individual-specific, functional and successful action a child's inclination towards adopting
333 the former was increased when the demonstrated action was made ritual-like.

334 It is notable that in this experiment children observed actions performed by
335 videotaped models. It is possible that their behavior would be different if the models were
336 live actors, and if the models either remained in the test room or left (McGuigan, Gladstone
337 & Cook, 2012; Nielsen & Blank, 2011). It is also possible that the children tested here may
338 have responded differently if the experimenter had not conveyed affiliation with the group by
339 wearing a t-shirt of the same color and nominating them as 'friends'. That is, children may
340 have felt an expectation to align themselves with the experimenter. However, if children were
341 simply motivated to appease or affiliate with the experimenter rates of copying the group
342 should have been similar across conventional and instrumental conditions, and they were not.
343 In addition, Bernard, Proust, and Clément (2015) found that when cues of reliability and
344 consensus conflict 4- and 5-year-olds prioritize consensus, whereas 6-year-olds prioritize
345 reliability. This highlights the trajectory of children's discerning judgements of the value of
346 imitation models. Children older than those tested here might therefore be expected to
347 respond differently, possibly prioritizing success over the value of copying the group (see
348 also Oostenbroek & Over, in press). Finally, there is the possibility that different outcomes
349 would be found if this experiment were replicated in a community where conformity and
350 group belonging is culturally prioritized over individuality and personal expression (Mesoudi,
351 Chang, Murray, & Lu, 2015). Exploring each of the issues outlined above is beyond the
352 current work and hence remain important topics for future research, research that promises to
353 further our understanding of core features of the human mind.

354 Children develop in environments where they are perpetually exposed to new
355 information, both social and otherwise, and they must choose which aspects of this new
356 information are most critical to learn. The current study adds to what is now a large corpus of

357 research showing children are indeed selective imitators, evaluating what to copy and from
358 whom across a wide range of contexts (see Koenig & Sabbagh, 2013). We show here that in
359 an instrumental context, if given a choice between an unsuccessful group action and a
360 successful individual action, children default to the individual's action. However, when the
361 actions are ritualized (characterized by a normative interpretation, as per the ritual stance),
362 children are more inclined to follow the group. The human social world is always changing
363 and challenging, and navigating this environment successfully necessitates a flexible,
364 adaptive response. To have a discriminating strategy for changing circumstances is an
365 immensely valuable tool for children, and indeed adults, and likely forms a cornerstone of
366 cumulative culture.

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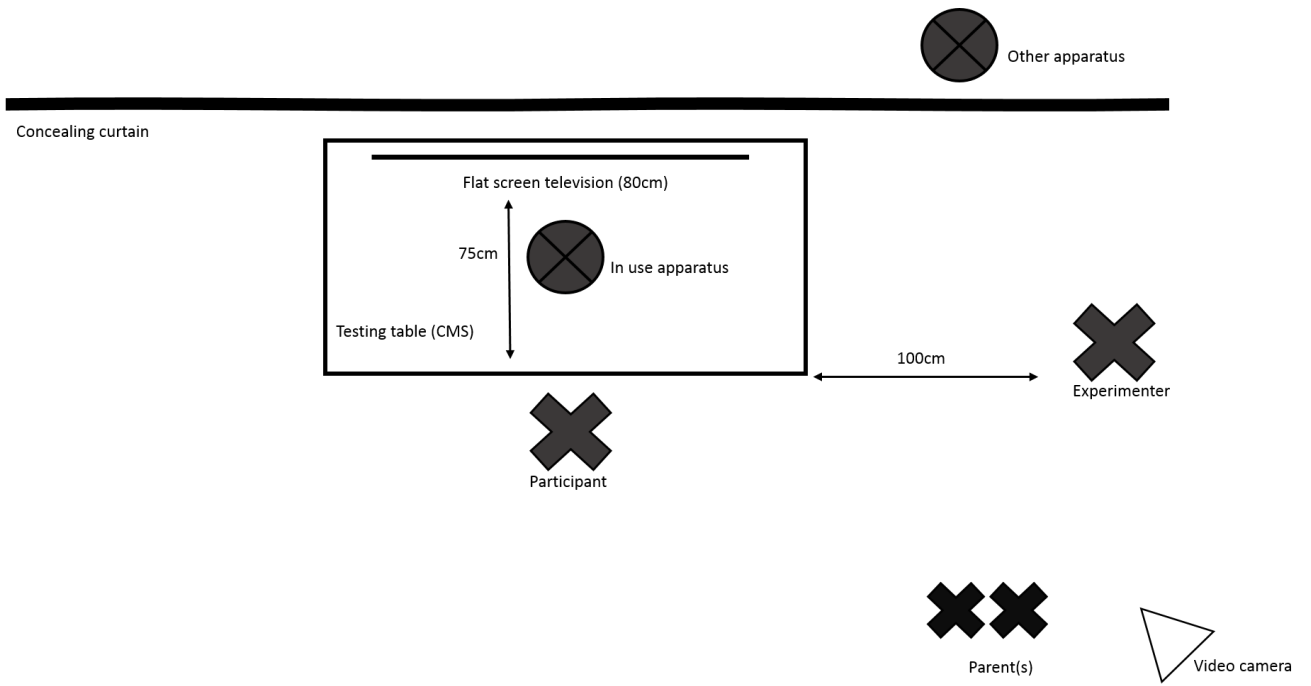
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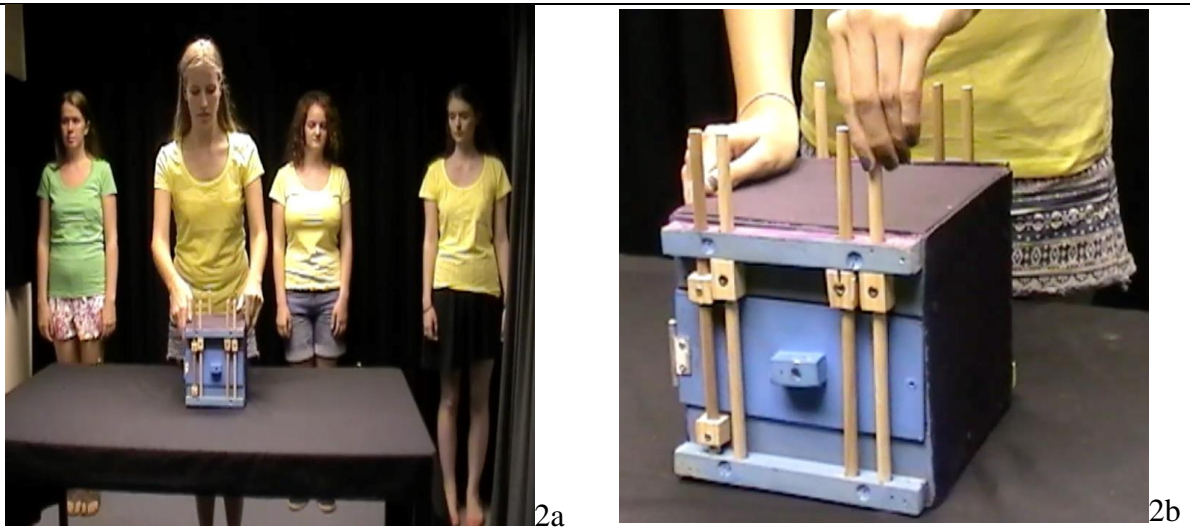


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495 Figure 1. *Schematic representation of the experimental setup.*

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498 Figure 2. *Screen shots of group demonstration (2a) and close up shown during action*
499 *modeling (2b)*

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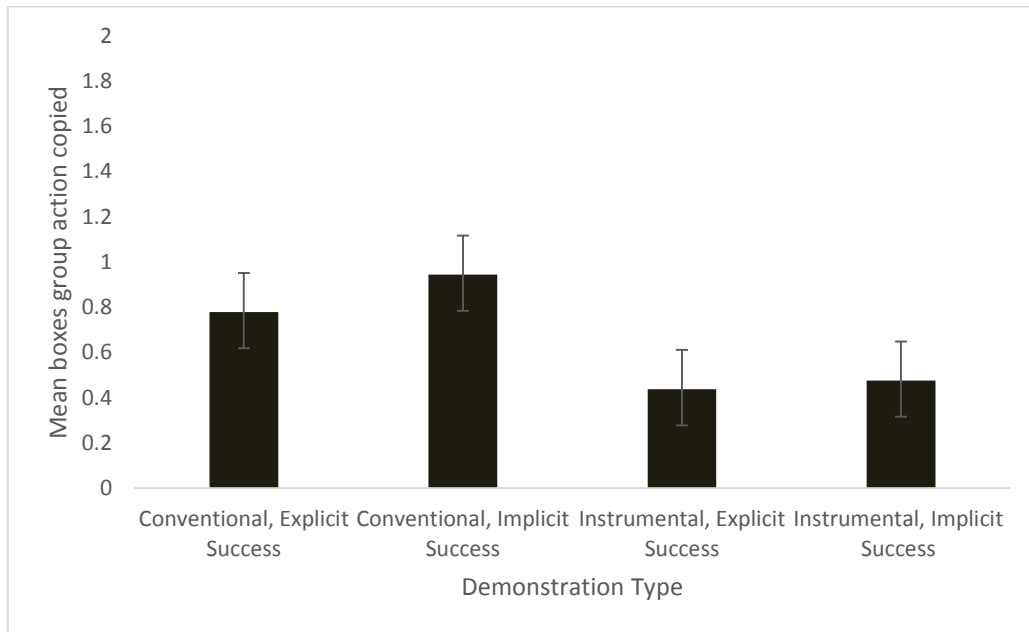
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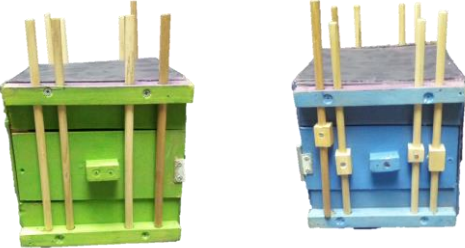
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513 Figure 3. Children's mean preferences for selecting the group or individual as a function of condition.

Table 1. *Two puzzle box apparatus and descriptions of standardized actions associated with them.*

Apparatus	Successful Action	Unsuccessful Action	Ritual Action
<p>Apparatus One</p> 	<p>Acting on purple side (first picture), spin each disc until the horizontal line of the disc faces the lid. Use handle to swing door open and attain reward inside.</p> <p>Note: In Conditions 2 and 4 the video was stopped when the demonstrator placed her hand on the handle.</p>	<p>Acting on pink side (second picture), spin each disc two full circles. Attempt (and fail) to open door using the handle; illustrate by rattling door.</p>	<p>Acting on pink side (second picture), spin each disc forward and backwards using two fingers of each hand. Place two fingers on the front of the handle and hold for one second.</p>
<p>Apparatus Two</p> 	<p>Acting on green side (first picture), lift each dowel consecutively from position and place on the table. Use handle to swing door open and attain reward inside</p> <p>Note: In Conditions 2 and 4 the video was stopped when the demonstrator placed her hand on the handle.</p>	<p>Acting on blue side (second picture), attempt to lift each dowel consecutively from position; attempting (and failing) to lift dowel out of position. Rattle dowel slightly during the process. Attempt (and fail) to open door using the handle; illustrate by rattling door.</p>	<p>Acting on the blue side (second picture), place two fingers on top of each dowel consecutively. Place two fingers on the front of the handle and hold for one second.</p>