

1 **PAPER**2
3 **Sensitivity to communicative relevance tells young children what**
4 **to imitate**5
6
7
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13
14 **Abstract**15
16 *How do children decide which elements of an action demonstration are important to reproduce in the context of an imitation*
17 *game? We tested whether selective imitation of a demonstrator's actions may be based on the same search for relevance that*
18 *drives adult interpretation of ostensive communication. Three groups of 18-month-old infants were shown a toy animal either*
19 *hopping or sliding (action style) into a toy house (action outcome), but the communicative relevance of the action style differed*
20 *depending on the group. For the no prior information group, all the information in the demonstration was new and so equally*
21 *relevant. However, for infants in the ostensive prior information group, the potential action outcome was already communicated*
22 *to the infant prior to the main demonstration, rendering the action style more relevant. Infants in the ostensive prior*
23 *information group imitated the action style significantly more than infants in the no prior information group, suggesting that*
24 *the relevance manipulation modulated their interpretation of the action demonstration. A further condition (non-ostensive prior*
25 *information) confirmed that this sensitivity to new information is only present when the 'old' information had been*
26 *communicated, and not when infants discovered this information for themselves. These results indicate that, like adults, human*
27 *infants expect communication to contain relevant content, and imitate action elements that, relative to their current knowledge*
28 *state or to the common ground with the demonstrator, is identified as most relevant.*29
30 **Introduction**31
32 The ubiquity of human imitation gives the impression of
33 an ability that is a trivial feat. We inadvertently imitate
34 one another during social interactions (Chartrand &
35 Bargh, 1999), newborn infants imitate the facial
36 expressions of their caregivers (Meltzoff & Moore,
37 1983), and, by about 9 months of age, human infants
38 spontaneously begin to imitate the actions of others.
39 Recent findings from social neuroscience have led to the
40 suggestion that a dedicated neural mechanism, which
41 maps observed behaviours directly onto the observer's
42 own motor system, may exist to sub serve this ability
43 (Iacoboni, Woods, Brass, Bekkering, Mazziotta &
44 Rizzolatti, 1999).45 However, as several authors have noted, imitation
46 requires not only the ability to map observed behaviours
47 onto one's own body, but also cognitive mechanisms to
48 select which behaviours are necessary to be imitated
49 (Gergely & Csibra, 2006; Brugger, Lariviere, Mumme &
50 Bushnell, 2007; Csibra, 2007; Southgate & Hamilton,
51 2008). The capacity to identify relevant behaviours for
52 reproduction is essential for imitation to have evolved as
53 an efficient tool for cultural transmission (Boyd &
54 Richerson, 1985; Galef, 1992; Tomasello, 1999). As a55
56
57 number of studies have shown, children do not blindly
58 imitate every action that they observe. For example,
12- and 14-month-old infants take into account the
action constraints of the demonstrator, and appear to
modulate their imitation depending on whether their own
situation is subject to the same constraints (Gergely,
Bekkering & Kiraly, 2002; Schwier, van Maanen,
Carpenter & Tomasello, 2006). In another study, infants
at 18 months did not imitate what an experimenter
actually did when she failed to achieve a goal – they
imitated what she had intended to do (Meltzoff, 1995).In a recent paper, Carpenter, Call and Tomasello
(2005) argued that infants imitate actions in terms of
what they think the demonstrator's goal is. In their study,
when 12- and 18-month-olds were shown a toy mouse
either hopping or sliding into a toy house, infants
selectively imitated putting the animal in the house, but
did not imitate the particular means (hopping or sliding)
by which the animal went into the house. However, when
there was no house present and they were shown the
animal simply hopping or sliding around a mat, infants
at both ages imitated the action style. Similar findings
were reported in a different paradigm and in older
children by Bekkering, Wohlschlagler and Gattis (2000).
The authors concluded that infants copied actions in57 Address for correspondence: Victoria Southgate, Centre for Brain and Cognitive Development, School of Psychology, Birkbeck, University of London,
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1 terms of goals: when there was a clearly visible goal (e.g.
 2 a house), infants interpreted the outcome as the goal
 3 (putting the mouse into the house), but when there was
 4 no visible goal, infants interpreted the action style (e.g.
 5 hopping or sliding) as the goal. Thus, since one could
 6 reproduce behaviours at a number of different levels
 7 (Byrne & Russon, 1998; Csibra, 2007), one can isolate
 8 relevant from irrelevant actions by identifying the goal of
 9 a particular action, and imitating at the goal level,
 10 disregarding any lower-level components that do not
 11 appear to be causally related to the desired outcome.
 12 That infants as young as 14 months are capable of
 13 identifying causally relevant actions and imitating on this
 14 basis has been demonstrated by Brugger and colleagues
 15 (Brugger *et al.*, 2007).

16 However, some authors have argued that, unlike the
 17 many documented instances of other animal cultures (e.g.
 18 Laland & Hoppitt, 2003; Rendell & Whitehead, 2001;
 19 Whiten, Goodall, McGrew, Nishida, Reynolds,
 20 Sugiyama, Tutin, Wrangham & Boesch, 1999), the goals
 21 and the causal relations between performed actions and
 22 their outcomes are often not immediately obvious in
 23 human cultural practices (Gergely & Csibra, 2006). This
 24 *cognitive opacity* will often render selective imitation, on
 25 the basis of goal identification, impossible. For example,
 26 humans engage in tool making for which, to a naïve
 27 observer, there may appear no immediate and visible goal
 28 at the time of construction, and perform rituals that do not
 29 reveal how they are supposed to work. If much of human
 30 culture consists of such cognitively opaque practices, it
 31 would make little sense for infants' observational learning
 32 to be driven solely by the identification of goals.

33 To cope with this problem of cognitive opacity,
 34 Gergely & Csibra (2005, 2006) have proposed that, as
 35 part of a suite of evolved adaptations, imitation has been
 36 selected to be sensitive to the communicative intent of the
 37 demonstrator. By this account, infants' interpretation of
 38 action demonstrations directed to them is based on the
 39 same pragmatic assumptions that human adults employ
 40 when engaged in communicative interactions with others
 41 (Sperber & Wilson, 1986). One of these assumptions is
 42 that the communication is in some way relevant to the
 43 recipient, where relevance is determined in relation to the
 44 knowledge state of the individual. Thus, any information
 45 that is not already possessed by the recipient, or could
 46 not be inferred on the basis of her knowledge, will be
 47 identified as relevant, and as the intended content of the
 48 demonstration. That communication plays a role in
 49 imitation is suggested by a number of recent studies
 50 showing that selective imitation in the second year of life
 51 is influenced by the presence or absence of ostensive
 52 communication (Brugger *et al.*, 2007; Kiraly, Csibra &
 53 Gergely, 2004; Nielsen, 2006), findings that are
 54 inconsistent with the proposal that infants simply
 55 imitate observed actions in terms of perceived goals.

56 The present study aimed to test the hypothesis that the
 57 role played by communication in imitation is the
 58 expectation of relevance that it elicits in recipients.

Specifically, we predicted that human infants seek
 relevance in others' communication and selectively
 imitate what they infer to be the communicatively most
 relevant part of action demonstrations. We modelled our
 task after the paradigm used by Carpenter and
 colleagues (2005), described above. However, in our
 version, we varied the communicative relevance of some
 aspects of the information that 18-month-old infants
 received in each of three groups. Infants in the first group
 received a demonstration in which all of the information
 demonstrated to them was new (no prior information
 condition). In this condition, infants watched as an
 experimenter either hopped or slid a toy animal into a
 toy house. In another condition (ostensive prior
 information), infants were first told and shown that the
 animal lives in the house, before seeing the same
 demonstration of the animal either hopping or sliding
 into the house. By showing infants that the animal lives
 in the house prior to the main demonstration, the placing
 of the animal into the house becomes 'old' information
 and should, if infants are sensitive to communicative
 relevance, receive less attention and processing resources
 than the 'new' information in the demonstration (the
 manner in which the animal moves). Our hypothesis was
 thus that infants who receive prior information would
 imitate the manner by which the experimenter moved the
 animal more than infants in the other condition in which
 all information is new. We expected that without prior
 information infants would perform as they did in
 Carpenter *et al.* (2005), and selectively imitate at the
 hierarchically highest level, putting the mouse into the
 house without reproducing movement style.

Our predictions here are based on the assumption that
 it is the communicative context that generates the
 expectation that the demonstrator is going to manifest
 some relevant information for them (Gergely & Csibra,
 2006). However, the expectation that communication is
 relevant is proposed to derive from a more general
cognitive principle of relevance (Sperber & Wilson, 1986),
 which describes the fact that human cognition is geared
 to the maximization of relevance (i.e. attend to
 information providing the most cognitive effects using
 the least processing resources). Thus, it is also possible
 that infants would simply attend more to the new
 information because of the greater cognitive effects it
 brings them, but that this relevance seeking is not related
 to the interpretation of the communicative intent of the
 demonstrator. To control for this possibility, we included
 a third condition (non-ostensive prior information), in
 which infants discovered for themselves that the animal
 could go in the house before the full demonstration. In
 this way, the action outcome component still constitutes
 cognitively 'old' information for the infant when it is
 subsequently ostensively demonstrated by the
 experimenter, but, crucially, it is not 'old' information
 in the communication. If infants' imitation is driven by a
 sensitivity to communicative (rather than just cognitive)
 relevance, then even if they already know that the animal

1 can go in the house, they should nonetheless treat this
 2 information as a relevant element of the experimenter's
 3 communication. As such, we predicted that infants in
 4 this condition would behave as they do without prior
 5 information, imitating predominantly the action
 6 outcome, and ignoring the action style.

7 8 9 **Method**

10 11 *Participants*

12
13 Thirty-nine infants aged 18 months ($M = 18.1$; range
 14 17.5–18.5 months; 22 boys and 17 girls) were recruited
 15 from a database of infants volunteered by their parents for
 16 participation in studies. Thirteen infants were assigned to
 17 each of the three conditions. A further 10 infants were
 18 tested but excluded from the final sample because of
 19 parental interference (3), the child refused to participate
 20 (6) and experimenter error (1). Four of the excluded infants
 21 were from the ostensive prior information condition, two
 22 were from the no prior information condition, and four
 23 were from the non-ostensive prior information condition.

24 25 *Materials*

26
27 A table with a black mat measuring 60 cm × 42 cm and a
 28 small cardboard house measuring 6 cm × 6 cm × 12 cm
 29 were used to demonstrate the actions. Four small toy
 30 animals (a squirrel, a rabbit, a mouse, and a monkey)
 31 were used to demonstrate the actions.

32 33 *Procedure*

34
35 Infants sat on a caregiver's lap at a small table facing
 36 the experimenter. To familiarize the infant with the
 37 materials, the experimenter first showed the infant the
 38 four toy animals and allowed the infant to play with
 39 them for about 1 minute. The animals were then removed
 40 from the table and the experimenter uncovered the house
 41 and drew infant's attention to it, by pointing to it. Then,
 42 in the ostensive prior information condition, the
 43 experimenter brought out one of the four animals
 44 (randomly selected), showed it to the infant, and then
 45 from the back of the house, placed the animal inside the
 46 house saying '*Look, the (animal) lives in the house. This*
 47 *is where he lives*'. Following this, the experimenter took
 48 the animal out of the house again, said to the infant
 49 '*Look, I'm going to show you what the (animal) does*',
 50 placed it in front of the infant, and demonstrated the
 51 animal sliding or hopping into the house, saying '*Look,*
 52 *the (animal) went into the house*'. The experimenter then
 53 removed the animal from the house, placed it in front of
 54 the infant and said '*Now it's your turn!*' In the no prior
 55 information condition, after engaging in the same warm-
 56 up, the experimenter brought out the first animal,
 57 showed it to the infant, but instead of placing the
 58

animal in the house, she simply talked for an equivalent
 amount of time about some aspect of the animal (e.g.
 '*Look, the squirrel has a big bushy tail*'). Following this,
 the experimenter followed the same script as in the
 ostensive prior information condition, placing the animal
 in front of the infant, saying '*Look, I'm going to show*
you what the (animal) does', and modelling an action by
 which the animal moved into the house, commenting
 finally '*Look, the (animal) went into the house*'. Again the
 animal was then placed in front of the infant for their
 turn. In the non-ostensive prior information condition,
 after engaging in the same warm-up, the experimenter
 simply gave infants one of the animals and said, '*Here, do*
you want to play with the (animal)?' At this point, infants
 were left to do what they wanted with the animal until
 the point where the infant placed the animal inside
 the house. If infants appeared fixated on the animal
 for more than about 30 seconds, the experimenter took
 the animal away, drew their attention to the house
 again, and then returned the animal to the infant.
 Crucially, the experimenter never instructed the infants,
 or suggested to them, to place the animal in the
 house, and so they acquired this information non-
 communicatively. All infants included in the sample
 placed the animal in the house on each trial within
 90 seconds (mean = 16 seconds). As soon as the infant
 had placed the animal in the house, the experimenter
 took the animal out of the house and performed the
 same demonstration as in the other conditions, saying
 '*Look, I'm going to show you what the (animal) does*',
 demonstrating the action, and placing the animal in the
 house saying '*Look, the (animal) went into the house*'.
 The experimenter again then placed the animal in front
 of the infant for their turn.

Infants in all conditions received a total of four trials,
 each with a different animal, with a fixed order of
 actions demonstrated (slide, hop, hop, slide). This fixed
 order was chosen because pilot testing suggested that
 hopping was a more familiar and more easily executable
 action for 18-month-olds, and presenting hopping as the
 first action often led infants to continue to hop on
 subsequent trials, irrespective of what the experimenter
 had demonstrated. Each demonstration of hopping or
 sliding was accompanied by a sound (a 'shush' sound for
 each turn of the slide and 'boing' sound for each hop). If
 infants did not pick up the animal, or became distracted
 while holding the animal, the experimenter would prompt
 the infant by saying, 'What are you going to do with the
 (animal)?' The infants were judged to have finished
 responding when they had either placed the animal in the
 house and left it there, left the animal on the mat, or gave
 the animal to the experimenter. If they had not made a
 clear response after 60 seconds, the experimenter requested
 the animal from them. If the infants put the animal in the
 house at this point, their behaviour was coded as such, but
 if they gave it to the experimenter, they were coded as not
 putting the animal in the house.

Coding

Infants were scored on two measures; matching the style (hopping or sliding the animal) and matching the outcome (placing the animal in the house). The percentage of matches for each of the measures (number of trials on which infants matched the action/matched the outcome, divided by the total number of trials that they completed) was calculated for each infant. Eight infants' percentages were calculated based on only three trials, and three on two trials, because either a parent prompted them (3), the child did nothing on one of the trials (6), or refused to participate in a fourth trial (2).

In accord with Carpenter *et al.* (2005), we coded an action as 'sliding' when the animal moved continuously without breaking contact with the mat, and we coded it as 'hopping' when the animal broke contact and made contact at least once again with the mat. Infants were coded as having put the animal in the house if they placed the animal in the house at least once, even if they then removed it afterwards. Occasionally infants placed the animal into the house before removing it and performing the action. Nevertheless, when these actions matched the style of the experimenter on that particular trial, they were coded as matches. Infants' imitations of the sounds the experimenter made were not coded as they rarely imitated this component.

An independent coder re-coded half of the data to assess reliability. Video clips of the imitation phase of each trial of 21 infants were created that did not include the demonstration that the infant had received. These were presented in a random order (so that the coder could not use the fixed trial order to guess the trial type), and the secondary coder was asked to assess whether the infant either hopped, slid, or did neither action, and whether the infant placed the animal in the house. Perfect reliability (100% agreement) was achieved.

Results

The mean proportion of trials in which infants imitated the two aspects of the demonstration (the outcome and the style) is represented in Figure 1. Our main interest was in whether the novelty of the demonstrated information modulated the likelihood that infants would imitate that act. A repeated-measures ANOVA was carried out on these proportions with condition (no prior information, ostensive prior information, non-ostensive prior information) as a between-subjects factor and type of imitation (action style vs. action outcome) as a within-subjects factor. This analysis revealed a significant main effect of type of imitation [$F(1, 36) = 29.2, p = .0001$], indicating a stronger tendency to imitate the outcome than the action style, and a significant interaction between condition and type of imitation [$F(2, 72) = 7.84, p = .001$], indicating that what

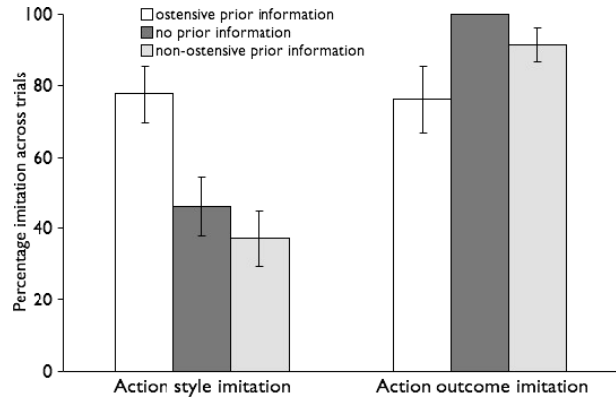


Figure 1 The mean percentage of trials on which infants imitated the action style (hopping or sliding) and the outcome (putting the mouse in the house) in each condition.

infants imitated depended on the condition that they were in. The absence of a condition main effect confirms that the overall amount of imitation did not differ across groups.

To investigate the interaction, planned independent samples *t*-tests, and equivalent non-parametric (Mann-Whitney) tests were carried out separately for each type of imitation (action matching and house matching). Infants in the ostensive prior information condition matched the style of the demonstrator significantly more (77.6%) than infants in the no prior information condition (46.2%), [$t(24) = 2.56, p = .017$; $Z = 2.34, p = .02$, two-tailed], or the non-ostensive prior information condition (37%), [$t(24) = 3.62, p = .001$; $Z = 3.00, p = .003$, two-tailed]. There was no difference between the amount of action style imitation in the no prior information and the non-ostensive prior information conditions [$t(24) = 0.74, p = .47$; $Z = .76, p = .45$, two-tailed], suggesting that infants in both conditions interpreted the demonstration similarly. Conversely, infants who received ostensive prior information about the potential action goal matched putting the animal in the house (action outcome) significantly less (76.3%) than infants who received no such information (100%), [$t(24) = 2.65, p = .01$; $Z = 2.71, p = .007$, two-tailed]. There was no significant difference between the amount of action outcome imitation in the no prior information (100%) and non-ostensive prior information (92%) groups [$t(24) = 1.8, p = .08$; $Z = 1.80, p = .07$, two-tailed]. Again, the amount of action outcome imitation suggests that infants in the non-ostensive prior information condition construed the demonstration as if they had not received any information.

We were also interested in whether either aspect of the demonstration was more likely to be imitated than the other. Although, as in Carpenter *et al.* (2005), infants for whom all information was new in the communication matched putting the animal into the house significantly more than matching the style of the action [$t(12) = 5.78$,

1 $p = .0001$]; infants in the ostensive prior information
 2 condition imitated action style and outcome equally
 3 [$t(12) = 0.093, p = .93$].
 4

6 Discussion

8 Our results show that, by 18 months of age, infants can
 9 selectively imitate observed actions based on the perceived
 10 relevance of component actions. Infants who had already
 11 received communication about one component of a
 12 subsequent demonstration were more likely to imitate
 13 the new information than infants who had not received this
 14 prior communication. Infants for whom all information
 15 was novel imitated placing the animal in the house at the
 16 expense of imitating the style of the action, replicating the
 17 result of the 'house' condition in Carpenter *et al.* (2005).
 18 Importantly, the additional demonstration of the animal
 19 in the house received by infants in the ostensive prior
 20 information condition did not result in an advantage for
 21 imitating this aspect of the demonstration. Instead,
 22 receiving *more* demonstrations of this aspect resulted in
 23 children imitating it *less*.

24 The overall amount of imitation in each group was the
 25 same, indicating that the extra demonstration did not
 26 simply facilitate the amount of imitation, but rather
 27 modified the relative *kind* of information imitated in the
 28 ostensive prior information condition. It is interesting to
 29 note that although our manipulation modulated how
 30 much infants in each group imitated the action style and
 31 the action outcome, the pattern did not completely
 32 reverse upon receiving extra information from the
 33 demonstrator, suggesting that despite raising the
 34 relevance of the action style, infants in this group still
 35 found the action outcome worth imitating. This is likely
 36 because the house served as a visible reminder of the
 37 action outcome and so was relatively easy for infants to
 38 reproduce and/or difficult to inhibit reproducing
 39 (Durham, Cannon & Woodward, 2008). It is also
 40 unlikely that the presence of only one house in our
 41 study can explain our results. Bekkering *et al.* (2000)
 42 reported that when they reduced the 'goal complexity' by
 43 executing actions on only one ear (rather than both),
 44 4- to 5-year-old children were better at using the correct
 45 hand demonstrated by the experimenter. However,
 46 although the level of action style imitation in the no
 47 prior information group was higher than in the
 48 Carpenter *et al.* (2005) study (46% as opposed to 15%),
 49 it was still significantly higher than in the ostensive prior
 50 information group. This suggests that although the
 51 presence of only one house may indeed result in higher
 52 levels of action imitation overall, this cannot explain the
 53 differences in imitation between the two groups.

54 Instead, these results support our hypothesis that, in
 55 humans, imitation is not solely driven by what the infant
 56 conceives to be the goal of the demonstrator. As many
 57 human cultural practices are cognitively opaque, it would
 58 often not be possible to identify important components

to imitate based on the causal relationship between a
 means and an end, or to use outcomes to identify
 components that are irrelevant. As a result, we propose
 that human imitation of communicative demonstrations
 is guided by the same inferential process that
 accompanies any other instance of communication
 (Sperber & Wilson, 1986). The extent to which some
 aspect of the communication is conceived as relevant will
 depend on the knowledge state of the recipient as well as
 on the history of the interaction between the participants
 (Sperber & Wilson, 1986). If information in the
 communication is unknown to the recipient, it will be
 identified as most relevant. In the present study, the fact
 that infants in the ostensive prior information group had
 already been exposed to the outcome (the animal in the
 house) and therefore already had this knowledge, the
 new information (the action style) was highlighted as
 being more relevant to attend to and reproduced. In
 the no prior information group, there is nothing in
 the communication that would enable infants to evaluate
 the importance of various aspects of the demonstration.
 In such situations, when nothing in the communication
 tells the infant to do otherwise, infants do appear to
 interpret the action to be reproduced at its hierarchically
 highest level, in terms of the outcome.

As relevance seeking is hypothesized to be a general
 property of human cognition (Sperber & Wilson, 1986),
 one possible interpretation of infants' performance in the
 ostensive prior information condition is that it reflects
 not a sensitivity to communicative relevance, but a
 general sensitivity to new information, irrespective of
 whether or not it is communicated. However, infants'
 behaviour in the non-ostensive prior information
 condition strongly suggests that this is not the case.
 Here, infants discovered for themselves that the animal
 could go in the house. An explanation based on the
 general cognitive relevance principle would predict that,
 during the demonstration, infants will attend more to the
 information that will bring them greater cognitive effects.
 This would be the action style information, since through
 their own discovery, the action outcome information is
 now less novel for them. However, we found that infants
 in the non-ostensive prior information condition
 behaved in the same way as infants who did not receive
 any information before the demonstration. Thus, the
 expectation of relevance was generated only by
 the ostensive communicative demonstration, which
 made the repeated information about the home of the
 animal look superfluous, and consequently increased the
 perceived relevance of the novel movement style.

Our results add to a growing body of literature
 demonstrating the important role that ostensive
 communication plays in modulating imitation in infants
 (Brugger *et al.*, 2007; Kiraly *et al.*, 2004; Nielsen, 2006).
 For example, when a model performed a strange action
 (turning on a light box with her head) non-
 communicatively, infants were less likely to reproduce
 the strange head action than if the model had

1 demonstrated the action ostensibly (Kiraly *et al.*, 2004).
 2 Brugger and colleagues showed that while, in the absence
 3 of ostensive communication, infants' decisions on what
 4 to imitate depended largely on their knowledge of the
 5 causal relationship between means and outcomes, when
 6 the causally irrelevant components were ostensibly cued,
 7 infants were more likely to imitate these causally
 8 irrelevant components (Brugger *et al.*, 2007). These
 9 findings, together with the present result, suggest that it
 10 is a mistake to conceive the prototypical situation of
 11 imitation studies as an example of pure observational
 12 learning, where the selection of what to imitate would
 13 depend only on the child. Rather, communicative
 14 elements of the experimenter's demonstration addressed
 15 to the infant contribute to this selection process by
 16 raising their expectation of relevance. The expectation of
 17 relevance, which defines unknown or highly unexpected
 18 aspects of demonstrations as maximally relevant, may
 19 also explain the high degree of imitation of causally
 20 unnecessary or inefficient actions observed in a number
 21 of studies with older children (Horner & Whiten, 2005;
 22 Nagell, Olguin & Tomasello, 1993; Lyons, Young & Keil,
 23 2007; Williamson & Markman, 2006). However, we note
 24 that this sensitivity to communicative relevance is only
 25 one way in which naïve observers can learn culturally
 26 relevant information and, as others have shown, in some
 27 cases, knowledge of desired outcomes can help infants to
 28 identify causally relevant components of action
 29 demonstrations (Carpenter, Call & Tomasello, 2002).
 30 Our view of imitation in the current study portrays the
 31 infants' task as comprehension of the experimenter's
 32 communicative intent rather than interpretation of her
 33 behavioural intention. That infants expect
 34 communication to contain new and relevant
 35 information has been demonstrated previously in non-
 36 imitative contexts (e.g. Moll, Koring, Carpenter &
 37 Tomasello, 2006). The results of the current study
 38 suggest that this expectation of relevance extends to
 39 demonstrations of actions, and that infants use their
 40 interpretation of others' communicative intent in order
 41 to select important components worthy of imitation.

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