The Boss is Always Right: Preschoolers Endorse the Testimony of a Dominant Over that of a Subordinate

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Abstract

Recent research has shown that young children rely on social cues to evaluate testimony. For instance, they prefer to endorse testimony provided by a consensual group than by a single dissenter. Given that dominance is pervasive in children's social environment, it can be hypothesized that children also use dominance relations in their selection of testimony. To test this hypothesis, a dominance asymmetry was induced between two characters either by having one repeatedly win in physical contests (physical power, Experiment 1) or by having one repeatedly impose her goals on the other (decisional power, Experiment 2). In two subsequent testimony tasks, 3- to 5-years-old children significantly tended to endorse the testimony of the dominant over that of the subordinate. These results suggest that preschoolers take dominance into account when evaluating testimony. In conclusion, we discuss two potential explanations for these findings.

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Young children learn most of their factual knowledge through testimony. Using a paradigm in which children have to choose between two contradictory testimonies, studies have revealed that several cues such as reliability (e.g., Koenig, Clément, & Harris, 2004), emotions (Clément, Bernard, Grandjean, & Sander, 2013), and linguistic markers (Bernard, Mercier & Clément, 2012) influence the selection of testimony by children. Another set of studies has investigated the influence of social cues in young children's endorsement of testimony, such as accent (e.g., Kinzler, Corriveau, & Harris, 2011), and consensus (e.g., Bernard, Proust, & Clément, 2015; Corriveau, Fusaro, & Harris, 2009). This latter research has shown, for instance, that children endorse more strongly information provided by a consensual group than information provided by a single dissenter. The present study explores the influence of another important social cue that has received very little attention: the dominance of one informant over another.

Dominance is often characterized as the competitive ability to prevail in conflicting interactions between two individuals, which typically involve resource control (e.g., toys, locations) and decision-making (e.g., deciding which game to play, where to go). Dominance relations might be achieved through different conducts such as agonistic physical behavior, verbal command, or persuasion. Ethological studies have established that 2-year-olds form stable and transitive dominance hierarchies and that these hierarchies play an important role in their everyday interactions (e.g., Boyce, 2004; Russon & Waite, 1991). Recent experimental studies have demonstrated that young children (and in some cases even infants) can infer dominance from a variety of relational cues such as physical supremacy, holding resources, and decisional power (Charafeddine *et al.*, 2015; Mascaro & Csibra, 2012; Thomsen, Frankenhuys, Ingold-Smith, & Carey, 2011).

Of particular relevance here is a series of experiments that have shown that 3- to 5-year-olds take a variety of cues into account when inferring dominance. For instance, in one condition of the first experiment of Charafeddine *et al.* (2015), two puppets verbally expressed conflicting goals over which game to play together. The situation occurred twice and the same puppet successfully imposed its favorite game on both occasions. Children were then asked which puppet was the dominant (dominance inference). They responded significantly above chance that the puppet imposing its goal was the dominant. Other conditions and other experiments in Charafeddine *et al.* (2015) have shown that 3- to 5-year-olds can also take physical supremacy, age, and amount of resources held as cues to infer dominance (see also Gulgoz & Gelman, accepted).

These experiments revealed a general increase in the ability to infer dominance with age, with no interaction between age and ability to infer dominance from specific cues (i.e., the ability to infer dominance from various cues increased equally with age). However, observational studies show clear developmental trends in the way dominance is expressed in young children. In particular, with age dominance moves away from physical agonism towards expressions of verbal and decisional power (Hawley, 1999; La Freniere & Charlesworth, 1983; Roseth, Pellegrini, Bohn, Van Ryzin, & Vance, 2007; Strayer & Trudel, 1984). It is therefore possible that some of the inferences drawn from dominance might display an age by type of dominance (e.g. physical supremacy vs. decisional power) interaction.

Several experiments have tested the inferences young children draw from dominance. For instance, 3- to 5-year-old children expect dominants to win competitive games, and to hold more resources, even if dominance was established in an unrelated way (Charafeddine *et al.*, 2015). These inferences seem to be robust within this age range. Given the observed developmental differences in the expression of dominance, it would not be surprising to

observe some developmental differences in the inferences drawn from dominance. For instance, in a related task, Charafeddine *et al.* (in press) have shown that as children grow older—from 3 to 8 years of age—they become increasingly likely to be more generous towards a subordinate than a dominant.

The question raised here is whether young children infer that dominants should be more or less trusted than subordinates in testimony tasks. On the one hand, it is not clear that dominance status provides much ground for epistemic trust. On the other hand, we know that dominance plays a crucial role in young children's social lives, that they can infer dominance from various cues, and make various inferences from dominance. Moreover, young children have been shown to take other social cues into account when evaluating testimony, even when those cues do not have obvious epistemic value like gender (Terrier, Bernard, Mercier, & Clément, 2016) or minimal group membership (MacDonald, Schug, Chase, & Barth, 2013).

To our knowledge, only one study has investigated the role of dominance on the evaluation of testimony. In this study, two characters were introduced to 4-, 5-, and 6-year-olds (Castelain, Bernard, Van der Henst, & Mercier, in press). In two short stories, the physical dominance of one character over the other was established: the dominant won a play fight with the subordinate, and acquired a toy they both wanted. After this dominance induction phase, the children completed a testimony task in which a third character who had lost an animal was introduced. The dominant and the subordinate then gave contradictory information about the location of the lost animal, and the children had to say where they thought the animal was (localization task). Children from each of the three age groups tended to endorse the testimony of the dominant individual over that of the subordinate.

Although this study provides evidence that young children take dominance into account in evaluating testimony, the generality of this finding is debatable. The present research extends this finding in four directions.

The first and most important is that the present study is conducted in a population of Western middle and upper-middle class children. By contrast, Castelain *et al.* (in press)'s study was conducted in a preliterate, traditional population (indigenous Kaqchikel Maya from Guatemala). Compared to this type of traditional populations (i.e. subsistence farmers), Western populations tend to be relatively egalitarian (see, e.g., Morris, 2015). Moreover, parenting in traditional societies often relies on power assertion, significantly more so than parenting in Western cultures (especially in middle- and upper-middle class children see, e.g., Tizard, Hughes, Carmichael, & Pinkerton, 1983). In traditional cultures, parents tend to rely on imperatives to address their children, and the children are expected to comply without questioning their parents' decisions (Gauvain, Munroe, & Beebe, 2013; Maratsos, 2007; Nicolaisen, 1988). As a result, the Maya children investigated in Castelain *et al.* (in press) likely face a much more hierarchical social structure than the Western middle- and upper-middle class children usually tested in experimental developmental psychology. This might explain Maya children's tendency to endorse the testimony of the dominant, in which case we might expect different results in Western middle and upper-middle class children. In particular, the latter might take dominance into account less than the Maya children. The plausibility of cross-cultural differences in this respect is bolstered by findings of significant differences between adults of different cultures in the processing of dominance (e.g., Freeman, Rule, Adams, and Ambady, 2009; Liew, Ma, Han, & Aziz-Zadeh, 2011).

The second novelty of the present study is that it introduces different cues to dominance. In Experiment 1, dominance is induced in a way that is very similar to that of Castelain *et al.* (in press). By contrast, in Experiment 2, dominance takes the shape of an asymmetry in decisional power: two protagonists disagree over which decision to make, and one always gets her way. As mentioned above, we know that 3- to 5-year-olds are able to infer dominance both from physical supremacy and from decisional power (Charafeddine *et*

117 *al.*, 2015). However, we do not know if those two ways of establishing dominance elicit
118 selective inferences regarding the trustworthiness of either the dominant or the subordinate. In
119 particular, given the developmental changes in the way dominance is expressed among young
120 children—from physical towards verbal cues—we might expect developmental differences,
121 so that for instance individuals whose dominance was established through physical supremacy
122 become less trusted with age.

123 The third novelty of the current experiments is the inclusion of younger children: 3-
124 year-olds. The inclusion of this age range is relevant for two reasons. First, as mentioned
125 above, it is interesting to test for potential developmental differences in the importance of
126 physical supremacy as an expression of dominance, since it is known to be more prevalent in
127 early ages (e.g., Hawley, 1999). Second, because several experiments in the trust in testimony
128 literature have revealed significant differences in the way 3- and 4-year-olds evaluate
129 testimony (see for instance Clément, 2010). Moreover, many experiments have shown that 3-
130 year-olds respond well to the type of paradigm used here (e.g., Clément, 2010; Harris, 2012).

131 Finally, the fourth novelty consists in the introduction of a new testimony task.
132 Besides the localization task used in Castelain *et al.* (in press), our experiments also use a
133 labeling task. In this task, children are presented with a novel object, and they have to name
134 on the basis of the contradictory suggestions of two informants. This labeling task has been
135 used in many previous experiments on the development of trust in testimony. Moreover, the
136 use of both a localization task and a labeling task allows testing for the effects of dominance
137 on trust in two different domains: episodic (localization task), and semantic (labeling task)
138 (Koenig & Stephens, 2014).

139 Although the existing literature does not allow for very strong predictions regarding
140 the effects of these novel features, there are grounds to expect they would have some effects.
141 The present participants might be less likely to trust dominants than the Maya participants,

younger children might put more weight on dominance induced through physical supremacy, by contrast with older children, who might put more weight on dominance induced through decisional power.

Besides their theoretical import, these novel features have great practical import: they make it much easier for other researchers to build on the results of our experiments. Nearly all the experiments in the development of trust in testimony literature rely on Western middle and upper-middle class children, many test 3- to 5-year-olds, and many use a labeling task. The present results provide a crucial step forward before more refined hypotheses about the influence of dominance on testimony can be tested—as they likely will, given that trust in testimony, on the one hand, and dominance, on the other, are currently the focus of significant efforts in developmental research.

Experiment 1

Method

Participants. This experiment involved 74 children: 25 three-year-olds (13 girls, $M_{\text{age}} = 43.9$ months, $SD = 2.36$, range 40–47 months), 23 four-year-olds (14 girls, $M_{\text{age}} = 53.6$ months, $SD = 3.87$, range 48–59 months), and 26 five-year-olds (10 girls, $M_{\text{age}} = 65.6$ months, $SD = 2.84$, range 61–71 months) from two schools in Lyons (France). All the participants were French, and all the experiments were conducted in French. Most children came from middle and upper-middle class families. Each child was seen individually in a quiet room by a single experimenter for about 10 minutes.

Materials and procedure. Children were tested in two phases: an induction phase and a test phase. In the induction phase, one individual was established as dominant over another. In the test phase, two testimony tasks were presented to children in order to test whether they tend to endorse the testimony of the dominant over that of the subordinate.

[Insert Figure 1 about here]

¹ The pseudo-words, classically used in labeling tasks, were created thanks to the *LEXIQUE Toolbox* software (New & Pallier, 2001)

Results²

In the localization task, the percentage of choices linked to the dominant was 62.7% for the 3-year-olds, 49.3% for the 4-year-olds, and 60.3% for the 5-year-olds. In the labeling task, the percentage of choices linked to the dominant was 62.7% for the 3-year-olds, 66.7% for the 4-year-olds, and 65.4% for the 5-year-olds.

A mixed model ANOVA with Age Group (3, 4, 5) as between-subjects variables and Task (Localization Task, Labeling Task) as within-subjects variable was calculated for the proportion of times (with an arcsin transformation) children followed the dominant. This revealed no significant main effect (Age Group: $F(2,71) = .25, p = .78, \eta^2 = .01$; Task: $F(1,71) = 2.23, p = .13, \eta^2 = .03$) or interaction effect between these two factors ($F(2,71) = 1.85, p = .16, \eta^2 = .05$). Given that children's scores in the localization task did not differ significantly from those in the labeling task, these data were combined to create a choice of dominant's testimony score (maximum score: 6 points). The choice of dominant's testimony was significantly above chance, both for the children as a whole (61.3%, $M = 3.68, SD = 1.47, t(73) = 3.95, p < .001, d = .92$), and for the 3-year-olds (62.7%, $M = 3.76, SD = 1.42, t(24) = 2.67, p < .05, d = 1.09$) and the 5-year-olds (62.8%, $M = 3.77, SD = 1.53, t(25) = 2.56, p < .05, d = .61$). The 4-year-olds were more likely to endorse the dominant's testimony, but this effect only reached significance in the labeling task (both tasks: 58%, $M = 3.48, SD = 1.50, t(22) = 1.52, p = .14, d = .65$; labeling task: $M = 2, SD = .90, t(22) = 2.65, p < .05, d = 1.13$; localization task: $M = 1.48, SD = .99, t(22) = -.11, p = .92, d = -.05$). The choice of dominant's testimony was significantly above chance both for the labeling task (64.8%, $M = 1.95, SD = .79, t(73) = 4.84, p < .001, d = 1.13$) and the localization task (57.7%, $M = 1.73, SD = .98, t(73) = 2.01, p < .05, d = .47$).

² Preliminary analyses revealed no significant effects of gender and order of task presentation (Localization Task/Labeling Task, Labeling Task/Localization Task) in Experiments 1 and 2. Thus, these two factors were not introduced into the following analyses. All children provided data during all experimental trials in Experiments 1 and 2.

Experiment 1 replicates and extends the results obtained by Castelain *et al.* (in press). Overall, the children—from a modern Western culture, by contrast with a traditional indigenous population—tended to endorse the testimony of the dominant individual. They did so not only in the localization task used by Castelain *et al.* (in press), but also in the new labeling task. Moreover, this was true also of 3-year-olds, an age group not tested by Castelain *et al.* (in press). The robustness of the overall results suggests that the 4-year-olds' lack of preference for the dominant's testimony in the localization task was a statistical abnormality. Experiment 2 extends these findings in two different ways: by relying on a different dominance induction phase, and by asking children whether they preferred the dominant or the subordinate. In Experiment 2, dominance is induced through decisional power. We might expect children, especially older children, to be more sensitive to this type of dominance induction. The question about preference aims at determining whether children's tendency to endorse the testimony of the dominant is related to a general preference for this character, or if it is a more specific phenomenon.

Experiment 2

Method

Participants. This experiment involved 67 children: Twenty-two 3-year-olds (15 girls, $M_{age} = 43.77$ months, $SD = 2.75$, range 39–47 months), twenty-three 4-year-olds (9 girls, $M_{age} = 54.34$ months, $SD = 3.56$, range 48–59 months), and twenty-two 5-year-olds (10 girls, $M_{age} = 66.50$ months, $SD = 4.23$, range 60–73 months) from two schools in Lyons (France). The demographics were similar to those of Experiment 1. Most children came from middle and upper-middle class families. Each child was seen individually in a quiet room by a single experimenter for about 10 minutes.

Materials and procedure. As in Experiment 1, children were tested in two phases: an induction phase and a test phase. In the induction phase, one individual was established as

dominant over another thanks to her decisional power. In the test phase, children were presented with the same testimony tasks as those used in Experiment 1.

Induction phase. As in Experiment 1, in the induction phase, the children were told stories involving two girl characters (Playmobils), Anna and Sophie, who are friends, but who end up competing. In this case, they compete over the placement of furniture in a new house they are moving in to. Figure 2 provides an example of the vignettes and script used in Experiment 2. For children who failed to answer the memory question at the third vignette, vignette 2 was repeated. There were two other induction stories (kitchen and living room stories), built on the model of the bedroom story.

[Insert Figure 2 about here]

In each of these three stories, it was thus specified that 1) the two characters have to make a decision regarding where to put a piece of furniture, 2) the characters have conflicting goal over where to put the piece of furniture, and 3) a decision is made, resulting in the two characters putting the piece of furniture in one of the two locations. In each story, the same character—the one induced as dominant—imposes her goal. Which character was dominant, the character’s location (left/right) and the order of information presentation were counterbalanced. The experimenter did not explicitly mention the dominance of one character over the other.

Test phase. In the second phase all children were presented with the same two testimony tasks used in Experiment 1, namely a localization task and a labeling task (order counterbalanced). Only the *Localization task* differed from the one used in Experiment 1 because it involved a young Playmobil girl instead of a boy in Experiment 1.

Preference question. After the last testimony task the experimenter asked the child: “Do you prefer Sophie or Anna [order counterbalanced]?” Children’s preferences were

evaluated to test whether their choices could be explained by a general preference for one of the characters.

Results

Regarding the success in the memory questions, all children correctly attributed the goals to the appropriate characters in either the first presentation or the second presentation of these questions.

In the localization task, the percentage of choices linked to the dominant was 66.6% for the 3-year-olds, 65.2% for the 4-year-olds, and 68.2% for the 5-year-olds. In the labeling task, the percentage of choices linked to the dominant was 65.2% for the 3-year-olds, 63.8% for the 4-year-olds, and 72.7% for the 5-year-olds.

A mixed model ANOVA with Age Group (3, 4, 5) as between-subjects variables and Task (Localization Task, Labeling Task) as within-subjects variable was performed for the proportion of times (with an arcsin transformation) children endorsed the testimony of the dominant character. This revealed no significant main effect (Age Group: $F(2,64) = .99, p = .37, \eta^2 = .03$; Task: $F(1,64) = .02, p = .88, \eta^2 = 0$) or interaction effect between these two factors ($F(2,64) = .47, p = .63, \eta^2 = .01$). Given that children's scores in the localization task did not differ significantly from those in the labeling task, these data were combined to create a choice of dominant's testimony score (maximum score: 6 points). The choice of the dominant's testimony was significantly above chance, both for the children as a whole (66.9%, $M = 4.01, SD = 1.25, t(66) = 6.46, p < .001, d = 1.59$), and within each age group (3-year-olds: 65.8%, $M = 3.95, SD = 1.09, t(21) = 4.43, p < .001, d = 1.93$; 4-year-olds: 64.5%, $M = 3.87, SD = 1.22, t(22) = 3.22, p < .01, d = 1.37$; 5-year-olds: 70.5%, $M = 4.23, SD = 1.44, t(21) = 4.01, p < .01, d = 1.75$). As in Experiment 1, the choice of dominant's testimony was significantly above chance both for the labeling task (67.2%, $M = 2.01, SD = .76, t(66) = 5.48$,

$p < .001$, $d = 1.35$) and the localization task (66.7%, $M = 2$, $SD = .82$, $t(66) = 5.01$, $p < .001$, $d = 1.23$).

To investigate the possible effect of the type of induction phase on children's testimony choices, a mixed model ANOVA with Age Group (3, 4, 5) and Experiment (1, 2) as between-subjects variables, and Task (Localization Task, Labeling Task) as within-subjects variable was performed for the proportion of times (with an arcsin transformation) children endorsed the testimony of the dominant character. This revealed no significant main effect (Age Group: $F(2,135) = .96$, $p = .38$, $\eta^2 = .01$; Experiment: $F(1,135) = 1.43$, $p = .23$, $\eta^2 = .01$; Task: $F(1,135) = 1.19$, $p = .28$, $\eta^2 = .01$) or interaction effects (Age Group x Task: $F(2,135) = .80$, $p = .45$, $\eta^2 = .01$; Age Group x Experiment: $F(2,135) = .24$, $p = .79$, $\eta^2 = .003$; Task x Experiment: $F(1,135) = .765$, $p = .38$, $\eta^2 = .006$; Age Group x Task x Experiment: $F(2,135) = 1.40$, $p = .25$, $\eta^2 = .02$).

Finally, comparisons to chance level (binomial test) were made for each age group regarding the preference for the dominant character. These choices did not differ significantly from chance in any age group: 3-year-olds: 8 preferences for the dominant, 14 preferences for the subordinate, $p = .29$; 4-year-olds: 15, 8, $p = .21$; 5-year-olds: 14, 8, $p = .29$. Moreover, the contingency table showed no effect of the age group factor regarding the preference choices: $\chi^2(2) = 4.72$, $p = .094$. The lack of effects of the induction phase on the preference question might be due to the relatively lengthy test phase that separated the induction phase from the preference question.

Experiment 2 replicates and extends the results obtained in Experiment 1. As in Experiment 1, the children tended to endorse the testimony of the dominant. They did so even though the dominance was induced using different means, that is, using decisional power. Indeed, our results do not suggest that the children were more or less sensitive to one way of inducing dominance over another. Finally, the fact that the 4-year-olds were more likely to

endorse the testimony of the dominant in Experiment 2 suggests that their failure to do so in the localization task of Experiment 1 was indeed a statistical fluke.

Discussion

Like infants, who are shown to infer dominance from physical size (Thomsen *et al.*, 2011) and from the capacity to prevail in a situation where there is a conflict between agents' goals (Mascaro & Cisbra, 2012), preschoolers have been shown to infer dominance from a variety of relational cues such as physical competition and decisional power (Charafeddine *et al.*, 2015). Preschoolers have also been shown to draw a variety of inferences from attributions of dominance (Charafeddine *et al.*, 2015). A study suggested that 4- to 6-year-olds were more likely to endorse the testimony of a dominant than that of a subordinate (Castelain *et al.*, in press). The goal of the present experiments was to extend this finding.

In two experiments, preschoolers were shown that one character was dominant over another character. The children then had to decide which character's testimony to endorse in two testimony tasks. The children were more likely to endorse the testimony of the dominant character. This was true whether dominance had been induced through physical power (Experiment 1) or decisional power (Experiment 2), whether the testimony task was a labeling task or a localization task (both experiments), and at all age groups (with a likely insignificant exception for one age group in one experiment).

These findings extend those of Castelain *et al.* (in press) in several ways: use of a new dominance induction phase, a new testimony task, a new age group, and a different population. This latter variable is particularly relevant. The children tested in Castelain *et al.* (in press) belonged to a traditional population and likely faced an environment in which hierarchy played a primordial role. By contrast, the middle- and upper-middle class French children tested in the current experiments live in a relatively more egalitarian society, and are

in a more egalitarian relation with their parents. It is thus significant that even such children tend to favor the testimony of dominants over that of subordinates.

In the remainder of the conclusion, we would like to discuss two potential hypotheses for children's use of dominance to select testimony. The first hypothesis is *social*: children might seek to ingratiate with the dominant. In general, it is more important to be seen in a positive light by dominants than by subordinates. If agreeing with an individual makes her more inclined to like us, then we might have a greater propensity to agree with dominants than with subordinates. Recent data could support this interpretation. It has been shown indeed that children defer to the majority consensus, even when this consensus runs against their own accurate perception (e.g., Bernard, Harris, Terrier, & Clément, 2015; Corriveau & Harris, 2010; Haun & Tomasello, 2011). This deferential behavior might also be present with a dominant source.

Although this social interpretation could account for part of the results, the outcome of the preference question suggests that children do not only rely on a social heuristic. If the goal of the children was to ingratiate with the dominant, then they should also want to ingratiate with the dominant when they answer the preference question, and thus say that they prefer him or her, which they did not significantly do. Further research is thus needed to better evaluate the strength of the social heuristic leading children to endorse the testimony of the dominant and to translate this selective endorsement into social preference.

Besides the social interpretation mentioned above, recent results suggest a second interpretation, in this case linked to competence, to explain why preschoolers might take dominance into account when evaluating testimony. In their third experiment, Charafeddine *et al.* (2015) presented 3- to 5-year-olds with two characters marked as being a dominant and a subordinate by their bodily postures and by the actions of, respectively, giving orders and complying with orders. When asked which of these two characters would win in a nondescript

game of skills, children were significantly more likely to select the dominant (Charafeddine *et al.*, 2015). These results suggest that preschoolers think dominants to be more competent than subordinates even in domains, such as a game of skills, which do not directly involve dominance.

Suggesting competence as a second inferential route leading to the selective endorsement of the dominant's testimony is consistent with research showing that adults tend to attribute more competence to individuals high in trait dominance (Anderson & Kilduff, 2009). Interestingly, this research revealed that dominant individuals are perceived as competent even when they are not especially competent. For instance, in one of Anderson & Kilduff's experiments, participants had to solve mathematical problems in groups. Post-discussion ratings of competence by group members and outside observers were correlated with dominance. And yet, dominance did not correlate with actual competence as measured by the chances of suggesting the correct answer during the discussion. Admittedly, in the current experiment, the dominance induction phase did not provide any direct clue of competence relevant for the testimony tasks (location of pieces of furniture vs. labeling objects or finding a pet). But children might nevertheless use a heuristic similar to that used by adults and attribute, by default, competence to dominants irrespective of their actual competence.

In the present experiments, competence and dominance could interact in at least two ways. As described above, in the induction phase children could infer that a character is dominant, and then infer that she is also competent, assuming that dominants are more competent across the board. But the induction phase could also lead children to infer both that one character is dominant and that she is competent in one area—better at fighting or at knowing where to put furniture. Children would then generalize from this attribution of a specific competence to the attribution of a broader type of competence, explaining the results

in the testimony questions. Whether and how children's dominance-based inferences are mediated by competence are interesting questions that need further research. But the question of whether dominance processing goes with competence attribution does not change the fact that young children did endorse the testimony of dominants over that of subordinates—confirming thereby previous experiments showing that children reliably infer dominance from this type of induction phases.

The two broad inferential paths leading to the selective endorsement of the dominant's testimony that we have suggested here, going either through deference or competence, are not incompatible. They might both work together, in a way that further developmental studies need to investigate. Such studies are all the more important as research on the inferential potential of dominance recognition remains, for the time being, relatively scarce.

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References

- Anderson, C., & Kilduff, J. (2009). Why do dominant personalities attain influence in face to-face groups? The competence-signaling effects of trait dominance. *Journal of Personality and Social Psychology*, 96, 491–503.
- Bernard, S., Harris, P. L., Terrier, N., & Clément, F. (2015). Children weigh the number of informants and perceptual uncertainty when identifying objects. *Journal of Experimental Child Psychology*, 136, 70–81.
- Bernard, S., Mercier, H., & Clément, F. (2012). The power of well-connected arguments: Early sensitivity to the connective because. *Journal of Experimental Child Psychology*, 111, 128–135.
- Bernard, S., Proust, J., & Clément, F. (2015). Four- to 6-year-old children’s sensitivity to reliability versus consensus in the endorsement of object labels. *Child Development*, 86, 1112–1124.
- Boyce, W. T. (2004). Social stratification, health, and violence in the very young. *Annals of the New York Academy of Sciences*, 1036, 47–68.
- Castelain, T., Bernard, S., Van der Henst, J-B., & Mercier, H. (in press). The influence of power and reason on young Maya children’s endorsement of testimony. *Developmental Science*.
- Charafeddine, R., Mercier, H., Clément, F., Kaufmann, L., Reboul, A., & Van der Henst, J-B. (2015). How preschoolers use cues of dominance to make sense of their social environment. *Journal of Cognition and Development*, 16, 587–607.
- Charafeddine, R., Mercier, H., Clément, F., Kaufmann, L., Reboul, A., & Van der Henst, J-B. (in press). Children’s allocation of resources in social dominance situations. *Developmental Psychology*.

- 423 Clément, F. (2010). To trust or not to trust? Children's social epistemology. *Review of*
424 *Philosophy and Psychology*, 1, 531–549.
- 425 Clément, F., Bernard, S., Grandjean, D., & Sander, D. (2013). Emotional expression and
426 vocabulary learning in adults and children. *Cognition and Emotion*, 27, 539–548.
- 427 Corriveau, K. H., Fusaro, M., & Harris, P. L. (2009). Going with the flow: Preschoolers prefer
428 non-dissenters as informants. *Psychological Science*, 20, 372–377.
- 429 Corriveau, K. H., & Harris, P. L. (2010). Preschoolers (sometimes) defer to the majority when
430 making simple perceptual judgments. *Developmental Psychology*, 26, 437–445.
- 431 Freeman, J. B., Rule, N. O., Adams, R. B., & Ambady, N. (2009). Culture shapes a
432 mesolimbic response to signals of dominance and subordination that associates with
433 behavior. *Neuroimage*, 47, 353–359.
- 434 Gauvain, M., Munroe, R. L., & Beebe, H. (2013). Children's questions in cross-cultural
435 perspective a four-culture study. *Journal of Cross-Cultural Psychology*, 44, 1148–
436 1165.
- 437 Gulgoz, S., & Gelman, S. A. (accepted). Who's the boss? Concepts of social power across
438 development. *Child Development*.
- 439 Harris, P. L. (2012). *Trusting what you're told: How children learn from others*. Cambridge,
440 MA: Belknap Press/Harvard University Press.
- 441 Haun, D. B. M., & Tomasello, M. (2011). Conformity to peer-pressure in preschool children.
442 *Child Development*, 82, 1759–1767.
- 443 Hawley, P. H. (1999). The ontogenesis of social dominance: A strategy-based evolutionary
444 perspective. *Developmental Review*, 19, 97–132.
- 445 Kinzler, K. D., Corriveau, K. H., & Harris, P. L. (2011). Children's selective trust in native-
446 accented speakers. *Developmental Science*, 14, 106–111.

- 447 Koenig, M. A., Clément, F., & Harris, P. L. (2004). Trust in testimony. *Psychological*
448 *Science*, 15, 694–698.
- 449 Koenig, M. A., & Stephens, E. C. (2014). Characterizing children's responsiveness to cues of
450 speaker trustworthiness: Two proposals. In E. Robinson & S. Einav (Eds.), *Current*
451 *issues in developmental psychology: Children's trust in testimony*. Psychology Press.
- 452 La Freniere, P., & Charlesworth, W. R. (1983). Dominance, attention, and affiliation in a
453 preschool group: A nine-month longitudinal study. *Ethology and Sociobiology*, 4,
454 55–67.
- 455 Liew, S. L., Ma, Y., Han, S. H., & Aziz-Zadeh, L. (2011). Who's afraid of the boss? Cultural
456 differences in social hierarchies modulate self-face recognition in Chinese and
457 Americans. *PLoSOne*, 6, 1–8.
- 458 MacDonald, K., Schug, M., Chase, E., & Barth, H. (2013). My people, right or wrong?
459 Minimal group membership disrupts preschoolers' selective trust. *Cognitive*
460 *Development*, 28, 247–259.
- 461 Maratsos, M. P. (2007). Commentary. *Monographs of the Society for Research in Child*
462 *Development*, 72, 121–126.
- 463 Mascaro, O., & Csibra, G. (2012). Representation of stable social dominance relations by
464 human infants. *Proceedings of the National Academy of Sciences*, 109, 6862–6867.
- 465 Morris, I. (2015). *Foragers, farmers, and fossil Fuels: How human values evolve*. Princeton
466 University Press.
- 467 New, B., & Pallier, C. (2001). LEXIQUE toolbox. <<http://www.lexique.org/toolbox.pub/>>
468 Retrieved 02.11.12.
- 469 Nicolaisen, I. (1988). Concepts and learning among the Punan Bah of Sarawak. In G. Jahoda
470 & I. M. Lewis (Eds.), *Acquiring culture: Cross-cultural studies in child development*
471 (pp. 193–221). Lodon: Croom Helm.

- 472 Roseth, C. J., Pellegrini, A. D., Bohn, C. M., Van Ryzin, M., & Vance, N. (2007).
473 Preschoolers' aggression, affiliation, and social dominance relationships: An
474 observational, longitudinal study. *Journal of School Psychology, 45*, 479–497.
- 475 Russon, A. E., & Waite, B. E. (1991). Patterns of dominance and imitation in an infant peer
476 group. *Ethology and Sociobiology, 12*, 55–73.
- 477 Strayer, F. F., & Trudel, M. (1984). Developmental changes in the nature and function of
478 social dominance among young children. *Ethology and Sociobiology, 5*, 279–295.
- 479 Terrier, N., Bernard, S., Mercier, M., & Clément, F. (2016). Visual Access Trumps Gender in
480 3- and 4-year-old Children's Endorsement of Testimony. *Journal of Experimental*
481 *Child Psychology, 146*, 223–230.
- 482 Thomsen, L., Frankenhuys, W. E., Ingold-Smith, M. C., & Carey, S. (2011). Big and mighty:
483 Preverbal infants mentally represent social dominance. *Science, 331*, 477–480.
- 484 Tizard, B., Hughes, M., Carmichael, H., & Pinkerton, G. (1983). Language and social class: Is
485 verbal deprivation a myth? *Journal of Child Psychology and Psychiatry, 24*, 533–
486 542.
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496 Figure Caption

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498 *Figure 1.* Excerpts from the induction phase (two characters contesting a doll), the
499 localization task and the labeling task of Experiment 1

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501 *Figure 2.* Excerpts from the induction phase (the bedroom story) of Experiment 2

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506 *Figure 1*

Induction phase – Experiment 1

Here are Anna [point left] and Sophie [point right]. Anna and Sophie are two friends. They just found a Doll. They both want the Doll. In the following images, we will see Anna and Sophie trying to get the Doll. Let's begin...

There, we see Anna [point left] and Sophie [point right] moving towards the Doll to catch it.

There, we see that Anna [point left] has started to take the Doll from Sophie [point right].

There, we see Anna [point left] and Sophie [point right] both touching the Doll.

There, we see that Anna [point left] pulled the Doll harder than Sophie [point right].

There, we see Anna [point left] and Sophie [point right] who both pull the Doll towards them.

Hey look, it is Anna [point left] who has the Doll.

Localization Task – Experiment 1

Now, I'm going to tell you the story of Stéphane [point] and his dog [point]. In this story, there will be Sophie and Anna too. Actually, Stéphane's dog [point] often escapes, and Stéphane has to go and look for it. In the game, you will help Stéphane to find his dog. Anna and Sophie will be on the pictures to help Stéphane to find his dog. Let's begin...

For example, one day Stéphane [point] is looking for his dog in front of a church. You see Anna [point right] and Sophie [point left] are both there too. Sophie and Anna say something to Stéphane. We are going to listen to them. Anna [point left] says "the dog went this way" [point to the left]. Sophie [point right] says "the dog went this way" [point to the right]. According to you, which way did Stéphane's dog go?

Labeling Task – Experiment 1

Now we see Sophie [point left] and Anna [point right]. They found strange objects. We will see those objects with them.

You see, Anna [point] and Sophie [point] are here. There is a strange object too [point]. Anna [point] she says that this object is a catif. Sophie [point] she says that this object is a botus. According to you, how is this object called? A catif as Anna says [pointer] or a botus as Sophie says [point]?

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510 *Figure 2***Induction phase – Experiment 2**

Here are Anna [point left] and Sophie [point right]. Anna and Sophie are two friends. They just bought a house together to live in. Look, we see their house behind them [point]. In fact, they just arrived in their house. In the following images, we will see Anna and Sophie placing their furniture in the different rooms of their house. Let's begin...

There, for example, we see Anna [point] and Sophie [point] in their bedroom. They have to decide where to put their wardrobe. Anna [point] wants to put the wardrobe next to the brown bed [point]. Sophie [point] wants to put the wardrobe next to the orange bed [point].

Finally, Anna and Sophie put their wardrobe next to the brown bed [point]. Tell me, in the previous image, where did Anna want to put the wardrobe? [If no response: "Anna wanted to put the wardrobe next to the brown bed or next to the orange bed?"]. And, in the previous image, where did Sophie want to put the wardrobe? [same procedure].

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