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## Japanese preschoolers' evaluation of circular and non-circular arguments

Hugo Mercier<sup>a</sup>, Mioko Sudo<sup>b</sup>, Thomas Castelain<sup>a,c</sup>, Stéphane Bernard<sup>d</sup> and Tomoko Matsui<sup>b</sup>

<sup>a</sup>CNRS – Institut des Sciences Cognitives Marc Jeannerod, Université Lyon 1, Lyon, France; <sup>b</sup>Center for Research in International Education, Tokyo Gakugei University, Tokyo, Japan; <sup>c</sup>Instituto de Investigaciones Psicológicas, Universidad de Costa Rica, San José, Costa Rica; <sup>d</sup>Centre de Sciences Cognitives, Université de Neuchâtel, Neuchâtel, Switzerland

### ABSTRACT

Observational and experimental data have revealed that preschoolers possess some argumentation skills, both in the production and the evaluation of arguments. However, these skills might have been fostered by the particular cultural context of Western middle- and upper-classes families, to which most children studied belong. Some data suggests that children in other cultures possess at least some of these skills, but no experimental data had been gathered in Eastern cultures. These cultures are supposed to frown on argumentation, and might thus be less conducive to the early development of argumentation skills. We test the emergence of argument evaluation skills in Japanese 5-year-olds by presenting them with a choice between endorsing a strong, perceptual argument, and a weak, circular argument. A first experiment revealed a trend in the direction of the strong argument. A second experiment that addresses some methodological concerns of the first demonstrates a significant tendency to follow the strong argument. These results are similar to those previously gathered in two other cultures (Swiss and Maya), and suggest that some basic argumentation skills are early developing across cultures.

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Children start arguing early on: at least some children start producing arguments around 2 years of age (e.g. Dunn & Munn, 1987; for review, see Mercier, 2011a). Observational data suggests that these argumentation skills play a useful role in children's interactions with parents, siblings, and peers (e.g. Ross, Ross, Stein, & Trabasso, 2006; Zadunaisky Ehrlich, 2011). Recent experimental studies have probed more precisely preschoolers' argumentation skills. Some studies have looked at argument production, and have shown that preschoolers

**CONTACT** Tomoko Matsui  matsui@u-gakugei.ac.jp

modulate the justifications they offer as a function of common ground. For instance, preschoolers are more likely to offer justifications for actions perceived to be unconventional (Köymen, Rosenbaum, & Tomasello, 2014). Similarly, preschoolers adapt the content of their arguments to their audience by making some premises explicit when they are not known by the audience (Köymen, Mammen, & Tomasello, 2015).

Other studies have looked at how preschoolers evaluate arguments. Initial studies suggested that 6-year-olds were unable to discriminate circular from non-circular justifications (Baum, Danovitch, & Keil, 2008). However, more recent experiments, using simpler stimuli, have revealed that preschoolers can in fact discriminate circular and non-circular arguments. For instance, one experiment asked children to choose which way a pet had gone following the testimony of two informants (Mercier, Bernard, & Clément, 2014). One informant supported her testimony with a perceptual argument 'because I've seen him go in this direction,' and the other with a circular argument 'because he went in this direction.' Three- to 5-year-olds were significantly more likely to select the direction supported by the strong, perceptual argument. Convergent results show that preschoolers can discriminate strong from weak arguments in different experimental situations (Castelain, Bernard, Van der Henst, & Mercier, 2016; Corriveau & Kurkul, 2014; Koenig, 2012).

Most of the experimental results obtained in this domain, however, were gathered among middle- and upper-middle class Western children. These children typically face an environment that might be particularly conducive to the early development of argumentation skills. Parents of middle- and upper-middle class Western children tend to talk to them a lot, using a rich vocabulary (e.g. Tizard, Hughes, Carmichael, & Pinkerton, 1983; for other specificities of this parenting style see, e.g. Little, Carver, & Legare, 2016). Of particular relevance is the relative prevalence of why-questions in the interactions between these children and their parents, questions that typically elicit explanations, justifications, and arguments (Gauvain, Munroe, & Beebe, 2013).

One experiment on argument evaluation was conducted in a non-Western population. Castelain et al. (2016) replicated the experiment opposing perceptual and circular arguments described above, and which had been conducted with Swiss children, with 4- to 6-year-old children from a traditional Maya community in Guatemala. The results were similar to those obtained previously, showing a significant tendency to follow the perceptual over the circular argument. Given that children in traditional cultures tend to engage in much less argumentation with their parents than children of the Western middle- and upper-middle classes (Bunzel, 1959; Maratsos, 2007; Pye, 1986), these results suggest that some early developing argumentation skills do not depend on the specific cultural of the latter.

In order to draw the inference that these argument evaluation skills develop early universally, it would be preferable to add other points of comparison. Besides traditional cultures, a standard point of comparison with Western

cultures has been Eastern cultures, of which Japan is a particularly relevant instance for the case in hand.

By contrast with most Western cultures, Eastern cultures – and Japanese culture in particular (Becker, 1983) – are supposed to value argumentation less (Becker, 1986; Nakamura, 1964). Texts that were influential in Eastern cultures devalue argumentation, such as this extract from the *Tao Te King*: ‘A good man does not argue; he who argues is not a good man’ (Becker, 1986; Nakamura, 1964; but see Mercier, 2011b for an alternative view of the role of argumentation in Eastern cultures). This cultural distaste for argumentation might be related to the collectivistic nature of many Eastern cultures (e.g. Triandis, 1995). In collectivistic cultures, stress is put on the face saving and on the preservation of social harmony, which argumentation is seen as challenging (Triandis, 1995).<sup>1</sup> Summarizing this research, Peng and Nisbett note that ‘there are social, historical, linguistic, and philosophical barriers to the acceptance of argumentation and debate as a method of intellectual discourse or as a strategy for the consideration of new proposals for social or political change’ (Peng & Nisbett, 1999, p. 747).

The literature on reasoning in adults has revealed significant differences in the reasoning styles of members of Western and Eastern cultures (for reviews, see Buchtel & Norenzayan, 2009; Nisbett, Peng, Choi, & Norenzayan, 2001). In particular, East Asians seem to be more tolerant of contradiction – whether within a point of view or between people – than Westerners. This might make the former less inclined to start exchanging arguments with each other (Peng & Nisbett, 1999; Suzuki, 2012; although see Mercier, Zhang, Qu, Lu, & Van der Henst, 2015).<sup>2</sup> However, some experiments have also revealed common patterns in the reasoning of members of Western and Eastern cultures. Particularly relevant here is the demonstration that Japanese participants benefitted from discussing problems in groups (Mercier, Deguchi, Van der Henst, & Yama, 2016), as Western participants do (Laughlin, 2011; Mercier, Trouche, Yama, Heintz, & Giroto, 2015). Since it is through argumentation that group discussion improves performance on these tasks (Mercier & Sperber, 2011), these results suggest that some argumentation skills, as well as proclivity to engage in argumentation in some contexts, are shared between the members of Eastern and Western cultures.

Parenting style might have an important effect on children’s argumentation skills. For instance, the ‘reasoning’ style typical of Western middle- and upper-classes (Grusec & Goodnow, 1994) might be more conducive to the development

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<sup>1</sup>Although some studies suggest a rise in individualism in many cultures, including Japan, some differences remain, so that Japan can still safely be said to be less individualistic than most Western cultures, the US in particular (Hamamura, 2012).

<sup>2</sup>Moreover, cross-cultural differences in the way adults evaluate arguments have been observed even in much more similar cultures, such as France, the Netherlands, and Germany (Hornikx & Hoeken, 2007; Hornikx & ter Haar, 2013).

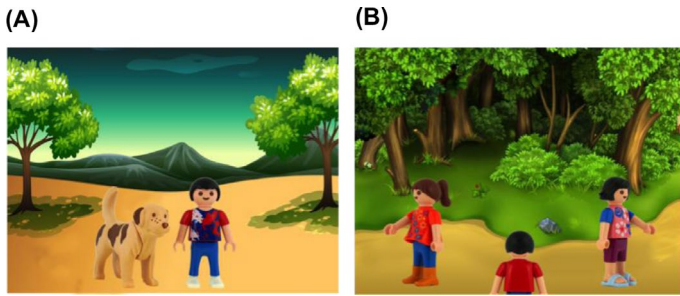
of argumentation skills than the ‘power assertion’ style. In this respect, there seem to be substantial similarities in the parenting of Japanese and of Western middle- and upper-classes. Sato (2003), summarizing research on the behaviour of Japanese mothers by Hess, Kashiwagi, Azuma, Price, and Dickson (1980) and Lewis (1984), notes that ‘Japanese mothers and nursery school teachers rely less on authority and more on patient, persistent explanations that will lead the child to eventual understanding’ (p. 26).

In spite of these similarities, some relevant differences have been observed in the development of young children in Eastern cultures, including Japan, compared to other cultures – Western cultures in particular. Argument quality is only one of the many cues young children use to decide who they should believe. Preschoolers have also been shown to be sensitive to the past accuracy of informants, their expertise, their niceness, and many other cues (for review, see e.g. Clément, 2010; Harris, 2012; Mills, 2013). The sensitivity to some of these cues has been shown to be affected by culture, thereby strengthening the plausibility that related cues of argument quality might also be affected by culture. For instance, children learning languages with evidentials – such as Turkish – seem to perform better in some selective trust tasks (Lucas, Lewis, Pala, Wong, & Berridge, 2013) (evidentials are grammatical markers that specify the source of one’s beliefs – for instance, whether they have been acquired through perception, hearsay, or inference; for review, see Aikhenvald, 2004). More relevant here, Japanese children seem more attuned to indications of confidence conveyed by tone of voice than French children (Matsui, Imai, Mercier, Bernard, & Castelain, *submitted*). Another domain related to argument evaluation is explicit mental states attribution (Malle, 2004; Mercier & Sperber, 2017). In this area, some results suggest that Japanese children have a significant delay in passing standard explicit false beliefs task, with most children failing until the ages of 6 or 7 (Naito & Koyama, 2006; but see Matsui, Rakoczy, Miura, & Tomasello, 2009).

Although these differences do not bear on argument evaluation directly, they show that culture can significantly affect children’s behaviour in closely related domains. Given the suggested differences in the way adults relate to argumentation in Western and Eastern cultures, it is plausible that argumentation skills would develop at a different pace in both types of cultures.

The goal of the present experiments is to test whether Japanese preschoolers are able to discriminate a perceptual from a circular argument. On the one hand, Japanese children’s cultural environment might be less conducive to the development of argumentation skills, so that delays might be observed in this domain. On the other hand, these skills might be universal enough, and the cultural environment of Japanese children conducive enough to their development, that we observe similar skills in Japanese and Western children.

Given the delays observed in related tasks in Japanese children (e.g. Naito & Koyama, 2006), and the fact that Western preschoolers sometimes fail to discriminate circular from non-circular explanations (Baum et al., 2008;



**Figure 1.** Excerpts of Experiment 1.

Notes: (A) Yuta and his dog are introduced to the child; (B) The two characters are giving contradictory testimony about Yuta's dog localization.

Corriveau & Kurkul, 2014), we choose to recruit not the youngest preschoolers, but 5-year-old children. To test their ability to discriminate a perceptual from a circular argument, we conducted two experiments. The first was a close replication of Mercier et al. (2014) and Castelain et al. (2016). Experiment 1 revealed some methodological difficulties with the adaptation of the original experimental set up for Japanese children. Experiment 2 tested the validity of the stimuli used in Experiment 1, as well as of those to be used in Experiment 3, with adults, establishing that both yielded high performance. Experiment 3 addressed the methodological difficulties raised by Experiment 1.

## Experiment 1

### Method

#### Participants

This experiment involved 28 5-year-old children (16 females,  $M_{\text{age}} = 65.1$  months,  $SD = 2.92$ , range 60–69 months) from a school in Tokyo (Japan). 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 5 min.

#### Materials and procedure

The design was adapted from Mercier et al. (2014). The stimuli were translated in Japanese from the English version that had been reported in the methods of Mercier et al. (2014). In the first vignette, a young Playmobil boy, Yuta, and his dog were presented to the children (see Figure 1). The experimenter said: 'In this game, you will try to help Yuta find his dog.' A second vignette showed Yuta facing two girl characters, each one pointing in a different direction. The experimenter said:

For instance, one day, Yuta is looking for his dog in front of a wood. These two girls tell him something. Actually they disagree. This one says: 'The dog went

this way because I've seen him go in this direction' (Perceptual Argument). And this one says: 'The dog went this way because he went in this direction' (Circular Argument).<sup>3</sup>

Finally, the experimenter asked the children: 'Which way do you think Yuta's dog went?' Starting from the second vignette, the experiment was repeated 3 times, with different backgrounds, saying that Yuta is looking for his dog again. The character's location (right/left) and the order of information presentation were counterbalanced. Each child could obtain a maximum score of 3 points: 1 point for each story in which the direction supported by the perceptual argument was chosen.

### Results and discussion

The percentage of choices linked to the perceptual argument was 61.9%. One-sample Wilcoxon signed rank test showed that children were only tendentially more likely than chance to select the testimony of the character providing the perceptual argument ( $Mdn_{\text{Japan}} = 2, Z = 1.85, p = .063$ ). These results are in line with, albeit weaker than, the results obtained by Mercier et al. (2014) with Swiss participants and Castelain et al. (2016) with Maya participants. Mann-Whitney tests of the testimony scores obtained by 5-year-old children (for the same task), from the two populations, revealed no difference with the Swiss children ( $Mdn_{\text{Swiss}} = 3, Z = -1.07, p = .28$ ) or the Maya children ( $Mdn_{\text{Maya}} = 3, Z = 1.03, p = .30$ ).

Even though there was no stark difference with previous results, the relatively weaker tendency to follow the perceptual argument shown by Japanese children prompted us to look in more details at their answers and at the stimuli. Regarding their answers, the experimenter had remarked that the children seemed somewhat baffled by the repetition of the trials. In line with this impression, the tendency to follow the perceptual argument dropped from the first trial (71%, or 20 out of 28)<sup>4</sup> to the third (46%, or 13 out of 28). Regarding the stimuli, we considered the possibility that the translations of both the perceptual and the circular argument might have denoted a high level of confidence. More specifically, the use of *yo* at the end of the first clause ('The dog went this way') denotes confidence. The sentence-final particle *yo* (certainty) was added to the stimuli sentences so that they sound more natural as expressions of an argument in Japanese. The use of the sentence-final particle, however, might have led the children to consider the two statements as more similar than children in the other two cultures tested, especially since Japanese children seem to be particularly sensitive to confidence markers (Matsui, Yamamoto, Miura, &

<sup>3</sup>The Japanese versions were, for the circular argument: 犬はこっちに行ったよ。だって、犬はこっちの方向に行ったから。; for the perceptual argument: 犬はこっちに行ったよ。だって、私は犬がこっちの方向に行くのを見たから。.

<sup>4</sup>Yielding a significant preference for the perceptual argument (binomial test,  $p = .036$ ).

McCagg, 2016; Matsui et al., *submitted*). Experiment 3 addressed these issues by (a) having only one testimony question, and (b), using more neutral statements. Before conducting Experiment 3, however, we tested the validity of our stimuli using Japanese adults in Experiment 2.

## Experiment 2

### Method

#### Participants

This experiment involved 25 undergraduate students (21 females,  $M_{\text{age}} = 20.3$  years,  $SD = 1.51$ , range 19–25 years) from a Japanese university in the Tokyo area.

#### Materials and procedure

The materials were essentially identical to those of Experiment 1. The main difference was that participants only answered two testimony questions. In the first, the arguments were those used in Experiment 1, in the second, those used in Experiment 3, which were designed to be more neutral in terms of confidence.<sup>5</sup> The experiment was administrated collectively in a classroom. The students were divided in two groups, and the order of presentation of the statements was counterbalanced between the two groups.

### Results and discussion

The percentage of choices linked to the perceptual argument was 88% for the statements from Experiment 1, and 96% for those of Experiment 3. Binomial test revealed that participants were more likely than chance to select the testimony of the character providing the perceptual argument for the statements that convey confidence (22 out of 25 for the perceptual argument,  $p < .001$ ), as well as for the new ones (24 out of 25 for the perceptual argument,  $p < .001$ ). An exact McNemar's test showed that there was no significant difference in the proportion of endorsement of the perceptual argument between the two versions of the statements (i.e. those used in Experiment 1 and those to be used in Experiment 3) for the adult participants of Experiment 2 ( $p = .62$ ). Still, the near-ceiling performance of adults with the stimuli that will be used in Experiment 3 suggests that they might be less likely to mislead younger children.

When adult performance on the statements from Experiment 1 is compared to the children's performance on the first trial of Experiment 1, the difference is not significant (22 out of 25 vs. 20 out of 28, Fischer's exact test  $p = .18$ ).

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<sup>5</sup>More specifically, for the circular argument: 犬が行ったのはこっち。だって、こっちなの。 , and for the perceptual argument: 犬が行ったのはこっち。だって、私犬を見たの。 .



## Experiment 3

### Method

#### Participants

This experiment involved 41 5-year-old children (23 females,  $M_{\text{age}} = 65.6$  months,  $SD = 3.33$ , range 60–71 months) from a school in Tokyo (Japan). 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 5 min. None of the children had taken part in Experiment 1.

#### Materials and procedure

Experiment 3 was identical to Experiment 1 with three exceptions. First, the story was not repeated, so that children only had to answer once to the question of where the dog went. Second, more neutral statements, with no confidence markers, were used (see description in Experiment 2). Third, for better control, instead of the experimenter telling the statements, they were prerecorded and activated at the appropriate time. More specifically, after the experimenter has said: 'For instance, one day, Yuta is looking for his dog in front of a wood. These two girls tell him something. Actually they disagree,' the experimenter said 'We are going to listen to them.' At this point, a recording voice was activated for one of the girls and children heard the new translation of one of the two arguments. A different recording voice with the other argument was played for the second girl. The character's location (right/left), the order of voice activation, and the voice attribution for the character were counterbalanced. The question was the same as in Experiment 1.

#### Results and discussion

The percentage of choices linked to the perceptual argument was 78%. Binomial test revealed that children were more likely than chance to select the testimony of the character providing the perceptual argument (32 out of 41 for the perceptual argument,  $p < .01$ ). They favored the testimony supported by the strong argument, replicating the results obtained with Swiss participants (Mercier et al., 2014) and with Maya participants (Castelain et al., 2016). Comparisons of the proportions of endorsement of the perceptual argument obtained by 5-year-old children (for the first testimony trial) revealed no significant difference between the Japanese children and the Swiss children (78% vs. 57.1%,  $\chi^2(1, N = 69) = 3.43, p = .064$ ) or the Maya children (78% vs. 72.7%,  $\chi^2(1, N = 74) = .28, p = .59$ ). Finally, the comparison with adult performance using the same stimuli (Experiment 2) only revealed a trend in the direction of superior adult performance (24 out of 25 vs. 32 out of 41, Fischer's exact test  $p = .08$ ).

## General discussion

In two experiments, Japanese 5-year-olds were faced with a situation in which they had to choose whether to believe a statement supported by a strong, perceptual argument, or a statement supported by a weak, circular argument. In both experiments the children were more likely to endorse the statement supported by the strong, perceptual argument. In Experiment 1 this result did not reach statistical significance, but it did in Experiment 3 which addressed potential methodological issues with Experiment 1 and relied on a larger sample of participants. Experiment 2 showed that adults performed well with the stimuli of both Experiments 1 and 3.

Experimental psychology, including developmental psychology, has been overly centred on participants from what has been dubbed Western Educated Industrialized Rich Democratic populations (Henrich, Heine, & Norenzayan, 2010). In some cases, these participants are not representative of other human populations – for instance, they tend to be much more individualistic (Henrich et al., 2010). Some of the best-studied differences are that between Western and Eastern populations (for review, see Nisbett, 2003). As summarized in the introduction, several of these differences could influence argumentative skills or the willingness to engage in argumentation. Moreover, these differences could affect not only adult performance, but also that of young children.

We thus feel it is important to conduct cross-cultural replications of theoretically significant findings obtained in Western populations. Of particular interest are cultures in which past theorizing suggest that differences might be observed – as in the case of argumentation in Eastern cultures. This is all the more relevant when a theory predicts that a given trait should be universal (or quasi-universal, see Norenzayan & Heine, 2005). The argumentative theory of reasoning makes precisely such claims: that enabling argumentation is the main function of human reasoning, and that argumentative skills should be universal and early developing (Mercier & Sperber, 2011, 2017).

In this context, the main contribution of these results is to add to the number of cultural contexts – after Switzerland (Mercier et al., 2014) and traditional Maya communities (Castelain et al., 2016) – in which it has been shown that young children possess some argument evaluation skills. While this does not demonstrate that these skills are universal, it offers an argument in favour of universality. It does so by preempting the counter-argument that children from Eastern cultures, in which argumentation is supposed to be disfavoured, might not possess these basic argumentative skills.

Besides fulfilling its main objective, this study also suggests another line of enquiry. In Experiment 1, linguistic markers of confidence were used, and they might have led children to focus on the informants' degree of confidence – which was equal – rather than the quality of their arguments – which wasn't. This might explain why Japanese children did not consistently favour strong

over weak arguments in Experiment 1, even though children from the same age in other cultures did so. The success of children from the same population in Experiment 3, in which the confidence markers present in Experiment 1 had been removed, also supports this hypothesis, although it doesn't conclusively prove it since there were other differences between Experiments 1 and 3.

The possibility that confidence markers might have influenced children more strongly than argument strength is bolstered by results showing that children are very sensitive to confidence markers generally (e.g. Brosseau-Liard & Poulin-Dubois, 2014). Moreover, Japanese children might be especially attuned to such markers. Matsui et al. (submitted) have shown that Japanese children are more attuned than French children to confidence expressed by tone of voice. Matsui et al. (2016) have also shown that for Japanese 3-year-olds, linguistic confidence markers can trump differences in familiarity between the informants. However, for 5-year-olds, familiarity trumped confidence. Given that argument strength is very likely more difficult to process than familiarity, it is not surprising that confidence markers might have exerted an influence above that of argument strength.

The question of confidence is certainly worth pursuing, especially in light of debates on whether confidence can trump argument strength in older children (e.g. Levin & Druyan, 1993) and adults (e.g. Trouche, Sander, & Mercier, 2014). When it comes to evaluating arguments on their own, the present data suggests that 5-year-olds Japanese children perform reasonably well (in Experiment 3, and in the first trial of Experiment 1). Although adult performance was higher – and near ceiling – it was not significantly so, strengthening the conclusion that children already possess robust argument evaluation skills. Some experimental results suggest that adults can adequately separate confidence from argument strength in the course of a discussion, so that better arguments are more convincing even if they are held by a less confident participant (Trouche et al., 2014). However, to the best of our knowledge it is not known whether such a result would obtain in other cultural contexts, for instance in Japan (although see Boku, Yama, & Mercier, submitted; Mercier et al., 2016).

This research opens several avenues to investigate developmental questions. The first is whether younger children in non-Western cultures (and Japanese culture more specifically) possess the argument evaluation skills that are discernible in (some) Western children at 3 (Mercier et al., 2014) or even 2 years of age (Castelain, Bernard, & Mercier, submitted). The second is how the interplay of confidence and argument evaluation develops with age. One might predict younger children to put more weight on confidence, relative to argument strength, than older children or adults, but this has not been shown. In that respect, cross-cultural investigations might prove particularly valuable, given the cross-cultural differences in the weight granted confidence markers (Matsui et al., submitted).

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