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Who do I believe? Children's epistemic trust in internet, teacher, and peer informants

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ABSTRACT

In the cultural context of rapidly increasing internet access, two experiments examine how 5- to 8-year-old Chinese children and adults evaluate information from an unspecified internet source or a known human informant (a teacher or a peer). In Experiment 1, when evaluating statements from a variety of domains, adults regarded the internet and a teacher as more trustworthy than a peer. Younger children did not show differential endorsement of statements by any source, and older children endorsed statements attributed to a teacher over those from the internet. In Experiment 2, when the statements involved scientific and historical facts only, all age groups sought out and endorsed information from the internet or a teacher more often than from a peer, but only adults trusted the internet more than the teacher. These results demonstrate that children can reason about the reliability of informants across different categories and that their trust in information sources is contingent on the type of information being presented.

1. Introduction

Information is indispensable for human survival and development, and this is especially true for children. In order to survive and adapt to complicated social and natural environments, children can obtain information from direct observations and their personal experiences. However, due to practical limitations, children also have to gain massive amounts of information via other sources (see Brosseau-Liard, 2017; Harris, 2012). These sources include other people, such as parents, teachers, and peers, and media sources, such as books, TV, and the internet. In some cases, different information sources provide nearly identical answers to the same question (e.g., Giles, 2005). However, in other cases, different information sources provide inconsistent answers (Enesco, Rodríguez, Lago, Dopico, & Escudero, 2016). Being able to select and evaluate information is a core skill for people in the 21 st century (van Laar, van Deursen, van Dijk, & de Haan, 2017), and this challenge is compounded by the proliferation of relatively new and unfamiliar information sources such as the internet. In the current studies, we examine how the ability to choose between a known individual (i.e., a teacher or a peer) and an unspecified internet source develops, and the extent to which children and adults trust an unspecified internet source when the information it provides conflicts with what a known individual says.

The rapid growth of the internet has facilitated the creation and spread of information (Johnson, 2007), yet it also poses new challenges. Because information on the internet can be authored anonymously and easily published or modified, the availability of fabricated or false quotations, images, and other types of counterfeit information on the internet has increased tremendously (Flanagin & Metzger, 2000; Mehrabi, Hassan, & Ali, 2009; Metzger & Flanagin, 2013; Waldrop, 2017). Due to the growing popularity of portable electronic devices (e.g., tablets, smartphones), there are also more opportunities for children to be exposed to and to

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access the internet. Indeed, middle- and high-school students have become increasingly reliant on the internet as a means of obtaining information (St. Jean, Taylor, Kodama, & Subramaniam, 2017).

In China, children's access to the internet has dramatically increased over the past 10 years. In 2017, 91% of 3- to 6-year-old Chinese children had accessed the internet through smartphones, tablets and computers, and more than 60% of 5-year-old Chinese children used the internet for entertainment for at least 30 min every weekend (China Internet Network Information Center, 2018b). Constrained by their literacy skills, Chinese children mainly access the internet through online video platforms and have limited experience looking up information online until at least age 9 (China National Youth Palace Association, 2015). Chinese children's online activities are not as diverse as adults' (e.g., children seldom use social media or do online shopping), yet they still have relatively unlimited access to popular information on the internet on websites other than those designed expressly for children. Although information is strictly censored by the China Internet Network Information Center to make sure it contains no sexuality, violence, or other kinds of illegal content, the authenticity and the veracity of the information available to Chinese children still varies. Moreover, though most Chinese parents set strict limits to their children's amount of internet use to protect children's health and prevent internet addiction, having internet access is still a recent innovation for most Chinese families. Chinese parents have very limited awareness of the need to help children evaluate the reliability of information found online (More than 60% Chinese children have mobile phones, 2016). Given children's strong propensity to imitate and learn from others (Harris, 2012), some Chinese educators are also concerned about the potential consequences of children accessing unreliable information online, especially in the absence of formal or informal internet instruction (More than 90% of children get access to internet, 2017). Thus, in contrast to other developed countries such as the United States, where internet access has increased relatively steadily over the past few decades and guidelines have been in place for educating children about how to safely and effectively use the internet since as early as 1998 (although local adoption of these guidelines has varied; International Society for Technology in Education, 1998, 2007), China is in the midst of a transition where adults have not necessarily had extensive experience with the internet and the messages that children receive about the reliability of the internet as an information source are limited.

Despite the fact that Chinese 5- to 8-year-olds have been exposed to the internet since early in their lives, their understanding and attitudes towards the internet as an information source have not been studied. Research with children in other countries suggests that children in this age range do not understand how the internet works (Mertala, 2019; Yan, 2005), nor are they very effective at obtaining information online (Dodge, Husain, & Duke, 2011; Duarte Torres, Weber, & Hiemstra, 2014). Moreover, even when they are capable of retrieving information from the internet, older children and adolescents find it difficult to evaluate the credibility of the information they encounter (Eastin, Yang, & Nathanson, 2006; Metzger, Flanagin, Markov, Grossman, & Bulger, 2015). By examining Chinese children's beliefs about the relative credibility of information attributed to an unspecified internet source, the studies presented here address important questions about the formation of children's attitudes towards information sources in the absence of education or adult input about the reliability of those sources.

Young children can select and evaluate information based on the characteristics of an informant (Bascandziev & Harris, 2016; Enesco et al., 2016; Landrum, Cloudy et al., 2015; Landrum, Eaves et al., 2015), yet little is known about how children judge information provided by other people relative to technology-based sources. The current study examines children's preferences for an unspecified internet source or a known individual, and their endorsement of information provided by an unspecified internet source, a teacher, or a peer. Previous studies have found that children as young as age 3 can weigh factors such as prior accuracy when judging informants (e.g., Koenig, Clément, & Harris, 2004; Koenig & Harris, 2005). By ages 4 and 5, they also take into account additional characteristics, including informants' familiarity (Corriveau & Harris, 2009; Danovitch & Mills, 2014), attractiveness (Bascandziev & Harris, 2014, 2016), and benevolence (Johnston, Mills, & Landrum, 2015; Li, Heyman, Xu, & Lee, 2014; Palmquist, Jaswal, & Rutherford, 2016). In these studies, children typically encounter pairs of informants from the same category. These are most often pairs of people, though there are a few studies using pairs of fictional characters (e.g., Danovitch & Mills, 2014) and reliable or unreliable computers (Danovitch & Alzahabi, 2013). In the current studies, we examine children's preferences and endorsements in situations where the informants belong to different categories.

Given that assessing the reliability of information sources is of great importance to children's early learning (Harris, 2012), Brosseau-Liard (2017) suggests that children's source evaluation skills form the basis for later-developing critical thinking abilities, and that source evaluation skills should not be limited to human sources. A few pertinent studies indeed have found that children can apply the same heuristics that they use to evaluate the reliability of human informants to reason about the credibility of other information mediums. For instance, preschoolers preferred information provided by a previously accurate computer rather than a previously inaccurate one (Danovitch & Alzahabi, 2013) and trusted a book with logically consistent contents rather than a book with logically inconsistent contents (Doebel, Rowell, & Koenig, 2016). Moreover, Einav and colleagues revealed that early readers treated oral information supported by printed text as more reliable than oral information not supported by print (Corriveau, Einav, Robinson, & Harris, 2014; Einav, Robinson, & Fox, 2013; Eyden, Robinson, Einav, & Jaswal, 2013; Eyden, Robinson, & Einav, 2014; Robinson, Einav, & Fox, 2013). These findings suggest that it is reasonable to consider children's source evaluation strategies as fundamental elements of social learning that enable children to learn more reliable information (see Harris, Koenig, Corriveau, & Jaswal, 2018 for a review). If this is the case, children's strategies might be domain-general methods which are not unique to evaluating human sources, and children should also be capable of applying them to assess the credibility of informants from different ontological categories. However, little is known about whether children treat one category of information source (e.g., internet sources) as more reliable than another (e.g., known individuals).

In this study, we investigate how children reason about information provided by an unspecified internet source in contrast with information provided by a teacher and a peer. Young children view teachers as emotional referents (Koomen & Hoeksma, 2003; Mantzicopoulos & Neuharth-Pritchett, 2003) and, in some cases, form attachments to them (see Bergin & Bergin, 2009 for a review).

Moreover, children view teachers as authority figures with a willingness to impart reliable facts in the classroom (Enesco et al., 2016), and Chinese culture strongly supports this view. Because Chinese children's experience of the internet seems to largely consist of watching videos or playing games (rather than interacting with others or using social media), children may view the internet as an impersonal source that does not have the pedagogical capacity or authority of a teacher. If this is the case, children should show greater trust in information from a teacher than from the internet. On the other hand, if children prioritize information capacity (such as the abundance of information and the ease of accessing information, see She, Liu, & Fan, 2018 for a review) over pedagogical authority and social bonds, they should show greater trust in the internet than a teacher. This outcome would suggest that epistemological characteristics are most important when children evaluate the reliability of an unspecified internet source in comparison to a known individual. It is also possible that children will treat a teacher or the internet as equally credible, although they may trust each source for different reasons.

In order to further disambiguate the role of knowledge access from that of a social relationship, we also examine children's trust in an unspecified internet source or a teacher when faced with information from a peer. Given that children generally treat adults as more knowledgeable than other children (Jaswal & Neely, 2006), if children show more trust in a same-age peer than in the internet, it would suggest that social connection is the crucial factor in determining children's trust (Elashi & Mills, 2014), but if children treat social bonds with peers as less important than access to extensive amounts of information, they should be more likely to believe in information from the internet. Our design also includes trials where participants choose between a teacher and a peer in order to ascertain that children in our sample view teachers as more credible than peers.

Participants in the current studies include 5- to 6-year-old kindergarteners and 7- to 8-year-old second-graders. We focused on these age groups because older children would presumably have had more exposure to the internet and be more capable of accessing the internet on their own. There are indeed some studies suggesting that children become more capable of evaluating information from the internet as they grow older (Eastin et al., 2006; Flanagin & Metzger, 2000; Hart & Liu, 2003; Metzger et al., 2015) and that improvement in these skills is already apparent between kindergarten and 2nd grade (Dodge et al., 2011). Moreover, older children are more likely to express concerns about the accuracy of online information than younger children (Yan, 2006). Thus, we were interested in exploring the relation between age and trust in an unspecified internet source or a known individual source. In addition, we examine whether children's online experiences related to their epistemic trust in information coming from an unspecified internet source.

2. Experiment 1

2.1. Participants

Thirty 5- to 6-year-old kindergarteners (M_{age} = 5;11, range = 5;7–6;2, 15 girls) and 30 7- to 8-year-old second-graders (M_{age} = 8;0, range = 7;0–8;9, 19 girls) participated. Five additional kindergarteners took part but were not included in the data analysis because they refused to endorse either informant and insisted on their personal answers to the questions instead. Most of the children came from middle-class families in the city of Wuhan, China. A priori power analysis using G*Power 3 (Faul, Erdfelder, Lang, & Buchner, 2007) revealed that a minimum of 54 total child participants would be needed to detect a medium effect size of 0.25 (a value based on a prior study showing that older children were more likely to choose a reliable computer than younger children; Danovitch & Alzahabi, 2013; Exp.2) within a 2 (Age Group: kindergarten, second-grade) × 2 (Alternate Informant: teacher, peer) ANOVA with power ($1 - \beta$) set at .95 and α set at .05. To assess what a mature pattern of responses would be for our tasks, 30 college students (M = 20.30 years; SD = 1.90; 20 females) were also recruited from a university in central China. They represented different levels of seniority and various majors, including psychology, mathematics, physics, and literacy. All participants received gifts or were paid for their participation. The study was approved by the Ethical Institutional Review Board of Central China Normal University.

2.2. Materials

Because in most circumstances, children can use the internet to access a wide range of information and Chinese children are unlikely to have received any explicit instructions about the reliability of internet sources for specific types of information, this experiment included trivia from a broad range of topics. The 12 pieces of trivia that were included involved obscure or difficult to obtain answers that were not contrary to common sense (e.g., people are more likely to be bitten by mosquitoes when they are eating bananas). Each piece of trivia was adapted to two statements that differed in one detail (e.g., "people are more likely to be bitten by mosquitoes when they are eating *bananas*" and "people are more likely to be bitten by mosquitoes when they are eating *apples*"; see Appendix A for English translations of the Chinese statements used). For each pair of statements, there was a related photograph printed on a card (e.g., a photo of a mosquito).

2.3. Procedure

The experiments were run in a quiet lab and sessions were recorded for coding purposes.

2.3.1. Children's online experience

After the participants completed a demographic questionnaire, they were asked about their online experience. First, participants

were asked an open ended question: "Have you used computers or iPads or iPhones? What did you do with them?" Then, they were asked a series of follow-up questions probing their online experiences (e.g., did you watch videos on Youku or IQiyi? Did you look up information online?) that were based on common online activities listed in *The 42nd China statistical report on Internet development* (China Internet Network Information Center, 2018a).

2.3.2. Informant's description

The experimenter described each informant to participants. The internet was described as "when you use computers and other portable devices such as iPads or iPhones to obtain information from IQiYi or Youku (a video platform where people can publish videos, similar to YouTube) or a news website or Baidu (a search engine similar to Google that is widely used by children in China)." (All descriptions are translated from Chinese.) These examples of internet-based sources were used because our observations and experience suggest that even if children have used the internet, they may not be familiar with the word "internet." The teacher was described as "a teacher who taught you" and the peer was described as "a child like you." In addition, to ascertain whether children had understood the meaning of each informant, they were required to give an example of retrieving information from the internet, a teacher, and a peer (for some typical examples of children's reports, see results section).

2.3.3. Endorse trials

After children reported appropriate examples of information retrieval, the experimenter explained that participants would hear some interesting statements coming from the internet, a teacher, or a peer, and they would indicate which statement they believed. During each trial, participants were first asked whether they knew the answer to the trivia question (e.g., what color do you think Americans like best?; see Appendix A). None of the participants reported answers consistent with statements that were later presented. Then, the experimenter read out loud two statements which were adapted from one piece of trivia and attributed the statements to two of the three informants (e.g., "Teacher says that most Americans like *yellow* best; according to the internet, most Americans like *purple* best"; translated from Chinese, see Appendix A). Participants were then asked to endorse one of the claims (e.g., "Now, what color do you think Americans like best, *yellow* or *purple*?"; see Appendix A). In order to maintain children's attention and help them to understand each piece of trivia, the experimenter presented a related photograph when the statement was introduced.

There were a total of 12 trials, divided into 4 blocks with 3 statements each (see Appendix A). In each block, one pair of statements were presented by the unspecified internet source and a teacher, another pair were presented by the internet source and a peer, and the remaining pair of statements were presented by a teacher and a peer. Which topics were presented by which pair of sources was balanced across participants, yielding 6 item orders within each block. In addition, the ordering of the blocks and the ordering of informant presentation in each block was counterbalanced across participants. For each participant, informant A followed informant B for half of the blocks, and for the other half of the blocks, informant B followed informant A.

2.4. Results

2.4.1. Children's online experience

Two trained coders (both graduate level researchers, one of whom was blind to the research goals and manipulation) coded each child's online experiences into three non-exclusive categories (watching online videos, using search engines and online news sources, using social media or chatting online) based on the child's responses to both the open-ended and forced choice questions. There was 100 percent agreement between coders.

Apart from generating appropriate examples of retrieving information from a teacher (e.g., "Last class, I learned from my teacher that horses usually sleep standing up") and a peer (e.g., "I asked my friend how to fold a paper airplane"), all children gave appropriate examples of using the internet (e.g., "I used it to watch short video on iPad about how various flowers went to seed or something unusual"), including watching videos and looking up information online. When asked to report their personal experience using the internet, 29 kindergarteners (1 child's recording could not be heard clearly) indicated watching online videos on Youku, IQiyi, or other video platforms. As for second-graders' online experience, 14 seconds-graders only reported watching online videos, while 13 seconds-graders reported watching videos and looking up information online (three additional second-graders' recordings were damaged or lost). Notably, no child in either age group mentioned using WeChat, a popular Chinese multi-purpose messaging and social media platform, or other social media.

To verify whether children's reports were reliable, children's parents were also contacted via phone or e-mail. Parents indicated that when online, their children mainly watched short videos or stories on video platforms, with no personal experience of any social media. Teachers in the elementary school and kindergarten where children were recruited were also interviewed. They indicated that they did not provide any formal education about the internet and that using the internet to retrieve information was not emphasized in classrooms. Moreover, although internet access was available in the classroom, students were not allowed to take any portable electronic devices into school.

2.4.2. Children'sendorsement of information from the internet

In order to see whether children showed stronger endorsement of information from the unspecified internet source when it was paired with a teacher or a peer, we computed the number of times participants chose to endorse the statement attributed to the internet in the internet vs. teacher or internet vs. peer trials (max = 4 for each set of trials). Preliminary analyses did not show an effect of gender (Kindergarteners: $ts < 1.57$, $ps > 0.12$; Second-graders: $ts < 1.77$, $ps > 0.09$) nor item order (Kindergarteners: $Fs < 2.51$, $ps > 0.09$; Second-graders: $Fs < 2.56$, $ps > 0.06$) on children's endorsements, so these variables were not included in

Table 1
Endorsement of Informants in Each Set of Trials (maximum = 4, chance = 2).

Age	Informant Endorsement					
	Internet (vs. Teacher)		Internet (vs. Peer)		Teacher (vs. Peer)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Kindergarten	2.23	1.01	1.90	1.09	2.37	1.23
Second-grade	1.40*	1.04	2.07	0.83	2.07	1.29
Adult	1.77	1.07	2.70*	1.12	2.90*	0.96

* indicates a significant preference ($p < .05$) for one informant.

subsequent analyses. To investigate whether the alternate informant (teacher or peer) impacted children's endorsement of statements from the internet, we conducted a 2 (Age Group: kindergarten, second-grade) × 2 (Alternate Informant: teacher, peer) ANOVA. Neither the main effect of age ($F(1, 58) = 3.00$, $p = .089$, $\eta_p^2 = .049$) nor alternate informant ($F(1, 58) = 0.95$, $p = .333$, $\eta_p^2 = .016$) was significant. However, the age by alternate informant interaction was significant, $F(1, 58) = 8.59$, $p = .005$, $\eta_p^2 = .129$. Further analysis of the interaction using simple effects tests indicated that second-graders were more likely to endorse statements from the internet when the alternate informant was a peer than when it was a teacher ($F(1, 58) = 7.63$, $p = .008$).

In the internet vs. teacher trials, second-graders endorsed statements from the internet at rates lower than chance (chance = 2, $t(29) = 3.17$, $p = .004$, $d = 0.58$; see Table 1). However, kindergarteners' responses were no different from chance, $t(29) = -1.27$, $p = .214$, $d = -0.23$, suggesting similar levels of trust in each informant. In the internet vs. peer trials, both second-graders' and kindergarteners' responses did not differ from chance (Second-graders: $t(29) < 1$, $p > .05$, $d = 0.08$; Kindergarteners: $t(29) < 1$, $p > .05$, $d = 0.09$; see Table 1). This result reveals that kindergarteners and second-graders did not show differential trust in internet and peer sources.

In order to examine whether children's online experience related to their endorsement of statements from the internet, we compared scores between second graders who reported having looked information up online and those who did not. The results suggested that children's experience with the internet did not relate to their endorsements of statements from the internet (see Table S1 in Supplementary Materials).

2.4.3. Children's endorsement of information from a teacher versus peer

For the four trials where statements were attributed to the teacher or the peer, responses were assigned 1 point each time the child endorsed the teacher's response, yielding a score of 0–4. Both second-graders and kindergarteners were at chance in choosing between the teacher's and peer's statements (Second-graders: $t(29) = 0.28$, $p = .778$, $d = 0.05$; Kindergarteners: $t(29) = 1.78$, $p = .086$, $d = 0.33$). There was also no difference between kindergarteners and second-graders' rate of endorsing the teacher's statements, $t(58) = 0.96$, $p = .341$, $d = 0.24$.

2.4.4. Adult endorsements

Considering the major differences in online experience between adults and children, we analyzed the data about adults' choices separately to explore what a mature pattern of responses looks like. Preliminary analyses did not show an effect of gender ($ts < 1.04$, $ps > 0.31$) nor item order ($Fs < 2.48$, $ps > 0.06$), so these variables were not included in subsequent analyses. We found that college students considered the unspecified internet source and a teacher as equally reliable in the internet vs. teacher trials, $t(29) = 1.19$, $p = .243$, $d = 0.21$, but they were less likely than chance to endorse the statements attributed to the peer in both the internet vs. peer trials and the teacher vs. peer trials (chance = 2, internet vs. peer: $t(29) = 3.43$, $p = .002$, $d = 0.63$; teacher vs. peer: $t(29) = 5.14$, $p < .001$, $d = 0.94$).

Table 2
Frequencies of Choices in Ask and Endorse Items in Experiment 2 (maximum = 4, chance = 2).

Question Type	Age	Informant Choice					
		Internet (vs. Teacher)		Internet (vs. Peer)		Teacher (vs. Peer)	
		M	*SD*	*M*	*SD*	*M*	*SD*
Ask Trials	Kindergarten	1.97	1.49	3.32*	1.25	3.68*	0.60
	Second-grade	1.83	1.21	3.77*	0.50	3.80*	0.55
	Adult	3.53*	0.97	3.83*	0.38	2.83*	1.18
Endorse Trials	Kindergarten	1.71	1.24	2.84*	1.16	3.42*	0.85
	Second-grade	1.63	1.35	3.60*	0.77	3.63*	0.67
	Adult	2.70*	1.29	3.47*	0.94	3.27*	0.94

* indicates a significant preference ($p < .05$) for one informant.

2.5. Discussion

The results of Experiment 1 suggest that when choosing between contrasting statements from the internet or a teacher, second-graders were more likely to endorse the teacher's statements but kindergarteners displayed no preference. Futhermore, second-graders were more likely to endorse statements from the teacher than kindergarteners. This may be because two years experience of formal education enhanced second-graders' emotional relationship to their teacher (Deru & Wanlun, 2007), thus, the desire to affiliate with their teacher may have taken precedence over the positive attributes of the internet. When faced with statements attributed to the internet or a peer, or statements attributed to a teacher or a peer, neither kindergarterners nor second-graders consistently endorsed information from either source. The latter finding is particularly suprising given that second graders endorsed statements from the teacher more often than those from the internet. One potential explanation for this lack of preference is that the trivia statements used in Experiment 1 may have seemed similar to the kinds of statements children share with their friends, as children can articulate adult-knowledge and child-knowledge and indicate that adults such as teachers are less likely to know the answer to child-specific knowledge than a child (Fitneva, 2010). Furthermore, VanderBorght and Jaswal (2009) found that although children acknowledged that other children were likely to be less knowledgeable than adults, there are situations (e.g., questions about toys) in which they prefer to seek information from a peer. Experiment 2 was designed to address these issues by only including scientific and historical facts that involved specific and precise numerical information that children would be unlikely to have discussed with friends or to think they had personal experience observing.

College students regarded statements from the unspecified internet source and a teacher as more reliable than a peer, yet they did not have consistent intuitions about which source to endorse when they were presented with contrasting statements attributed to the internet or a teacher. Due to their long-term experience with formal education, adults may view teachers as possessing more erudite knowledge (Enesco et al., 2016) than their peers. At the same time, adults' experience accessing different types of information online may lead adults to consider the internet an equally reliable information source to a trained teacher (Mehrabi et al., 2009).

3. Experiment 2

The trivia statements presented in Experiment 1 represented a wide range of topics. They included statements about cultural differences in human behavior (e.g., most Americans like yellow or purple best), which could be considered somewhat subjective or prone to error, and observations about the human body that children might have thought they could answer based on their direct experience or observation (e.g., whether the thumb or the middle finger nail grows the slowest). Due to the nature of the statements, children's endorsements may have been influenced more by their own intuitions about the correct answer than which source provided the information.[1] In order to address this possibility, the questions and statements in Experiment 2 involved only scientific and historical facts and focused on specific, numerical values (e.g., how many days it takes a flower to germinate).

In addition, in Experiment 1, participants' epistemic trust in different informants was operationalized in terms of which informant's statements they endorsed. Although the statements were counterbalanced, participants may have focused more on their intuitions about the statements than on the information sources, resulting in patterns of responses that did not differ from chance. Thus, in Experiment 2, we also measured participants' trust in terms of preferences for seeking information from each source before asking which statement they endorsed.

3.1. Participants

Thirty-one 5- to 6-year-old kindergarteners (M_{age} = 5;11, range = 5;5–6;2, 16 girls) and 30 7- to 8-year-old second-graders (M_{age} = 7;7, range = 7;0–8;11, 13 girls) participated. Thirty college students (M = 20.83 years; SD = 2.10; 18 females) also participated. Participants were recruited from the same school and university as Experiment 1. None had participated in Experiment 1.

3.2. Materials

Experiment 2 included 12 scientific and historical questions, which were designed to be unfamiliar to all participants and involved numerical values (e.g., How many days does it take Mars to finish a single orbit?; see Appendix B). Each fact was adapted to two statements that varied in only one numerical value (i.e., "as one of the solar system planets, Mars takes about *600 days* to finish a single orbit" and "as one of the solar system planets, Mars takes about *700 days* to finish a single orbit"; see Appendix B for complete list of items). As in Experiment 1, 12 facts were divided into 4 blocks. Each block contained 3 pairs of statements, presented by unspecified internet and a teacher, internet and a peer, a teacher and a peer respectively. The pairings of topics and statements with informants within each block, and the order in which the blocks appeared was counterbalanced between participants.

3.3. Procedure

The introduction and each informant's description was exactly the same as in Experiment 1, and children were probed about their

[1] Item analyses support that kindergarteners in particular were more likely to endorse the internet for items that involved factual statements than items involving more subjective statements (see supplemental Table S2).

online experience as in Experiment 1.

3.3.1. Ask trials

After hearing a very brief introduction to each fact statement (e.g., "Look, it is Mars"), participants were first asked whether they knew the answer of the fact statement (e.g., how many days do you think Mars takes to finish a single orbit?). None of the participants knew the answer to any of the questions. Then, participants indicated which of two informants they would ask the question (e.g., "If you were going to find out how many days Mars takes to finish a single orbit, which would you like to ask, the internet or the teacher?"; see Appendix B). There were a total of 12 trials. In order to maintain the children's attention and help them understand each question, the experimenter also presented a related photograph when the question was introduced.

3.3.2. Endorse trials

Following each ask trial, the experimenter presented two contrasting statements about a numerical fact that were attributed to two of the three informants (e.g., "Teacher says Mars takes about *600 days* to finish a single orbit; according to the internet, Mars takes about *700 days* to finish a single orbit"; translated from Chinese; see Appendix B). Participants were then asked to endorse one of the claims (i.e., "Now, how many days do you think Mars takes to finish a single orbit, *600* days or *700* days?"; see Appendix B). The same related photograph was also presented as when the question was introduced.

3.4. Results

3.4.1. Children's online experience

Following the procedure from Experiment 1, two independent raters coded and classified children's responses to the online experience questions. There was 100 percent agreement between coders. All children provided appropriate examples of obtaining information from the internet, a teacher and a peer. Twenty-eight kindergarteners reported watching videos online (2 additional children's recordings were incomprehensible or damaged). Sixteen second-graders only reported watching videos online, and 13 reported both watching videos and looking up information. As in Experiment 1, no child reported experience using social media. Children's online experience was also confirmed in interviews with their parents and teachers as in Experiment 1.

3.4.2. Ask trials

Preliminary analyses did not show an effect of gender (Kindergarteners: $ts < 1.99$, $ps > 0.06$; Second-graders: $ts < 1.81$, $ps > 0.08$) nor item order (Kindergarteners: $Fs < 0.61$, $ps > 0.70$; Second-graders: $Fs < 2.00$, $ps > 0.12$) on responses on ask trials, so we did not consider these factors in the rest of the analyses.

3.4.2.1. Internet versus alternate informants

Responses to ask trials were assigned one point for each time the children chose to ask the internet, yielding a score of 0–4 for each set of trials (internet vs. teacher and internet vs. peer). A 2 (Age: kindergarten, second-grade) × 2 (Alternate Informant: teacher, peer) ANOVA yielded a significant main effect of alternate informant, $F(1, 59) = 71.01$, $p < .001$, $\eta_p^2 = .546$. Bonferroni post-hoc analysis showed that kindergarteners and second-graders were more likely to seek information from the internet when the alternate informant was a peer ($M = 3.55$) than a teacher ($M = 1.90$). No other main effects nor interactions were significant, $F(1, 59) \leq 2.20$, $p \geq .144$, $\eta_p^2 \leq .036$; see Table 2.

Across ask trials where children chose between the internet and the teacher, neither second-graders nor kindergarteners displayed a preference for asking the internet or a teacher (Second-graders: $t(29) = 0.76$, $p = .455$, $d = 0.14$; Kindergarteners: $t(30) = 0.12$, $p = .905$, $d = 0.02$; see Table 2).

In the trials comparing the internet and a peer, both second-graders and kindergarteners asked the internet significantly more often than would be expected by chance (Second-graders: $t(29) = 19.20$, $p < .001$, $d = 3.51$; Kindergarteners: $t(30) = 5.90$, $p < .001$, $d = 1.06$).

There was no evidence for differences in the likelihood of seeking information from the internet between second-graders who reported experience looking up information online and second-graders without this experience (see Table S1 in Supplementary Materials).

3.4.2.2. Teacher versus peer

In the four trials where the informants were a teacher and a peer, kindergarteners and second-graders indicated that they would ask the teacher significantly more often than the peer (Kindergarteners: $t(30) = 15.58$, $p < .001$, $d = 2.80$; Second-graders: $t(29) = 17.90$, $p < .001$, $d = 3.27$; see Table 2). There was no difference between kindergarteners' and second-graders' choices, $t(59) = 0.83$, $p = .41$, $d = 0.22$.

3.4.2.3. Adults'choices

Preliminary analyses did not show an effect of gender ($ts < 1.28$, $ps > 0.21$) nor item order ($Fs < 0.76$, $ps > 0.59$) on responses on ask trials, so these factors were not considered in the rest of the analyses. Adults indicated that they would seek information from the internet at rates significantly more frequent than chance in the internet vs. teacher trials (chance = 2, $t(29) = 8.63$, $p < .001$,

$d = 1.57$) and in internet vs. peer trials ($t(29) = 26.49$, $p < .001$, $d = 4.83$). When choosing between the teacher and the peer, adults were more likely to ask the teacher, $t(29) = 3.88$, $p = .001$, $d = 0.71$.

3.4.3. Endorse trials

Preliminary analyses did not show effects of gender (Kindergarteners: $ts < 1.12$, $ps > 0.27$; Second-graders: $ts < 0.97$, $ps > 0.34$) nor item order (Kindergarteners: $Fs < 1.24$, $ps > 0.32$; Second-graders: $Fs < 2.57$, $ps > 0.053$) on responses in the endorse trials, so these factors were not considered further.

3.4.3.1. Internet versus alternate informants

Endorse trials were scored as in Experiment 1, yielding a total score of 0–4 indicating how many times the statement from the unspecified internet source was endorsed on each type of trial (internet vs. teacher and internet vs. peer). A 2 (Age: kindergarten, second-grade) × 2 (Alternate Informant: teacher, peer) ANOVA yielded a significant main effect of alternate informant, $F(1, 59) = 57.30$, $p < .001$, $\eta_p^2 = .493$, and an Age × Alternate informant interaction, $F(1, 59) = 4.20$, $p = .045$, $\eta_p^2 = .066$, but no significant main effect of age, $F(1, 59) = 2.59$, $p = .113$, $\eta_p^2 = .042$. Bonferroni post-hoc tests revealed that statements from the internet were more likely to be endorsed when the alternate informant was a peer ($M = 3.21$) than a teacher ($M = 1.67$). Further analysis of the interaction using simple effects tests indicated that both kindergarteners and second-graders were more likely to endorse statements from the internet when the alternate informant was a peer than when it was a teacher (Kindergarten: $F(1, 59) = 15.50$, $p < .001$; Second-grade: $F(1, 59) = 45.50$, $p < .001$).

When choosing between statements from the unspecified internet source and the teacher, second-graders' and kindergarteners' endorsements did not differ significantly from chance (chance = 2; Second-graders: $t(29) = 1.49$, $p = .148$, $d = 0.27$; Kindergarteners: $t(30) = 1.30$, $p = .204$, $d = 0.23$; see Table 2). In trials involving statements from the internet and the peer, kindergarteners and second-graders endorsed the statements from the internet at above-chance levels (Kindergarteners: $t(30) = 4.03$, $p < .001$, $d = 0.73$; Second-graders: $t(29) = 11.38$, $p < .001$, $d = 2.08$; see Table 2).

As in Experiment 1, there was no evidence that second graders who had experience searching for information online were more likely to endorse statements from the internet (see Table S1 in Supplementary Materials).

3.4.3.2. Teacher versus peer

In the teacher vs. peer trials, children endorsed the statements made by the teacher at rates well above chance (chance = 2; Kindergarteners: $t(30) = 9.32$, $p < .001$, $d = 1.67$; Second-graders: $t(29) = 13.38$, $p < .001$, $d = 2.44$). There was no difference between kindergarteners and second-graders' choices, $t(59) = 1.09$, $p = .28$, $d = 0.28$.

3.4.3.3. Adults' choices

Preliminary analyses did not reveal effects of gender ($ts < 1.46$, $ps > 0.16$) nor item order ($Fs < 2.15$, $ps > 0.09$) on responses in the endorse trials, so these factors were not considered further. Adults endorsed the answers coming from the internet at rates significantly higher than chance in the internet vs. teacher trials (chance = 2, $t(29) = 2.97$, $p = .006$, $d = 0.54$) and in internet vs. peer trials ($t(29) = 8.57$, $p < .001$, $d = 1.57$). Across four trials where adults chose between the teacher and the peer, they were more likely to endorse the teacher, $t(29) = 7.35$, $p < .001$, $d = 1.35$.

3.4.4. Comparisons between Experiment 1 and Experiment 2

To further investigate whether differences between the nature of the statements used in each experiment impacted children's judgments about information from the informants, a 2 (Experiment) × 2 (Age) ANOVA was conducted for the endorse trials for each combination of informants.

3.4.4.1. Internet versus teacher

In trials comparing statements from the internet and the teacher, an ANOVA yielded a significant main effect of age, $F(2, 117) = 4.58$, $p = .034$, $\eta_p^2 = .038$. Bonferroni post-hoc analysis showed that second-graders ($M = 1.52$) were less likely to endorse testimony attributed to the unspecified internet source than kindergarteners ($M = 1.97$). There was no significant main effect of experiment, $F(1, 117) < 1$, $p > .10$, $\eta_p^2 < .01$, the experiment by age interaction was not significant either, $F(1, 117) = 3.17$, $p = .078$, $\eta_p^2 = .026$.

3.4.4.2. Internet versus peer

When statements were attributed to the internet or a peer, there was a significant main effect of Experiment, $F(1, 117) = 48.29$, $p < .001$, $\eta_p^2 = .292$, children were more likely to endorse the internet in Experiment 2 ($M = 3.22$) than in Experiment 1 ($M = 1.98$). There was also a main effect of age ($F(1, 117) = 6.80$, $p = .010$, $\eta_p^2 = .055$). Post-hoc Bonferroni tests showed that second-graders ($M = 2.83$) were more likely to endorse the internet over a peer than kindergarteners ($M = 2.37$). The interaction was not significant, $F(1, 117) = 2.79$, $p = .097$, $\eta_p^2 = .023$.

3.4.4.3. Teacher versus peer

In the teacher and peer informant trials, there was a significant main effect of Experiment, $F(1, 117) = 50.86$, $p < .001$, $\eta_p^2 =$

.303, but no main effect of age, $F(1, 117) = 0.06$, $p = .815$, $\eta_p^2 < .001$. The interaction between Experiment and age was not significant, $F(1, 117) = 1.96$, $p = .164$, $\eta_p^2 = .016$. As a whole, children were more likely to endorse the teacher in Experiment 2 ($M = 3.53$) than Experiment 1 ($M = 2.22$).

3.5. Discussion

Overall, 5- to 6-year-old kindergarteners and 7- to 8-year-old second-graders endorsed the teacher's statements more often than the peer's statements in Experiment 2. This suggests that when faced with judgments about specific numerical values associated with scientific and historical information, children are more likely to realize the limited knowledge of their peers and seek out information from a teacher (see VanderBorght & Jaswal, 2009).

Additionally, in Experiment 2, both kindergarteners and second-graders showed greater trust in unspecified internet source over a peer. This may be because children regard the internet as an information source which contains a wider range of knowledge than their peers, a possibility supported by prior work suggesting that children were more likely to trust an adult who provided diverse information than one who provided non-diverse information (Landrum, Cloudy et al., 2015; Landrum, Eaves et al., 2015). The results also suggest that children can use the same heuristics that they use to evaluate the reliability of two known individuals (e.g., two adults) to reason about the credibility of two different types of information sources (e.g., the unspecified internet source and a peer), which provides support for the idea that children's source evaluation strategies are domain-general.

As for college students, the results in Experiment 2 were inconsistent with the finding in Experiment 1 that adults endorsed statements from an unspecified internet source and a teacher equally. Confronted with questions and statements involved only scientific and historical information, college students were more likely to seek out and endorse information from an unspecified internet source than a teacher. One possible explanation might be that college students believed that although their teachers (i.e., college professors) could be viewed as a reliable information sources, their knowledge base is not as large as an internet source and their memory could not be less reliable or precise than information available on a website. Therefore, when facing questions focused on specific facts and numerical values, college students were more likely to trust an unspecified internet source.

4. General discussion

The current experiments are among the first to examine children's preferences for and endorsement of statements from informants from different categories. We explored 5- to 6-year-old kindergarteners', 7- to 8-year-old second-graders', and college students' trust in three informants: an unspecified internet source, a teacher, and a peer. When the statements involved trivia from a broad range of domains and included facts that children might think they knew or could directly observe (Experiment 1), kindergarteners did not show consistent endorsement of statements from any of the informants and second-graders only showed a preference for endorsing statements from a teacher over those from the internet. When the statements were about objective, numerical values associated with scientific and historical information (Experiment 2), both kindergarteners and second-graders were more likely to say that they would seek out answers from the internet or a teacher than from a peer, and their endorsements showed the same pattern. In contrast, adults showed greater trust in the internet or a teacher than a peer across both experiments, and they also trusted the unspecified internet source more than a teacher when evaluating statements about scientific and historical facts in Experiment 2.

Taken together, our findings suggest that school age children can reason about the reliability of information sources from different categories and that their judgments are sensitive to the type of information being sought. Just as children can be skeptical when making judgments about the reliability of different people (see Mills, 2013), children's belief in information from the internet is not immutable. Rather, children's assessment of the trustworthiness of an internet-based source may depend on the circumstances. For instance, when the information in question involves specific numerical values associated with scientific phenomena that children cannot directly observe, children are more likely to rely on the internet, but when the information is from other domains (e.g., information that seems more accessible or that can be directly observed), they do not view the unspecified internet as more trustworthy than a peer. Children may also consider facts about specific quantities or dates, such as those in Experiment 2, to be more reliably addressed by the internet that facts about behaviors and appearances, such as those in Experiment 1. That said, additional research is needed to examine how the nature and domain of the information at hand, and children's prior familiarity with the information, may play into children's evaluations of the reliability of different informants (see also Danovitch & Keil, 2007).

Prior work on the development of epistemic trust suggests that children use at least two distinct strategies when selecting between informants who provide conflicting information. The first is to focus on their epistemic goals by making judgments based on the informants' previous accuracy or the extent of their knowledge (see Harris, 2012 for a review). The second is to focus on social identity which can help children establish and maintain positive social relationships. In these cases, children show greater trust in informants who are familiar, or who share features, such as an accent or group membership, with them (e.g., Corriveau & Harris, 2009; Corriveau, Kinzler, & Harris, 2013). In the current experiments, when children chose between endorsing statements from the internet or a peer, children's preference for the internet (in Experiment 2) suggests that they put more weight on epistemic characteristics than social ones. However, across both experiments, children showed similar levels of endorsement of statements from the internet and a teacher (as did adults in Experiment 1), which may reflect a view of both informants as similarly capable of answering questions. This finding might also suggest that participants' socially driven desire to treat the teacher as an intellectual authority compensated for the teacher's potential epistemic limitations in comparison to the internet source.

In addition, our findings indicate that there are major differences in how children and adults treat information from the internet. One possible explanation for this age difference may be a function of increasing exposure to the diverse types of information available

on the internet and a growing appreciation of the epistemic capacity of the internet. In the current study, information from the internet was described as information from online video and news websites (including information from a popular search engine) to fit children's limited practical online experience. Adults are more likely to realize the complexity of the internet (Yan, 2005, 2006) and understand the value of the internet in terms of access to much more information than any person could know. Likewise, there may also be less variability in how adults conceptualize the internet and its capabilities. Another possible explanation might be that as children mature into adults, they gain a greater understanding of deception, and realize that intentions and motivations could influence a human informant's reliability (see Mills, 2013 for a review). Thus, adults show less trust in other humans, even if they are teachers. Finally, differences in adults' and children's judgments may also depend on differing views of the consequences of endorsing the wrong answer. Choosing the wrong answer to the questions in our experiments may not have seemed very consequential for children, but adults may have more experience with situations where endorsing incorrect information may be costly (e.g., in a college course or a job setting). Thus, adults may place more emphasis on a source's likely accuracy than on maintaining social bonds or respecting authority.

Our findings suggest that Chinese children may experience a tension at times between trusting a familiar adult or the internet[2], which could have implications for their learning. Although all of the children in our studies had experience with the internet, relatively few reported having searched for information online. Given that even college students struggle to evaluate information found online (Mason, Boldrin, & Ariasi, 2009), elementary school children may benefit from explicit instruction about the nature of the internet and from teacher-guided examples of how to use the internet to obtain information. One of the practical implications of our findings is that young children may be reluctant to choose alternate types of information sources over a familiar, trustworthy adult, and that it may be necessary to support them or explicitly instruct them that there are benefits to seeking out information from different types of sources. For example, watching a teacher or a parent model an online information search and apply appropriate criteria to evaluating the results (e.g., looking for the author of a website; see Mason, Junyent, & Tornatora, 2014) could be an effective way of introducing children to the concept that the internet can provide information that even an knowledgeable adult would not know.

Since the internet is unlike all other information sources in terms of the quantity and speed at which information can be accessed (Gerjets & Hellenthal-Schorr, 2008), and children are not adept at evaluating the reliability of online information (Kuiper, Volman, & Terwel, 2008), it is important for educators and caregivers to translate and filter online information for their children (especially for younger children). However, in the present experiments, when children's parents were interviewed, none of them indicated that they would always accompany their children while the children viewed online videos via PC or other portable electronic devices. In most cases, Chinese children just go online by themselves. Given that instructional interventions can be effective at improving children's evaluation behavior (Mason et al., 2014), it would be interesting to examine whether encouraging parent's filtering or translation of information from internet sources influences children's trust in the internet in the future.

One potential limitation of the current studies is that the statements in question involved trivia or scientific and historical facts which were designed to be novel to the Chinese children who participated. Although related photographs were used to help children visualize and understand these statements, we did not directly measure children's comprehension of the statements. Recent evidence supports that, compared to children already had some background knowledge about a target question (though they still did not know the answer), 5- to 7-year-old children who were naïve about a target question were more likely to ask a teacher who could provide exhaustive information (Gweon, Shafto, & Schulz, 2018). Similarly, it is possible that, in our studies, children who lacked background knowledge about the statement topic or who could not fully comprehend the statements were more likely to seek out answers from the internet for its abundance of information (in the ask trials of Experiment 2). However, had the statements involved more familiar topics, children may have been more likely to trust individuals who could efficiently provide an accurate answer (i.e., a teacher) than information sources that could access a broader range of knowledge. Consequently, future research might investigate whether children's familiarity with and comprehension of the topics in question relate to the strategy they use to determine which information source they ask or endorse.

Another potential limitation is that unlike children's limited online experiences, adults' forms of internet use were much more diverse. Therefore, college student participants may have viewed the unspecified internet source as potentially including a vast collection of websites or videos while they considered a teacher to be a specific known individual (i.e., their college professor). Given the great variability in the credibility of information found online, future studies might only focus on college students and investigate their epistemic trust in a teacher versus one specific kind of internet source (e.g., information published by governmental institutions, or advertisements from a commercial site).

Finally, it is important to note that the participants in this study were Chinese children. Given that "honoring the teacher" and respecting authority is deeply emphasized in Chinese socio-cultural traditions, children's trust in the teacher may have reflected socio-cultural practices and expectations rather than a genuine belief that the teacher was more likely to be accurate. It would be informative for future research to compare trust in teachers or internet-based sources among Chinese children and children in other cultures where questioning the teacher's and adults' authority is a more socially acceptable practice. In Western culture, associated with Socratic ideals for learning, children are encouraged to question their own and others' beliefs and evaluate others' knowledge (see Tweed & Lehman, 2002 for a review). Parents of Western children also tend to raise more why-questions in the interactions with

[2] In Experiment 2, we calculated the number of inconsistencies in responses between the ask and endorse trials. These inconsistencies were most prevalent in the internet vs. teacher trials, suggesting that participants were uncertain about which informant's response to endorse even after indicating a preference to ask one of the informants (see supplemental Table S3).

their children (Gauvain, Munroe, & Beebe, 2013), which might be more conducive to the development of argumentation skill. Consequently, Western children may be more likely to realize the limited knowledge of human informants and a Western sample may put more weight on epistemic factors and show greater trust in the internet than a teacher or a peer.

The results of the current study suggest that school-aged children exhibit flexible trust in an unspecified internet source, teacher, and peer. Moreover, trust in statements from the internet may be affected by the type of information being evaluated, such that an unspecified internet source is considered more credible in some domains (e.g., scientific and historical facts) and for certain types of information (e.g., numerical values) than others. As an initial foray into the development of children's judgments about the reliability of information from the internet and known individuals, these findings offer an insight into the factors that influence children's trust in the internet, and provide a foundation for future research focusing on how children's experience with and understanding of novel information sources, such as the internet, influences their preferences and judgments.

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Appendix A

Table A1

Table A1
Twelve questions used in Experiment 1 (Translated from Chinese).

Block	Statement 1	Statement 2	Test
1	Most Americans like yellow best.	Most Americans like purple best.	What color do you think American like best, yellow or purple?
	Thumb nail grows the slowest.	The middle finger nail grows the slowest.	Which finger nail do you think grows the slowest, the numb or the middle finger?
	All polar bears like using their right hand.	All polar bears like using their left hand.	Which hand do you think polar bears like to use, right or left?
2	American use toothpicks most often.	German use toothpicks most often.	Who use toothpicks most often, American or German?
	The color of lobster's blood is blue.	The color of lobster's blood is green.	What color do you think lobster's blood is, blue or green?
	When eating bananas, people are more likely to be bitten by mosquitoes.	When eating apples, people are more likely to be bitten by mosquitoes.	Which fruit makes people more likely to be bitten by mosquitoes, banana or apple?
3	The cat has more fingers on its back paws.	The cat has more fingers on its front paws.	Which paws do cat has more fingers on, back paws or front paws?
	Magpie is the only kind of bird which can distinguish blue from other colors.	Owl is the only kind of bird which can distinguish blue from other colors.	Which kind of birds can distinguish blue from other color, magpie or owl?
	Girl's hearts beats faster.	Boy's hearts beats faster.	Whose heart beats faster, girl or boy?
4	Information is better remembered when it was heard by the right ear.	Information is better remembered when it was heard by the left ear.	Through which ear do you think the information heard is better remembered, the right ear or the left ear?
	The first bottle of cola in the world is blue.	The first bottle of cola in the world is green.	What color do you think the first bottle of cola is, blue or green?
	The earth moves around the sun faster in winter.	The earth moves around the sun faster in summer.	Which season does earth move around the sun faster, winter or summer?

Appendix B

Table B1

Table B1
Twelve scientific and historical facts used in Experiment 2 (Translated from Chinese).

Block	Ask Trials	Endorse Trials
1	If you are going to find out how many days Mars takes to finish a single orbit, who would you like to ask, ×× or ××?	×× says Mars takes about 600 days to finish a single orbit; ×× says Mars takes about 700 days to finish a single orbit. Now, how many days do you think Mars takes to finish a single orbit, 600 days or 700 days?
	If you are going to find out how many layers in the earth, who would you like to ask, ×× or ××?	×× says the earth is constituted with 4 layers; ×× says, the earth is constituted with 5 layers. Now, how many layers do you think earth is constituted with, 4 layers or 5 layers?
	If you are going to find out how many years mammoth have existed, who would you like to ask, ×× or ××?	×× says mammoth have existed for 4.5 million years; ×× says mammoth have existed for 4.6 million years. Now, how many years do you think mammoth have existed for, 4.5 million years or 4.6 million years?

(*continued on next page*)

Table B1 (*continued*)

Block	Ask Trials	Endorse Trials
2	If you are going to find out how many teeth each person has, who would you like to ask, ×× or ××?	×× says each person has 34 teeth; ×× says each person has 36 teeth. Now, how many teeth do you think each person has, 34 teeth or 36 teeth?
	If you are going to find out what their body temperature is, who would you like to ask, ×× or ××?	×× says bird's temperature is 40 degrees Celsius; ×× says bird's temperature is 42 degrees Celsius. Now, what do you think bird's temperature is, 40 degrees Celsius or 42 degrees Celsius?
	If you are going to find out how many days the seeds of sunflowers take to germinate, who would you like to ask, ×× or ××?	×× says the seeds of sunflowers take about 8 days to germinate; ×× says the seeds of sunflowers take about 10 days to germinate. Now, how many days do you think the seeds of sunflowers take to germinate, about 8 days or 10 days?
3	If you are going to find out how many bones your hands consists of, who would you like to ask, ×× or ××?	×× says one hand is composed of 26 thin bones; ×× says one hand is composed of 27 thin bones. Now, how many thin bones do you think your hand consists of, 26 thin bones or 27 thin bones?
	If you are going to find out how many years the origin of India can be traced back to, who would you like to ask, ×× or ××?	×× says the origin of India can be traced back to 4200 years; ×× says the origin of India can be traced back to 4500 years. Now, how many years do you think the origin of India can be traced back to, 4200 years or 4500 years?
	If you are going to find out the exact date when the contour of the moon is like this image, who would you like to ask, ×× or ××?	×× says the shape of the lunar in Jan. 2nd is like this image; ×× says the shape of the lunar in Jan. 28th is like this image. Now, in which date do you think the contour of the moon is like this image, Jan. 2nd or Jan. 28th?
4	If you are going to find out how large Australia is compared to the other countries in the world, who would you like to ask, ×× or ××?	×× says Australia is the 6th largest country in the world; ×× says Australia is the 7th largest country in the world. Now, how large do you think Australia is compared to the other countries, the 6th or the 7th?
	If you are going to find out how many muscles each person has, who would you like to ask, ×× or ××?	×× says each person has around 500 muscles; ×× says each person has around 600 muscles. Now, how many muscles do you think each person has, about 500 muscles or about 600 muscles?
	If you are going to find out how long the plane has been invented, who would you like to ask, ×× or ××?	×× says the plane has been invented for 110 years; ×× says the plane has been invented for 120 years. Now, how long do you think the plane has been invented, for 110 years or for 120 years?

Appendix C. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.cogdev.2019.05.006.

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