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To Trust or not to Trust? Children's Social Epistemology

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Abstract Philosophers agree that an important part of our knowledge is acquired via testimony. One of the main objectives of social epistemology is therefore to specify the conditions under which a hearer is justified in accepting a proposition stated by a source. Non-reductionists, who think that testimony could be considered as an a priori source of knowledge, as well as reductionists, who think that another type of justification has to be added to testimony, share a common conception about children development. Non-reductionists believe that infants and children are fundamentally gullible and their gullibility could be seen as an example for justifying testimony, while reductionists believe that this gullibility is merely an exception that should be taken into account. The objective of this paper is to review contemporary literature in developmental psychology providing empirical grounds likely to clarify this philosophical debate. What emerges from current research is a more elaborated vision of children's attitude toward testimony. Even at a very young age, children do not blindly swallow information coming from testimony; doubtful or contradictory information is automatically screened by their cognitive system. Even if they are unable to give positive reasons for the acceptance of a given testimony, young children are not gullible. Such empirical findings tend to call into question the radical opposition between reductionism and non-reductionism.

1 Introduction

The most obvious realities tend to go unnoticed. Thus, philosophers and social scientists have long neglected the fact that most of our beliefs, even our most cherished, have not been acquired through personal observations or inferences but through *testimony*, i.e. via a proposition communicated by a source (person, institution, media, etc.). Philosophers have recently made up for their previous intellectual blindness, probably under the influence from dynamic sociology and the history of sciences (Latour and Woolgar 1986; Latour 1988; Shapin and Schaffer 1989; Shapin 1995). Alvin Goldman, among contemporary philosophers, criticizes

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traditional epistemology, that «was highly individualistic, focusing on mental operations of cognitive agents in isolation or abstraction from other persons» (Goldman 1999, p. 4). In the same vein, Kitcher emphasizes that, given the organization of scientific labor, trust in others is essential to scientists' activities (Kitcher 1995, p. 304). Indeed, the stated aim of social epistemology is to describe «the type of practices that might contribute to increase knowledge through testimony» (Goldman 1999, p. 103).

More specifically, a dedicated literature on trust and testimony has flourished in philosophy. The main issue is the status of beliefs acquired via testimony; when someone tells me about something that I have not personally observed, to what extent am I entitled to accept what this person tells me (Goldman 2006)? On the one hand, the teller could be wrong, intentionally or not, and the communicated information might not have the epistemic status of something that others could personally experience. On the other hand, as Sosa says, «We rely on testimony for our grasp of history, geography, science and more» (Sosa 1994, p. 57). We are therefore intuitively ready to consider that a certain part, at least, of our knowledge acquired through testimony is legitimate.

In a nutshell, the current debate opposes partisans of two opposite paradigms (Origgi 2004). The reductionists proclaim their Humean inheritance and state that we always need to have some appropriate non-testimonial positive reasons for accepting a speaker's report (Fricker 1987, 1995, 2006; Hume 1975). On the contrary, non-reductionists are descendants of Thomas Reid and claim that beliefs acquired merely on the basis of a speaker's testimony could be justified *per se* (Burge 1993; Coady 1995; Goldman 1999; Reid 1983; Weiner 2003).

Often, philosophers engaged in both sides of the controversy appeal to the children's cognitive development in their argumentation. Burge (1993), for example, uses the paradigmatic case of language to show that, without a kind of primitive trust, children would not be able to join their linguistic communities. Children, therefore, accept transmitted information *instinctively* (Burge 1993, p. 467). This belief in intuition is shared by Elisabeth Fricker (1995), who believes that each of us has been through a process of development that begins with an attitude of *simple trust*. Reductionists tend to agree that children earn a special epistemological treatment because even if they do not have yet reasons for accepting or rejecting what is said to them, they could nevertheless acquire knowledge through testimony (Lackey 2005).

Interestingly, few philosophers take into account the literature generated by the developmental psychologists[1]. It must be said in their defense that an individualistic

[1] An interesting exception is Goldberg (2008), although this demonstrates the complexity of interdisciplinary work. One problem is that psychological studies are interpreted with specific theoretical lenses that tend to twist the results. For example, Goldberg recruits one of our studies (Clément et al. 2004) to illustrate his conception of the cognitive immaturity of children. For him, «children exhibit simple (uncritical) trust in the so-say of others» (2008, p. 1). In this context, our results would prove that, before 3 to 4 years of age, «children exhibit a high degree of "indiscriminate trust"» (2008, p. 2). But, in our paper, «indiscriminate trust» means that younger children were not able to discriminate between the more reliable of two sources in order to acquire new information. Contrary to Goldberg's opinion, in this paper we will demonstrate that research in developmental psychology does not show that children systematically demonstrate uncritical trust—in fact, we believe the opposite is closer to the truth. Beside this, Goldberg proposes an interesting hypothesis about the role of the social environment of children who live in a «pre-screened environment,» with «pro-active monitoring» by their caregivers. This is an interesting idea, although based on a rather questionable western middle class image of the ideal family. (For a more realistic and cross-cultural perspective, see Rogoff 1990).

stance has prevailed for a long time in developmental psychology. Building on the work of Piaget, psychologists aimed to describe the way children construct, on their own, models and theories about the causal structures of the world, whether they be physical, biological, or social. According to Paul Harris, this perspective describes children's development as a long and essentially lonely «March toward a more veridical representation of the world» (Harris 2001, p. 248). Because most of the empirical and theoretical research share a more or less explicit view of the child as a little scientist (Gopnik and Wellman 1992; Gopnik and Meltzoff 1998), the fact that children, like the adult scientists described by social epistemology, largely depend on the information transmitted by different kinds of experts could not stay unnoticed for long. «Checking our sources: The origins of trust in testimony» (Harris 2002) could be viewed as a landmark in the construction of a new and burgeoning research domain.

One of the objectives of this paper is to present an overview of the main studies that investigate the ways that children react to the constant waves of information communicated to them, both directly and indirectly. To organize our presentation of this growing literature, we will focus on a central question: How do children filter the information communicated directly and indirectly to them? Are they able to discriminate reliable (i.e., leading to true beliefs) versus unreliable sources of information? We will begin by summarizing the two main positions about the origin of skepticism and credulity, starting with what we know about phylogeny. We will then describe the experimental results in order to present what we currently know about naive social epistemology. Finally, we will see how this experimental literature could shed some light on the philosophical debate on the epistemic status of transmitted knowledge.

2 The Phylogenesis of Skepticism

The importance of culture to many forms of life, not just to the human species, is widely accepted and is now assessed in biological terms. Ethologists in particular are giving more and more importance to culture, which is defined as information transmitted through non-genetic means (via social learning) among members of a group (Boesch and Tomasello 1998; Richerson and Boyd 2005; Van Schaik et al. 2003). The fact that humans, born at an earlier stage of development than other species, are more dependent upon others to survive, as well as the importance of adapting to the symbolic systems of their culture, in particular language, make human beings particularly prone to becoming the receptacle of numerous representations that have not been acquired through personal perceptions or investigations. To the extent that a great number of these representations will then be held as true and thus orient behaviors and inferences, it is important to see how there are processed by our cognitive system.

One hypothesis, closely linked with the non-reductionist perspective (Reid 1983), insists on the adaptive character of credulity. Since children need to acquire a large number of beliefs in order to survive in their natural and social environments, it is essential for them to absorb the representations that are communicated to them. According to Reid, this adhesion is unproblematic because of two principles that

Nature (or God) implemented in us: the veracity principle, or the propensity to speak the truth, and the credulity principle, or the propensity to believe what others tell us (Reid 1983, p. 197). According to this conception, the information we obtain via communication is not fundamentally different from that obtained via perception. Ruth Millikan and other philosophers defend a similar position by claiming that language, like light, is a direct medium of perception (Millikan 1998). In psychology, interesting experiments performed by Daniel Gilbert and his colleagues tend to show that communicated propositions, as soon as they are internally represented, are immediately held as true by the cognitive system. It is only in a second step that this information could be discarded; if cognitive energy is low or is recruited for another task, then the communicated information will become part of the individual's beliefs (Gilbert 1991, 1993). In this perspective, humans are therefore credulous by nature. A certain kind of suspicion could emerge through life's vicissitudes, but the default position of our beliefs and acquisition devices is to spontaneously integrate communicated representations into our stock of beliefs.

This position contrasts sharply with what could be called the Machiavellian hypothesis (Byrne and Whiten 1988). Inspired by evolutionary theory, this perspective emphasizes the risk of credulity as a default position. Natural selection is a matter of competition and, in certain contexts, it is particularly advantageous *not* to transmit the truth but to transmit information that is more beneficial to the transmitter (Krebs and Dawkins 1984). In an environment that includes potential cheaters, it is therefore reasonable to think that lineages of individuals that were able to evolve mechanisms to block potential deception were favored by selection (Cosmides and Tooby 1989; Cosmides et al. 2005; Sperber 2001). From that evolutionary perspective, it would be surprising if humans adopted an indiscriminate trust. It would be disastrous if the knowledge base were causally linked to symbolic input, like language. Because linguistic statements could be unreliable—informants can make mistakes and their interests are not always to tell the truth—and are subject to frequent errors of interpretation, our knowledge base would become alarmingly unstable (Perner 1991).

Given the relative incompatibility of these two theses, empirical research in developmental psychology is particularly relevant. If humans do inherit a specific «filtering device» for sorting out communicated information, one can expect it to be effective in a relatively early stage of development.

3 Counting on Others: The Case of Language Acquisition

One domain in which children's credulity is especially plausible is language acquisition. After all, even if acquiring and using language depends on complex cognitive abilities (Pinker 1996), words themselves are conventional. Children do not have a choice about whether to say *dog*, *hund*, or *chien* for the animal that is barking in the street.

However, children are not without resources even in the extreme situation in which they are completely dependent on the labeling performed by seemingly competent speakers. First, let's highlight an ecological point; the probability of being fooled during the language acquisition process is relatively low. Speakers do not

have much interest or motivation to deceive children by providing them with false labels, except maybe in teasing situations. On the contrary, we could even say that in order to be able to deceive in the future, speakers have an interest in leading children to share a common vocabulary with them. From an ecological perspective, it is noteworthy that infants usually learn language from their parents, who wish the best for them and do not have any reason to intentionally transmit a twisted language to them. Second, even in building up their linguistic repertoire, which draws from multiple sources, children are not blind to speakers' characteristics. For example, when they have the choice to learn a new word from a speaker who expresses knowledge or a speaker who expresses ignorance, 3-and 4-year-old children demonstrate better learning when the speaker is knowledgeable (Sabbagh and Baldwin 2001). We will present more examples of this kind of phenomena later on.

If language acquisition is such an interesting entry to the problematic of children's credulity, it is also because of what happens *after* a child associates a word with a referent. Indeed, a checking mechanism appears to be in place in children's cognitive system from a very early stage. Roy Pea was able to show that most 2- to 3-year-old children spontaneously correct speakers' statements when a different name is used for a known referent (Pea 1982). Melissa Koenig and Catharine Echols went even further by conducting clever set of studies with 16 month-old infants. In one of the scenarios, infants heard either true or false labeling of common objects coming from a human speaker seated next to the infant. Interestingly, these infants looked significantly longer at the speaker when she falsely labeled the objects than when she truthfully labeled them[2]. These results seem to indicate the infants were surprised by the false labels and tried to resolve the conflict by looking at the face of the speaker. Moreover, nearly all infants made explicit attempts to interrupt and repair those incorrect statements (Koenig and Echols 2003).

These results point to the existence of a checking process that compares, from a very early age, incoming information with information already possessed by the cognitive system. When a conflict arises, children express surprise and seek complementary information to resolve the mismatch. If such a system exists, it would speak in favor of an early system of defense against potentially dubious or deceptive communication. However, until now, the evidence we had for these kinds of processes was limited to language acquisition. One could argue that the results do not really concern trust in general but are closely connected to specific properties of language itself, which rely by definition on communication.

4 Mechanisms of Caution

To prove the existence of an mental mechanism that checks for incompatibilities by comparing incoming information with information already considered as true by the organism, it is therefore important to show that this kind of mechanism can be generalized to other cognitive domains that are not dependent upon language and

[2] In another scenario, an electronic audio speaker replaced the human false labeler. This time, children did not show a similar behavior of paying more attention to a speaker that falsely labeled an object, indicating that information obtained from people is processed differently than information that just happens to be available.

word acquisition. A good example would be a scenario where a belief that has been acquired through perception, for example, is contradicted by what a speaker is expressing about the very same object, event, or property.

Such a scenario was elaborated and tested with 3- and 4-year-old children (Clément et al. 2004). The experimental design belongs to what could be called the reliability paradigm. Two stuffed animal puppets were introduced to a group of children. During the training phase, the children observed that one of these puppets consistently named familiar objects that were placed in front of the puppet correctly, whereas the other puppet consistently stated that these same objects were something else (a fork was named a spoon, for example). At a certain point in the experiment, the children were able to see the color of a ball (*red*), which was then placed into a closed box. The two puppets entered the scene and looked into the box. The experimenter asked them about the color of the ball that they just saw in the box. The unreliable source said the ball was *green* and, this time, the reliable source that it was *blue*. Children were therefore confronted with contradictory information coming from different channels. Through their own perception, they formed the belief (only seconds before) that the ball in the box was red; through communication, they should form the belief that the ball was blue. The results showed that a vast majority (about 80%) of both 3- and 4-year-olds rejected the proposition of the apparently reliable source and stuck to their initial perceptual judgment.

This experiment, combined with others, seems to confirm the existence of a checking mechanism that restrains children from having total faith in informants, even if these informants have been trustworthy in the past. Nevertheless, the significance of these results has to be qualified. First, it is an understatement to say that the sources used were not especially prestigious (a stuffed frog and a stuffed mouse). In real life, testimony is often provided by impressive role bearers or affectively significant others; many more studies have to be conducted in order to better understand the impact that those sources could have on young children's credulity. Second, human cultures are remarkable precisely because they include many propositions that people consider as true, even if they contradict representations that are provided by perceptions or common sense.

5 Not All Beliefs are Equal: The Case of Cultural Beliefs

If we want to give some weight to the idea that, after all, children are not that credulous, we have to face an implicit consensus that is widespread among social scientists. Indeed, the idea that children fully absorb the culture of the group they are born into is still very much prevalent in social sciences. The standard social science model (SSSM), as Cosmides and Tooby called it, considers that infants are fundamentally blank slates, with very rudimentary cognitive equipment that is essentially mobilized to the learning of culture (Tooby and Cosmides 1992). In SSSM, the complexities of adult mental organization are generated by the process of social transmission, the main task of which is to ensure that individual minds are correctly molded by the symbols and practices of their group.

Such a model not only presupposes cognitive abilities that are largely refuted by contemporary research but also assumes that individuals blindly adhere to the

cultural representations of their community. This conception has been criticized by cognitive anthropologists who borrowed concepts and methodology from experimental psychology. One of the most recent and relevant examples has been proposed by Rita Astuti, who studied the conception of inheritability by the Vezo from Madagascar (Astuti 2007). These latter are well known in the anthropological literature for being apparently impervious to the distinction between the facts of biology and the facts of sociality (Astuti and Carey 2004). Astuti used the adoption task, a scenario where an experimenter asks questions about some properties of a baby born to one set of parents and raised by another. If the Vezo cultural system and its way of thinking and processing information constitute a unique system, the Vezo adults should respond that the adopted baby would resemble the adoptive parents in terms of all or almost all traits—their culture explicitly describe inheritance that way. However, Vezo adults clearly discriminated between causal mechanisms that concern generating children and those mechanisms that concern their nurture (see also Astuti et al. 2004). Cultural beliefs were therefore not recruited in the inferences used by the subjects to answer the anthropologist/psychologist's questions.

Dan Sperber has highlighted this relative discrepancy between cultural beliefs and what individuals believe (Sperber 1982, 1996). Indeed, it is already noticeable in word learning. Numerous words are not fully understood by children, such as *molecule, death*, or *holy spirit*. Yet children have the ability to keep for later use a body of semi-understood concepts that could be filled in with semantic content later on (Atran and Sperber 1991). This ability is available to humans because they are able to represent representations themselves, that is, to have *metarepresentations* (Sperber 2000). Thanks to this cognitive ability, they can hold a belief without fully understanding it [3]. For example, a proposition like «God is almighty» can be, as a bracketed proposition, considered as true when delivered by a trustworthy speaker, even if the propositional content remains somewhat mysterious (Sperber 1985). Since the belief is not about reality itself but about a representation, it does not have the same inferential consequences as other representations held to be true (Sperber 1997). For example, believers, even if they consider God as almighty, will usually try to act in an appropriate way in order to obtain a desired outcome instead of waiting for its realization through some mystical procedure. Other anthropologists have used this decoupling process to indicate that exotic people are not intrinsically irrational; they are perfectly aware that their religious entities, for example, possess counterintuitive properties (Boyer 1994). Indeed, Boyer and Sperber posit that it is precisely because of their counterintuitive properties that religious entities are good candidates for stable and widely distributed cultural representations (Boyer 2002; Sperber 1985).

Interestingly, recent studies carried out by Paul Harris and his colleagues demonstrate that children are quite capable of discriminating different entities whose existence depends entirely on testimony (Harris et al. 2006). For example, 4- to 8-year-old children were asked «Is there really ___ in the world?» about five

[3] Note that this Sperberian account tends to consider partially understood concepts as somewhat cognitively undermined. Tyler Burge considers that partial understanding is a pervasive and inevitable phenomenon and that many of our concepts, as adults, are never completely understood (Burge 1979).

different kinds of entities: real entities (e.g., cats, trees), scientific entities (e.g., germs, oxygen), culturally endorsed beings (e.g., the Tooth Fairy, Santa Claus), equivocal beings (e.g., monsters, witches), and impossible, illogical entities (e.g., flying pigs, barking cats). The results show that a broad dichotomy is made between entities and beings that children claim to exist (real entities and scientific entities) and those that they deny existence (equivocal beings and impossible entities). Fine-grained distinctions are also made among the invisible entities that the children assume to exist: the existence of scientific entities such as germs is endorsed with more confidence than endorsed beings such as Santa Claus (Harris 2007). This differential ontological confidence is coupled with a high sensibility to context. For example, children who are questioned about death are more inclined to answer that mental functioning will continue after death in a religious context than in a secular context (Harris and Giménez 2005).

Thus, children conceptualize the numerous invisible entities whose existence is asserted only through testimony in various ways. The differential ontological weight that they give to the entities endorsed by their community is not easy to explain. Harris and Koenig propose two main routes of explanation (Harris and Koenig 2006). The fact that extraordinary beings such as Santa Claus or God have, by definition, extraordinary properties might incline children to adopt a more cautious stance toward their existence compared to that of scientific entities. Another explanation focuses on the type of discourses that surrounds these entities. Children rarely hear explicit statements about the existence of scientific entities, such as «I believe in germs» or «There really is oxygen», since their existence, contrary to that of extraordinary beings, is taken for granted and embedded in ordinary propositions. Children could also be sensitive to the degree of consensus among the members of their community; the influence of a minority of disbelievers might play an important role in this context (Moscovici and Doise 1994). One could add another route of explanation, which insists on the children's sensitivity to context. Observing that certain entities and beliefs are summoned only in specific situations (e.g., rituals, collective celebrations) could diminish their naturalness. By contrast, a germ is a germ, whether in a school or in a church.

6 Who is Trustworthy?

In order to show that children do not exhibit radical credulity and evaluate communicated propositions, we focused our attention on the primary evaluation process that is essentially concerned with the content of communicated representations. Crudely, this initial process could be summarized by a simple question: Does the communicated representation contradict, in any way, what is already considered as true? In simple cases, we have seen that even very young children (16 months) reject a labeling that does not correspond with their knowledge. At 3 years of age, they do not accept a piece of information coming from an apparently reliable source if this information contradicts what they have previously perceived. In addition, when representations concern entities that possess extraordinary properties but are nevertheless endorsed by their community, they «do not place them on exactly the same ontological footing» (Harris and Koenig 2006) as factual or scientific entities.

Another closely connected line of research consists of exploring children's early abilities to decide which of two contradictory sources to trust when they cannot compare the communicated propositions with information already at their disposal. This detection ability is very important in natural contexts where it is common for transmitted information to prove false, either by deception or mistake. The first important results showed that children between 3 and 5 years of age tend to believe utterances only when the speakers are better informed than they are themselves (Mitchell et al. 1997). In another study, 3-year-olds updated their beliefs to match the utterances of a well-informed speaker when they themselves were guessing but maintained their own beliefs when they were well-informed and the contradicting speaker was guessing (Robinson et al. 1999). Information access is, therefore, one of the criteria that could be used by children to decide if they are able trust a given source (Robinson and Whitcombe 2003).

Things become slightly more complicated when children must choose between two sources of information. The reliability paradigm discussed above has been used to study this phenomenon. Let us remember that the experiment consists of introducing a group of children to two characters (puppets or real persons) that consistently name familiar objects either correctly or incorrectly (e.g., saying «It's a banana» when looking at an apple) (Clément et al. 2004; Koenig et al. 2004). Children were then asked about the reliability of the two sources. Next, the two sources gave contradictory information about something that was not known to the children. For example, a novel object was presented and called a *wug* by the reliable source and a *dax* by the unreliable one (Koenig et al. 2004). The usual result was that 4-year-old children were able to select the reliable speaker and correctly label the object as a *dax* (Koenig et al. 2004; Koenig and Harris 2005a). Three-year-olds were less systematic; we will discuss their difficulties later.

At the same time, 3-year-olds were as selective as 4-year-olds when, instead of being shown a reliable versus an unreliable source during the training phase, a reliable versus ignorant source was introduced. In this case, both age groups preferred the reliable source's label for a novel object (Koenig and Harris 2005b). Moreover, in the same set of experiments, when the two sources (reliable versus ignorant) showed children how to use a novel object, 3- and 4-year-olds selected the information given by the source which had previously named objects reliably.

Birch and colleagues recently showed that similar results were obtained when the training phase involved the correct or incorrect demonstrations of familiar object *functions*, instead of the labeling of familiar objects. When 3- and 4-year-olds were asked to choose between two sources in order to decide the function of novel objects, they preferred the information given by the reliable source (Birch et al. 2008).

Harris and his colleagues recently added to the body of research by highlighting the fact that, in normal life, informants are rarely always right or wrong (Pasquini et al. 2007). The idea was then to test the statistical abilities of children who encountered sources who were not always right. In one study, informants were either 100% versus 0%, 75% versus 0%, or 100% versus 25% correct during the training phase. The results of the test phase were interesting in at least two ways. In the 100% versus 0% condition, both 3- and 4-year-olds were able to recruit a kind of statistical monitoring, trusting the reliable (100%) informant. However, in the 75% versus 0%

condition, 3-year-olds' answers were at the level of chance, whereas 4-year-old children again demonstrated a more subtle capacity to monitor the accuracy of the sources and even coped with a 75% versus 25% correct scenario.

Once again, the findings reported here show that children «are well equipped to benefit from what other people tell them» (Robinson et al. 2008b). When confronted with situations in which they do not possess any prior knowledge of their own, they are able (at least by 4 years of age) to choose appropriately between two sources that have previously expressed different levels of reliability. The credulous child hypothesis must be definitively revisited.

7 Indirect Information About Sources

Until now, we have described children's abilities to filter communicated propositions when some *direct* information is accessible, i.e., knowledge from previous learning (via language or perception) or from the past reliability of a source. But there are cases when none of this information is available. The child is forced to make a decision about which utterance to accept without the ability to check the reliability of the speaker in this specific episode, or to recruit some of her own beliefs for comparison purposes.

Research on these *indirect* ways of screening sources is still quite sparse but we shall nevertheless mention some interesting results. One of the cues that children might use is *age*. Confronted with two informants assessing contradictory propositions, age could be a way of discriminating between them, according to a study by Jaswal and Neely (2006). In the training phase, children had the opportunity to learn, thanks to the classical naming paradigm, whether one, both, or neither informant was a reliable source. One of the speakers was a young girl, the other a grown-up woman. The two speakers then differently labeled novel objects. When both sources were reliable, 3- and 4-year-old children chose the adult's name for the object, indicating therefore that age is, for them, a relevant cue to decide whom to believe. But again, children do not demonstrate blind faith in adults; when the child was reliable in the training phase and the adult not, children put their trust in the child to decide on the correct label! Other things being equal, children seem to demonstrate a certain preference for adults compared to children when they have no information about their reliability. But this is not a sign of naive credulity; on the contrary, adults are more experienced and we should reasonably expect accurate information from them (Lutz and Keil 2002). Yet as soon as they show signs of unreliability, they lose their epistemic privileges.

Another satisfactory indicator that permits uncertainty reduction is the number of people who are assessing a proposition. Social psychology has insisted on cases where this cue could lead to error (Asch 1965), but *consensus* is often a good guide for deciding what is appropriate to believe in normal situations. Again, children seem to be sensitive to this phenomenon. In a recent study, Harris and colleagues showed three unknown objects to 3- and 4-year-old children, indicating that one of them was called a *modi*. To decide which one was the *modi*, they asked for help from four different informants; three pointed to object X, one to object Y. Both 3- and 4-year-olds displayed a preference for the object indicated by the majority (Corriveau et al. 2009b).

This consensus rule is also apparent when bystanders are introduced. For example, Repacholi and Meltzoff showed that young children are able to use indirect emotional information, i.e., emotional reactions that are directed at someone else, to extend their knowledge base about objects (Repacholi and Meltzoff 2007). This is important for testimony, as Fusaro and Harris (2008) recently demonstrated. Two adults were naming new objects with different labels. Next to them, two bystanders consistently nodded their head in agreement with one of the informants, but consistently shook their head in disagreement with the other informant. All participating 4-year-old children judged the consensually designed informant as *good* and the unreliable informant as *not very good* at naming the objects. When new objects were introduced in the absence of bystanders, however, only 4-year-olds passing a false belief task were able to select the appropriate source—an issue we return to in the next section.

Another way to discriminate contradictory information coming from different sources is to take into account of their level of *benevolence*. One could rationally suppose that someone who wishes you well is more likely to transmit accurate information. A study by Mascaro and Sperber (2009) indicates that young children take into account benevolence in deciding whom to trust. Two stuffed animal characters were shown to 3- and 4-year-old children. Though their attitudes and actions (they hit or caressed the experimenter), they were presented as *mean* or *kind*. The experimenter then took a closed container and the two puppets successively looked into it. The two characters gave contradictory answers when asked by the experimenter about the nature of the object inside. When it was the child's turn to say what was inside the box, 3- and 4-year-olds accepted the testimony of the benevolent speaker. Thus, in the case of conflicting testimony, benevolence turned out to be a relevant clue in deciding whom to trust. After all, someone that seems to wish you well is, *a priori*, more likely to transmit reliable information.

Often linked to benevolence, *familiarity* is another way to assess trustworthiness. In general, familiar persons are, in real life, persons who care about you and, with a few exceptions, they are persons you could put your faith in. To test this, Corriveau and Harris (2009b) recently varied the relative familiarity of two informants by presenting children with films of a familiar teacher from their own preschool paired with a teacher from a different preschool. Two conditions were presented to the children. Half of them witnessed a film in which the familiar teacher was 100% accurate and the unfamiliar was 100% inaccurate; the other half viewed a film in which the familiar teacher was 100% inaccurate whereas the unfamiliar teacher was 100% accurate. Children were then presented with a film in which the two informants labeled novel objects. On the novel object label trials, 3- and 4-year-olds preferred to ask for and endorse information from the more familiar informant, whereas 5-year-olds preferred the more accurate informant.

8 The 3-year-olds' Problem

In order to have a general view of children's capacities to screen communicated information, we must stress an intriguing age difference. In several of the experiments on testimony that we have described above, some differences emerged

between 3- and 4-year-olds. Crudely, 3-year-olds tended to have difficulties in using an apparently reliable informant when confronted with another informant who proved to be wrong in the recent past. In a series of studies, 3-year-olds responded at the level of chance, while 4-year-olds chose and endorsed the claims made by the reliable source (Clément et al. 2004; Koenig et al. 2004; Koenig and Harris 2005a). For example, when an object is hidden in a box and two informants were able to see it, younger children seemed unable to recruit an informant's past reliability to decide whom to trust. This difference is, however, a matter of degree; 3-year-olds were able in certain situations to differentiate between a reliable versus an unreliable informant (Koenig et al. 2004; Pasquini et al. 2007). In a recent study, 3-year-olds were even able to choose a previously accurate informant up to one week after exposure to information regarding her accuracy (Corriveau and Harris 2009a).

Given that this age change corresponds to another age change that has been well established in the last 20 years, that is, passing standard false belief tasks, it has been hypothesized that 3-year-olds' difficulties in certain cases might be linked to their grasp of false beliefs. In other words, younger children might lack the conceptual tools for interpreting the statements of an informant who seriously makes claims that contradict the children's known reality (Koenig and Harris 2005b). This difficulty would parallel the difficulty that 3-year-olds have in engaging in deception by manipulating observable cues that could lead a target or victim to misrepresent the ongoing situation (Ruffman et al. 1993). However, recent findings do not support this «lack of theory of mind» hypothesis; 3-year-olds who fail a standard false belief task are nevertheless capable of showing selective trust (Pasquini et al. 2007). Conversely, infants younger that 3-year-old are able to pass modified false belief tasks (Onishi and Baillargeon 2005; Surian et al. 2007).

Another possible explanation for 3-year-olds' difficulties lies in their attachment to *conventionality*, to what is supposed to be the case. For example, we asked children, after they had witnessed one informant labeling familiar objects correctly and the other informant giving wrong names for the same objects, what both informants would say when asked for the color of a red ball placed in front of them. Four-year-olds were able to name a color other than red, but 3-year-olds could not help but say that the unreliable source would say that the ball was red (Clément et al. 2004). Thus, the children's difficulty might be less related to metarepresentational weakness than to the conventional context implied by the naming task. In normal life, there is a regular and reliable connection between what people say and the objects they refer to. This expectation, so often valid, could be automatically and irresistibly taken for granted, leading 3-year-old children to infer a Velcro-like connection between what is said and the person who says it. Support for a conventional bias could be found in the fact that 3-year-olds are perfectly capable of discriminating between two sources when one is appropriate and the other ignorant (Koenig and Harris 2005a).

This *conventionality hypothesis* is somewhat reinforced by Nurmsoo and Robinson (2009). Their current research shows that, when the history of reliability or unreliability of the speakers does not depend on a naming task, younger children are better at distinguishing between two contradicting informants. For example, when the speaker made errors because she had an uninformative access to an object (this latter, being in a tunnel, could be touched but not seen, for example),

3-year-olds were still ready to believe her when she later looked into a closed container and told the children what was inside. By contrast, children did not accept the proposition of an informant who named objects wrongly, wearing a blindfold, in the earlier training session; in a way, his errors were not forgiven by the 3-year-olds. Therefore, the findings from the 3-year-olds could partly be the result of the naming procedure itself.

A final possible explanation, which is not exclusive of the preceding ones, focuses on the executive processing associated with the tracking of trustworthy sources. Indeed, the computational burden that children must carry in these testimony tasks is quite considerable. They must detect the reliable source, keep track of the incoming information and, at the decision point, connect new information—information that is transmitted by the sources—with information about the past reliability of those sources. Remembering who said what in which context might ask too much from a 3-year-olds who already have to assimilate a great deal of information about his or her environment.

This is especially the case when conflicting sources are not 100% accurate. We have seen that, in that sort of context, 3-year-olds tend to display an all-or-nothing strategy, discarding a source as soon as he or she commits a single mistake (Pasquini et al. 2007). This executive hypothesis is reinforced by results showing that young children are not good at remembering how they acquire a piece of information. Gopnik and Graf, for example, demonstrated that young preschoolers, even if they were able to identify the source of their belief correctly (see, tell or infer), did not store this information in memory (Gopnik and Graf 1988). Robinson and colleagues have recently obtained similar results. Three- to 4-year old children were able, like 4- to 5-year-olds, to discriminate between information they acquired from their own direct experience versus information from an apparently cooperative and well-informed experimenter. However, when a delay was introduced, younger children tended to forget about the conditions that surrounded the informant's utterances, particularly the level of certainty or doubt he or she acknowledged (Robinson et al. 2008a).

A recent study by Harris and colleagues (Corriveau et al. 2009a) might shed light on the strategy used by the younger children when confronted with these «executive» constraints. Three situations were presented to 3- and 4-year-old children: (a) One informant named objects accurately, whereas the other named them inaccurately; (b) One informant named objects accurately, whereas the other merely drew attention to them, without naming them (neutral); and (c) One informant named objects inaccurately, whereas the other merely drew attention to them. Interestingly, even if the performance of 4-year-olds was slightly better, the 3- and 4-year-olds' results were not significantly different, except in condition (b). Therefore, Corriveau & al. conclude that 3-year-olds appear to operate with a simple binary coding system. Their attention is focused on inaccuracy, as if trustworthiness is attributed by default. Given their executive limits (or due to children's developing understanding of theory of mind, as Harris and colleagues suggest), younger children adopt an all-or-nothing strategy with regards to inaccurate speakers. One mistake destroys their trust in a non-familiar informant. Older children are able to memorize and use more complex scales of trust, with a graduated order linked with the past informants' accuracy.

More generally, younger children might have a problem in monitoring acquisitions of their beliefs; given their executive limits, they tend to attach importance to the actual state of affairs, not the way representations were acquired. This propensity of younger children's minds is even perceptible in their difficulty in keeping track of modifications to their own beliefs. For example, when a candy box turned out to be full of pencils, 3-year-olds could not remember that they wrongly believed, a short time ago, that the box was full of candy. They updated their beliefs, erasing the history of their acquisition (Gopnik and Graf 1988). One could therefore suppose that the main problem for 3-years-olds with testimony might be linked to this weakness in source monitoring—either because younger children have other «information fish» to fry, or because they do not yet have the cognitive ability to exercise this monitoring activity.

9 Conclusion: Credulity and the Infant/child Objection

By surveying the literature on the ontology of naive social epistemology, this paper has tended to give a rather optimistic glimpse of children's abilities when faced with testimony. The findings reported here confirm that many 3- and 4-year olds are «well equipped to benefit from what other people tell them and can guard against the risks associated with learning from others» (Robinson et al. 2008a, p. 116). Given these experimental results, we could now revisit the reductionism vs. non-reductionism controversy in the epistemology of testimony.

As mentioned at the beginning of this paper, one of the arguments of the non-reductionist position lies in the intuition that at least part of the information children accept from testimony could be considered as knowledge. On the other side, reductionists struggle to accept this idea because justified beliefs are dependent on sufficiently good reasons for accepting a report, and children seem to lack the inductive capacities to critically evaluate the communicated information (Lackey 2005). The general picture that emerges from the experimental literature tends to blur the sharpness of this opposition. On one hand, non-reductionists cannot appeal to the credulity principle in the case of children; we have seen that these latter do not swallow indiscriminately what is communicated to them. Nevertheless, if no contradiction with information already possessed is detectable and the speaker does not demonstrate signs of untrustworthiness, children will accept the communicated propositions and enrich their stock of beliefs. On the other hand, reductionists are in a way relieved of the infant/child objection; children's knowledge is somewhat justified because incoming information is submitted to inferential processes in order to check their veracity. However, contrary to the view that conceives the acquisition of knowledge as involving a kind of reflexive performance by the receiver, children (and adults) are biologically equipped to perform basic epistemological checks. If there is virtue in this process, it has to be ascribed more to natural selection than to conscious intellectual effort. In that sense, the justified character of beliefs transmitted by testimony is not entirely external to the individual minds (Lackey 2007); individuals are endowed with basic mechanisms that protect them from naive gullibility.

Nonetheless, one could wonder if this epistemic optimism is moderated by certain biases that most of the quoted experimental studies display. First, we have already

mentioned that sources are often basic, without much prestige or authority. Younger children are good at rejecting testimony that contradicts what they already consider as true when the informant is relatively neutral. As soon as some social or affective property is at work, the results seem to change. For example, 3-year-olds chose to trust a familiar informant over an unfamiliar one, whether the familiar informant had been 100% or 0% reliable in a training phase (Corriveau and Harris 2009). Similarly, when the object is slightly more ambiguous, young children are less prone to go with their perception. When introduced to hybrid objects, for example, a cat-dog animal designed to look more like a dog, 2-year-olds ignore the perceptual input and go with the informant—who said that it was a cat (Jaswal and Markman 2007). In another study, 4-year-olds were more reluctant than 3-year-olds to accept hybrid objects designed to look like a member of another category based on an informant's labeling (Jaswal 2004). Three-year-olds were even ready to trust the informant when this latter was unreliable or distracted (Jaswal and Malone 2007). Four-year-olds were sensitive to these factors. When the speaker explicitly indicated the use of an unexpected label for a hybrid animal picture by saying «You're not going to believe this, but this is actually an X», 4-year-olds were as ready to trust him as 3-years-olds (Jaswal 2004)!

Secondly, children's developing theory of mind does not enable them to exert a very sophisticated *Machiavellian* strategy (Byrne and Whiten 1988; Sperber 2000). We could therefore suppose that manipulations will be less easily perceived by young children who struggle to represent intentional mental states that differ from their own. Indeed, this is precisely what the experimental findings tend to demonstrate. For example, when children heard stories in which characters made statements aligned either with or against their self-interest, 8- and 10-year-olds put their trust in characters in the *against self-interest* scenarios. On the contrary, 6-year-olds were more inclined to believe statements aligned with the self-interest of the informants (Mills and Keil 2005)! Therefore, young children, even after the 4-year cognitive landmark, are in a sense more gullible than adults. In the same way, one could imagine that they will have difficulty in resisting propositions that have positive consequences for them.

Finally, one might wonder how children's effective performances fit into the more general theoretical framework exposed at the beginning of this paper. In a nutshell, children's epistemic dilemma is to take advantage of the formidable accumulated knowledge of their culture without being fooled by their fellows. From that point of view, one might say that children are, even within their cognitive limitations, rather well equipped. Admittedly, they are not very good at remembering how they acquired their beliefs but, in their first years of life, this is not very dangerous. After all, young children are usually surrounded with well-intentioned caregivers. Moreover, it would be strange, if not logically impossible, to doubt *by default*: to put something into question, you need to possess at least one piece of contradictory information (Wittgentein 1969). However, as soon as the communicated information can be compared to some acquired belief, children tend to be not so credulous; the many experimental results we summarized point to the existence of something like a *cognitive filter* that enables children to take advantage of testimony without the risk of being completely misled. In a first step, this filter works by comparing the communicated information with representations already considered to be true.

Things indeed become more complicated when transmitted information is new to the child. Without being able to weight the truthfulness of the information itself, children must focus on the trustworthiness of the source. Two cognitive limits might sometimes impair children's judgment at that point. On the one hand, young children are not very good at monitoring the way they receive information about their environment; they could, for example, attribute a sort of perceptual vividness to a communicated representation (Principe et al. 2006). On the other hand, their conceptual difficulties with representations that are not congruent with reality prevent them from evaluating the mind of informants in search of a potential trickery. Therefore, they rely on shortcuts that could in certain circumstances lead to overconfidence and gullibility. It is very likely that the nature of these decision processes has an important emotional dimension: to put confidence in someone has an obvious affective dimension, as is highlighted by the distress that is provoked by betrayal. From that point of view, the distinction between children and adults is a thin line, and the extent to which we ought to put our trust in someone's words a question for life.

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