Cognitive Foundations of Learning from Testimony

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Abstract

Humans acquire much of their knowledge from the testimony of other people. An understanding of the way that information can be conveyed via gesture and vocalization is present in infancy. Thus, infants seek information from well-informed interlocutors, supply information to the ignorant, and make sense of communicative acts that they observe from a third-party perspective. This basic understanding is refined in the course of development. As they age, children’s reasoning about testimony increasingly reflects an ability not just to detect imperfect or inaccurate claims but also to assess what inferences may or may not be drawn about informants given their particular situation. Children also attend to the broader characteristics of particular informants—their group membership, personality characteristics, and agreement or disagreement with other potential informants. When presented with unexpected or counterintuitive testimony, children are prone to set aside their own prior convictions, but they may sometimes defer to informants for inherently social reasons.

Keywords

testimony, trust, informants, appraisal, counterintuitive, unobservable
1. INTRODUCTION

There is no species of reasoning more common, more useful, and even necessary to human life than that which is derived from testimony.

—David Hume (1748, p. 119)

Any culture with access to a human language has access to human testimony, which stands alongside memory, perception, and inference as a primary and fundamental source of knowledge. The study of testimony raises a suite of conceptual, empirical, and normative questions about how knowledge is gained from testimony, especially in childhood. In this review, we first identify basic aspects of testimony: its scope and characteristic features, its limits, and the role of trust. Second, we underline the impact of testimony on cognitive development. Third, we analyze children’s receptivity to testimony in both infancy and early childhood, arguing that infants possess a basic understanding of how testimony works and that preschoolers make a differentiated appraisal of their informants along several dimensions, some epistemic and some not. Fourth, we consider how children respond when testimony conflicts with what they observe or assume to be the case. Finally, we highlight promising directions for future research. Throughout this review, we recognize that the study of testimonial knowledge is an interdisciplinary endeavor and seek to connect the growing psychological literature with insights from other fields. At the same time, given the scope of recent research on testimony, we offer a selective rather than a comprehensive review.

1.1. What Is Testimony?

It is hard to overstate the amount of knowledge that children gain from others via testimony. Even apparently direct observation (e.g., seeing a Dalmatian dog, looking at a photograph of the planet Earth) has a hidden layer of testimonial input that we typically take for granted: Identifying the dog or the planet depends on our capacity to apply culturally acquired concepts (Gelman 2009, Harris & Koenig 2006). Moreover, the accumulation of cultural, scientific, and historical knowledge over time depends on the transmission of knowledge gained from testimony.

1.2. The Limits of Testimony

It is important to examine the limits of testimony. Some types of knowledge are not transmitted through testimony. For example, if a child needs to learn a new skill, such as riding a bicycle, they cannot learn it through testimony alone. They must also practice the skills. Similarly, if a child needs to learn a new concept, such as the concept of gravity, they cannot learn it through testimony alone. They must also observe the effects of gravity, such as when a ball falls to the ground.
Philosophers traditionally characterize testimony as language-based exchanges that consist of “tellings generally” (Fricker 1995, p. 396) or “statements of someone’s thoughts or belief” (Sosa 1991, p. 219). In recent reviews of the empirical literature, psychologists have generally followed this tradition, taking it as “uncontroversial that human beings often use language to make credible assertions and that listeners treat such testimony as reliable evidence for the truth of those assertions” (Harris & Koenig 2006, p. 505). This characterization of testimony includes religious and scientific claims, claims based on a speaker’s first-hand experience, and claims deriving from a speaker’s reflection or expertise.

All testimony requires some sort of medium—a means by which a speaker can relay a message to a listener. Although spoken statements are generally treated as the bread and butter of testimonial exchange, testimony extends well beyond spoken utterances. It includes written language (Robinson et al. 2013) as well as nonverbal communication (Harris & Lane 2014). Indeed, it can extend to conventional indicators such as maps and road signs (Corriveau & Harris 2015) and to commemorative artifacts such as tombstones and statues. It includes resources such as Wikipedia, where authorship is typically anonymous and collaborative, as well as legal cases, where the identity and credentials of a source are of paramount importance. In this review, we stay close to the standard usage of testimony by focusing primarily on verbal communication. Nevertheless, we probe the foundations of testimonial exchange by reviewing the preverbal communication patterns of infants, and we acknowledge that testimony can serve as an umbrella term to cover the various ways in which different media, verbal as well as nonverbal, serve to transmit knowledge and belief (Callanan 2006).

Consider Lackey’s (2008) suggestion that problems in defining testimony are connected to at least two aspects of our concept of testimony. “On the one hand, we think of testimony as a source of knowledge or belief for hearers, regardless of a speaker’s intention to be a source. On the other hand, we often think of testimony as involving the intention to communicate information to other people, regardless of the needs or interests of the hearers” (Lackey 2008, p. 19). To see the significance of the first point, consider the knowledge gained from overheard conversations or from posthumously published memoirs. Our conception of testimony includes such knowledge, i.e., knowledge that is gained from speakers who do not address a given individual or, indeed, anyone in particular. This is especially relevant for child listeners, who may not be directly addressed by speakers (Hart & Risley 1995) but who begin to interpret overheard exchanges from an early age (Akhtar et al. 2001, Harris & Lane 2014).

Lackey’s second point bears on another central aspect of our concept of testimony. We allow that speakers may communicate their beliefs to others, regardless of whether any listener gains from it at all. For example, it seems natural to say that when religious believers talk to devoutly atheist listeners about their beliefs in miracles, their claims count as testimony (Harris & Koenig 2006). Similarly, when infants produce gestures or incomplete utterances and an interlocutor fails to understand them, these early acts of communication still count as testimony (Harris & Lane 2014, Liszkowski et al. 2008). By implication, our concept of testimony does not require the conjunction of a speaker’s intention and a listener’s epistemic gains, but allows for the disjunction of these features (Lackey 2008).

1.2. The Limits of Testimony

Are there limits to the types of knowledge that can be transmitted via testimony to others? Notions like testimony and testifying have long been associated with reports of experience, especially observational experience. In this way, testimony counts as an undisputed source of empirical knowledge. But what about other, less empirical, types of knowledge, such as knowledge of logic,
math, morality, or God? Kant was sympathetic to testimony as a source of empirical knowledge, but rejected other categories of testimony, arguing that testimony always conveys some empirical content (as discussed in Gelfert 2006). Thus, we differentiate listeners who can only parrot what they have been told (e.g., regarding a mathematical theorem) from listeners who can understand for themselves, or demonstrate to others, how and why the theorem is true (Williams 1972). Similar concerns have been raised about testimony’s capacity to directly transmit moral knowledge: We typically credit someone with knowing a moral principle under their own power not simply because they were told about it, but because they appreciate it for the right reasons (Jones 1999). Testimony might help us to recognize the full scope of a moral principle (Harris 2012) but might not help us see the significance of the principle itself. Such cases point to potential limits on the kinds of knowledge that can be gained from others via testimony.

1.3. Trust in Testimony

Much of the current research on learning from testimony treats testimony as a species of evidence, not unlike other impersonal forms of evidence on which knowledge and justified belief can be based. When testimony is understood in this way, decisions to accept it can be treated as probabilistic estimates about the truth of a claim based on the evidence, with speakers serving as more or less reliable vehicles of transmission (Shafto et al. 2012, Sobel & Kushnir 2013, Sperber et al. 2010). Although it is indeed true that testimony counts as evidence for learners, this strictly evidential picture leaves open questions about trust, how to characterize it, and the various roles it might play in children’s acceptance of particular claims. In work on testimony, children have been shown to treat certain speakers as more reliable sources of information, but this evidential treatment seems different from the sense in which we might interpersonally trust others, taking them at their word without knowing very much about them or having evidence against them (Holton 1994, Marušić 2015).

By focusing on the evidentiary value of testimony, we neglect both its normative aspect, as expressed via speech acts with various practical aims, as well as the greater stock of reasons that children, and all agents, have to trust another person (Koenig & McMyler 2017). We also ignore central questions about the attitude of trust: Is it a propositional attitude, like belief (McMyler 2011, Marušić 2015)? Are there two types of trusting attitudes, one that is affective and one that is merely predictive (Faulkner 2011)? Or is trust a form of interpersonal reliance taken from a participant stance (Baier 1986, Holton 1994), a stance that motivates various decisions we make even in the teeth of negative evidence against the person who is trusted? Is it all of these things? In characterizing the foundations of testimonial learning, we seek to address how it is achieved not just by integrating prior beliefs with evidence, but also by invoking the social and interpersonal goals and values that make testimonial learning possible (Jaswal & Kondrad 2016).

2. TESTIMONY AND THE NATURE OF COGNITIVE DEVELOPMENT

According to one influential program of research on cognitive development, children everywhere are born into a world constrained by various physical, biological, and psychological regularities. Accordingly, a major agenda has been to work out how children grasp those universal regularities, to study, for example, how they come to grasp universal constraints on human existence imposed by the inevitability of death or the fallibility of beliefs. This line of research has often explored parallels between the scientist and the child in their search for causal regularities in the natural world (Gopnik & Wellman 2012).

Without denying the importance of this agenda, the study of children’s learning from testimony highlights a neglected possibility, namely that children may come to conceptualize universal
regularities not only on the basis of unmediated, observable evidence but also via the lens of the surrounding culture—a lens conveyed to them through the testimonial practices of their culture (Harris & Koenig 2006). For example, when they think about the universal constraints imposed by the inevitability of death or by the fallibility of beliefs, their developing ideas likely reflect assumptions conveyed to them via those testimonial practices. They will come to understand the biological inevitability of death, but they may also come to believe that there is an afterlife, whether in Heaven or among the Ancestors (Harris 2011); furthermore, even if they accept the fallibility of human beliefs, they may come to believe in the infallibility of God’s beliefs (Heiphetz et al. 2016).

Indeed, recent evidence highlights the possibility that the very assumption that there are natural causal regularities constraining what can possibly happen in the world is an assumption that can be affected by testimonial practices. Children who have not received a religious education doubt that violations of ordinary causal constraints can ever happen. By contrast, children who have received a religious education within a Christian or an Islamic tradition are more likely to believe that miracles can occur (Corriveau et al. 2015, Davoodi et al. 2016). By implication, many children arrive at a view of the world in which the laws of nature can be overridden by divine or supernatural forces.

Because children learn from testimony and not just from the observation and interpretation of universal regularities, we also need to consider the cognitive impact of variation in the testimonial practices that they encounter. For example, we know that the frequency and complexity of the language input that young children receive vary sharply with the socioeconomic status of their parents (Hart & Risley 1995), with the level of their parents’ formal education (Huttenlocher et al. 2007), and with their access to literacy (Levine et al. 2012). Such variation in language input is a cause for concern among educators because it is plausibly associated with marked variation in vocabulary size and reading skill. However, variation in the quantity of language input is also accompanied by variation in the style of input. To take one example, parents differ in the extent to which they use conversation either as a practical tool to get things done via the frequent issuing of instructions and imperatives or, alternatively, as an epistemic tool for exploration and information exchange about phenomena displaced from the time and place of the conversation (Hart & Risley 1995, Rowe 2012). Emerging evidence suggests that these stylistic features of language input impact children’s working model of how information can be gathered, not via first-hand observation, but via the testimony of others. For example, children who are exposed more often to conversation as an epistemic tool ask more questions of their adult interlocutors (Kurkul & Corriveau 2017, Tizard & Hughes 1984).

As noted in Section 1, philosophical approaches to testimony have concentrated on the spoken word. Yet the written word is clearly a distinctive source of testimony in both the secular and the spiritual domains. It is also distinctive because it provides a powerful conduit for testimony that traverses history and geography in ways that are rarely possible for oral testimony. Recent findings highlight three other notable features of written testimony. First, soon after they have acquired the ability to decode simple written words, young children are more inclined to trust written over oral messages. For example, when supplied with conflicting names for unfamiliar creatures or conflicting instructions about how to act on an unfamiliar apparatus, young readers favor information conveyed via written as opposed to oral testimony (Robinson et al. 2013)—a bias not seen in prereaders. Apparently, the written word rapidly assumes an authority over the spoken word in the minds of young children.

Second, analyses of the linguistic complexity of different media, especially written versus oral media, highlight dramatic variation in vocabulary breadth. Weizman & Snow (2001) report that mothers produced only a small percentage of rare word types—fewer than 2% of all word types—when speaking to their 5-year-olds across a variety of settings. By contrast, mothers’ rare word production tripled when they read aloud to their children from information-oriented books.
Moreover, compared to children’s books, newspapers and popular magazines include more than double the number of rare words (Cunningham & Stanovich 1998).

Third, written testimony, especially expository text, is distinctive in its frequent reliance not just on rare vocabulary items but also on a special repertoire of language forms and functions that co-occur across academic texts in various disciplines, including the use of discourse connectives (e.g., “although” or “in other words”) and conceptual anaphors (e.g., “The evaporation of water occurs due to rising temperatures. This process….”). Comprehending these linguistic features of academic texts calls for skills not captured by standard measures of vocabulary (Uccelli et al. 2015). By implication, learning from written texts calls for and likely nurtures (Levine et al. 2012) a distinctive set of discourse processing skills.

In sum, a focus on the way that children learn from testimony encourages researchers to think of children not only as constructing an objective or universally valid conception of the world but also as steeping themselves in the culturally inflected views of their community or civilization—as conveyed to them via oral as well as written testimony (Harris 2012).

3. INFANTS UNDERSTAND HOW TESTIMONY WORKS

Much recent work on testimony has examined children’s learning from testimony in the preschool period and later (Mills 2013). Before discussing those findings in subsequent sections, we first consider the foundations of such learning. We begin by reviewing infants’ sensitivity to affective signals and then consider their grasp of how information can be exchanged via gesture and vocalization.

3.1. Affective Signals

Sorce et al. (1985) showed that 14-month-olds could be guided by their mother’s facial expressions of emotion. When approaching an apparent cliff, infants saw their mothers silently express either negative or positive affect. Infants were more likely to traverse the cliff if their mother signaled positive affect. Subsequent research has revealed three notable parameters of such social referencing, as it came to be called. First, infants construe emotional signals not simply as encouraging or discouraging their ongoing actions but rather as an affective commentary on an aspect of the immediate environment highlighted by the gaze of the signaler. Thus, infants (aged 12 and 18 months) adjusted their behavior toward a toy when an adult expressed positive or negative affect while looking at it but not when the adult’s view of the toy was blocked (Moses et al. 2001). In addition, when two toys were simultaneously present, infants adjusted their behavior selectively—i.e., with respect to the toy that the adult was gazing at when emoting. Moreover, if a mother had signaled her affect toward a novel stimulus, for example a stranger, her infant continued to use that signal to calibrate his or her approach to the stranger even when the mother turned her attention elsewhere (De Rosnay et al. 2006). Thus, infants monitor the attention of an adult to figure out the target of his or her emotional signals, and they adjust their behavior toward that target accordingly. Absent a plausible target, no adjustment is made. But if a target is identified, infants continue to regulate their behavior toward it even when the adult no longer provides relevant signals. In sum, infants can identify the target of affective testimony, remember its valence, and act appropriately toward the target thereafter.

Second, affective signals have an impact only within certain limits. Tamis-Lemonda et al. (2008) found that, when 18-month-olds were uncertain about a situation, they heeded emotional signals, but they did not otherwise. For example, faced with a steep slope, positive maternal affect did not encourage infants to descend. Conversely, faced with a gentle slope, negative maternal affect did not discourage them from descending. But faced with difficult-to-evaluate, intermediate slopes,
maternal affect had a marked effect. Positive maternal affect prompted infants to descend and negative maternal affect led them to stop or retreat. Kim & Kwak (2011) obtained similar results in a study of toy exploration by 12- and 16-month-olds. An adult’s emotional signals had little impact on infants’ reactions to unambiguously attractive or repellant toys but did moderate their reactions toward more ambiguous toys. Indeed, in the case of the ambiguous toys, infants were more likely to seek guidance by looking toward an adult.

Third, infants are discriminating about whose affective signals they are guided by. Given that infants often turn to an attachment figure when experiencing anxiety, we might expect them to prioritize a familiar caregiver when seeking affective guidance. However, Kim & Kwak (2011) noticed that infants looked more at the experimenter than at their mother when faced with a novel toy. Infants appeared to treat the experimenter as the local expert, implying that they sought information about the nature of the toy rather than emotional reassurance in the wake of anxiety. Support for this conclusion emerged in a series of studies in which 12-month-olds met two experimenters, only one of whom displayed expertise in playing with various toy sets (Stenberg 2013). When subsequently presented with an ambiguous mechanical dinosaur, infants were more likely to seek and accept affective guidance, whether positive or negative, from the expert as compared to the nonexpert. Infants also evaluate the reliability of an informant’s affective signals. Thus, 14-month-olds were unlikely to follow the gaze of an adult who expressed positive reactions when looking into containers that turned out to be empty; similarly, infants ranging from 13 to 16 months old were unlikely to faithfully imitate an adult whose affective signals had proven unreliable (Poulin-Dubois & Brosseau-Liard 2016).

In summary, these studies of social referencing show that 1-year-olds look to adults for an emotional commentary on situations that evoke uncertainty; they approach situations that receive a positive commentary but retreat from situations that receive a negative commentary. Infants are selective about whose commentary they seek and accept. They look to an apparently well-informed stranger rather than their mother, an expert rather than a nonexpert, and a reliable emoter rather than an unreliable one. Yet such learning from affective signals is restricted; infants seek and rely on guidance about ambiguous situations or objects visible in the immediate environment. As discussed in the next section, other preverbal signals convey information that goes beyond the immediate environment.

### 3.2. Gesture and Vocalization

When a caregiver points, the infant often follows suit and vice versa. One construal of such reciprocity is that pointing is a gesture par excellence for establishing joint attention. Yet pointing can also serve another function—the transmission of information about a target, including an invisible target. The findings of Behne et al. (2012) are illustrative. Infants of 12 months watched as the experimenter concealed an object in one hand and then, sliding each hand under a box, prevented infants from inferring which particular box she had left the object in. However, when she then pointed at the correct box, infants used that gesture to guide their search. Indeed, when one adult played the role of seeker by covering her eyes while a second adult hid the object, some infants helpfully responded to the seeker’s queries by pointing to the correct box. These findings suggest that, even at 12 months of age, infants have a rich and bidirectional understanding of pointing as a source of testimony—rich because they realize that pointing can convey information about hidden objects in addition to visible ones and bidirectional because they appreciate that, via pointing, they can both receive and transmit information about such hidden objects.

Strong evidence of infants’ bidirectional conception of pointing was obtained by Krehn et al. (2014). Infants of 9 and 11 months old first watched as an adult exhibited a preference
for manipulating one of two objects. In a subsequent test phase, the two objects were placed out of the adult’s reach and she pointed to the one she preferred—as if requesting that it be handed to her. Both age groups expressed more surprise (i.e., stared longer) when a second adult handed over her nonpreferred object rather than the one she had pointed to. This differential looking pattern was not shown if the requester produced a noncommunicative hand gesture—a closed fist rather than a point—or if the second adult covered her eyes during the requester’s point. Martin et al. (2012) obtained similar results when the requester indicated her desired object not by pointing but by saying “koba”—a word that was meaningless for the 12-month-olds being tested but that, in the context, could be taken to imply a request for the preferred object. Again, control conditions confirmed that infants were selective in assuming that a communicative act had occurred. They did not display selective looking if the requester coughed rather than spoke or produced an affective vocalization (“Oooh!”) rather than a lexical item. Finally, Vouloumanos et al. (2012) obtained similar results when one adult communicated a request for help in stacking a ring on an out-of-reach funnel by saying “koba” to an interlocutor. Again, infants’ looking times implied that they expected the interlocutor to understand the request and respond appropriately—they looked only briefly when the interlocutor stacked the ring but stared for longer if she did not respond as intended. Taken together, these studies show that 12-month-olds are intelligent third-party observers and interpreters of nonverbal testimony. They realize that someone can produce a point or a lexical item (but not a cough or an “Oooh!”) to indicate which object or action is wanted, and they expect an interlocutor to understand and comply with such requests.

Do infants understand more straightforwardly informative assertions as well as requests? More specifically, do they understand that an informant may communicate with an interlocutor to update or guide the interlocutor rather than to make a request? Song et al. (2008) had 18-month-olds watch two adults. The seeker placed a ball in a box and then briefly left. In her absence, a second adult moved the ball to a cup but either told the returning seeker about the ball’s new location (“The ball is in the cup!”) or said something less informative (“I like the cup.”). Infants’ looking times indicated that they were surprised when the seeker who was told its new location looked for the ball in its original location (i.e., the box) and, conversely, when the seeker who was told something uninformative looked in its new location. Fusaro & Harris (2013) showed that 18-month-olds also grasp that head gestures can be informative. When one adult enquired about the location of an object by pointing to each of two boxes and asking, “Is it in here,” a second adult replied with a nod in one case and a shake of the head in the other. If then prompted to search, infants selected the correct box as inferred from the adults’ exchange. In summary, 18-month-olds realize that a point, a verbal utterance, or a head gesture can transmit information from one person to another.

Granted that infants can make sense of such communicative acts when they observe them from a third-party or bystander perspective, how far do they spontaneously engage in such acts to either seek or provide information? Begus & Southgate (2012) concluded that 16-month-olds use the pointing gesture not simply to call attention to an object of interest but also to seek information about it. When shown various objects, they were likely to point at them if an accompanying adult seemed potentially well informed but pointed less often if the adult was poorly informed, as indexed by prior misnaming of familiar objects. These findings are fully consistent with research on preschoolers, who also spurn inaccurate informants (Harris & Corriveau 2011, Koenig & Harris 2005). Further evidence of spontaneous information seeking in the second year is reported by Chouinard (2007). Parents of children ranging from 12 to 23 months old recorded their children’s “questions” in the home. Questions did not need to be explicit to warrant recording. For example, if a toddler picked up a novel object, held it toward a parent, and said “Uh?,” it was treated as question meaning, roughly, “What’s this?” Analysis confirmed that the majority of children’s “questions” (80%) sought information rather than, for example, practical help or attention.
Most were requests for a name, but information about locations and activities was also sought, especially by older toddlers. Finally, toddlers are better at processing solicited, as compared to unsolicited, information. Thus, Begus et al. (2014) found that 16-month-olds were more accurate at reproducing actions demonstrated on novel objects that they had pointed at, as compared to novel objects that they had ignored. In summary, infants spontaneously adopt an interrogative stance in the second year. They use gestures and vocalizations to solicit information, especially from apparently knowledgeable interlocutors. Moreover, if they have sought information, rather than being given it unsolicited, they are more likely or better able to process it effectively.

As emphasized above, as third-party observers, infants display an understanding of the way that an informed individual can alert or update someone who is less informed. Given infants’ understanding of dialogic communication, we can reasonably expect infants to supply information unbidden, especially when they know something that an interlocutor does not. Indeed, when 18-month-olds saw an adult place an object in one of several containers and then saw a second adult transfer it to a new container, they spontaneously helped the first adult to relocate the object by pointing at the new container, but only if she had been absent during the transfer (Knudsen & Liszkowski 2012). Similarly, when an object slid to the floor and an adult expressed puzzlement, 12-month-olds were more likely to point to it if the adult had not seen it slide to the floor than if the adult had seen it slide but seemed puzzled as to how it came to do so (Liszkowski et al. 2008). Thus, infants’ points are not reflexive responses to expressions of puzzlement. Rather, infants point to inform someone when their expressions of puzzlement signal ignorance of an object’s current location.

In summary, infants of 12–18 months are capable not just of convergent attention on a common object, as routinely emphasized in research on joint attention, but also of contributing to a convergence of knowledge. They grasp that a divergence of knowledge between two people can be transformed into a convergence if missing information is appropriately conveyed from one interlocutor to the other. Simply stated, infants understand the basic elements of testimony (Harris & Lane 2014). In the role of third-party observer, infants expect interlocutors to respond appropriately to requests and assertions. In the role of informant, they proffer specific information to the ignorant or mistaken. In the role of questioner, they direct interrogative gestures and vocalizations to other people, especially to those unimpeached by prior inaccuracy.

### 4. CHILDREN’S REASONING ABOUT INFORMANTS

As Hume was right to stress, testimonial learning gives us the opportunity to study a common and important “species of reasoning” (Hume 1748, p. 119). Indeed, the research reviewed above suggests that key aspects of this reasoning process emerge early: Infants are sensitive to informant reliability—they pay less heed to those who have proven inaccurate or ignorant and show an interest in the conditions that explain a speaker’s error or anomalous statement (Henderson et al. 2015, Koenig & Echols 2003). Further insight into this reasoning process has come from research presenting children with various kinds of imperfect speakers. Importantly, children do not give one singular response to such sources. Rather, children’s distinct and specific patterns of response suggest that they reason about the particular factors—of the informant or the situation—that might limit or undermine trustworthiness. For example, when presented with a speaker who inaccurately named objects but who clearly looked inside two boxes, 4- and 5-year-olds doubted her subsequent labeling claims but accepted her claims about where objects were hidden (Brosseau-Liard & Birch 2011). Conversely, when a speaker’s visual access to information was held fixed, but the conceptual significance of her errors varied, they treated her categorical errors as a more serious breach than transient, factual errors (Konrad & Jaswal 2012, Stephens & Koenig 2015; see also Einav &
Preschool-aged readers treat an informant with access to printed information as reliable but no longer trust that informant when his or her access to print is removed (Einav et al. 2013). Children’s nuanced rejection of informants reflects their sensitivity to the conditions under which accuracy is achieved. From infancy, children not only discern the truth or falsity of a report, but also show an interest in how informants obtained their information.

Granted that no informant will prove either omniscient or fully ignorant, how do children respond to the inevitable gaps in a speaker’s knowledge? Although they reject claims made by ignorant speakers (Sabbagh & Shafman 2009), they are more positively disposed to speakers whose earlier professions of ignorance are later followed by claims to know something. They expect a professedly ignorant speaker to profess more ignorance, but they take seriously her new and unmarked claims, accepting them at rates no different than previously accurate speakers (Kushnir & Koenig 2017). Thus, professions of ignorance, when kept distinct from the other things that the speaker knows, are not treated by children as penalties against a speaker. Such findings are consistent with other evidence that young children adopt an open-minded view of the relationship between a speaker’s state of ignorance and her later behavior (Friedman & Petrashek 2009), continually adjusting their trust based on an informant’s ongoing accuracy (Ronfard & Lane 2017).

In appraising an informant, the monitoring of accuracy will not be enough. Informants can provide accurate but insufficient information, and children are alert to misleading omissions. For example, if they know that a toy has multiple functions and witness a teacher’s incomplete instruction, they mistrust her (Gweon et al. 2014). Conversely, they are prone to assume that a teacher has been exhaustive in the absence of counterevidence. For example, if they encounter an apparently knowledgeable teacher who demonstrates a single function of a novel toy, then they infer that it has no additional functions (Bonawitz et al. 2011, Shneidman et al. 2016). Such research sheds light on the conditions under which a speaker’s nonexhaustive statements might or might not be penalized, not simply against standards of accuracy but also against standards of informativeness or relevance (Wilson & Sperber 2002).

Overall, young children appreciate several distinct ways in which speakers can be imperfect and realize that not all of them signal risks of misinformation. Their interpretive sensitivity is especially evident when they treat the same behaviors as grounds for doubting an informant in certain contexts but not others. As discussed above, when the situation constrains or limits an inaccurate speaker’s access to information, children take that limited access into account in their interpretation of the speaker. When a speaker’s anomalous claims are explicable in terms of her playful actions (Henderson et al. 2015), children interpret and excuse them. When a speaker admits to her ignorance, it signals that she does not present a general risk of misinformation (Kushnir & Koenig 2017). When an informant omits information, it may or may not be penalized. Thus, children’s testimonial reasoning reflects an ability not just to detect false statements, bad intentions, or the withholding of information, but also to assess what such behaviors signify about the informant given her particular situation. By implication, when children reason about testimony, they are making inferences at two levels simultaneously. They are reasoning about particular claims in light of the information that is available to the informant and also making—or withholding—inferences about the informant’s (trustworthy) character.

5. APPRAISAL OF AN INFORMANT’S SOCIAL STANDING AND PERSONALITY

The research described above highlights young children’s emerging ability to use various types of epistemic cues to evaluate a speaker’s claims and future credibility. Yet children often hear claims
that cannot be evaluated via either experience or logic. For example, when told about the existence of invisible or absent referents (Ganea & Harris 2013, Harris et al. 2006) or past and future events (Corriveau et al. 2009c), children cannot easily check those claims. They will encounter instances where verification is possible, but lack the requisite expertise (e.g., to check the evidence for speciation). They will also encounter instances where the claims in question amount to cultural assumptions rather than verifiable assertions. Under these circumstances, it might be useful to the children to evaluate the social standing of an informant. In this section, we highlight children’s use of three types of social information: social relationships, personality characteristics, and informant consensus.

Preschool children prefer to learn new information from their mother rather than a stranger (Corriveau et al. 2009b) and from a familiar rather than an unfamiliar teacher (Corriveau & Harris 2009). They are more likely to seek or endorse information provided by individuals belonging to the same social group as themselves, as indexed by their race (Chen et al. 2013), minimal group status (Hetherington et al. 2014), age (Jaswal & Neely 2006), accent (Corriveau et al. 2013b), or gender (Shutts et al. 2010). They also favor informants who enjoy greater influence or appeal within any given group, as indexed by their strength-based dominance (Bernard et al. 2016), prestige (Chudek et al. 2012), or physical attractiveness (Bascandziev & Harris 2016). Privileging information from familiar informants, from members of their in-group, and from those with higher status is likely to facilitate the transmission of local and pertinent cultural information (Boyd &Richerson 1985).

Children also consider the personality characteristics of an informant. They prefer to learn from an informant who has been attributed prosocial, as opposed to antisocial, intentions (Landrum et al. 2013, Mascaro & Sperber 2009). Similarly, they prefer to learn from an informant who is described positively by a third party—as kind rather than mean, smart rather than not smart, and honest rather than dishonest. Moreover, such selectivity becomes more pronounced with age (Lane et al. 2013). One possible interpretation of these findings is that children are prone to halo effects—they favor informants with any type of positive trait. However, children are actually more selective. When Hermes et al. (2015) presented children with a choice between individuals who had each displayed a positive trait—either superior expertise in naming or superior strength—children were likely to seek help from the former in a task calling for knowledge and from the latter in a task calling for strength. Moreover, this selective pattern was only found among children who could correctly answer trait questions (e.g., “Who is smarter?” and “Who is stronger?”), providing strong evidence that children’s trait attributions mediated their selective help seeking.

Children assess not only the individual characteristics of informants but also agreement among informants; they are receptive to claims endorsed by a consensus (Chen et al. 2013; Corriveau & Harris 2010; Corriveau et al. 2009a, 2013a; DiYanni et al. 2015; Morgan et al. 2015a). Arguably, children use consensus information to make an inference about the likely truth of a given claim; unanimity could provide children with especially persuasive evidence for its truth. Alternatively, children might defer to a consensus in the face of social pressure (Jaswal &Kondrad 2016). If so, children should publicly defer to a consensus but make a different judgment in private. Some research supports this conclusion, with children altering their judgment depending on the presence or absence of the experimenter (Corriveau et al. 2013a) or of the consensus (Corriveau & Harris 2010). Such respectful deference might lead to local adjustments in children’s overt pronouncements but would not entail a genuine change of judgment (see also Koenig & Woodward 2010). It might also vary by culture. Indeed, children of East Asian descent appear to be more influenced by consensus information than children of European American descent (Corriveau & Harris 2010, Corriveau et al. 2013a, DiYanni et al. 2015).
In summary, young children, like adults, have several ways of evaluating their informants. They can use testimony to appraise the informants themselves, especially with respect to their history of accuracy or bias. But they also appraise their informants more broadly in terms of their group status, their personality traits, and their agreement—or lack of agreement—with other informants. In future research, it will be important to study how children respond when these lines of appraisal point in different directions. Castelain et al. (2015) reported an interesting study along these lines. They found that 4- to 6-year-olds from traditional Mayan communities favored speakers who cited perceptual reasons (“P because I saw that p”) over speakers who cited circular reasons (“P because p”). These same children also favored socially dominant over socially subordinate speakers. However, when these two cues were put into conflict, children treated a sound argument from a socially subordinate speaker as better than a circular argument from a dominant speaker. By implication, well before they reach school age, young children show an appreciation for sufficiently good reasons or arguments as considerations that weigh in their evaluation of informants’ claims. Moreover, even in nonegalitarian communities, such as traditional Mayan communities, that preserve strong social hierarchies between adults and children, children’s evaluations of arguments can override source-based cues like dominance when sufficiently good arguments are produced.

6. TESTIMONY AND PRIOR KNOWLEDGE

Much of the information conveyed through testimony is likely to be neutral with respect to what the recipient already knows. For example, when a teacher explains that the process by which plants transform light into energy is called photosynthesis, this label may be news to many students, but it probably does not conflict with any information or conceptual framework that they already have. If the information comes from a speaker they view as credible (see Section 4) and if other important prerequisites for learning are in place (e.g., attention, motivation, memory), this new fact is likely to be incorporated into their knowledge base.

There are, however, situations where someone’s claim may be surprising in light of what a listener already believes. For example, testimony that the Earth is round conflicts with the naive intuition (based on personal experience) that it is flat. Understanding how children navigate such conflicts—the circumstances under which they retain their existing beliefs versus those under which they give them up in favor of the claim conveyed through testimony—has been the subject of much recent research (Lane & Harris 2014). This is an important issue philosophically because beliefs formed on the basis of first-hand experience seem like they should be more salient, immediate, and reliable than beliefs formed on the basis of testimony [e.g., Hume 1748, Locke 1975 (1689)]. It is also an important issue practically because imparting unexpected or counterintuitive knowledge is an important part of education in many domains, particularly science (e.g., Shtulman 2017).

Children often weight unexpected testimony more heavily than their existing beliefs, but their deference has limits. Children’s receptivity can be influenced by a number of factors, including the strength of those existing beliefs, characteristics of the speaker, and individual differences in how willing and able children are to ignore the claim in question. Children may also be receptive to unexpected testimony for social rather than epistemic reasons.

Toddlers and even infants balk when they hear a speaker produce a claim that is blatantly false. For example, if a speaker calls a cup a shoe, infants will stare at the speaker (Koenig & Echols 2003), and toddlers will often produce an explicit denial: “No” (Pea 1982). More generally, children are not routinely gullible (Lane & Harris 2014, Woolley & Ghossainy 2013). Nevertheless, if speakers make a claim that is unexpected but somewhat plausible given the available evidence, children are quite receptive (Bernard et al. 2015). A simple but powerful demonstration of this receptivity...
comes from a study on category induction. In Gelman & Markman’s (1986) study, 4-year-olds were shown three line drawings—for example, a tropical fish, a dolphin, and a shark. The experimenter explained that the fish stayed underwater to breathe whereas the dolphin popped above the water to breathe and asked children how the shark breathed. Crucially, the experimenter referred to the shark either as a dolphin (a label that was consistent with its appearance) or as a fish (a label that was unexpected given its appearance). Children tended to make the inference that matched the label given, even when that was perceptually unexpected: If the shark was referred to as a dolphin, they inferred that it popped above the water to breathe; if it was referred to as a fish, they inferred that it stayed underwater. Children occasionally commented when the label was discrepant from the target’s appearance by, for example, noting that the shark was a “funny-looking” fish (e.g., Gelman & Coley 1991). But most of the time, they simply accepted the label the experimenter provided and treated the target like a member of the named category.

That said, children are not always deferential to such unexpected categorizations. There is some evidence, for example, that older children may be less deferential than younger ones. In a variant of Gelman & Markman’s (1986) procedure, Jaswal (2004) showed 3- and 4-year-olds specially designed hybrid animals and objects—for example, a dog-like animal that had some features of a cat (e.g., a long tail and tabby cat coloring). When children heard this hybrid dog referred to neutrally (as “this one”), they overwhelmingly inferred that it shared characteristics with other dogs—a reasonable inference given its appearance. But when another group of children heard the same hybrid referred to as a “cat,” 3-year-olds tended to infer that it shared characteristics with other cats, whereas 4-year-olds were ambivalent. In many cases, the older children spontaneously rejected the label (“No, it’s not a cat”). A plausible explanation for the age difference is that, as children gain experience—in this case, as they encounter more cats and dogs—they become more confident of the boundaries of those categories and, thereby, more skeptical of testimony that conflicts with their intuitions about them.

In addition to age, the strength of children’s prior beliefs and the culture in which they are raised can influence how they respond to unexpected information. In a study by Chan & Tardif (2013), kindergartners and second graders in the United States and Hong Kong were asked to identify several objects. Some were perceptually ambiguous (e.g., an object that looked like it could be either a button or a wheel), so that children were expected to have only weak intuitions about their identities. Indeed, about half of the children tended to refer to these objects with the label of one of the possible categories, and half with the label of the other. When a teacher referred to the ambiguous objects using labels opposite to the ones a particular child had used earlier, most children, irrespective of age and culture, tended to accept them, even though the labels did not match what children had said earlier.

Children were also asked to identify objects that were prototypical members of their category (e.g., a prototypical button), and almost all named them accordingly. When the teacher referred to these objects using counterintuitive labels, children were not uniformly deferential. Instead, an interaction between age and culture emerged: Kindergartners in the United States accepted the teacher’s labels, but kindergartners in Hong Kong and second graders in both cultures were less likely to do so. Chan & Tardif (2013) proposed that children who could recognize that they had strong intuitions about the identities of the prototypical items were resistant to the counterintuitive labels. This metacognitive recognition was derived from experience and, in the case of the kindergarteners in Hong Kong, from an educational system that emphasizes early self-reliance and autonomy.

Children’s receptiveness to unexpected testimony can also depend on the quality of their relationship with the speaker (Corriveau et al. 2009b), as well as online cues to the speaker’s competence and confidence. For example, 4-year-olds in Jaswal’s (2004) study involving hybrids
tended to be skeptics about unexpected labels, but they could be turned into believers if the speaker simply acknowledged that the testimony was going to seem surprising (e.g., “You’re not going to believe this, but this is actually a cat”). This statement signaled that the speaker’s use of an unexpected label was intentional and, perhaps, that she had some special knowledge about the thing being named (see also Jaswal 2006). Conversely, Jaswal & Malone (2007) showed that 3-year-olds, who tended to be believers about unexpected labels, could be turned into skeptics if the speaker simply said “I think” as she was offering them a label, thereby conveying uncertainty.

The examples given so far in this section have focused on children’s responses to testimony that conflicts with their expectations about the name of the category to which something belongs. Yet in order to learn a conventional vocabulary, children have to be receptive to information from other people: The only way to learn that a table is called a table, for example, is by being willing to accept that this is its name. Other domains of knowledge seem less reliant on information from other people. For example, some of children’s expectations about the behavior of physical objects (e.g., that solid objects cannot move from one location to another without crossing the intervening space) are in place early in infancy (Spelke et al. 1992). These expectations are reinforced continuously in daily life; exceptions are likely to be quite rare. One might therefore predict that intuitions about the physical world would be relatively immune to testimony that challenges them. In fact, however, children are sometimes willing to entertain unexpected testimony even when it conflicts with an event they have just seen.

For example, in Ma & Ganea (2010), preschoolers watched as an adult hid a toy in one location and then heard the same adult claim it was somewhere else. Most 3-year-olds looked where the adult said it was, whereas most 4- and 5-year-olds looked where they had seen it hidden, consistent with findings, described above, that younger children are more receptive to unexpected information than older children. Interestingly, if the 3-year-olds first had experience of finding the hidden object without any conflicting testimony, they tended to ignore the adult when she claimed, on a later trial, that the toy was not where they had seen it hidden, presumably because the initial experience allowed them to build up confidence in the accuracy of their own expectations in this particular setting (see also Jaswal 2010).

Even when testimony describes objects that behave in ways that violate well-entrenched principles of naive physics, like gravity, young children are sometimes receptive. For example, in Lane & Harris (2015), 3- to 8-year-olds heard a speaker claim that a metal object called a “pleak” could float above a table and were asked to decide how certain they were about this claim. Children at all ages were, on average, ambivalent, suggesting that even the oldest children entertained the possibility that objects can behave in unexpected ways—not inconceivable given that there are exceptions to principles of naive physics (e.g., a remote control can apparently activate another object at a distance). Admittedly, 3- and 4-year-olds were more likely than older children to accept that the speaker’s counterintuitive claim was true, but baseline measures showed that their pre-existing intuitions were less firm.

Children’s early receptivity to counterintuitive testimony may originate from an adaptive, domain-general bias to trust that other people will treat them in helpful (or at least benign) ways (Baier 1986, Jaswal et al. 2010). This bias to believe testimony is likely to become stronger with experience because most of what children (and adults) are told is likely to be true or, at least, to reflect what speakers believe to be true. Children are novices in many of the domains that they encounter, so accepting claims by default could be adaptive, saving them, as listeners, from having to engage in the time-consuming and sometimes impossible task of verifying everything that they are told. Indeed, there is some evidence that, when adults are provided a piece of testimony, they accept it as true by default; they can unaccept it, but this requires cognitive effort (Gilbert 1991). This leads
to the interesting prediction that individual differences in inhibitory control—the ability to inhibit a prepotent response—could be related to how credulous children are to unexpected testimony.

Jaswal et al. (2014) investigated this possibility in a study with 2.5- to 3.5-year-olds. Children were invited to find and eat Goldfish crackers. In each trial, they watched as a cracker was dropped into one of three intertwined tubes and indicated into which of three opaque cups the cracker had landed. Children's initial indication was almost always correct, but before they learned that this was the case, an adult confederate claimed that the cracker had landed in a different (incorrect) cup. Children were then asked to indicate a second time where the cracker had landed. There was enormous variability in how children responded to the adult's unexpected testimony. About 40% acquiesced on most or all trials, and 60% resisted on most or all trials. Consistent with the hypothesis that not believing requires more cognitive effort than believing, resistant children performed more accurately than acquiescent children on a separate, computerized spatial conflict task designed to measure inhibitory control.

Although the ability to inhibit a prepotent response may be related to the likelihood that children respond skeptically to misleading testimony (but see Heyman et al. 2013), there are circumstances under which children with more advanced executive functioning skills (of which inhibitory control is one) can benefit from unexpected testimony. In Bascandziev et al.'s (2016) experiment, for example, toddlers who scored higher on some measures of executive functioning were better able to take advantage of an experimenter’s counterintuitive (and accurate) testimony about the physical world than toddlers who scored lower.

Being receptive to testimony obviously provides a way to obtain information from other people, but it can also be a means of engaging socially with other people (Jaswal & Kondrad 2016). That is, children may sometimes seem receptive to unexpected testimony not because they believe it but because the speaker is someone with whom they would like to affiliate. In some of the studies reviewed above, attempts were made to demonstrate the relative unimportance of such social goals by, for example, establishing that children were willing to pass the information on to another person outside the earshot of the original speaker (e.g., Chan & Tardif 2013, Jaswal et al. 2009). However, there is no doubt that children’s endorsement of a given claim can be influenced by social factors. As noted in the previous section, children are especially prone to publicly endorse the unexpected claims of a consensus even if they demur in private.

7. FUTURE DIRECTIONS

Research on children’s learning from testimony has progressed in two distinct directions. First, in the wake of early empirical findings, investigators have conducted an intense analysis of so-called selective trust—the tendency of children and, indeed, infants to favor the claims of one informant over another, especially in light of their differential history of reliability. Second, investigators have explored the key conceptual point that there is much about the world that children cannot observe first hand. Thus, it is appropriate for them to consult other people about this vast, unobservable terrain. We conclude with brief comments about the future directions of these two endeavors.

Some commentators have pointed out the limited ecological validity of the standard paradigm for studying selective trust. In everyday life, children are rarely confronted with two informants whose profile is equivalent in all but one respect, such as prior accuracy, or with two informants who produce circumscribed but conflicting claims. In future research on selective trust, it will be helpful to make three changes. First, children can be presented with informants who differ along more than one dimension to assess the relative impact of each dimension on children’s trust over the course of development (e.g., Corriveau & Harris 2009, Corriveau et al. 2013b, Hermes et al. 2015, Hetherington et al. 2014). Second, we can ask how far children trust a single informant with
a known profile. As discussed in Section 6, children tend to accept claims, even counterintuitive claims, made by one informant when no competing claim is made (Jaswal & Kondrad 2016). Nevertheless, children’s encoding of a claim made by a single unreliable informant may be liable to weaken over time (Sabbagh & Shafman 2009). By implication, we should ask not just about children’s immediate uptake or endorsement, but also about their longer-term consolidation of claims made by different informants—for example, those who have proven reliable as compared to those who have not or those who belong to the recipient’s in-group as compared to those who do not. Third, research on selective trust has focused on the transmission of circumscribed claims—such as the name of a novel object—in the context of a one-shot, one-way testimonial delivery. But life outside of the laboratory is more complicated. It can involve claims—such as the existence of God or the universality of death—that are deeper than the names of objects. Moreover, rather than a brief, one-shot exchange, it can involve successive encounters, as children repeatedly hear about topics that puzzle or worry them. Finally, it may involve a dialog between children and their informants, rather than a one-way pronouncement by an informant. Indeed, children are not acquiescent and passive recipients of testimony; they also seek to remedy their ignorance or confusion by asking questions, sometimes in the context of an extended passage of intellectual search in which they pose multiple questions (Tizard & Hughes 1984).

Initially, children’s questions tend to be of the what and where variety, but, by about 30 months old, as many as one-quarter of the questions asked by children in Western, middle-class communities are how and why questions intended to elicit explanatory responses (Chouinard 2007). Children often ask questions when they encounter something anomalous. Thus, a question like “Why doesn’t the butter stay on top (of hot toast)?” is presumably motivated by the observation that most objects do not sink into each other. Such questions imply an expectation that dialog can help to make sense of apparent anomalies (Harris 2012). Indeed, after a satisfactory explanation, children are likely to acknowledge their agreement or pose a follow-up question on the same topic. Absent a satisfactory explanation, they may reiterate their initial question or offer an explanation of their own (Frazier et al. 2009, Kurkul & Corriveau 2017). Moreover, preschoolers differentiate between informative explanations (e.g., “It rains because the clouds fill with water and get too heavy”) and quasicircular ones (e.g., “It rains because water falls from the sky and gets us wet”) (Corriveau & Kurkul 2014), showing superior memory for informative explanations (Frazier et al. 2016). Finally, they are sometimes prepared to challenge explanations that run counter to what they know (Harris 2012). In sum, research on testimony would benefit from a focus on everyday, explanatory dialog between children and their informants (e.g., Luce et al. 2013). Indeed, as noted in Section 2, there may be potent cumulative effects at work in the context of such dialog. Some children may be increasingly engaged and supported in reflective dialog, whereas others may be increasingly discouraged. Arguably, such divergent engagement and support lead children to different assumptions about the benefits and social acceptability of seeking, discussing, or challenging explanations from others (Reifen Tagar et al. 2014).

Turning to the second direction of research—testimony about the unobservable—findings highlight an intriguing paradox (Harris et al. 2006). Young children justify their belief in the existence of various unobservable entities—some drawn from the scientific domain and some from the religious domain—in a similar fashion. They invoke the known characteristics of the various entities, characteristics that they presumably learned about via testimony. For example, they justify their belief in the existence of germs by noting that they can make you sick; they justify their belief in the existence of God by noting that God has the power of a Creator. However, despite this parallel in the way that children justify their claims about scientific and religious entities, they express greater confidence in the existence of scientific entities (Harris & Corriveau 2014). Findings in adults highlight a similar pattern (Shtulman 2013).
The explanation of these findings is likely to have broad implications for the study of testimony, especially concerning unobservable phenomena. Two different lines of explanation seem feasible. First, the differential confidence displayed in scientific as compared to religious entities may reflect the pattern of testimony surrounding each type of entity. Affirmations with respect to scientific phenomena, such as germs, are often matter-of-fact and widely accepted. Affirmations with respect to religious phenomena, such as the afterlife, may be exhortative and contested. On this view, the differentiation between religious and scientific entities is due to the fact that children and adults register the sociolinguistic differences in the pattern of testimony surrounding phenomena in these two domains. Second, the alternative possibility is that, despite the parallels in their patterns of explanation, children and adults have some deep-seated sense that there is a distinction between the grounds for scientific, as compared to spiritual, belief, and they bring that ontological intuition to the various testimonial claims that they encounter. Research in communities that differ in the relative standing of science and religion should help to resolve this debate.

8. CONCLUSIONS

Research on testimony is young—it began just over a decade ago. Yet we are optimistic about its long-term future for several reasons. First, philosophical analysis dating back to the Scottish Enlightenment has long identified testimony as an important source of knowledge. Despite that conceptual warrant, psychologists have been slow to focus on testimony. This hesitation has been especially evident in developmental psychology, where, following in the footsteps of Rousseau and Piaget, investigators have tended to romanticize the child’s cognitive autonomy and to dismiss children’s receptivity to other people’s assertions as mere verbalism. Given the emerging connections between philosophical analyses of trust in testimony and empirical research on children’s competence (see Sections 1 and 4), we are confident that the importance of children’s learning from testimony can no longer be underestimated.

Second, empirical work on children’s learning from testimony has led to a keener appreciation of its considerable scope. For example, Harris & Koenig (2006) deliberately followed philosophical precedent by focusing on verbal testimony. Yet, as set out in Section 3, children’s learning from oral testimony is preceded and likely supported by an earlier capacity to learn from information conveyed via nonverbal gestures. In addition, recent evidence indicates that children who can read invest more trust in written than in spoken messages (Robinson et al. 2013). We anticipate that future work on testimony will continue to push beyond standard usage of that term.

Third, there is increasing recognition of the importance of learning from others, not just in the human species or in our primate cousins (Whiten 2017) but in a range of other species, from whales to sticklebacks and from birds to bees (Whiten et al. 2017). Yet learning from the verbal testimony of others is a uniquely human competence, one that is absent among primates, despite their skills at tool construction and cultural transmission. Thus, we anticipate increasing attention, both in biology and psychology, to the contribution that is made by testimony in comparison to other potent mechanisms of social learning, such as imitation (Morgan et al. 2015b).

Finally, we are optimistic given the range and intensity of current empirical research on testimony. Reviewing it has been an enjoyable challenge.

SUMMARY POINTS

1. Research on testimony has underlined how children learn not just from their own first-hand observation but also from the credible assertions of other people.
2. In learning from others’ testimony, children steep themselves in the culturally inflected views of their community or civilization.

3. Preverbal infants understand how testimony works: They grasp that information can be communicated by gesture or vocalization from one interlocutor to another.

4. Children reason about an informant’s claims, drawing inferences about the trustworthiness of the claim and the person making it.

5. Children also appraise their informants more broadly in terms of their group status, their personality traits, and their agreement—or lack of agreement—with other informants.

6. Credible testimony can lead children to set aside or revise their initial intuitions in a variety of cognitive domains.

7. Future research is likely to expand our concept of testimony but also sharpen our understanding of the extent to which learning from testimony is a distinctively human form of cultural learning.

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