Knowing When to Doubt: Developing a Critical Stance When Learning From Others

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Children may be biased toward accepting information as true, but the fact remains that children are exposed to misinformation from many sources, and mastering the intricacies of doubt is necessary. The current article examines this issue, focusing on understanding developmental changes and consistencies in children's ability to take a critical stance toward information. Research reviewed includes studies of children's ability to detect ignorance, inaccuracy, incompetence, deception, and distortion. Particular emphasis is placed on what this research indicates about how children are reasoning about when to trust and when to doubt. The remainder of the article proposes a framework to evaluate preexisting research and encourage further research, closing with a discussion of several other overarching questions that should be considered to develop a model to explain developmental, individual, and situational differences in children's ability to evaluate information.

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Children are especially credulous, especially gullible, especially prone toward acceptance and belief—as if they accepted as effortlessly as they comprehended but had yet to master the intricacies of doubt. (Gilbert, 1991, p. 111)

Young children are often thought of as being credulous and gullible, believing in impossible fantastical characters, holding grandiose ideas about their own abilities, and accepting what they hear mostly without question. Indeed, some have argued that believing everything, even to the point of gullibility, may be an evolutionary necessity in order for children to learn information quickly and efficiently (e.g., Dawkins, 1993). Yet mastering the intricacies of doubt is essential. Children are bombarded with information from many sources, and not all information is completely accurate: claims can be inaccurate due to ignorance, incompetence, or incomplete knowledge, distorted due to bias, or deceptive due to manipulative intent. Even if adults and children do generally default to trusting new claims, they also need to be vigilant for reasons to disregard the claims.

Recent research in developmental psychology has explored this issue, often using the term *selective trust* to describe the ability to distinguish who should be trusted from who should be not (e.g., Bergstrom, Moehlmann, & Boyer, 2006; Clément, 2010; Harris &

Corriveau, 2011; Harris & Koenig, 2006; Heyman, 2008; Heyman & Legare, in press; Koenig & Harris, 2005). Other researchers have used the term *epistemic vigilance* to focus on the ability to filter out misinformation from accurate information (Sperber et al., 2010). Here, I use the broader term *critical stance* to describe an approach toward evaluating information, one that involves the ability to weigh multiple pieces of information in order to determine the truth value of encountered claims, being prepared to doubt if necessary.

Regardless of the specific term that is used, though, it is clear that these terms all share a common theme: at times, it is necessary to distinguish sources that are more trustworthy from sources that are less so. The current theoretical article focuses on what is known about this ability, keeping in mind the goal of developing a critical stance. To address this issue, I begin with a broad overview examining developmental change and stability in how children evaluate information. Next, to better understand the reasons for what is seen in development, I pose a framework to evaluate preexisting research as well as to motivate additional research. I close by presenting several additional questions that need to be considered in order to develop a model to explain developmental, individual, and situational differences in children's ability to evaluate information.

What Is Developing, and What Is Stable?

The primary focus of research on the development of a critical stance toward information is to determine whether children treat all sources of information equally or if they can distinguish between them. Some bias toward trusting the claims of others makes sense, given that children must often rely on information from others to learn (Harris & Koenig, 2006). But not all information is equally accurate or reliable—at times it is necessary to doubt. In order to understand developmental changes in the ability to distinguish between more and less trustworthy sources of informa-

tion, a burgeoning field of research has emerged. This research has tended to focus on preschool-age children between the ages of 3 and 5 years, although there is work with infants and toddlers as well as with elementary school-age children.

In many versions of the typical paradigm used in this research, children first receive an introduction to one or two informants (i.e., the sources providing claims to evaluate). For instance, mirroring the idea of learning about someone through gossip or hearsay, children might hear an experimenter provide a description of the informants (e.g., "This person does not know very much"). Or similar to the idea of recognizing on one's own that someone is not likely to provide helpful claims, children might witness some informants answer questions or behave in a certain manner. This introduction serves to provide children with some background regarding the informants' characteristics that may be relevant to the accuracy of their claims. But regardless of whether the children receive an introduction to the informants, children encounter a situation in which they could demonstrate doubt: they witness one or two informants who make statements, demonstrate behaviors, or engage in other kinds of activities that they could evaluate. A number of measures have been used to represent how children are evaluating the claims or behaviors of the informants, including how much children learn, who children think is more helpful, whose advice they follow, and so on.

The specific aims of these studies have varied drastically. Some research has focused on developmental changes, while other research has focused on remarkable competencies in younger children and infants. Still other research clusters preschoolers together or takes no stance regarding reasons for or against developmental improvements on aspects of selective trust competency. It can be difficult to tell what this research tells us about the *development* of a critical stance except that children sometimes—but not always—prefer learning from or gathering information from or asking questions of a more trustworthy source over a less trustworthy one.

To move forward toward developing a model regarding the development of a critical stance, we must first look for common themes in the research to date. To that end, I will briefly review this vast body of literature and focus on clustering the research into two main themes: what changes over the preschool years and into middle childhood, and what seems more consistent across development.

What Is Developing?

Where it starts: The early years. When presented with claims made by inaccurate informants, a first step is to *recognize* that inaccuracy is possible, which infants can sometimes do (e.g., Koenig & Echols, 2003). Beyond that, though, it is essential to *apply* that understanding when faced with additional information from those sources.

Responding to uncertainty. One way children can do this is by discounting information from informants who have expressed clear uncertainty. Infants as young as 14 months have shown some ability to discount unreliable informants. For instance, after being introduced to one informant who appropriately showed enthusiasm when looking inside a container holding an object (the "reliable looker") and another who inappropriately showed enthusiasm because the container held no object (the "unreliable looker"), infants demonstrated understanding of the informants' differing reliability

in three ways: they were more likely to follow the eye gaze of the reliable looker over the unreliable one (Chow, Poulin-Dubois, & Lewis, 2008), more likely to expect the reliable looker but not the unreliable one to demonstrate appropriate looking in another task (Poulin-Dubois & Chow, 2009), and more likely to imitate the reliable looker but not the unreliable one (Poulin-Dubois, Brooker, & Polonia, 2011). Fourteen-month-olds have also been shown to prefer to imitate an informant who has confidently and correctly interacted with familiar objects over an informant who has interacted incompetently with uncertainty (Zmyj, Buttelman, Carpenter, & Daum, 2010; see also Birch, Akmal, & Frampton, 2010).

Another way to express uncertainty is through language (e.g., to *think* or *guess* vs. to *know*). Three-year-olds are sometimes sensitive to these cues, being less likely to learn a new object's label from an informant who expresses uncertainty (e.g., "I think this is a spoon"; Jaswal & Malone, 2007; "I don't know what a blicket is"; Sabbagh & Baldwin, 2001) or has indicated ignorance on prior related problems (e.g., Koenig & Harris, 2005, Experiment 2) than if the informant has been confident and/or indicated knowledge (e.g., "I *know* this is a spoon").

Responding to a lack of episodic knowledge. A different cue that young children can use is whether an informant has or does not have relevant episodic knowledge. For example, an informant who has seen what is inside of a box is more likely to provide accurate claims about the contents of the box than an informant who has not. By the time they turn 3, children have a sense of the importance of trusting someone with the appropriate episodic knowledge (e.g., Pillow, 1989). For instance, 3-year-olds attend to whether an informant has looked inside a container to guide whether they should change their own guesses about the container's contents to match the informant's claims (Robinson, Champion, & Mitchell, 1999). Furthermore, if 3-year-olds are presented with evidence that an informant has been incorrect several times in the past at knowing the location of a hidden toy (thus, lacking episodic knowledge), they ignore that informant's claims about the location of subsequent hidden toys (Ganea, Koenig, & Millett, 2011). Three-year-olds also recognize that a knowledgeable informant should be trusted only when his claims are based on his own current knowledge, not past successes (Kushnir, Wellman, & Gelman, 2008).

Young children do not need to just witness someone not having access to information to know to doubt that person. They can also use explanations indicating the presence or absence of an informant's episodic knowledge to guide their trust. For instance, 3-year-olds show selective trust for an informant who has indicated the source of her knowledge (e.g., looked in a container) over an informant who has indicated the likelihood of ignorance (e.g., guessing or pretending something is in a container; Koenig, 2012).

Responding to a history of inaccuracy. Another cue that young children can use in determining when to trust someone is that person's history of accuracy regarding similar problems in the past. Much of the research on this topic has focused on accuracy regarding the labels of familiar objects: someone who has correctly labeled familiar objects is more reliable as a source for the labels of novel objects than someone who has not. When young children are introduced to two informants providing conflicting names for novel objects, they are often better at learning words from informants who have accurately labeled objects in the past than informants who have demonstrated a history of inaccuracy (e.g., Koe-

nig & Harris, 2005; Scofield & Behrend, 2008). Young children are capable of selectively learning from the more reliable source even without being encouraged to explicitly note that informant was most helpful (Birch, Vauthier, & Bloom, 2008). Furthermore, they can also keep track of past reliability when learning new functions and how to use new tools (e.g., Birch et al., 2008; DiYanni & Kelemen, 2008).

Two-year-olds have also shown some sensitivity to cues indicating reliability. In one study, 2-year-olds were introduced to only one informant who provided claims regarding the labels of familiar objects; the informants were accurate, inaccurate, uninformative ("Look at that"), knowledgeable ("I know what that is"), or ignorant ("I don't know what that is"). During the test phase, 2-year-olds accepted new names for *familiar* objects from informants who had previously been accurate or knowledgeable or had provided uninformative answers over informants who had previously been inaccurate or ignorant. In other words, children were more willing to override their own knowledge if the informant had been reliable previously or seemed likely to be reliable than if the informant seemed flawed. Interestingly, when presented with only one informant labeling a *novel* object, 2-year-olds learned from her regardless of her prior knowledge status, suggesting a default to trust when no other sources of information are available (at least in the domain of word learning; Krogh-Jesperson & Echols, 2012; see also Koenig & Woodward, 2010).

Responding to negativity. Young children also show some sensitivity to traits that indicate that a source may be bad. For example, 3-year-olds are more trusting of claims made by a nice puppet than a mean one (niceness was demonstrated through behavior, with the experimenter asking a question about whether the behavior was kind; Mascaro & Sperber, 2009). It is possible to reject claims made by mean informants simply because of wanting to avoid informants who seem negative. Thus, even younger children and infants may avoid trusting negative informants. The power of negativity in affecting how people evaluate information will be addressed several times throughout this article.

Summary. In sum, before the age of 4, children show some ability to discount claims made by informants who express clear uncertainty (e.g., Sabbagh & Baldwin, 2001), lack relevant episodic knowledge (e.g., Robinson et al., 1999), have made clearly inaccurate claims in the past (e.g., Koenig & Harris, 2005), or are mean (Mascaro & Sperber, 2009). Although there are likely to be some developmental differences during the first few years of life, such as the strong possibility that children can be aware that an informant is inaccurate earlier than they are capable of being able to selectively trust a more accurate informant (also seen in older children with more complicated tasks, described later), more research is needed.

Changes from early to middle childhood. In examining developmental differences during the preschool years in how children evaluate information, much of the research to date suggests that children 3 years old and younger make their trust decisions primarily on the basis of a binary decision of goodness or badness. In contrast, older children recognize some of the subtleties in evaluating informants. To further explain this idea, I will walk through several lines of research finding developmental changes between 2- and 3-year-olds and older children.

Understanding the importance of the degree of inaccuracy. One major developmental change in early childhood is in how children respond to the degree of inaccuracy or accuracy. For example, although 3-year-olds prefer to learn from an informant who has been 100% accurate over one who has made errors, they do not show preferential learning when both informants have made errors in the past, even if one informant has made only one error and the other has always erred (Pasquini, Corriveau, Koenig, & Harris, 2007). They also do not distinguish between informants who have clearly been accurate in the past and those who they know nothing about (Corriveau, Meints, & Harris, 2009). These studies provide evidence that 3-year-olds are somewhat absolutist when determining whom to trust, evaluating informants based on a binary decision of good versus bad. They seem to default to trust people they do not know anything about, and when an informant makes even one error, she becomes "bad" or untrustworthy.

Four-year-olds were much more successful in these studies but that does not mean they are always sensitive to the number and kind of errors when evaluating claims. Some errors are more major than others; for instance, calling a tiger a mouse is a larger error than calling a tiger a lion, and adults may be less forgiving of large errors than small ones. In one set of studies, 4- to 7-year-olds could recognize the distinction between small and large errors in labeling objects and in describing the quantity of dots on a card, but there were developmental differences in how children applied that knowledge when evaluating subsequent claims. Although 4-year-olds could keep in mind who had made greater numerical errors in the past when evaluating new claims, it was not until age 6 or 7 that children succeeded at applying an understanding of less measurable errors (e.g., whether it is worse to call a tiger a mouse or a lion). Furthermore, only 7-year-olds used claims made by the informant who had previously made smaller errors to influence their own answers (Einav & Robinson, 2010). In other words, by age 4, children can reflect on the degree of someone's errors, but there are still developmental improvements in sensitivity to the degree of errors in different domains and in recognizing that some errors can be informative.

Understanding deception. Another major development seen in early childhood is in responses to deception. Even though 3-year-olds can discount claims made by a mean informant, they struggle to respond appropriately to informants described as liars or as being tricky. For instance, 4-year-olds, but not 3-year-olds, doubt claims made by a puppet described as a "big liar" (Mascaro & Sperber, 2009), and 4- and 5-year-olds, but not 3-year-olds, show some ability to infer from the claims made by someone described as "tricky" what the true state of reality is (Lee & Cameron, 2000).

In fact, several studies have found that when it comes to recognizing deceptive claims, 3-year-olds seem to be biased to trust testimony over other cues that may be more meaningful for detecting deception. For example, although 4- and 5-year-olds have been shown to use the eye gaze of deceptive actors as opposed to their false claims of ignorance to infer the correct location of a hidden object, 3-year-olds struggle to do so. This poor performance does not seem to be due to 3-year-olds being unable to follow eye gaze: instead, they seem to focus more on the incorrect answers provided verbally over correct answers provided through nonverbal cues (Freire, Eskritt, & Lee, 2004). Three-year-olds have also been shown to follow deceptive testimony even after

multiple trials of witnessing that the claims were incorrect, but in past research, this was much more likely to happen when the testimony was presented live or on video than via other mediums, such as over audio (Jaswal, Carrington Croft, Setia, & Cole, 2010). Other studies find evidence that 3-year-olds are biased to rely on other social cues that are typically informative (e.g., pointing, eye gaze; Csibra & Gergely, 2009), even though they can learn over time to avoid cues provided by nonsocial agents, like pointers (Couillard & Woodward, 1999).

Further developments are seen during early childhood in understanding deception. In one line of work, 4- to 6-year-olds were presented with an informant described as having negative intentions toward the child (e.g., someone described as "mean" and not wanting the child to find a treat), even though the informant showed no other signs of deception. The informant then claimed that a treat was hidden in one of two boxes. Although 5-year-olds accurately inferred the correct answer on about half of the trials, only 6-year-olds successfully inferred the correct answer at greater than chance levels (Mascaro & Sperber, 2009). This research has found that it is easier for children to recognize claims to be false and to infer the correct answers if the informants are explicitly described as having certain dispositions (i.e., being "big liars") as opposed to described as having certain intentions (i.e., not wanting the child to have a treat). Indeed, the latter may take considerable mind-reading abilities, as children have to infer the link between intentions and statements (Mascaro & Sperber, 2009).

Other developmental changes in recognizing deception relate to the ability to generalize from someone's past deceptive behavior to make decisions. In one study, children were introduced to an informant who either helped or tricked two others in a task to find a prize hidden in one of two boxes. When the helper and the tricker later gave advice to the child, 3-year-olds trusted both helpers and trickers indiscriminately and did not indicate metacognitive awareness of who was trying to help. In contrast, 4-year-olds realized that the helpers were trying to help more than the trickers, but they were unable to use this understanding to selectively trust the helper. It was not until age 5 that children were able to both understand that the helpers were trying to help more than the trickers and to use this understanding to selectively trust the helpers (Vanderbilt, Liu, & Heyman, 2011). This research provides evidence that just because a child may know something about who might provide more accurate claims does not mean that the child can apply that knowledge when evaluating specific claims.

Summary. Beyond age 3, children show some ability to move beyond absolutism when evaluating others' claims—for instance, when deciding whom to trust, they pay attention to how many errors someone has made in the past. They are also capable of detecting some forms of deception. That said, before the age of 6 or 7, children tend to struggle more when the reasons to doubt are more subtle (e.g., trusting someone who has made small errors instead of large ones in labeling familiar animals) or involve greater understanding of the role of intentions and motivations (e.g., detecting deception).

Changes in middle childhood. In middle childhood, children have a better sense of how past actions, intentions, and motivations influence behavior. For example, unlike preschool-age children, they can use a single encounter with informants to guide future information seeking (Fitneva & Dunfield, 2010). In addition, un-

like younger children, they understand more complicated cues to deception (e.g., that gaze aversion can be a clue someone is lying; Einav & Hood, 2008), although they find it somewhat more difficult to detect the truth when encountering verbal–nonverbal inconsistencies in behavior (Rotenberg, Simourd, & Moore, 1989; of course, adults also have difficulty detecting body language and facial expressions suggesting deception; see Ekman, 1992).

Detecting distortions. Children also begin to show signs of detecting distortion. Distorted claims take many forms, from self-interested statements to partial judgments to persuasive testimony. One potentially distorted source of information is self-report: at times, individuals may evaluate themselves more positively than merited (e.g., claiming to be the smartest in a classroom even if one is not). Research has found that 10- and 11-year-olds, but not 6- and 7-year-olds, demonstrate skepticism regarding the accuracy of self-report for evaluative traits (Heyman & Legare, 2005). Likewise, although 8-year-olds recognize that claims made with someone's self-interest are less trustworthy than claims made against someone's self-interest, 6-year-olds show the opposite intuition (Mills & Keil, 2005). Thus, 6- and 7-year-olds seem to struggle to recognize how claims about one's own abilities and achievements may be distorted.

Another potential source of distortion is partiality. Partiality may be more difficult for children to understand than skewed self-report, as it relates to distortion regarding others, and the motivations for this may be less salient. Even 6-year-olds have some sense that it is possible for someone to be biased in favor or against someone because of preexisting relationships (e.g., someone might choose his undeserving best friend as a winner of a contest; Mills, Al-Jabari, & Archacki, 2012). That said, they do not necessarily keep that in mind when evaluating claims that may be incorrect due to bias, although they are better at detecting negative bias (e.g., selecting against one's enemy as the winner) than positive bias (e.g., selecting one's friend as the winner; Mills & Grant, 2009). Eight-year-olds show more advanced reasoning as long as the evidence that the claim was likely biased is readily apparent (e.g., a judge choosing a friend as the winner of the contest; Mills & Grant, 2009) or involves negative biases (Mills & Keil, 2008). Otherwise, if asked to infer accuracy based on information regarding personal connections, it is not until age 10 that children can do so (Mills & Keil, 2008). As children grow older, they become more capable of placing weight on the context of the claim when evaluating the likelihood of bias (e.g., Mills & Grant, 2009; Mills & Keil, 2008; Mills & Landrum, in press). Thus, there are clear improvements in the ability to understand, evaluate, and predict the effect of partiality on claims.

Finally, distortion can involve persuasive testimony: claims that are framed in certain ways to convince others to engage in certain behaviors or think certain things. These kinds of claims may be extremely difficult to detect, as the connection between the informant's motives and the way the claims are skewed is sometimes difficult to observe. Much of the work on this topic with children has been done in the realm of advertising (see Friestad & Wright, 1994; John, 1999; Moses & Baldwin, 2005). Although even 3- to 4-year-olds have some sense that advertisements differ from programming and that advertisers have the goal of selling a product, not until between the ages of 6 and 8 do children develop an understanding of the methods used to influence others to purchase a product, such as presenting biased or misleading information.

Even when children do have richer knowledge of advertising, they may not consistently apply that knowledge when confronted with advertising claims (e.g., Brucks, Armstrong, & Goldberg, 1988; Livingstone & Helsper, 2006). In fact, children may not regularly apply defenses against advertising until they are older, perhaps not until age 11 and older (John, 1999).

Summary. In middle childhood, children have a better sense of how intentions and motivations influence behavior, understanding more complex reasons to doubt, such as persuasion and distortion. But just because they have this knowledge does not mean they necessarily apply it.

What Is Stable?

Much of the research to date examining the development of a critical stance toward information has focused on examining developmental changes or focusing on one particular age group. But there is evidence for a few aspects of how children and adults evaluate information as being fairly stable across development.

Default response to new information. Some have argued that children and adults assume new information is true, given that most communicative messages are intended to be accurate (e.g., Gilbert, 1991; Sperber, 2001). According to this perspective (Gilbert, 1991), when individuals encounter a new claim, they implicitly accept it as true, and only later do they update their judgments to mark doubt if necessary. This perspective has been supported by research; for instance, when adults' cognitive resources are taxed so that they process information more superficially than normal, their immediate evaluation of that information generally reflects trust, not doubt (Gilbert, 1991). Although in some circumstances, adults are hesitant in their initial assessments of claims, such as when the information is clearly relevant to them (e.g., Hasson, Simmons, & Todorov, 2005; Sperber et al., 2010), when they have strong background knowledge that influences their immediate assessments (Richter, Schroeder, & Wöhrmann, 2009), or when goals related to survival are involved (e.g., Ferguson & Zayas, 2009), there still seems to be a strong bias toward trusting new information.

This seems to be the case with children as well. For instance, 2-year-olds trust informants who have provided uninformative claims in the past, judging them more similarly to previously accurate informants than previously inaccurate ones (Krogh-Jesperson & Echols, 2012), and 3-year-olds show no preference when an accurate informant is contrasted with a neutral one, suggesting that they are assuming both informants are accurate until they make an error (Corriveau, Meints, & Harris, 2009). In other words, across development, children and adults tend to trust new claims if they have no clear reason to doubt. What counts as a clear reason to doubt, though, differs across development and may depend on a number of factors, to be discussed later.

The power of negativity. Another contender for what is stable across development is that when encountering information from others, given that children and adults may be inclined to process negative information more carefully than positive information (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), people may be more cautious when evaluating informants when negative cues are present (Koenig & Doebel, in press). Perhaps this is somewhat related to the idea of cheater detection (e.g., Cosmides & Tooby, 2000)—people may be biased toward protect-

ing themselves from clear cheaters or clearly bad sources. There is some evidence to support this possibility, given that even infants distinguish "good" characters from "bad" ones (e.g., Hamlin, Wynn, & Bloom, 2007; Kuhlmeier, Wynn, & Bloom, 2003) and that 3-year-olds (the youngest age studied to date) avoid trusting claims from informants described as "mean" (Mascaro & Sperber, 2009). But, again, what counts as a clearly bad source as well as how this information is used (or misused) may change over development (an idea that will be discussed later in this article).

Background knowledge is important—but sometimes for good and sometimes for bad. Across development, children and adults often apply their background knowledge, when relevant, to evaluate information. For instance, 2- and 3-year-olds tend to follow their own intuitions regarding how to interact with an object instead of an informant's behaviors (Birch et al., 2010). Similarly, 3-year-olds who witnessed informants label hybrid objects that looked more like one object than another (e.g., one object was a cross between a key and a spoon but looked more like a key) trust their own intuitions about the object labels most of the time over labels provided by others (Jaswal & Malone, 2007). Three-year-olds have also been found to be more successful at ignoring information from misleading informants if they have had previous success trusting their own judgment on the same task (Ma & Ganea, 2010) or have clear evidence present at the time an incorrect claim is made to discount it (Jaswal, 2010). In some cases, even infants rely on their own judgment over information from others (e.g., Chow et al., 2008).

Background knowledge can be applied in a number of different situations, from having the vocabulary to evaluate the contents of a claim (e.g., Jaswal, McKercher, & VanderBorght, 2008; Koenig & Woodward, 2010; Moore, Bryant, & Furrow, 1989) to understanding how the affordances of a tool would lead it to be used in certain ways (DiYanni & Kelemen, 2008) to recognizing that the claim someone is making is improbable and likely deceptive or incorrect (Lee, Cameron, Doucette, & Talwar, 2002; Robinson, Mitchell, & Nye) to determining whether a novel entity is real or fake (Tullos & Woolley, 2009; Woolley, Boerger, & Markman, 2004; Woolley & Van Reet, 2006). But it is also important to note that relying on background knowledge may sometimes be problematic. Indeed, children are often notoriously poor judges of whether they know or do not know something (e.g., Flavell, Fredrichs, & Hoyt, 1970; Marazita & Merriman, 2004; Pressley, Levin, Ghatala, & Ahmad, 1987). Both children and adults often suffer from an illusion of explanatory depth, assuming their understanding of a topic is deeper than it actually is (Mills & Keil, 2004; Rozenblit & Keil, 2002). If they are not well calibrated to their own knowledge status, then it may be difficult for them to recognize when they should and should not consider their own prior knowledge when evaluating claims. Furthermore, even when children do have a good sense of what their background knowledge is on a topic, their willingness and ability to consider it may vary drastically depending on the circumstances (e.g., the salience of informant characteristics that indicate prestige or expertise). The fact is that adults often overestimate their knowledge and understanding (e.g., Dunning, Johnson, Ehrlinger, & Kruger, 2003), which can lead them to make poor choices when evaluating new information. Thus, background knowledge can help or hinder, depending on how it is used and how well calibrated someone is.

Summary. Across development, people seem to have a default to trust new information, although they may be particularly receptive to cues indicating negativity. Also across development, reference to background knowledge is frequently necessary in order to evaluate whether a claim should be trusted. There are likely to be other aspects of how people evaluate information that are stable across development, but additional research is needed to identify them.

Developing a Model for the Ability to Take a Critical Stance

In characterizing the development of the ability to take a critical stance toward information, we need to ask ourselves how much of what we see in children really relates to what we see in adults. We know that adults often struggle to appropriately evaluate claims, falling victim to biases and accepting ridiculous ideas. We describe how amazing it is that infants and young children show an ability to prefer learning a word or behavior from a more reliable source over a less reliable one, and in the next breath we curse our students for not being able to distinguish between propaganda and scientific research articles as sources of information. Clearly, there is a disconnect between the successes seen in younger children and the failures seen in adults.

In moving forward, to better address the question of what is changing and what is constant over development, it is crucial to reflect on the vast body of research in social psychology examining persuasion and attitude change. Reviewing the strengths and weaknesses in how adults evaluate information provides insight into some of the changes seen in development as well as motivation for focusing on particular weaknesses in children for intervention. A full review of the rich body of literature on models of persuasion and attitude change is outside the scope of this article. That said, one of the early models of how to approach examining how adults evaluate information can be easily applied to research with children. Hovland, Janis, and Kelley (1953) asked a question regarding how people evaluate information that seems quite simple but is incredibly powerful: "*Who* says *what* to *whom*?" *Who* refers to the informant or source of a message, *what* refers to the message itself, and *whom* refers to the target of the message. At times, as demonstrated below, each of these factors plays a crucial role in how successful a person is at evaluating a message and knowing when to disregard a claim. Therefore, in this next section, I review what we know about each of these factors as well as what we *need* to know to better understand the development of the ability to take a critical stance toward information.

The *Who*: What Are the Characteristics of the Informant Providing a Claim?

In much of the research with children to date, the focus has been on examining children's ability to detect cues to inaccuracy, deception, or distortion, and less attention has been paid to how other informant characteristics could influence this process. Yet other characteristics matter. Some, like expertise, may be incredibly important to consider when evaluating claims (in research with adults in social psychology, these characteristics are often labeled as *central characteristics*); others, like the group membership of an informant, may at times distract from the task at hand (often labeled *peripheral characteristics*; see Petty & Cacioppo, 1986).

Expertise. One important reason to doubt a claim is when someone does not have the appropriate expertise to answer a question. This connects to recognizing when someone is ignorant, but there are some important differences. Ignorance relates to a lack of knowledge, and in prior studies, this lack has tended to be focused either on episodic knowledge (i.e., not knowing the contents of a container) or a generic statement about someone not knowing something. In contrast, a lack of expertise relates to a lack of specialized semantic knowledge related to the question at hand. Detecting a lack of expertise may be quite tricky, as an informant may be competent in some domains or have some basic knowledge in the domain at hand and yet still not be able to satisfactorily answer questions.

By age 4, children can attribute different kinds of knowledge to familiar experts (e.g., doctors and car mechanics) as well as to novel experts (e.g., eagle experts and bicycle experts) on the basis of more than simple association between words related to the domain. They use their understanding of different domains of knowledge and expertise to determine which speaker will be more likely to provide an accurate answer to a question (Lutz & Keil, 2002). As children grow older, they grow better at recognizing different types of expertise and applying this understanding when selecting informants (e.g., Danovitch & Keil, 2004, 2007).

It is important to note that just because a child recognizes that different people are likely to know the answers to different questions does not mean he or she can evaluate claims made by those people in light of what they are likely to know. To succeed at knowing whom to question, children must connect the domain of expertise mentioned in a question to the informant likely to know the correct answer. In contrast, to succeed at evaluating claims made by different informants, children must recognize the domain of expertise needed to make a specific claim, override a tendency to trust new claims, and determine whether the person making the claim has the expertise needed for the claim to be accurate.

Even in research mentioned earlier on children's understanding of inaccuracy, preschoolers were found to sometimes be more successful at indicating which of two informants they might ask about a given problem than at accurately evaluating claims made by those two informants (e.g., Einav & Robinson, 2010; Koenig, 2012). Regarding children's understanding of expertise, a similar pattern has been found: preschoolers recognize which expert would be likely to know the answer to a given question yet struggle to evaluate claims made by those informants in light of their expertise (Landrum, Mills, & Johnston, 2011).

That said, it is clear that in some cases, preschoolers can use knowledge from appropriate experts to help solve simple problems, like determining which key can open a box (Mills, Legare, Bills, & Mejias, 2010; see also Mills, Legare, Grant, & Landrum, 2011; Sobel & Corriveau, 2010). But because this area of research is so new, how children think about claims made by different experts or by people with and without specific expertise remains largely unknown.

Age. One informant characteristic that can sometimes—but not always—serve as a cue to knowledge status is age. When all else is equal, children seem biased to believe that adults are better sources of information than children. That said, they do not blindly rely on age: for example, 3- and 4-year-olds believe that a child

who has reliably named objects in the past will be more trustworthy than an adult who has unreliably done so (Jaswal & Neely, 2006). They also recognize that there are circumstances when a child may know more than an adult (e.g., a child may know more about new toys than an adult; VanderBorght & Jaswal, 2009). Still, in some cases, children may feel social pressure to agree with claims made by an older source due to the connection with power and authority.

Power and authority.   Little research has examined how children are influenced by the authority of the informant, but research with adults frequently finds that they are more trusting of claims made by powerful sources than powerless ones (e.g., Michener & Burt, 1975). This finding with adults may be problematic when interpreting children's capacity to evaluate informant claims. Indeed, Clément (2010) pointed out that many testimony studies have involved informants without much prestige or authority, suggesting that young children can do well at rejecting testimony when the informant is neutral but may have trouble when other cues come into play. Supporting this point, researchers have found that children are sometimes willing to reject claims made by puppets that contrast their own beliefs (e.g., Clément, Koenig, & Harris, 2004) while trusting similar claims made by informants with more authority, such as adults (e.g., Ma & Ganea, 2010). In the eyewitness testimony literature, children are affected by the power of the source when providing their own testimony (e.g., Goodman & Schwartz-Kenney, 1992). Children also trust claims made in person more than those presented via audio only (Jaswal, 2010). Thus, given that many claims children encounter in everyday life are from more powerful sources than themselves, prior research may be *overestimating* how capable children are of taking a critical stance toward information.

Relationships.   Another cue that children may be influenced by is their relationship with an informant. In studies involving word learning, 3-year-olds are influenced by the familiarity of the informant making novel claims (e.g., whether the informant is a familiar or unfamiliar preschool teacher), and this overrides their ability to examine her level of accuracy on that particular task; 4- and 5-year-olds are more successful at focusing on past accuracy instead of familiarity (Corriveau & Harris, 2009). Thus, 3-year-olds seem particularly influenced by the familiarity of an informant—and this may override their ability to detect past accuracy.

Another closely related factor is whether the informant is in one's in-group. Group membership may be an even stronger cue than familiarity, as group membership implies similar beliefs and preferences, which could lead someone to be biased to trust an ingroup member. In some cases, group membership may be a meaningful cue for trust; for instance, preschool-age children prefer learning new functions from someone speaking in a native accent than someone speaking in a nonnative accent, presumably because they assume that the person speaking with the native accent has more relevant knowledge than the other informant, all other characteristics being equal (Kinzler, Corriveau, & Harris, 2011). But in other cases, ingroup bias can be problematic: for instance, just because someone is on the same sports team as you does not mean that he or she knows more about domains unrelated to sports compared with someone from a different team. Elashi and Mills (2011) found that 3- to 7-year-olds initially tended to trust ingroup members over outgroup members. Moreover, after witnessing an ingroup member incorrectly label unfamiliar objects,

children across ages seemed reluctant to give up their trust in an ingroup member. Thus, it is important for children to recognize that group membership is not always indicative of a reliable source of information.

Negativity.   As mentioned earlier, children and adults may be inclined to process negative information more carefully than positive information. In fact, at times, children may place more weight on negativity over other characteristics like expertise and reliability when evaluating informants. Recent research has found that preschoolers are less likely to trust an expert's claims if he was mean than if he was nice (Landrum et al., 2011), and in some situations, they seem to struggle to decide how much to focus on past reliability and how much to focus on niceness when encountering claims about the names of novel objects (Johnston, Mills, & Landrum, 2011). Preschoolers also seem to be influenced by a *pitchfork effect*, assuming that someone who has one negative characteristic (e.g., a nonexpert in a familiar domain) will be ignorant in other domains (Koenig & Jaswal, 2011). In middle childhood, children's attention to negativity is also apparent in their understanding of bias (e.g., Mills & Grant, 2009; Mills & Landrum, in press).

This sensitivity toward negativity may be useful in many situations: for instance, the fact that an informant has a negative characteristic (e.g., being unfriendly) may be indicative that the informant should not be trusted (e.g., the unfriendly informant does not like you and is going to lie). But at other times, an informant's negative characteristic may be unrelated to the truth value of his claims: for instance, just because a physics professor is unfriendly to someone asking him a question does not mean that his response is inaccurate. There is some evidence that older children can put aside a preference for someone who is nicer to recognize the importance of relative expertise (Danovitch & Keil, 2007), but it is important to further examine this issue in future research.

Summary.   There are a number of different informant characteristics that may influence how children and adults evaluate informant claims, and some of these characteristics may be quite peripheral to an informant's ability to provide an accurate, trustworthy claim. Studies presenting children with multiple cues to determine how they are weighing them should provide better understanding of which cues are understood in a sophisticated manner very early in development and which cues are not understood until later, perhaps even adulthood.

The *What*: What Are the Characteristics of the Testimony?

Research examining selective trust has involved testimony regarding a number of different topics, from the contents of a box or the name of a novel object to the answer to a question requiring expertise or a decision about the outcome of an event that requires interpretation. More systematic examination of the characteristics of the testimony is required if developmental change and stability in evaluating information are to be better understood.

Degree of inaccuracy or bizarreness.   Many of the paradigms used to examine children's trust in testimony involve two informants providing conflicting claims or actions, with one being somehow bizarre (e.g., calling a brush a plate; using one's head to turn on a light that can be more easily turned on with one's hands).

In these studies, neither the experimenter nor the other informants react to such bizarre claims and actions, even though presumably, in real life, bystanders would show some indication of surprise, befuddlement, or doubt. This may be problematic, given that 4-year-olds have been found to be sensitive to bystander attention and other nonverbal cues (Chudek, Heller, Birch, & Henrich, 2012; Fusaro & Harris, 2008) as well as majority agreement (Corriveau, Fusaro, & Harris, 2009) when determining whether to trust a claim.

As noted by Lucas and Lewis (2010), being able to avoid claims made by informants that are acting in a bizarre manner or are clearly incompetent is certainly a useful ability. But it is also important to recognize that the ability to discount bizarre claims may require different skills than the ability to discount more subtly inaccurate claims, which may be closer to what happens in everyday life. Thus, this is additional support for the possibility that prior research may overestimate young children's ability to demonstrate selective trust.

Domain of the testimony. Connected to ideas proposed by Lucas and Lewis (2010), a sophisticated critical stance requires children to be specific in their judgments of inaccuracy, recognizing that an informant's flaws may be domain or situation specific. For example, just because someone is ignorant about the contents of a box does not mean she is also ignorant about how to make a great beef stew, how to solve simple algebraic problems, or how to explain the intricacies of string theory.

Building on this idea, recent research has begun to examine how the kind of claim influences children's decisions regarding who to trust. Some claims require episodic knowledge, such as knowing the contents of a box or the characteristics of the person who stole a cookie from a cookie jar. To accurately obtain this knowledge, someone needs to have access to this information and to be able to able to fully attend to it. Other claims require some kind of semantic knowledge, but the *domain* of this knowledge can vary widely. Some knowledge, such as words and general claims such as "airplanes fly," may be seen as more generic and universally known. Other kinds of knowledge, such as the cure for a certain illness or the name of a specific enzyme, may be seen as more specialized and less widely known.

In theory, how children weigh different cues regarding informant trustworthiness should vary depending on the kind of knowledge required to provide an accurate claim. Csibra and Gergely (2009) suggested that infants and children may be biased to trust claims related to generic knowledge since that knowledge might be difficult to acquire on one's own. In contrast, children may be less inclined toward automatic trust when it comes to episodic knowledge (e.g., contents of a box) or other kinds of knowledge that they can normally acquire through their own first-hand experience (Csibra & Gergely, 2009). This difference may be explained by many reasons, including the possibility that the connection between the experiences required to know a certain claim is more direct for episodic knowledge than for many kinds of semantic knowledge. Esbensen, Taylor, and Stoess (1997) conducted a study with preschool-age children who were learning either a new fact (i.e., a piece of semantic knowledge) or a new behavior (i.e., closer to episodic knowledge): they were able to recognize learning something new when it was behavioral but not when it was factual. In other words, given that preschool-age children may have a richer understanding of the link between perception and

episodic knowledge than between other experiences and semantic knowledge (e.g., Wimmer, Hogrefe, & Perner, 1988), they may have an easier time detecting reasons to distrust someone for a lack of episodic knowledge than for a lack of semantic knowledge.

Research examining the conditions under which children excuse an informant's past errors provides an important illustration of how the kind of knowledge required to make an accurate claim matters. In a line of work involving episodic knowledge, 3- to 5-year-olds were able to excuse past errors resulting from uninformative perceptual access regarding the contents of a container (Nurmsoo & Robinson, 2009a). In contrast, in a line of work involving semantic knowledge, 3- to 7-year-olds struggled to excuse past errors about the labels of familiar objects, even if the speaker had been wearing a blindfold when making the errors (Nurmsoo & Robinson, 2009b). In other words, children seem more aware of when to discount claims made by an informant with good reasons for previously lacking *episodic* knowledge than one with good reasons for previously lacking *semantic* knowledge (at least in the realm of word learning). It may be that when learning words, the intuition to doubt informants who have been inaccurate in the past is so strong that it at times keeps children from reflecting on the reasons for those inaccuracies, but this is an open question for future research.

Domain specificity and generalizability. Much is unknown about how children's evaluations are influenced by the kind of knowledge informants have (or do not have). Some have speculated that there may be differences in the generalizations children make depending on the kind of knowledge an informant has or lacks. Brosseau-Liard and Birch (2011) found that 4-year-olds inferred that an informant who had accurately labeled familiar objects (a type of semantic knowledge) would have knowledge about the labels for unfamiliar objects (the same domain of semantic knowledge), but they did not draw any conclusions about whether that informant or someone else would know about which object was in a box (a type of episodic knowledge). Further, when 4-year-olds were presented with cues regarding both the semantic and the episodic knowledge of two informants, children were able to selectively trust the informant with proper episodic knowledge, even if he had flawed semantic knowledge. This supports the idea that 4-year-olds do not indiscriminately doubt information from informants with flaws—to some extent, they are tracking the relationship between the type of flaw and the type of knowledge needed to provide accurate claims.

Additional evidence supports differences in inferences made depending on the kind of knowledge someone has. If an informant lacks knowledge of something that seems subjective (or perhaps situation specific), infants do not necessarily treat that as a cue for current semantic knowledge (Zmyj et al., 2010). In contrast, if an informant lacks or has some kind of semantic knowledge, children sometimes make broader generalizations. For instance, 5-year-olds and, to some extent, 4-year-olds think that an informant who has correctly labeled objects in the past is more likely to know the rules for a novel game (Rakoczy, Warneken, & Tomasello, 2009) and to know words and facts and to engage in prosocial behavior (Brosseau-Liard & Birch, 2010) than one who has incorrectly labeled objects. Four- and 5-year-olds also conclude that someone who knows the causal properties of an object is also likely to know the name of that object (Sobel & Corriveau, 2010). In other words, when children are presented with information about an informant's

knowledge, they sometimes—but not always—infer other kinds of knowledge and characteristics.

It is also important to note that when thinking about how much children generalize about whether an informant who is knowledgeable or incompetent in one domain will be knowledgeable or incompetent in another, much may depend on the area of expertise. Evidence suggests that even 6-year-olds (the youngest age studied to date) believe that some areas of knowledge (e.g., natural sciences) are harder for people to figure out on their own than others (e.g., psychology; Keil, Lockhart, & Schlegel, 2010). Thus, it may be that children would make different generalizations regarding someone incompetent in a difficult domain of knowledge compared with someone incompetent in an easier domain of knowledge.

Summary. In moving forward as a field, we need to keep in mind that while tasks involving episodic knowledge or simple semantic knowledge may demonstrate early competencies in evaluating informant claims, much of what people experience when they are presented with new claims involves more complex domains of information. Further research is needed to better understand how children evaluate information in different domains.

The *Whom*: What Are the Characteristics of the Child (or Adult) Encountering the Claim?

Much of the prior research examining selective trust focuses on age as the critical factor influencing children's ability to evaluate information. Yet it is clear in research with adolescents and adults that other characteristics held by the person encountering and evaluating claims are important. Some of these characteristics may help explain developmental changes in evaluating information, while others may provide insight into individual differences.

Social cognition. Many changes in how children understand knowledge and beliefs of others seem clearly connected to changes in children's ability to take a critical stance toward information. Between early and middle childhood, children shift from believing that all reality is directly knowable and that there is only one right answer to everything that everyone should have (e.g., not recognizing that others can hold beliefs that are false) to recognizing that people can hold beliefs that are false. Thus, a 3-year-old may respond strongly to someone making an incorrect statement, since such a statement would not match reality, regardless of how many incorrect statements are made. In contrast, a 4-year-old who has a better understanding of how beliefs can be incorrect (and thus has more advanced social cognitive skills) may be more willing to weigh the level of accuracy when evaluating competing claims. Indeed, several studies have found a link between social cognitive skills and the ability to use knowledge that an informant has been inaccurate or deceptive in the past to evaluate that informant's claims (e.g., DiYanni & Kelemen, 2008; Fusaro & Harris, 2008; Vanderbilt et al., 2011; but see also Pasquini et al., 2007).

Another change seems to occur around age 7, when children tend to shift from thinking that reality basically copies itself onto whoever is in the path of that knowledge to understanding the importance of interpretation on thinking and reasoning (Barquero, Robinson, & Thomas, 2003; Carpendale & Chandler, 1996; Chandler & Lalonde, 1996). For instance, they understand that two people could have different trains of thought about the same item (Eisbach, 2004), and they understand more about unconscious mental processes (Choe, Keil, & Bloom, 2005; Flavell, Green,

Flavell, & Lin, 1999). They also begin to understand that it is possible for people to hold different perspectives but for one to be more right than the others based on evidence and logic (for more information, see Kuhn, Cheney, & Weinstock, 2000; Wainryb, Shaw, Langley, Cottam, & Lewis, 2004). These changes seem to relate to children's ability to doubt informant claims that may involve preexisting beliefs or knowledge skewing interpretation, such as distortion. For instance, children with higher mental-state reasoning abilities show more sensitivity to the knowledge status of the interviewer regarding misleading testimony (Evans & Roberts, 2009). There is also some evidence that advanced interpretive theory of mind skills link to the ability to recognize certain aspects of persuasive testimony (Grant & Mills, 2011b).

Although it is clear that changes in social cognitive skills may relate to aspects of how children evaluate information, they do not tell the whole story. Even young children who cannot pass a false belief task are still able to discount unreliable sources in some situations (e.g., Pasquini et al., 2007). At first, this may be a blind doubt, where children have learned the rules for doubting without really reflecting on the underlying reasons. Over time, as children develop a greater sense of how intentions influence people's claims and more experience with different kinds of intentions, they learn new reasons to be prepared for distorted claims. Changes in interpretive theory of mind (along with other changes) likely help children understand these different kinds of reasons for distortion. But, again, just because children understand that distorted claims are possible does not mean that they can detect them consistently in action.

Although there seems to be a clear link between social cognition and the development of a critical stance, this link may be due in part to other developmental changes during childhood, such as developments in the brain. And there are also clearly other factors, both developmental and individual differences, that relate to how children evaluate information. Some of these other possibilities are described in the following sections.

Use of prior knowledge to evaluate information. As noted earlier, children and adults often apply their prior knowledge when evaluating information. That said, in some cases, children age 3 and younger seem remarkably influenced by the testimony of others, even when it conflicts with their own knowledge, beliefs, and expectations. For instance, one set of studies examined how 30-month-olds responded to evidence related to their strongly held bias that objects would fall straight down even if placed into tubes that curved downward in different directions (known as the *gravity bias*; e.g., Hood, 1995). Although children tended to hold this bias, their judgments were shaped fairly easily by the testimony of others (Jaswal, 2010). In another set of studies, children watched through a window as an adult put a toy in one of three boxes. The adult then returned and falsely claimed that the toy was in a different box from the one in which the child had observed the adult place the toy. Three-year-olds were frequently misled by the adult's false testimony even though it conflicted with their direct observation (Ma & Ganea, 2010). In another study, 3-year-olds were willing to copy a model's tool use if the informant made it clear that the tool was "made" to do something, even when the tool's affordances suggested other behaviors would be appropriate (DiYanni & Kelemen, 2008). Understanding more about the conditions under which children successfully use their prior knowl-

edge to evaluate claims—as well as the conditions under which they do not—should be useful.

Detecting flaws in the messages themselves. Related to prior knowledge is someone's skill set for evaluating messages themselves. At times, people can detect logical flaws in the messages themselves, even without much relevant background knowledge. Preschoolers have some sensitivity to some of Grice's (1975) conversational maxims, preferring to accept claims made by informants providing relevant information (as opposed to irrelevant). They also have some awareness of the distinction between someone providing the right quantity of information and someone providing too little (e.g., saying an object is hidden in a cup as opposed to specifying the cup; Eskritt, Whalen, & Lee, 2008).

As children grow older, they are more capable of evaluating claims based on logic and consistencies in the claims themselves (e.g., Morris & Hasson, 2010; Ruffman, 1999; Samarapungavan, 1992). For instance, 6-year-olds distinguish long noncircular explanations from short circular ones, and 8-year-olds distinguish long noncircular explanations from long circular ones (at least in familiar domains; Baum, Danovitch, & Keil, 2008). That said, there are age differences that depend on the questions asked and the complexity of the domains involved (e.g., Markman, 1979). Using a more diverse set of domains and assessing children's background knowledge should provide more information on whether and when children can even detect flaws in informant claims, which is essential for demonstrating appropriate selective trust.

Relevance of claim to the child. In evaluating claims, adults process more carefully those claims that affect themselves (e.g., Hasson et al., 2005; Petty & Cacioppo, 1990; Sperber et al., 2010). This may be true of young children as well. For instance, although 3-year-olds have previously not seemed to understand what it means to be "fair," they seem to recognize that something is unfair when it directly harms them (while showing little concern about fairness when it benefits them; LoBue, Nishida, Chiong, DeLoache, & Haidt, 2011). This suggests that when claims directly influence children, they will be more cautious in how they evaluate them, more carefully weighing informant characteristics to determine whom to trust.

Claim relevance may be most important when there are limited resources available to process information. In adults, this happens under conditions of cognitive load (e.g., Smith & DeCoster, 2000). Since children already are at a disadvantage compared with adults in terms of mental resources available to process information, claim relevance may be even more important for them.

Motivation to think deeply. Some individuals have a high tendency to engage in and enjoy effortful cognitive activity, while others would like to avoid thinking and reflecting at all costs. Known as the *need for cognition* (Cacioppo, Petty, Feinstein, & Jarvis, 1996), this individual difference measure has been studied in depth with adults and found to be quite relevant to how they evaluate the things they experience (e.g., Fletcher, Danilovics, Fernandez, Peterson, & Reeder, 1986; Verplanken, Hazenberg, & Palenéwen, 1992). For instance, there is evidence that adults who demonstrate high need for cognition are better at coping with persuasive testimony (e.g., Cacioppo et al., 1996) and are better at attending to both verbal and nonverbal cues (as opposed to only nonverbal) when attempting to detect lies (Reinhard, 2010). It is important to note that the need for cognition is not merely an intellectual ability: it is a motivational one, and thus while it relates

modestly to intelligence in some studies, it is a separate construct (e.g., Cacioppo & Berntson, 1994). Cacioppo and his colleagues (1996) hypothesized the following:

> Children who learn, through observation and experience, that they can cope with their problems through reason and verbal influence rather than through physical force or flight should tend to develop higher levels of need for cognition because of the demonstrated import of good problem-solving skills and habits in charting a course through the hazards of life. (p. 246)

Yet very little is known about the development of the need for cognition: 10-year-olds are the youngest age studied to date (Kokis, Macpherson, Toplak, West, & Stanovich, 2002), and the vast majority of studies have focused on high school-age students and adults. Need for cognition and other individual differences in thinking disposition (e.g., actively open-minded thinking; Stanovich & West, 2008) may play an important role in children's success at taking a critical stance toward information.

Summary. The preceding list of characteristics is by no means comprehensive. A number of other factors likely influence how children evaluate information, including culture (e.g., Callanan, 2006; Heyman, Fu, & Lee, 2007), general trust beliefs (e.g., Rotenberg, Boulton, & Fox, 2005), executive functioning skills (e.g., Evans & Lee, 2011), scientific reasoning ability (e.g., Kuhn & Crowell, 2011; Kuhn & Pease, 2008; Kuhn, Pease, & Wirkala, 2009), optimism (e.g., Boseovski, 2010; Boseovski & Lee, 2008; Grant & Mills, 2011a; Heyman & Giles, 2004; Lockhart, Chang, & Story, 2002), and attachment style (Corriveau, Harris, Meins, et al., 2009). Other more general cognitive abilities, such as intelligence and working memory capacity, may also play a role. If psychologists want to say there are meaningful changes and consistencies in how children and adults evaluate information, then it is essential to much more thoroughly examine specific characteristics that relate to how individuals evaluate information.

Conclusions

It is clear that children seem biased toward trusting new claims, and to some degree, this is justified: most claims they encounter are likely to be accurate, and most informants do intend to provide accurate information. But it is also paramount that they take a critical stance. Over the course of development, children will encounter misinformation in many forms, from inaccurate claims to deceptive testimony to manipulative suggestions. The potential harm from trusting too much varies. Believing in inaccurate or unsubstantiated claims can lead to a whole host of consequences, from educational (i.e., missing questions on a test due to treating Wikipedia as a reliable source) to interpersonal (i.e., getting in an argument with a classmate due to a rumor) to health-related (i.e., making medical decisions based on trusting a questionable Internet source), and beyond. Exposure to advertising without a critical perspective (at times even with such perspective) encourages a desire for those products (e.g., Auty & Lewis, 2004) and greater levels of materialism (e.g., Buijzen & Valkenburg, 2003), even in children. Thinking about trust more generally, children with very high trust beliefs (e.g., expecting people to be honest and being unprepared for the possibility of hurt or manipulation) as well as very low trust beliefs have been found to be at risk for maladjustment, social exclusion, and other issues (Rotenberg et al., 2005).

Similar findings are seen in adulthood—too much trust as well as too little can have consequences (e.g., Rotter, 1980).

So the key, then, is to be *selectively* skeptical: to cautiously evaluate the information that is encountered, recognizing the conditions under which it is appropriate to doubt instead of trust. Over the course of development, children gradually develop the ability to distinguish trustworthy sources from untrustworthy ones, becoming more and more capable of taking a critical stance toward new information. They shift from making binary decisions regarding whom they should doubt based on whether a sign of incompetency is present to recognizing that some incompetent informants are more problematic than others before finally understanding how intentions and motivations can influence someone's trustworthiness. Yet at any given time, with any given claim, a number of factors may influence children's success at evaluating the claim. They must weigh multiple and sometimes competing characteristics to determine which informant is likely to provide an accurate, trustworthy claim. They must reflect on their own background knowledge and employ logical reasoning skills to reflect on the content of informant claims. And they must utilize their strengths and overcome their weaknesses to determine whether it is reasonable to trust someone.

In attempting to build a model to explain developmental, individual, and situational differences in children's ability to evaluate information, researchers must keep in mind the question "Who says what to whom" (Hovland et al., 1953) and be diligent in asking how much of the critical-thinking behavior that is seen represents a sophisticated analysis of reasons to trust, and how much is based on more gut intuitions of characteristics social psychologists tend to describe as being more peripheral to the issue at hand. Asking questions regarding the origin of these intuitions should provide additional insight into reasons for developmental changes.

As psychologists gain a better grasp on what seems to be changing over the course of development and under what conditions, it will be key to strive for greater ecological validity. How much of children's sophistication in evaluating information inside the lab translates into everyday life situations? Further, presuming that this ability to know when and how to take a critical stance toward information is important both inside the lab and out, a crucial question remains: how can children (and adults) be helped to be better critical thinkers? Although children sometimes show remarkable and appropriate skepticism, care must be taken not to overstate young children's ability to detect reasons to doubt, as doing so may inadvertently put them in harm's way. That said, children *do* have a strong desire to fully understand the world around them (e.g., Gopnik, 1998), being unsatisfied with incomplete or wrong answers to their questions (e.g., Frazier, Gelman, & Wellman, 2009; Kemler Nelson, Egan, & Holt, 2004). Thus, even young children show a clear desire to discover the truth. Future research in the field *must* harness this interest to understand how to best support the truth-seeking efforts of children, encouraging them to develop into vigilant consumers of information.

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