The effect of inconsistent affective cues on children's judgments of speakers

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

What speakers say is sometimes incongruent with the manner in which it is said. As a result, listeners are exposed to inconsistencies in communication: for example, when a speaker's words are discrepant with her demonstrated emotions (e.g., a positive statement said in a negative tone of voice). While inconsistencies may be exploited by speakers to produce nuanced communication (e.g., verbal irony), they also introduce ambiguity, which may render the speaker a less credible source of information. The present work outlines three studies examining the extent to which children make credibility discriminations based on the consistency of a speaker's lexical and non-verbal cues. In Study 1, when children were provided the opportunity to solicit novel information from video-recorded speakers, or unknown speakers, school-age children (7- and 8- year-olds) preferred to solicit information from consistent speakers to a greater extent than inconsistent speakers (e.g., those who provided a negative statement in a positive tone of voice). In contrast, preschool-age children (4- and 5- year-olds) did not show a preference for consistency and avoided speakers who showed any negative valence (lexical or non-verbal). Study 2 demonstrated that school-age children's preference for consistent speakers did not extend to a context where children had to decide whether to solicit information about a speaker's personal preferences. Further, across Studies 1 and 2, school-age children's ratings of speakers were influenced by speakers' consistency when the attribute being judged was related to information acquisition (e.g., believability, weirdness of speech), but not when it was a general characteristic (e.g., friendliness, likeability). In Study 3, 9 and 10 year old children demonstrated flexibility in their credibility judgments by preferring to solicit information from inconsistent speakers if the speaker was aware of a situational context that normalized the inconsistency. Together the findings from the three studies indicate that school-age, but not preschool-age,

children can detect emotional inconsistency in speaker cues, use this information to form speaker credibility judgments, and use contextual information to think flexibly about speakers' credibility.

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Introduction

Children acquire vast amounts of new information throughout childhood. This occurs through many methods, for example, through observation, modelling, and trial and error. Another common way of learning new information is through the verbal testimony of others (e.g., a teacher labelling a novel object; e.g., Harris, 2002). Indeed, verbal testimony is the only possible way to impart certain types of information (e.g., historical facts). Therefore, it is particularly important for children to develop the ability to learn from others in this way. However, children are unable to take in *all* of the information to which they are exposed. Adaptively, they have been shown to be 'selective learners' in that they are sensitive to a number of characteristics that speak to the credibility of the person providing the information, and choose to solicit new information from speakers that exhibit these characteristics. Much of the previous literature in this area has focused on whether children are sensitive to cues to a speaker's knowledge (e.g., Koenig & Harris, 2005; Scofield & Behrend, 2008). However, the knowledge possessed by a speaker is irrelevant if he/she is not able to convey the information in a clear and unambiguous manner. Showing appreciation for this notion, children prefer to solicit information from speakers who show more clarity in their utterances (Gillis & Nilsen, 2013). The overarching goal of this dissertation was to further investigate children's sensitivity to the manner in which speakers deliver information. Three studies examined whether children preferred to solicit information from speakers who provided information in a consistent manner, that is, when their nonverbal affect was consistent with the emotional valence of the words uttered. The first study assessed whether preschool and school-age children preferred to solicit new information from consistent speakers (relative to unknown speakers), compared to

inconsistent speakers (i.e., as opposed to inconsistent). The second study examined whether children maintained a preference for consistency when soliciting information that did not require a correct answer, and further investigated whether children form more positive global attributions of consistent, compared to inconsistent, speakers. Finally, the third study assessed whether school-age children are able to integrate information regarding the situational context and the speaker's perspective when deciding on the credibility of consistent and inconsistent speakers. By investigating children's sensitivity to *how* information is delivered, these studies contribute to the growing literature demonstrating children's sophisticated ability to determine credible sources of information.

Children's Judgments of Speaker Credibility

Adopting a discriminating stance towards speakers is adaptive given that children are exposed to vast amounts of new information from others (e.g., Harris, 2002) and are unable to absorb everything. Further, at times it could be detrimental to trust an individual's verbal testimony (e.g., individuals lie or unknowingly deliver incorrect information). Therefore, it is advantageous for children to determine when they should attend to information versus when they should ignore it. A large body of research has demonstrated that children are selective when deciding from whom to solicit information (see Mills, 2013 for a review). Research on children's sensitivity to cues to speaker credibility has typically used a paradigm that involves exposing children to pairs of speakers who differ in specific ways and provide different information (Mills, 2013). After children have had a chance to familiarize themselves with these speakers and the type of information they deliver, each speaker provides a conflicting piece of novel information (i.e., each speaker labels a novel object with a different word). Children's speaker

preferences can then be inferred by observing which individual's information they choose to adopt or apply (e.g., Koenig, Clement & Harris, 2004; Pasquini, Corriveau, Koenig & Harris, 2007). Using variations of this methodology, previous research has demonstrated that there are many speaker characteristics that children are sensitive to when deciding who is a credible source of information. For example, as early as the preschool years, children prefer to learn from individuals who are familiar (Corriveau et al., 2009; Corriveau & Harris, 2009), adult (compared to children; Jaswal & Neely, 2006), non-dissenting (Corriveau et al., 2009), experts (Lutz & Keil, 2002), part of their in-group (Elashi & Mills, 2011), and nice (compared to mean; Mascaro & Sperber, 2009). Further, children have been shown to mistrust individuals referred to as "big liars" (Mascaro & Sperber, 2009).

While it can be a helpful strategy for children to rely on speaker characteristics as a way to determine trustworthy sources of information, there are occasions where it could lead children astray. For example, while adults are generally more credible sources of information than children, this is not always the case, especially with regards to child-specific topics (e.g., toys, games). Accordingly, another important cue to credibility is the amount of knowledge a person has with regards to a certain topic. Researchers have speculated that children see some of the speaker characteristics (mentioned above) as indications of speakers' knowledge, as per a large body of research demonstrating that children prefer to learn from knowledgeable individuals over unknowledgeable individuals (e.g., Koenig & Harris, 2005; Sabbagh & Baldwin, 2001; Corriveau, Meints, & Harris, 2009; Koenig, Clement & Harris, 2004; Scofield & Behrend, 2008). Children have been shown to use knowledge as a cue to speaker credibility both when individuals announce the extent of their knowledge (e.g., saying "I know" compared to "I think,"

e.g., Koenig & Harris, 2005; Sabbagh & Baldwin, 2001) as well as when they demonstrate their knowledge through the accuracy with which information is presented (e.g., accurately or inaccurately labelling objects; e.g., Corriveau et al., 2009; Koenig et al., 2004; Scofield & Behrend, 2008). Accuracy appears to be a particularly robust cue. For example, 3- and 4-year-olds continue to trust more accurate speakers a week after exposure (Corriveau & Harris, 2009) and 4-and 7-year-olds have been shown to prefer to learn from accurate individuals after only one encounter (though the 4-year-olds needed more exposure; Fitneva & Dunfield, 2010).

Some research suggests that children put greater weight on speakers' knowledge compared to their other characteristics. For example, 3- and 4-year-olds have been shown to prefer to learn from accurate children over inaccurate adults (Jawal & Neely, 2006), as well as unfamiliar, but accurate, individuals over inaccurate, but familiar, individuals (Corriveau et al., 2009; Clement et al., 2004). Further, children have been shown to be sensitive to the type of knowledge about which different individuals are likely aware. Specifically, 3-to 5-year-olds were more likely to ask adults about the nutritional value of food, while they directed their questions regarding toys to children (VanderBorght & Jaswal, 2009). Children have also been shown to excuse a speaker's inaccuracy if it is clear that they do not have access to the relevant information (e.g., Nurmsoo & Robinson, 2009). By 4 years of age, children demonstrate even further sophistication in their decisions regarding from whom to solicit information by tracking the relative history of individuals' accuracy. Specifically, 4-year-olds preferred to learn from individuals who were 75% accurate compared to those who were 25% accurate (Pasquini et al., 2007). Together, this research suggests that children value the knowledge of speakers and are

able to employ complex strategies to reason about which speakers are likely to be credible sources of information.

While knowledge can be an important indicator of whether a speaker will be a good source of new information, it becomes irrelevant if speakers are unable to express their knowledge clearly. Within the speaker credibility literature, there is a relative lack of research investigating whether children are attuned to *how* a speaker delivers information. However, there is some evidence to suggest that children are able to take the *how* into account when deciding from whom to solicit new information. For example, Birch, Akmal and Frampton (2010) found that 2-year-olds preferred to learn from individuals who displayed confident non-verbal cues (e.g., upright posture with shoulders back and chin high, facial expressions of recognition) as opposed to uncertain non-verbal cues (e.g., shoulder shrugging, puzzled facial expressions). Similarly, 4- and 5-year-old children favored confident informants over hesitant ones (of note, when confidence conflicted with accuracy, preschool-age children's speaker choices were at chance, but as their age increased, they were more likely to rely on the speakers' prior accuracy over their confidence; Brosseau-Liard, Cassels, & Birch, 2014). Children have also been shown to take bystanders' non-verbal cues into account when judging speaker credibility. For example, 4-year-olds preferred to learn from individuals who delivered information while a bystander was nodding and smiling as opposed to shaking her head and frowning (Fusaro & Harris, 2008, see also Chudek, Heller, Birch & Henrick, 2012). Further, while no research has investigated whether children are sensitive to tone of voice in isolation when determining a speaker's credibility, it has been demonstrated that children prefer to learn from individuals who speak with their native accent as opposed to a foreign accent (Kinzler, Corriveau & Harris, 2011),

demonstrating that they are attuned to the sound of an individual's speech. Speaking more directly to children's consideration of speakers' ability to unambiguously deliver information, school-age children preferred to learn from individuals who provided information that unambiguously identified an object as opposed to individuals who provided information that was accurate, but insufficient to identify the specific object (Gillis & Nilsen, 2013). Given that children encounter many other types of ambiguity in communication, beyond lexical ambiguity, this dissertation sought to determine whether children are attuned to other types of communicative ambiguity and subsequently use them as cues to speaker credibility. More specifically, I wondered whether children would be less likely to judge speakers to be credible if their non-verbal[1] affect was discrepant with the lexical information they delivered. Prior to posing hypotheses regarding children's use of consistency between non-verbal and lexical affect information, it is important to review the literature regarding children's sensitivity to these two streams of communication.

Children's Sensitivity to Communicative Cues

Speakers convey their feelings and intentions through both the content of their statements and the manner in which they make their utterances (i.e., non-verbal cues such as tone of voice or facial expression). When individuals communicate, their non-verbal cues are often consistent with the lexical meaning of the information they deliver (e.g., saying "I'm happy" in a positive tone of voice), which helps to create unambiguous messages for others to interpret. However, occasionally, individuals deliver lexical information that is inconsistent with their non-verbal cues, which can result in ambiguous communication (i.e., it is unclear which aspects of the

[1] Throughout my dissertation, I use the term "non-verbal" to refer to both tone of voice and facial expression

communication more accurately convey the true message). For example, this occurs when individuals try to mask their true emotions (e.g., saying "I feel great" in a sad tone of voice), when they are being sarcastic (e.g., saying "I'm *really* excited about going to school" in an unenthusiastic tone of voice) or when trying to be deceptive (e.g., saying "I didn't break the glass" with a guilty facial expression). Though such inconsistent messages allow for more nuanced communicative behaviour (as is the case with sarcasm), they also introduce more room for miscommunication to occur. Therefore, it may be advantageous for children to be able to detect inconsistencies in communication and use this information to form judgments of speakers' credibility. For example, it would be adaptive to be skeptical of the information delivered by an individual who is being deceptive or masking their true emotions.

As an initial step in appreciating inconsistencies in messages, children would need to show sensitivity to both lexical and non-verbal aspects of the message. Much research has demonstrated that very early in development, children are sensitive to vocal tone (Fernald, 1993; Clarkson & Clifton, 1985; Zuckerman, Blanck, DePaulo & Rosenthal, 1980); indeed, within their first year of life, infants show sensitivity to vocal tones and facial expressions indicative of different affective states (Barrera & Maurer, 1981; Fernald, 1993; Kuchuk, Vibbert & Bornstein, 1986; Ridgeway, Waters, & Kuczaj, 1985). Further, by one year of age, children are able to use the facial expressions of others to regulate their behaviour (Sorce, Emde, Campos & Klinnert, 1985). At 4 years old, children can use a speaker's vocal affect to interpret ambiguous messages (Berman, Chambers, & Graham, 2010) and can label emotions from facial expressions (Ridgeway, Waters, & Kuczaj, 1985). Taken together, these results demonstrate that children are adept at interpreting non-verbal cues from a very young age.

Research investigating children's sensitivity to multiple (and possibly divergent) communicative cues has been examined using various methodologies. In one paradigm children hear statements from speakers (e.g., "My mommy gave me a treat.") read with either consistent (e.g., positive) or inconsistent (e.g., negative) vocal non-verbal cues. Children are then asked to indicate how the speaker feels (e.g., happy or sad; e.g., Morton & Trehub, 2001). This methodology allows researchers to determine whether children are attending to the words spoken or the non-verbal cues (or both) when interpreting the feelings of the speaker. Another paradigm involves children hearing instructions from a speaker who uses either consistent (e.g., an approving lexical message delivered with approving facial and vocal non-verbal cues) or inconsistent (e.g., a disapproving lexical message delivered with approving non-verbal cues) cues and observing how a child responds (i.e., whether the child follows the instruction or not e.g., Friend, 2001). In general, findings from studies using both paradigms demonstrate that there is a developmental progression in how children and adults interpret inconsistent lexical / non-verbal information. That is, infants demonstrate greater sensitivity to the non-verbal aspects of communication but, beginning at 18 months, children base their interpretations on the lexical (as opposed to non-verbal cues), showing lexical primacy (e.g., Morton & Trehub, 2001; Friend & Bryant, 2000; Lawrence & Fernald, 1993 [as cited in Friend, 2001]; Friend, 2000; 2003; Waxer & Morton, 2011). Between the early childhood years and adulthood, an increased reliance on the non-verbal information is observed when individuals are asked to interpret inconsistent messages (Friend, 2000; Solomon & Ali, 1972). By adulthood, a non-verbal primacy is demonstrated in that interpretations of communicative utterances are based on the non-verbal content (e.g.,

Morton & Trehub, 2001; Mehrabian & Ferris, 1967; Argyle, Alkema, & Gilmour, 1971; Reilly & Muzekari, 1986).

Pertinent to my research question, it is important to establish whether children are in fact detecting the lexical / non-verbal inconsistency. For example, it is possible that children demonstrate a lexical primacy because they are not processing the non-verbal information when there are two streams of information. Indeed, past research suggests that children do not consistently demonstrate explicit sensitivity to the inconsistency until about 9 years of age. For example, results from the Morton & Trehub (2001) study found that the majority of 4- to 5-year-old participants did not demonstrate any evidence of an explicit appreciation for the inconsistency. By 7 years of age, most children noted that there was something "weird or silly" about what the speaker had said. However, up until 8 years of age, children continued to judge the speaker as having "expressed her feelings well." By 9 – 10 years, most children demonstrated an explicit awareness of the inconsistency by recognizing that the speaker hadn't expressed her feelings well. A development in children's explicit appreciation of the lexical / non-verbal inconsistency has also been demonstrated in a study by Rotenberg, Simourd & Moore (1989) who found an increase in the use of a lexical - non-verbal consistency principle in children's detection of deception across ages 5, 7 and 9. That is, 9-year-olds reliably judged individuals who delivered consistent information (e.g., "I like that shirt" said in a neutral tone of voice but with a smile) as being truthful and individuals who delivered inconsistent information (e.g., "I do not like that coat" said in a neutral tone of voice but with a smile) as lying. Five-year-olds, however, demonstrated limited sensitivity to the inconsistency and judged consistently positive individuals, but not consistently negative individuals, as being more truthful than both types of

inconsistent individuals. Importantly, Morton & Trehub (2001) have found evidence to suggest that preschool-age children demonstrate an implicit sensitivity to inconsistent messages: 4- to 10-year-olds took longer to respond to inconsistent, compared to consistent statements when judging individuals' emotions. This finding suggests that children as young as 4 years of age process both the lexical and non-verbal information to a certain degree, albeit not at an explicit level. Further evidence that young children are capable of attending to the non-verbal information within inconsistent messages, under specific circumstances, has been demonstrated. For example, Morton, Trehub & Zelazo (2003) found that 6-year-olds relied more on the non-verbal information when primed to do so. More specifically, as an initial task, children were asked to judge speakers' emotions when the lexical content of their statements was neutral and thus were forced to focus on the non-verbal information; following this, children were exposed to statements that contained discrepant lexical / non-verbal content and were subsequently more likely to respond to questions based on the non-verbal content. In addition, Eskritt and Lee (2003) found that 3- to 5-year-olds relied more on the non-verbal component of inconsistent messages when the nonverbal information was exaggerated. Finally, by 5 years of age, children recognize that individuals are capable of expressing emotions (through verbal statements and facial expressions) that differ from those that they are experiencing (Wellman & Liu, 2004).

Taken together, these results suggest that younger children (i.e., from approximately 2- to 8 years old) demonstrate a lexical primacy when interpreting inconsistent lexical / non-verbal messages. However, as children mature into adulthood, they gradually begin to demonstrate a non-verbal primacy. Further, some evidence suggests that younger children (i.e., 4- to 6 year-olds) are sensitive to this inconsistency, at least on an implicit level. Children begin to

demonstrate an ability to explicitly detect lexical / non-verbal inconsistencies between the ages of 7 to 9 years old. Thus, together this research allows for an understanding of children's sensitivity to various communicative cues, including inconsistency in these cues; however, it is unclear how children apply this sensitivity to forming judgments about speakers.

While no research has investigated whether children use inconsistency between lexical and non-verbal affective cues as an indication of a speaker's credibility, some research has demonstrated that children are attuned to other forms of consistency in non-verbal cues when deciding on a speaker's credibility. Specifically, at 14 months of age, children have demonstrated some ability to be selective in who they trust based on the speakers' non-verbal cues (Chow, Poulin-Dubois, & Lewis, 2008). In particular, they were more likely to trust individuals whose non-verbal cues (e.g., saying "wow!" and smiling) were consistent with the context (e.g., looking in a box with a toy) as opposed to inconsistent (e.g., looking in an empty box). These results suggest that children are attuned to visual and vocal non-verbal cues (e.g., facial expression and tone of voice), and the appropriateness of these cues based on the context, when deciding on speaker credibility.

Over three studies, this dissertation sought to determine whether (in)consistency between the affective content of a statement and the non-linguistic delivery influences children's judgments of speaker credibility. In Study 1, I asked whether preschool and school-age children prefer to solicit new information from consistent speakers (relative to unknown speakers) more than they choose inconsistent speakers. In Study 2, I investigated whether children demonstrate a preference for consistency in other domains, for example, when deciding whether to adopt a speaker's personal preferences. I also investigated what types of perceptions children have of

consistent, compared to inconsistent speakers (e.g., level of friendliness). Finally, in Study 3, I explored whether children are able to integrate information from multiple sources (i.e., communicative cue consistency *and* contextual information) to determine a speaker's credibility. More specifically, I wondered whether children would be more likely to solicit information from a speaker who delivers a lexical statement with inconsistent affective cues, if the context explains this inconsistency.

Study 1 Introduction

Occasionally children encounter communications that are delivered with inconsistent lexical / non-verbal information; as a result, it is advantageous for children to be sensitive to these seemingly ambiguous communications in order to avoid learning from speakers who provide information that is prone to misinterpretation or may be an indication that an individual is being untruthful. While a large body of research has demonstrated that children are attuned to cues to speakers' knowledge when judging the credibility of speakers, to my knowledge, there is only one study that has investigated whether children use ambiguity in communication to determine speaker credibility. I sought to extend the findings of Gillis and Nilsen (2013), which demonstrated that 6- and 7-year-olds are sensitive to lexical ambiguity and use this as a cue to speaker credibility. Given that children demonstrate an implicit sensitivity to inconsistency in lexical / non-verbal cues beginning at 4 years of age, and are able to explicitly detect this inconsistency starting around 7 years of age (Morton & Trehub, 2001; Rotenberg et al., 1989), I wanted to determine whether children at these ages are able to apply this sensitivity / detection by using it to determine speakers' credibility. Therefore, the goal of Study 1 was to determine whether preschool-age (4 to 5 year old) and school-age (7 to 8 year old) children use (in)consistency between lexical / non-verbal cues as an indication of speakers' credibility.

Children completed a speaker affect task in which they were exposed to speakers who either delivered information that was consistent (e.g., a positive statement said in a positive tone of voice with a positive facial expression) or inconsistent (e.g., a positive statement said in a negative tone of voice with a negative facial expression). After being exposed to the type of information that a speaker gave, children were asked to indicate whether they wanted to receive a

new piece of information from that speaker or from a speaker of whom they had no prior knowledge. Therefore, I was able to determine whether there was a difference in how often children chose to solicit new information from consistent speakers compared to inconsistent speakers. However, this measure did not provide an indication as to *why* children might prefer to solicit information from one type of speaker over another. Therefore, children were also asked to indicate how much they believed each speaker. Finally, to assess whether any potential age-related differences were due to emotion recognition abilities, as well as to link this study in with past research on children's lexical primacy and the development of a non-verbal primacy (e.g., Morton & Trehub, 2001), I asked children to rate how the speakers were feeling in a separate task.

Given that past research indicates that preschool-age children demonstrate limited explicit awareness of inconsistencies in lexical and non-verbal information (e.g., Morton & Trehub, 2001; Rotenberg et al., 1989), I predicted that 4- and 5- year-olds would not use inconsistent lexical / non-verbal information as a cue to decide from whom to solicit information. In contrast, as 7-year-old children begin to demonstrate the ability to explicitly detect lexical / non-verbal inconsistency (e.g., Morton & Trehub, 2001; Rotenberg et al., 1989), I anticipated that the 7- and 8-year-olds would apply their detection of the emotional inconsistency and choose to solicit novel information from consistent speakers over inconsistent speakers.

Study 1 Method

Participants

Twenty 4- and 5-year-olds (12 males, M = 62.15 months, SD = 5.58) and 22 7- and 8-year-olds (11 males, M = 96.09 months, SD = 8.01) were recruited from a mid-sized North

American community and tested individually within a research laboratory. Six additional children were tested but not included in the analyses due to difficulties completing the task (n = 2) or difficulty understanding instructions for the task due to learning English as a second language (n = 4). Parents of all included participants reported that their children were fluent in English and, as assessed by a standardized measure of receptive vocabulary, all children possessed language skills sufficient to understand the statements in the videos.

Materials and Procedure

Participants were tested individually by an experimenter in a quiet room within the research laboratory. The speaker affect task was always administered first, followed by a language task, feeling rating task and an emotion recognition task.

Speaker Affect Task. The speaker affect task was different from a common speaker reliability procedure where children are presented with two speakers and then are required to choose which speaker they would like to 'learn' from. In our task, children were exposed to one speaker at a time and subsequently asked whether they wanted to solicit information from this speaker or from an individual of whom they had no prior knowledge. The rationale for this change in methodology was twofold. First, it is not often in children's everyday life that they hear conflicting information from two sources (one right after the other) and have to decide which piece of information to choose. Rather, it is more often the case that they are exposed to one source of information that they can either attend to (or solicit information from) or not. My methodology was more closely aligned with this everyday situation (relative to the two speaker methodology of previous work); the option of an unknown speaker provided children with a neutral alternative, creating a situation where children had to base their decisions solely on the

information that one speaker provided (i.e., as opposed to weighing their choice against the information that a second speaker provided). Second, the present methodology reduced the working memory demands of the task by only requiring children to hold information from one speaker in mind. Working memory was taken into consideration due to the fact that children were being asked to pay attention to information in two communication channels (i.e., verbal/lexical and non-verbal), which differs from past studies that manipulated only one aspect of speakers' characteristics or information (e.g., familiarity, accent, knowledge). Previous research has demonstrated that children are capable of making judgments about single speakers (i.e., as opposed to comparing two different speakers; Birch et al., 2010; Koenig & Woodward, 2010; Nurmsoo & Robinson 2009), suggesting that this change would not have reduced the ability to demonstrate an effect.

The children's task was to watch video-recorded speakers, one at a time, and decide whether to solicit information from the shown speaker or from another individual (about whom children had no information; Figure 1). Speakers differed in the consistency with which they delivered affective information. Specifically, speakers provided positive or negative lexical information, and positive or negative non-verbal cues. This allowed for four speaker types: consistent positive (Pos-Lex/Pos-NV: positive statement said with positive non-verbal cues), consistent negative (Neg-Lex/Neg-NV: negative statement said with negative non-verbal cues) and two inconsistent (Pos-Lex/Neg-NV: positive statement said with negative non-verbal cues; Neg-Lex/Pos-NV: negative statement said with positive non-verbal cues). For positive non-verbal cues, speakers were instructed to sound happy, smile, and use speech that was faster, higher pitched, had more pitch variability and more intensity. For negative non-verbal cues,

speakers were instructed to sound sad, bring their eyebrows down into a sad frown, and use speech that was slower, lower pitched, with less pitch variability and less intensity. The audio files of speakers' statements were analyzed with the program PRAAT (Boersma, 2001) and subjected to 2 (Lexical valence: positive, negative) X 2 (Non-verbal valence: positive, negative) repeated measures ANOVAs. The dependent variable was the mean of each speaker type for each of the paralinguistic variables (duration of utterance, pitch mean, pitch standard deviation, intensity). Analyses for all paralinguistic variables revealed a main effect for Non-verbal valence, *p*s < .001. No other significant effects were found (*p*s > .17). Thus, as designed, the paralinguistic cues differed in the intended direction across the non-verbal, but not lexical, conditions (i.e., happy speech was rated as higher pitched, with greater pitch variability and higher intensity). All 12 speakers were Caucasian women with brown hair pulled back from their face. To help children to easily differentiate between the speakers, each speaker wore a uniquely coloured t-shirt. The type of information provided by each speaker was counterbalanced across children (i.e., one speaker delivered consistent information to one child but inconsistent information to another child). Further, the content of the statement (see Appendix A for the statements) delivered by each speaker was randomized, as well as the order in which children encountered each of the 12 speakers and the order of the type of information delivered (i.e., consistent or inconsistent). Children were told that their task was to figure out a story by soliciting details from different speakers. To highlight that there was a 'correct' answer and increase motivation for obtaining accurate information, children were told that at the end of the task, the real story would be consulted and they would receive a stamp for every correct detail.

Children completed 12 trials (three per speaker type) while seated at a table in front of a computer and book. Each trial began with the children watching a video-recorded speaker making a statement. Next, children decided whether they wanted to solicit a missing detail of the story from that speaker or from a different individual about whom they had no information (i.e., *speaker choice*; "Do you want this girl to help you figure out part of the story or another girl?"). Choices were scored '1' if the speaker was chosen or '0' if the other girl was chosen (i.e., a possible total of 3 for each of the 4 speaker types). After their choice, children rated how believable the speaker was with the aid of a visual scale (i.e., *speaker rating*; "How much do you believe this girl? Not at all, not much, mostly or very much")[2]. Ratings were scored from a 1 (not at all) to a 4 (very much).

Each page of the book depicted a question about the story (e.g., "What did Johnny eat for breakfast?") as well as two contradicting responses with pictures: one from the speaker and one from the other girl (i.e., each girl was pictured with their response in a speech bubble). Importantly, children did not see the page showing the 'other girl' or depicting the girls' responses until *after* making their decision. This ensured that participants did not base their responses on personal preferences.

At two specified times, (before beginning the task and after trial 6) children completed four stimuli checks to ensure that they understood what the individuals were saying and could

[2] To ensure that the question, "How much do you believe this girl?" was appropriate for the age groups, a random subsection of children (30% of the sample, two-thirds of whom were 4 years old) were asked further questions. These children were introduced to two different girls who were described as follows: "This girl is very tricky, she always lies and doesn't like to help people. This girl is not tricky, she always tells the truth and tries to help people." After this children were told a new piece of information from each girl and asked "How much do you believe this girl?" The rating scale provided for a response was identical to that used in the study. All children rated the truthful girl as 'believable', while all but one child rated the lying girl as 'not believable'.

accurately judge their emotions. The trials involved children watching two consistently positive speakers and two consistently negative speakers. For two of these manipulation check trials, children were asked to repeat what the speaker had said and to decide whether the statement was happy or sad. For the other two trials, children were asked whether the speaker's voice sounded happy or sad. The purpose of these trials was to ensure that children of all ages were able to clearly understand the speakers' words and detect the emotion that she was displaying.

Language Task. The Picture Vocabulary subtest of the Test of Language Development Primary Third Edition (TOLD-P:3; Newcomer & Hammill, 1997) was administered. On this test children were asked to point to the picture that represented the word spoken by the experimenter. This test was administered in a standardized fashion with the purpose of ensuring that all children had language skills sufficient to understand the statements in the videos (i.e., in the average range for a 4 year old).

Feeling Ratings Task. This task was administered to determine whether there were age differences in affect recognition abilities. Children watched 12 new videos depicting different speakers than those in the Speaker Affect task, but who said the same statements (i.e., resulting in the same four speaker types). The order of speakers and type of information delivered by each speaker was counterbalanced across children. After watching each speaker, children rated (with the aid of a visual scale) how the speaker was feeling, from 1(mostly sad) to 3(mostly happy). The verbal instructions of the rating were accompanied with a visual aid depicting a happy face, neutral face and a sad face.

Study 1 Results

Preliminary Analyses

All children accurately repeated the content of the 8 statements in the manipulation check trials and correctly labeled the valence of the statements, suggesting that they were able to comprehend the speakers' statements as well as identify the appropriate valence.

Speaker Choice

To examine whether age and speaker type (i.e., consistent or inconsistent) influenced children's speaker preferences, a 2 (Age: preschool- versus school-age) X 2 (lexical valence: positive, negative) X 2 (Non-verbal valence: positive, negative) mixed model ANOVA was conducted. The dependent variable was the mean of children's *speaker choices* for each of the 4 speaker types (see Table 1; i.e., children's choices were scored a 1 if they chose to solicit information from the speaker or a 0 if they chose to solicit information from the other individual). Results revealed a significant 3 way interaction between age, lexical valence and non-verbal valence, $F(1, 40) = 19.75$, $p < .001$, $\eta_p^2 = .33$. To further explore this interaction, two 2-way interactions (lexical valence X non-verbal valence) were conducted (one for each age group). For both age groups, the 2-way interaction was significant (preschool-age: $F(1, 19) = 17.79$, $p < .001$, $\eta_p^2 = .48$; school-age: $F(1, 21) = 55.16$, $p < .001$, $\eta_p^2 = .72$). To interpret the significant interactions, follow-up paired *t*-tests (with Bonferroni correction, due to the large number of comparisons; i.e., .05 / 6 comparisons, resulting in a *p* value of .008) were conducted.

Preschool-age. Preschool-age children chose to solicit information from the consistently positive speakers (i.e., pos-lex/pos-nv) over unknown speakers to a greater extent than both of the inconsistent speakers (neg-lex/pos-nv: $t(19) = 3.24$, $p = .004$, $d = .70$; pos-lex/neg-nv: $t(19) = 3.86$, $p = .001$, $d = 1.03$, as well as the consistently negative speakers, $t(19) = 2.93$, $p = .001$, $d = .90$. There were no other differences between speaker types, *p*s > .44. One-sample t-tests

revealed that preschoolers chose consistently negative speakers (over unknown speakers), as well as both types of inconsistent speakers, less than expected by chance (neg-lex/neg-nv: $t(19) = 3.56$, $p = .002$, $d = 1.03$; neg-lex/pos-nv: $t(19) = 2.30$, $p = .03$; pos-lex/neg-nv: $t(19) = 4.61$, $p < .001$. They chose consistently positive speakers, over unknown speakers, at chance-levels, $p = .44$.

School-age. School-age children chose to solicit information from consistently positive speakers, over unknown speakers, to a greater extent than both inconsistent speakers (neg-lex/pos-nv: $t(21) = 8.44$, $p < .001$, $d = 2.61$; pos-lex/neg-nv: $t(21) = 7.09$, $p < .001$, $d = 2.25$), but not more than consistently negative speakers ($p = .05$). Importantly, they also preferred to solicit information from consistently negative speakers, over unknown speakers, more than both inconsistent speakers (neg-lex/pos-nv: $t(21) = 5.85$, $p < .001$, $d = 1.79$; pos-lex/neg-nv: $t(21) = 4.83$, $p < .001$, $d = 1.52$). There was no difference between children's preference for the two inconsistent speakers, $p = .33$. Therefore, school-age children showed a preference for both types of consistent speakers (relative to unknown speakers), over both types of inconsistent speakers. Further analyses revealed that consistently positive speakers were chosen more often than chance: $t(21) = 3.50$, $p = .002$, while both inconsistent speakers were chosen less often than chance (neg-lex/pos-nv: $t(21) = 9.76$, $p < .001$; pos-lex/neg-nv: $t(21) = 7.31$, $p < .001$), suggesting that these speakers were actively avoided. Consistently negative speakers were chosen at chance-levels, $p = .35$.

Comparisons between age groups revealed that, relative to school-age children, preschool-age children were less likely to choose the consistently negative speakers, $t(40) = 3.18$, $p = .003$, $d = 1.00$), with no other significant differences, ps > .04. [3]

Speaker Belief Ratings

To examine whether age and speaker type (i.e., consistent or inconsistent) influenced children's speaker ratings, a 2(Age: preschool- versus school-age) X 2(Lexical valence: positive, negative) X 2(Non-verbal valence: positive, negative) mixed model ANOVA was conducted; Table 1). The dependent variable was the mean *speaker rating* for each speaker type. Results revealed a significant 3-way interaction between age, lexical valence and non-verbal valence, $F(1, 40) = 24.73$, $p < .001$, $\eta_p^2 = .38$. To further explore this interaction, two 2 way ANOVAs (lexical valence X non-verbal valence) were conducted (one for each age group). For both age groups, the 2 way interaction was significant (preschool-age: $F(1, 19) = 9.84$ $p = .005$, $\eta_p^2 = .34$; school-age: $F(1, 21) = 91.89$, $p < .001$, $\eta_p^2 = .81$). To interpret these interactions, follow up *t*-tests were conducted with Bonferroni correction; i.e., .05 / 6 comparisons, resulting in a p value of .008).

Preschool-age. Preschool-age children rated the consistently positive speakers as more believable than both of the inconsistent speakers (neg-lex/pos-nv: $t(19) = 4.62$, $p < .001$, $d =$ .1.57; pos-lex/neg-nv: $t(19) = 4.56$, $p < .001$, $d = 1.54$), as well as the consistently negative speakers, ($t(19) = 3.72$, $p = .001$, $d = 1.31$). There were no other differences, ps > .65. Therefore,

[3] Due to the restricted range in children's choice data, we conducted non-parametric analyses for both age groups using the Friedman test and the Wilcoxon signed-rank test with Bonferroni correction. Results showed an identical pattern, with the exception that preschoolers' choice of consistently positive speakers no longer differed from the consistently negative speakers ($p = 0.02$).

preschool-age children rated consistently positive speakers as more believable than the other three speaker types.

School-age. School-age children rated the consistently positive speakers as more believable than both of the inconsistent speakers (neg-lex/pos-nv: $t(21) = 13.28$, $p < .001$, $d = .3.97$; pos-lex/neg-nv: $t(21) = 7.67$, $p < .001$, $d = 2.82$), and the consistently negative speakers, $t(21) = 3.78$, $p = .001$, $d = .71$. Importantly, they rated consistently negative speakers as more believable than both of the inconsistent speakers (neg-lex/pos-nv: $t(21) = 9.48$, $p < .001$, $d = 2.77$; pos-lex/neg-nv: $t(21) = 6.19$, $p < .001$, $d = 2.02$). There was no difference between children's ratings of the two inconsistent speakers, $p = .36$. Therefore, school-age children rated both types of consistent speakers as more believable than both types of inconsistent speakers.

Of note, compared to school-age children, preschool-age children rated both types of inconsistent speakers as more believable (neg-lex/pos-nv speakers: $t(40) = 4.74$, $p < .001$, $d = 1.45$; pos-lex/neg-nv speakers: $t(40) = 3.09$, $p = .004$, $d = .96$, with a trend for consistently negative speakers to be rated as less believable, $t(40) = 2.53$, $p = .02$, $d = .78$).

Speaker Feeling Ratings

To determine whether age affected affect recognition, a 2(Age: preschool- versus school-age) X 2(Lexical valence: positive, negative) X 2(Non-verbal valence: positive, negative) mixed model ANOVA was conducted. The dependent variable was the mean rating of each of the 4 speaker types (i.e., from 1 (mostly sad) to 3 (mostly happy); see Table 1). This analysis was done to determine whether potential differences between preschool-age and school-age children on the speaker affect task were due to differences in emotion recognition abilities.

Results revealed a main effect of lexical valence, $F(1, 40) = 34.30$, $p < .001$, $\eta_p^2 = .46$, such that children of both ages rated individuals who made positive statements as being happier than those who made negative statements. Further, there was a main effect of non-verbal valence, $F(1, 40) = 135.71$, $p < .001$, $\eta_p^2 = .77$, such that children of both ages rated individuals who delivered statements with positive non-verbal cues as happier than individuals who delivered statements with negative non-verbal cues. There were no other significant effects, ps > .15, including age, suggesting that preschool-age and school-age children were similar in their ratings of how each of the 4 speaker types were feeling. Thus, it is unlikely that the age differences noted in the main analyses above (i.e., speaker choice and speaker ratings) were due to differences in children's emotion recognition skills.

Study 1 Discussion

There are a number of avenues by which speakers share information about their intentions and feelings. While speakers often demonstrate consistency between the various channels through which they convey affect, there are occasions when lexical information is inconsistent with the non-verbal cues with which it is delivered. The goal of Study 1 was to examine whether preschool- and school-age children use (in)consistency between *what* a speaker says and *how* it is said to determine speaker credibility.

Results showed that school-age children preferred to solicit new information from speakers who showed consistency between the words uttered and the non-verbal cues provided. Specifically, in a context where the goal was to obtain accurate information, they solicited information from consistently positive speakers as well as consistently negative speakers (over unknown speakers) to a greater extent than inconsistent speakers. School-age children's ratings

of speakers' believability showed a similar pattern, namely, that both types of consistent speakers were found to be more believable than inconsistent speakers. In contrast, preschool-age children did not show a preference for consistency. That is, although children in this age group preferred consistently positive speakers, they solicited (or rather, tended not to solicit) information from consistently negative speakers at an equivalent rate to the inconsistent speakers. These findings add to previous work demonstrating children's preference for speaker consistency in other forms (i.e., consistency between non-verbal cues and context; Chow et al., 2008; Chiarella & Poulin-Dubois, 2013). Given that inconsistent utterances introduce ambiguity into communication, school-age children may have chosen not to solicit information from inconsistent speakers because they believed they would provide poor quality information. Past work demonstrates that school-age (and to a lesser extent, preschool-age) children, use communicative ambiguity as a cue to speaker credibility (i.e., they prefer individuals who provide information that unambiguously identifies an object compared to those who provide information that is accurate but insufficient to identify the object; Gillis & Nilsen, 2013). However, inconsistency between cues is also seen to be indicative of lying (Rotenberg et al., 1989). In this study, school-age children rated the inconsistent speakers to be less believable than the consistent speakers, suggesting they may have viewed these speakers as more deceitful.

A developmental progression was observed in application of this lexical/non-verbal consistency principle: In contrast to school-age children, preschool-age children did not show a preference for consistency, instead, they solicited (or rather, tended not to solicit) information from consistently negative speakers at an equivalent rate to the inconsistent speakers. It is unlikely that these age-differences were related to affect recognition abilities as there were no

age differences in children's ratings of the speakers' feelings. Further, these results are consistent with previous research demonstrating that five-year-olds judged consistently positive speakers to be more truthful than consistently negative speakers (Rotenberg et al., 1989). It may also be the case that preschool-age children did not detect the inconsistency in the messages. Certainly, previous work has found that the explicit recognition of inconsistency between lexical/non-verbal information begins around 6 – 7 years of age (Morton & Trehub, 2001; Rotenberg et al., 1989).

Despite the developmental differences, results indicate that preschool-age children were processing both lexical and non-verbal cues. Specifically, if they were only sensitive to one of these cues, I would have observed a different result for the two inconsistent speakers. Instead, preschoolers were equally unlikely to solicit information from both types of inconsistent speakers, and rated them as equally unbelievable. Essentially, preschoolers tended to avoid soliciting information from speakers who demonstrated any amount of negativity. This result, demonstrating younger children's awareness of negativity and subsequent avoidance of speakers, is consistent with a negativity bias; which Vaish, Grossman and Woodward (2008) argue develops in infancy and serves an evolutionary purpose. I speculate that school-age children's decisions did not solely reflect a negativity bias because they valued the consistency over the emotional valence of the speakers' statements. However, school-age children rated consistently positive speakers as more believable than consistently negative speakers, demonstrating that school-age children were influenced, to a certain extent, by speakers' affective valence.

These results add to a growing body of literature demonstrating the sophistication with which children determine credible sources of information: they suggest that individuals who display

non-verbal cues that are inconsistent with the words they utter are seen as less trustworthy than individuals who display consistent communicative cues. However, it may be the case that school-age children just generally prefer individuals who show consistency in their communicative behaviour. That is, it is not clear whether the preference demonstrated is specific to the acquisition of novel information. Therefore, in Study 2, I investigated how far children extend their preference for consistent speakers. In particular, I wanted to know whether children demonstrated a preference for consistent speakers when making decisions that do not have a correct answer. More specifically, I asked whether children were more likely to adopt the personal preferences of consistent (versus inconsistent) speakers. Further, I wanted to determine whether children's preference for consistent speakers could be attributed to factors that are not important for accurate information delivery; accordingly I asked whether children would rate consistent and inconsistent speakers differently on dimensions of friendliness and likeability.

Moreover, there may be instances where inconsistency between a speaker's words and non-verbal affect becomes more appropriate when contextual information is provided. For example, it makes more sense to sound upset when indicating you have to play soccer (a game you usually enjoy), when the weather is bad, relative to when the weather is good. A remaining question, which will be addressed in Study 3, is whether children treat all inconsistent speakers similarly or whether there are certain communicative contexts where emotional inconsistency is accepted.

Study 2 Introduction

Study 1 provided insight into whether children are able to apply their sensitivity to inconsistent lexical / non-verbal cues by preferring to solicit information from consistent speakers. However, beyond the believability of each speaker, it is unclear what other inferences children made regarding the speakers. It is possible that school-age children chose to solicit information from consistent speakers because they used the consistency as a cue to other speaker characteristics that they use to determine speaker credibility. For example, one possibility is that children prefer to solicit information from consistent or positive speakers because they are seen as being nicer or more pleasant interaction partners. Indeed, past research has demonstrated that children prefer to solicit information from speakers who are seen as nice, compared to mean (Mascaro & Sperber, 2009). Further, while it has often been suggested that children make inferences about speakers' knowledge based on speaker characteristics, a study by Brosseau-Liard and Birch (2010) suggests that children also make inferences about speakers' characteristics based on speakers' knowledge. Specifically, they found that 5 year old children predicted knowledgeable speakers to be more prosocial (i.e., nicer) than unknowledgeable speakers. Therefore, the first goal of Study 2 was to address the question of what characteristics (beyond believability) children ascribe to the speakers. More specifically, I investigated other attributions, beyond speaker believability, that could account for children's reliance on consistency of communicative cues when deciding the credibility of the speakers, as well as whether the valence of the affect makes a difference to the types of attributions that children make.

I investigated several different attributions that children may form in response to inconsistent, compared to consistent, speakers. Children were asked to make judgments about how friendly speakers were and how much they liked the speakers. The reason for choosing these attributions is that they play a role in determining from whom children prefer to learn (Mascaro & Sperber, 2009). This is logical given that social interaction is a key part of soliciting information from an individual. For example, if a child thinks it will be unpleasant to solicit information from a mean individual, they might be inclined to ask the nicer, but less knowledgeable speaker. Indeed, recent research by Landrum, Mills and Johnston (2013), demonstrated that children are less likely to trust an expert if they are mean as opposed to nice. Further, nice individuals may in fact be more likely to help others out by delivering accurate information. Given that both age groups rated consistently positive speakers as more believable than all other speakers, and chose consistently positive speakers at rates that were higher than their choices of inconsistent speakers, I anticipated that consistently positive speakers would receive the highest friendliness and likeability ratings. However, I was most interested in how the consistently negative speakers would be rated. If the consistently negative speakers were also rated highly on positive attributions (i.e., friendliness and likeability), it would seem that children use consistency as an indication of positive speaker characteristics more generally, and use these characteristics to determine speaker credibility. If, however, consistently negative speakers are not viewed as having generally positive characteristics, this would suggest that the preference for these speakers in Study 1 was driven by other inferences about the speakers (e.g., speaker knowledge).

Next, I sought to examine whether children are more likely to use the *personal preferences* of consistently positive speakers compared to consistently negative speakers, as well as consistent, compared to inconsistent, speakers. This question expands on the findings from Study 1 in which children's task was to solicit *accurate* information from others (i.e., their goal was to get as many details of the story "right" as possible). While it is advantageous for children to be attuned to cues that indicate a speaker is likely to deliver accurate information, there are also times when they would need to make decisions regarding unfamiliar information when there is no "right" answer (e.g., when making a decision based on personal preference). For example, if a child is asked to decide between two unfamiliar toys as a present, he / she might not know how to make a decision. One source of information that could help children make decisions when there is no "right" or "wrong" answer could be the personal preferences of others. I predicted that children of both ages would not use (in)consistency as a cue to deciding whether to receive information regarding speaker's personal preferences. More specifically, though speculative, I hypothesized that school-age children were attuned to (in)consistency in Study 1 because it indicated whether the speakers would be able to provide accurate information; therefore, when the speakers provide information regarding their personal preferences in Study 2, the consistency of their lexical / non-verbal cues might not be relevant to children's decisions. Therefore, I predicted that children would not rely on the consistency between speakers' affective cues when deciding between speakers; instead, I anticipated that children would choose each speaker type at chance rates. It is worth noting, however, that if children are using consistency as a cue to speaker "friendliness" or "likeability," it may be possible that children

take consistency into account when making decisions regarding speakers' personal preferences (i.e., they may prefer the personal preferences of someone they like).

Recall that the developmental differences noted in Study 1 (i.e., that school-age children, but not preschool-age children, showed a preference for consistency) were consistent with previous work showing that it isn't until 7 years of age that children explicitly detect inconsistency (Morton & Trehub, 2001). Study 2 gave me the opportunity to examine this more directly within our paradigm. Specifically, I examined whether children were able to explicitly detect the (in)consistency between lexical and non-verbal cues, by asking them whether they noticed anything weird or tricky about the way the individual spoke. I predicted that, consistent with previous research (Morton & Trehub, 2001; Rotenberg et al., 1989), school-age but not preschool-age children would be able to explicitly state that the inconsistent speakers had said something "tricky or weird."

Study 2 Method

Participants

Twenty three children aged 4- and 5-years-old (12 males, M = 61.35 months, SD = 6.10) and 21 children aged 7- and 8-years-old (12 males, M = 95.29 months, SD = 7.86) were recruited from the community in Waterloo, Ontario. Five additional children were tested, but their data were not included in the analyses due to difficulties with completing the task. More specifically, each of these children struggled with inattention or compliance to the degree that they were unable to complete a sufficient number of the trials (e.g., not watching the videos due to fidgeting, refusing to give an answer to the examiner). Parents of all included participants reported that their children were fluent in English and, as assessed by a standardized measure of

receptive vocabulary, all children possessed language skills sufficient to understand the statements in the videos.

Materials and Procedure

Participants were tested individually by an experimenter in a quiet room within the research laboratory. The Speaker Personal Preferences Task was always administered first, followed by a receptive language task.

Speaker Personal Preferences Task. This task was similar to the task in Study 1 and the same videos were used. The key difference in the tasks was in the type of choice children were asked to make and the characteristics on which children rated the speakers. As with Study 1, speakers differed in the consistency with which they delivered affective information, resulting in the same four different types of speakers as Study 1.

To provide children with information regarding speakers' personal preferences, they were told that each speaker they would see had picked her favourite sticker and put it in a cup. The cups were opaque so the children were not able to see the stickers until after the task was complete. Each cup had a small image of the speaker on top so it was clear which cup contained the speaker's favourite sticker. The children's task was to listen to each speaker and then decide whether to keep that speaker's favourite sticker for themselves, or keep the favourite sticker of another girl to whom they had had no exposure. This allowed us to determine whether consistency impacted children's decisions to use, or not use, a speaker's personal preference when choosing between unknown items. More specifically, after watching a video of a speaker, children were shown pictures of the speaker from the video and an unknown girl. Then a cup was placed beside each of the two pictures and a speech bubble from each girl that said, "This is my

favourite sticker." Once children made their choices, the cup with the sticker they wanted to keep was placed in a pile with the label "mine to keep." Children were told that they would get to open the cups at the end of the task to see the stickers that they had chosen and to take them home.

Children completed 12 trials while seated at a table in front of a computer and book. Each of the 12 pages of the book, placed in front of the children, showed the speaker from the video and a picture of the other girl. The pages depicted the girls saying "This is my favourite sticker" in a speech bubble, and the cups containing the stickers were placed next to each speaker. Once children made their choices, the cup with the sticker they wanted to keep was placed in a pile with the label "mine to keep," while the other cup was placed in a pile that was labeled "not mine." Importantly, children did not open the cups and see the stickers until the end of the task. In this way, we ensured that participants were not basing their responses on the stickers themselves. Children repeated this process for all 12 trials (i.e., as in Study 1, there were three trials for each of the four speaker types). The trials were randomized in the same way as they were in Study 1.

Each trial began with the children watching a video-recorded speaker making a statement (i.e., to learn what type of information she gave: consistent or inconsistent). Next, children decided whether they wanted to keep the sticker the speaker preferred or the sticker that another girl, of whom they had no prior knowledge, preferred (i.e., *speaker choice*; "This girl likes the sticker in this cup best, the other girl likes the sticker in this cup best, which one do you want?"). After making their choice, children were asked three questions about the speaker: "How much do you like this girl? Not at all, not much, mostly, very much" (*speaker liking*), "How friendly is

this girl? Not at all, not much, mostly, very much" (*speaker friendliness*), and "Was there anything weird or tricky about what this girl said? Yes or no" (*speaker weirdness*). As in Study 1, the verbal instructions of the rating were accompanied by visual scales depicting the options in differently sized bars. Children's choices for stickers were scored as '1' if they chose to keep the sticker from the speaker or '0' if they chose to keep the sticker from the other individual. They received a score of '1' if children indicated that the speaker's responses were 'weird' and '0' if not. Liking and friendliness ratings ranged from a 1 (not at all) to a 4 (very much).

Identical to Study 1, on two occasions (before beginning the task and after trial 6), children completed four stimuli checks to ensure that they were able to understand what the individuals were saying and accurately judge the emotions of the speaker. The purpose of these trials was to ensure that children of all ages were able to clearly understand the speakers' words and detect the emotion that she was displaying.

Language Task. To ensure that all children who participated had a receptive vocabulary sufficient to complete the task, the Picture Vocabulary subtest of the Test of Language Development Primary Third Edition (TOLD-P:3, Newcomer & Hammill, 1997) was administered in a standardized fashion. This task required children to point to pictures that represented words spoken by the experimenter.

Study 2 Results

Preliminary Analyses

All children accurately repeated the content of the 8 statements in the stimuli check trials and correctly labelled the non-verbal emotion cues of the statements, suggesting that they were able to comprehend the speakers' statements as well as identify the appropriate emotions.

Speaker Choice

To examine whether age and speaker type (i.e., consistent or inconsistent) influenced children's speaker preferences, a 2 (Age: preschool- versus school-age) X 2 (Lexical valence: positive, negative) X 2 (Non-verbal valence: positive, negative) mixed model ANOVA was conducted. The dependent variable was the mean of children's *speaker choices* for each of the 4 speaker types (see Table 2). Results revealed a main effect of non-verbal valence, ($F(1, 42) = 8.95$, $p = .003$, $\eta_p^2 = .18$), which was qualified by a significant 3 way interaction between age, lexical valence and non-verbal valence, ($F(1, 42) = 9.83$, $p = .003$, $\eta_p^2 = .19$). There were no other significant main effects or interactions *ps* > .08. To explore the 3 way interaction, two 2-way interactions (lexical valence X non-verbal valence) were conducted (one for each age group). For both age groups, the 2-way interaction was significant (preschool-age: $F(1, 22) = 4.59$, $p = .04$, $\eta_p^2 = .17$; school-age: $F(1, 20) = 5.12$, $p = .04$, $\eta_p^2 = .21$). As discussed below, paired t-tests (with Bonferroni correction; i.e., .05 / 6 comparisons, resulting in a *p* value of .008) were conducted to interpret significant interactions.

Preschool-age. Once the Bonferroni correction was applied, none of the preschool-age children's speaker choices were significantly different from one another (*p*s > .02), suggesting that preschool-age children did not interpret any particular type of speaker as having more desirable personal preferences (i.e., sticker preference). However, preschool-age children chose the stickers that the neg-lex / neg-nv speakers liked at less than chance, $t(22) = -2.65$, $p = .01$, $d = .57$, and the rest of the speakers at chance *ps* > .30. This suggests that preschool-age children avoided choosing to keep stickers that consistently negative speakers liked.

School-age. School-age children chose the stickers preferred by consistently positive speakers to a greater extent than the inconsistent pos-lex / neg-nv speakers: $t(20) = 3.28$, $p = .004$, $d = 1.11$. This suggests that school-age children interpreted consistently positive speakers as having more desirable personal preferences. No other comparisons were significant, ps > .03. School-age children chose the stickers that the pos-lex / pos-nv speakers liked at greater than chance, $t(20) = 3.24$, $p = .004$, $d = .70$; other speakers were chosen at chance-levels, ps>.006. This indicates that school-age children were attuned to speakers' positivity and chose to keep stickers that consistently positive speakers liked.

Comparisons between the age groups revealed that, relative to school-age children, preschool-age children were less likely to choose the consistently positive speakers, $t(42) = 2.42$, $p = .02$, $d = .71$). There were no significant differences between the age groups in their choices of inconsistent speakers or consistently negative speakers, ps > .06[4].

Speaker "Liking" Ratings

To examine whether age and speaker type (i.e., consistent or inconsistent) influenced children's ratings of how much they liked the speakers, a 2 (Age: preschool- versus school-age) X 2 (Lexical valence: positive, negative) X 2 (Non-verbal valence: positive, negative) mixed model ANOVA was conducted. The dependent variable was the means of children's *speaker liking ratings* for each of the 4 speaker types; see Table 2). Results revealed a main effect of non-verbal valence ($F(1, 42) = 25.12$, $p < .001$, $\eta_p^2 = .37$) and a main effect of lexical valence ($F(1, 42) = 20.04$, $p < .001$, $\eta_p^2 = .32$). These main effects were qualified by a significant 2 way

[4] Due to the restricted range in children's choice data, non-parametric analyses on each age range were conducted using the Friedman test and then Wilcoxon signed-rank test with Bonferroni correction. Results showed an identical pattern with the exception that the significant difference in school-age children's choices between the consistently positive speaker and the pos-neg speaker did not remain ($p = .01$).

interaction between non-verbal and lexical valence, $F(1, 42) = 16.80$, $p < .001$, $\eta_p^2 = .29$. No other main effects or interactions were significant, *ps* > .09. To interpret the 2 way interaction, follow up *t*-tests were conducted with Bonferroni correction (i.e., .05 / 6 comparisons, resulting in a *p* value of .008). Children of both ages gave consistently positive speakers higher likeability ratings than all other speakers types (neg-lex / neg-nv: $t(43) = 6.92$, $p < .001$, $d = 1.03$; pos-lex / neg-nv: $t(43) = 6.28$, $p < .001$, $d = .89$; neg-lex / pos-nv: $t(43) = 5.87$, $p < .001$, $d = .97$). No other speaker types were significantly different from one another, *p*s > .10. These findings suggest that children of both ages thought consistently positive speakers were more likeable and tended to rate speakers who demonstrated any kind of negativity as less likeable.

Speaker "Friendliness" Ratings

To examine whether age and speaker type (i.e., consistent or inconsistent) influenced children's speaker ratings, a 2 (Age: preschool- versus school-age) X 2 (Lexical valence: positive, negative) X 2 (Non-verbal valence: positive, negative) mixed model ANOVA was conducted. The dependent variable was the mean of children's *speaker friendliness ratings* for each of the 4 speaker types; see Table 2). Results revealed a main effect for non-verbal valence ($F(1, 42) = 25.11$, $p < .001$, $\eta_p^2 = .37$) and a main effect for lexical valence ($F(1, 42) = 4.38$, $p = .04$, $\eta_p^2 = .09$). These main effects were qualified by a 2 way interaction between non-verbal valence and lexical valence ($F(1, 42) = 19.11$, $p < .001$, $\eta_p^2 = .31$), as well as a 3 way interaction between age, lexical valence and non-verbal valence, $F(1, 42) = 17.02$, $p < .001$, $\eta_p^2 = .29$. No other main effects or interactions were significant, *ps* > .14. To further explore the 3 way interaction, two 2 way ANOVAs (lexical valence X non-verbal valence) were conducted (one for each age group).

Preschool-age. For the preschool-age children, there was a main effect of non-verbal valence: $F(1, 22) = 9.85$, $p = .005$, $\eta_p^2 = .31$, such that speakers who delivered positive non-verbal cues were rated as more friendly than speakers who delivered negative non-verbal cues. There were no other significant main effects or interactions, *ps* > .64. Therefore, preschool-age children were more likely to judge speakers as friendly if they delivered positive non-verbal cues, regardless of the lexical information delivered.

School-age. For the school-age children, the 2-way interaction between lexical and non-verbal valence was significant: ($F(1, 20) = 25.89$, $p < .001$, $\eta_p^2 = .56$). To interpret these interactions, follow up *t*-tests were conducted with Bonferroni correction. School-age children rated the consistently positive speakers as friendlier than all other speakers (neg-lex / neg-nv: $t(20) = 4.91$, $p < .001$, $d = 1.42$; pos-lex / neg-nv: $t(20) = 7.29$, $p < .001$, $d = 1.96$; neg-lex / pos-nv: $t(20) = 5.29$, $p < .001$, $d = 1.24$). No other comparisons were significantly different from one another, *p*s > .15. Therefore, school-age children were more likely to judge speakers as friendly if they demonstrated consistently positive cues. In addition, children perceived speakers showing any negativity (lexical or non-verbal) as less friendly.

Comparisons between the age groups revealed that, relative to preschool-age children, school-age children rated the consistently positive speakers as more friendly, $t(42) = 2.59$, $p = .01$, $d = .80$). There were no significant differences between the age groups in their ratings of inconsistent speakers or consistently negative speakers, *p*s > .23.

Speaker "Weirdness" Ratings

To examine whether age and speaker type (i.e., consistent or inconsistent) influenced children's judgments of whether a speaker had said anything weird or tricky, a 2 (Age:

preschool- versus school-age) X 2 (Lexical valence: positive, negative) X 2 (Non-verbal valence: positive, negative) mixed model ANOVA was conducted. The dependent variable was the mean of children's *speaker weirdness ratings* for each of the 4 speaker types (see Table 2). Results revealed a main effect of age, ($F(1, 42) = 10.31$, $p = .003$, $\eta_p^2 = .19$), which was qualified by a 2-way interaction between non-verbal valence and lexical valence ($F(1, 42) = 48.47$, $p < .001$, $\eta_p^2 = .54$), and a 3-way interaction between age, lexical valence and non-verbal valence, ($F(1, 42) = 15.58$, $p < .001$, $\eta_p^2 = .27$). No other main effects or interactions were significant, *ps* > .12. To further explore the 3-way interaction, two 2-way interactions (lexical valence X non-verbal valence) were conducted (one for each age group). For both age groups, the 2-way interaction was significant (preschool-age: $F(1, 22) = 6.32$, $p = .02$, $\eta_p^2 = .22$; school-age: $F(1, 20) = 44.74$, $p < .001$, $\eta_p^2 = .69$). As discussed below, paired t-tests (with Bonferroni correction; i.e., .05 / 6 comparisons, resulting in a *p* value of .008) were conducted to interpret significant interactions.

Preschool-age. There was a trend towards children rating inconsistent speakers as more weird or tricky than consistent speakers; however, once the Bonferroni correction was applied, none of the preschool-age children's speaker ratings were significantly different from one another, *p*s > .01. .

School-age. School-age children rated both types of inconsistent speakers as more weird or tricky than the consistently positive speakers (pos-lex / neg-nv: $t(20) = 6.52$, $p < .001$, $d = 2.14$; neg-lex / pos-nv: $t(20) = 5.68$, $p < .001$, $d = 1.83$), as well as the consistently negative speakers: (pos-lex / neg-nv: $t(20) = 7.15$, $p < .001$, $d = 2.14$; neg-lex / pos-nv: $t(20) = 6.18$, $p < .001$, $d = 1.83$); no other comparisons were significant, *p*s >.21. This indicates that school-age children detected the inconsistency in speakers' cues.

Comparisons between the age groups revealed that, relative to preschool-age children, school-age children were more likely to indicate that the inconsistent speakers said something weird or tricky (pos-lex / neg-nv: $t(42) = 4.16$, $p < .001$, $d = 1.26$; neg-lex / pos-nv: $t(42) = 2.92$, $p = .006$, $d = .87$). There were no significant age group differences in the ratings of the consistent speakers, ps > .28[5].

Study 2 Discussion

The goal of Study 2 was to investigate whether children extend their preference for consistent speakers to other contexts, such as relying on information about personal preferences. I also examined whether children form more globally positive ratings of consistent speakers relative to other speakers (e.g., in terms of friendliness and likeability). Across children's responses, their speaker choices and ratings did not demonstrate a preference for speaker consistency. With respect to the speaker choices, children were asked to decide whether to rely on information about personal preferences from the speaker or from another individual that they had no knowledge about. In contrast to Study 1, neither preschool- nor school-age children chose consistent speakers (relative to unknown speakers), more than inconsistent speakers, (with the exception of school-age children who preferred consistently positive speakers compared to speakers that delivered a negative statement in a positive tone of voice). Moreover, when children's choices were compared to chance, it was found that school-age children chose consistently positive speakers at levels greater than expected by chance, but chose the consistently negative and inconsistent speakers at chance. Preschool-age children chose to

[5] Due to the restricted range in children's "weirdness" ratings data, non-parametric analyses on each age range were conducted using the Friedman test and then Wilcoxon signed-rank test with Bonferroni correction. Results showed an identical pattern of results.

receive information from consistently negative speakers at *less* than chance levels and the rest of the speakers at chance levels. I hypothesize that children did not show a preference for consistent speakers, and did not actively reject inconsistent speakers, because the information they were gathering did not require a "correct" answer. Specifically, I assume that school-age children used consistency as a cue to speaker credibility in Study 1 because they saw this as a cue to determining who would be able to provide clear, good quality information in the future; however, when deciding which speakers' personal preferences to rely upon, it is not imperative to be provided with clear, good quality information because there is no "correct" answer to learn.

A second goal was to examine whether children form more positive impressions of consistent speakers generally. It was found that both age groups rated consistently positive speakers as more likeable than all other types of speakers. Similarly, school-age children rated consistently positive speakers as friendlier than all other types of speakers. Preschool-age children rated speakers as being friendlier when they delivered positive, compared to negative, non-verbal cues. These findings demonstrate that children did not perceive consistent speakers to be more friendly or likeable than inconsistent speakers (i.e., they did not rate consistently negative speakers positively). Instead, children were focused on the valence of speakers' affect and rated positive speakers more positively than speakers that demonstrated any negativity. It is logical that school-age children preferred to rely on information regarding personal preferences from consistently positive speakers, given that they rated these speakers as more friendly and likeable than the other speakers; that is, I hypothesize that school-age children recognized that their personal preferences were likely to be similar to those of speakers that they like. Importantly, school-age children solicited information from both consistently negative and

consistently positive speakers in Study 1, despite the fact that consistently negative speakers were rated as less friendly and less likeable than consistently positive speakers in Study 2. This suggests that in Study 1, children were making their decisions based on who they thought was going to provide the best quality information and not on the valence of the affect with which the speaker delivered information, or on how much they liked the speaker.

The final goal of Study 2 was to determine when children explicitly detect the (in)consistency between lexical and non-verbal cues. Participants were asked to indicate whether there was anything 'weird' about what the speaker said. Preschool-age children only demonstrated an emerging sensitivity to the inconsistency, while school-age children indicated that the inconsistent, but not the consistent, speakers had said something weird. Thus, by 6 – 7 years of age, children are explicitly detecting the inconsistent communicative cues. Our finding replicates past research (Morton & Trehub, 2001; Rotenberg, et al., 1989) which found that this explicit detection occurs beginning at 7 years of age. This finding helps to interpret the findings from Study 1. Testing for the ability to detect inconsistency provided an indication of whether children were able to integrate lexical and non-verbal cues and manage the cognitive demands of simultaneously tracking both of these streams of communication. Within this interpretation, it is likely that preschool-age children were not using consistency as a cue to decide from whom to solicit information because they were less able to integrate and detect the inconsistency in speakers' cues.

Together, the results from Study 2 indicate that children do not generally prefer consistent speakers over inconsistent speakers. Instead, it seems that their preference for

consistent speakers in Study 1 is likely founded in an appreciation that consistent speakers are better information sources.

Study 3 Introduction

In Study 1, I established that school-age children apply their sensitivity to inconsistency between lexical and non-verbal information to help decide who is a credible source of information. That is, they solicit information from inconsistent speakers (versus an unknown speaker) less often than consistent speakers. Study 2 demonstrated that by 7 – 8 years of age, children indicate that there is something weird about how the inconsistent speakers speak and judge these speakers to be less believable than consistent speakers. However, in these studies, children were not provided with contextual information that could help speakers' inconsistent utterances to sound less confusing. Indeed, contextual information might help to clarify why an individual may deliver lexical information with an affective valence that is inconsistent with their non-verbal cues. For example, on its own, the statement "My bike broke and now I can't ride it," said in a positive tone of voice, is an inconsistent message (i.e., most individuals would be upset, as opposed to happy, if their bike broke). However, this emotional inconsistency is more understandable if an individual knows that the speaker doesn't like riding bikes and now has an excuse to avoid going biking. In this way, a listener's access to key contextual information can influence their judgment of this inconsistent message. In this third study, I assessed whether children are sensitive to, and use, contextual information when making decisions regarding from whom to solicit new information. Specifically, I assessed whether children recognize and use instances where it is more appropriate (versus less appropriate) for speakers to deliver inconsistent communicative cues and modify their judgments of the speakers accordingly. Past research has demonstrated that there are circumstances under which children are more likely to rely on speakers if there is a context that explains their prior inaccuracy (e.g.,

when a speaker has a false belief (Robinson & Nurmsoo, 2009). For example, Nurmsoo and Robinson (2009) found that when speakers delivered inaccurate object labels while wearing a blind fold (which prevented them from seeing the objects), 3-to 5-year-olds continued to solicit information from these speakers at a later time. Thus, it may be the case that children 'excuse' an inconsistent speaker when the context explains the emotional inconsistency, and are subsequently likely to solicit information from her.

To appreciate the impact of contextual information on a speaker's message, children must have an awareness of what emotions would be typical for a particular context. Indeed, past work has demonstrated that even at 14 months of age, children are more likely to trust speakers whose non-verbal cues are consistent, as opposed to inconsistent with the context (Chow et al., 2008). Further, 18 month olds demonstrated more checking behaviour (i.e., suggesting confusion) when speakers' demonstrated emotions were inconsistent with the situation (e.g., distress when a positive event occurs; Chiarella & Poulin-Dubois, 2013).

Children must also possess an awareness of the speaker's perspective. That is, in addition to the child knowing about the context, the child needs to appreciate that the speaker is knowledgeable of the context. For example, saying "I'm going to the fair today," with a sad tone would be more understandable if the speaker knew that the weather was stormy, but potentially confusing or suspicious if the speaker did not have access to information regarding the weather (e.g., if the curtains were closed); therefore, in this scenario, children would need to be able to take the speaker's perspective to determine whether her statement is confusing or not.

Early in life, children show evidence of the ability to take the perspective of others and judge others' behaviour and communication accordingly. Infants demonstrate an implicit

understanding that others can possess mental states that differ from reality (e.g., Southgate, Senju, & Csibra, 2007; Surian, Caldi, & Sperber, 2007). Further, they understand that an individual's mental state influences their behaviour. For example, Onishi and Baillargeon (2005) found that 15-month-olds were able to predict where an individual would look for a hidden toy based on where that individual believed the toy was located (i.e., as opposed to where it was in reality). Preschoolers' sensitivity to others' mental states has also been shown to influence their own communicative behaviours (Liszkowski, Carpenter & Tomasello, 2008; O'Neill, 1996) and at 2 years of age, they are able to modify their communications based on an individual's perspective (i.e., pointing to the location of a hidden toy more when an individual did not, as opposed to did, see the toy being hidden; O'Neill & Topolovec, 2001). In the early school-age years, children are able to interpret communications based on a speaker's perspective, even when this differs from their own perspective (Nadig & Sedivy, 2002). For example, Nilsen & Graham (2009), found that when provided with ambiguous clues (e.g., "It's under the bear", when there was a big bear and a small bear), preschool-age children chose objects that speakers were able to see, versus those they were not able to see, suggesting that they use perspective information to disambiguate ambiguous messages.

Being able to attend to the knowledge states of others requires that children override a more general social bias, the 'curse of knowledge,' which refers to individuals' general difficulty with appreciating the knowledge state of a more naïve other (e.g., Birch & Bloom, 2007). For example, in the aforementioned studies, children had to suppress their own knowledge to appreciate others' interpretations of the communicative information. This skill has been demonstrated in other communicative contexts, such as ambiguity detection and sarcasm

interpretation. For example, by 5 years of age, children say that an ambiguous clue would be 'tricky' for the listener when he/she did not, as opposed to did, see where a sticker was hidden – even when the child had access to this knowledge in both scenarios (Nilsen & Graham, 2012). Further, Nilsen, Glenwright, and Huyder (2011) found that 8- to 10-year-olds recognized that a listener required access to specific contextual knowledge to accurately interpret sarcasm, while 6- to 7-year-olds did not.

Together these studies demonstrate sophistication on the part of young communicators in their ability to interpret language based on interlocutors' knowledge of contextual information. These perspective taking abilities are particularly impressive given that even adults have been shown to be biased by their own knowledge when interpreting the communicative behaviour of others (though to a lesser extent than children; Epley, Morewedge, & Keysar, 2004). Given that children show evidence of perspective taking skills at a young age, it may be that they are able to use these skills when interpreting inconsistent communicative cues from speakers. More specifically, it may be that they are able to take others' perspectives into account when deciding whether the inconsistent communicative cues that they deliver are appropriate (thereby rendering a speaker more credible).

To investigate whether children integrate contextual and perspective information into their judgments of speaker credibility, children completed a Contextualized Speaker Task. In this task, children were introduced to a speaker, provided with contextual information, and were told whether the speaker had access to this contextual information. Children then heard the speaker provide a statement that either contained lexical information that was consistent, or inconsistent with the non-verbal cues with which it was delivered. Therefore, in certain contexts, a speaker's

statement was less appropriate, while in others it was more appropriate, depending on the context and whether the speaker had access to this contextual information. For example, in the context of rainy weather, it would make more sense for a child to be upset about having to play his "favourite game, soccer," if the child was aware, compared to not aware, that it was raining outside. As in Study 1, children were then required to decide whether to solicit information from the speaker, or from another individual that they had no information about. I predicted that I would replicate the results from Study 1, by finding that speakers who used a tone of voice that was inconsistent with the affective valence of their words (e.g., sad voice to say something positive) would be relied on to a lesser extent than speakers who used a tone that was consistent with their words (e.g., happy voice to say something positive). I further hypothesized that in contexts that rendered an inconsistent lexical / non-verbal statement to be more appropriate, children would 'excuse' the affective inconsistency as demonstrated by not avoiding soliciting information from these speakers. This pattern, however, presumably would only occur when speakers were knowledgeable of the contextual information.

Study 3 Method

Participants

Thirty seven children aged 9- and 10-years-old (19 males, M = 121.57 months, SD = 5.85) were recruited from the community within a mid-sized North American city. This age group was chosen to ensure that most participants were able to explicitly detect the inconsistency in the communicative cues (as per findings from Study 2). This number of participants was chosen to be similar to the number in each age group in Studies 1 and 2. Two additional children were tested, but their data was not included in the analyses due to difficulties with completing

the task (e.g., asking off topic questions while the videos were playing or the examiner was giving information, being distracted during the task and remarking about wanting to be elsewhere). Parents of all included participants reported that their children were fluent in English and, as assessed by a standardized measure of receptive vocabulary, all children possessed language skills sufficient to understand the statements in the videos and stories.

Materials and Procedure

Participants were tested individually by an experimenter in a quiet room within the research laboratory. The Contextualized Speaker Task was always administered first, followed by a receptive language task.

Contextualized Speaker Task. The Contextualized Speaker Task was similar to the previous speaker tasks, with the following exceptions. First, in contrast to Study 1 and 2 (which had four speaker types), there were only two types of speakers: consistently positive speakers and inconsistent speakers who delivered positive statements in a negative tone of voice (i.e., consistent versus inconsistent). Second, prior to watching the videos, children were provided with information about the situational context for the speaker that was either positive or negative (i.e., positive versus negative valence) and they were told that the speaker either had access to this contextual information or not (i.e., knowledgeable versus unknowledgeable). Thus, the design of the study was 2 (speaker type: *consistent, inconsistent*) X 2 (context valence*: positive, negative*) X 2 (speaker knowledge: *knowledgeable, unknowledgeable*), resulting in 8 different trial types, which were administered twice for a total of 16 trials. Each trial depicted a different speaker with the type of information each speaker delivered counterbalanced across the

participants. All speakers were Caucasian women with brown hair pulled back from their face, wearing a t-shirt of a different colour from each other.

Children were told that their task was to solicit details from different speakers to figure out the characteristics of four monsters from a book. To increase motivation for the task, children were told that at the end of the task, they would get to see what the monsters really looked like and they would receive a sticker for every correctly identified monster characteristic. Children were told that this was a real story and were shown the title page of a book to emphasize that there was a right and wrong answer regarding each monster characteristic.

Children completed the task while seated at a table in front of a computer and a book with space on the table for pictures to be laid out. Each trial began with children being told information about the speaker (while being shown accompanying pictures; Figure 2). Following this, children watched the speaker video. The information always followed the same pattern. First, the experimenter named the speaker (e.g., "This is Julia"). Then a statement was made that described a positive occurrence for the speaker (e.g., "Julia's bike just got fixed so she can go biking with her family today"). Next, a statement was made that rendered the context either positive or negative (e.g., negative: "Her family was planning to go on the really hard route that Julia doesn't like"). Finally, a statement was made that explained whether the speaker was knowledgeable of the contextual information or not (e.g., unknowledgeable: "Julia did not know this because she was in the garage when her mom said this, so she did not hear her mom"). Children then watched a video of the speaker making a statement about the situation (e.g., "Julia said: 'My bike got fixed and I can ride it.'"; See Table 3 for an example for each condition; See Appendix B for each of the stories). Then children decided whether they wanted to solicit

information about the monster characteristics from that speaker or from a different individual that they had no information about.

To assist children's comprehension, each piece of information in the stories was accompanied by pictures. That is, a picture of the speaker was placed in front of the participant, followed by two images depicting the information read out by the experimenter. The first image depicted the statement describing the positive occurrence (e.g., a picture of a fixed bike). The second image depicted the contextual information and whether the speaker had access to this information (e.g., a picture showed the speaker's mother saying "hard route" along with an image of a bike going up a large hill). Each scenario involved either the speaker having "heard" or "not heard" the contextual information, or "seen" or "not seen" the contextual information. Each image displayed the contextual information on the left side of the page, while the right side of the page showed whether the speaker had access to this information. When a speaker did not have access to the contextual information, there was a squiggly line between the image of the contextual information and the image of the speaker; when a speaker did have access to this information, there was no line between the two sides. There was also an image of an eye or an ear in the top right corner of the page that was either bare (i.e., if the speaker could see or hear) or had a "no sign" imposed over top (i.e., if the speaker could not see or hear). Children were trained prior to beginning the test trials to recognize and understand what it meant when they saw the images depicting that the speaker had access to the contextual information or not. They were told what each of the symbols meant and then they were shown images similar to those used in the study and asked to explain what they meant. All participants accurately identified the images, suggesting that they were able to comprehend the stimuli.

Following the speaker statements, children made their speaker choices (e.g., "Do you want this girl to help you figure out what the dibdat monster looks like, or another girl?"). Each of the 16 pages of the book depicted a picture of the speaker and a picture of a girl the child had not met. Each page also had a question about one of the monsters (e.g., How many eyes does the dibdat monster have?) as well as two stickers that depicted contradicting responses from the two information sources: one from the video-recorded speaker and one from the girl whom children had no information about (i.e., each individual was pictured with their response in a speech bubble). For example, the speaker was shown to say, "The dibdat monster has 5 eyes," with a sticker showing 5 eyes, while the other individual was shown to say, "The dibdat monster has 3 eyes," with a sticker showing 3 eyes. Then the images of the monsters were created based on the children's choice of speakers, using stickers on a separate page (e.g., if children chose to solicit information from the speaker, the sticker with 5 eyes was taken from the booklet and added to the image of the monster). Importantly, children did not see the page depicting the speakers' or the "other" girls' responses until they had made their decision regarding from whom to solicit information. In this way, I ensured that participants were not basing their responses on their own personal preferences of the options.

Children also completed the stimuli check trials as in Study 1 and 2 to ensure that they were able to understand what the individuals were saying and accurately judge the emotions of the speaker. Children watched two consistently positive speakers; for one speaker, they were asked to repeat what the speaker had said and to decide whether the statement was happy or sad, for the other speaker, children were asked how the speaker sounded, happy or sad.

Language Task. To ensure all children who participated had a receptive vocabulary sufficient to complete the task, receptive vocabulary subtest of the Wechsler Individual Achievement Test – Third Edition (WIAT-III; Wechsler, 2009) was administered in a standardized fashion. This task required children to point to pictures that represented words spoken by the experimenter.

Study 3 Results

Preliminary Analyses

All children accurately repeated the content of the statements in the manipulation check trials and correctly labeled the valence of the statements, suggesting that they were able to comprehend the speakers' statements as well as identify the appropriate valence.

Speaker Choice

To examine whether speaker type, speaker knowledge and scenario valence influenced children's speaker preferences, a 2 (Speaker consistency: consistent, inconsistent) X 2 (speaker knowledge: knowledgeable, unknowledgeable) X 2 (scenario valence: positive, negative) within-subject ANOVA was conducted. The dependent variable was the means of children's *speaker choices* (see Table 4). Results revealed a main effect of speaker consistency, ($F(1, 36) = 43.04$, $p < .001$, $\eta_p^2 = .55$), which replicates the findings from Study 1: children solicit information from consistent speakers, relative to unknown individuals, to a greater extent than they solicit information from inconsistent speakers. However, this main effect was qualified by a 2-way interaction between speaker consistency and scenario valence ($F(1, 36) = 6.08$, $p = .013$, $\eta_p^2 = .16$), as well as a significant 3-way interaction between consistency, speaker knowledge and scenario valence, ($F(1, 36) = 12.55$, $p = .001$, $\eta_p^2 = .26$). No other main effects or interactions

were significant, *ps* > .14. As the main objective of this study was to examine the interplay between knowledge and context, the 3-way interaction was explored with two 2-way interactions (speaker knowledge X scenario valence; one for each speaker type).

Consistent Speakers. For the consistent speakers, there was a main effect of scenario valence ($F(1, 36) = 7.03$, $p = .01$, $\eta_p^2 = .16$), which was qualified by a 2-way interaction ($F(1, 36) = 5.57$, $p = .02$, $\eta_p^2 = .13$). The main effect of knowledge was not significant $p = .79$. Paired t-tests with Bonferroni correction (i.e., .05 / 6 comparisons, resulting in a *p* value of .008), revealed that children were more likely to choose to solicit information from the consistently positive speakers (over an unknown speaker) when the speakers were knowledgeable of the positive context compared to when they were knowledgeable of the negative context: $t(36) = 3.31$, $p = .002$, $d = .73$; Put another way, children were more likely to choose a consistent speaker when she was aware of contextual information that rendered her positive affect more appropriate (i.e., sounding happy about a positive context), as opposed to when the context suggested that the speaker 'should' sound negative (i.e., sounding happy about a negative context). There were no other differences between speakers depending on knowledge or context *p*s > .05.

Inconsistent Speakers. For the inconsistent speakers (i.e., those making a positive statement in a negative tone of voice), there was a main effect of knowledge ($F(1, 36) = 7.04$, $p = .01$, $\eta_p^2 = .16$, which was qualified by a 2-way interaction ($F(1, 36) = 13.92$, $p = .001$, $\eta_p^2 = .28$). The main effect of scenario valence was not significant $p = .32$. The 2-way interaction was explored using comparisons with Bonferroni correction (i.e., .05 / 6 comparisons, resulting in a *p* value of .008). Results showed that children were more likely to solicit information from the

inconsistent speakers, over an unknown speaker, when these speakers were knowledgeable of the negative context compared to when they were knowledgeable of the positive context: $t(36) = 2.99$, $p = .005$, $d = .61$. Thus, children judge an inconsistent speaker to be more credible when the context in which the inconsistent statements were made helped to explain the inconsistency (e.g., sounding sad in a negative context as opposed to a positive context). They also preferred to solicit information from inconsistent speakers (over an unknown speaker) to a greater extent when these speakers were knowledgeable of the negative context compared to when they were unknowledgeable of the negative context $t(36) = 4.49$, $p < .001$, $d = 1.01$. Thus, children were tracking the speakers' knowledge of the context (which explained the inconsistency) when forming judgments of the speakers' credibility. There were no other differences between speakers, ps $> .03$[6].

Children's speaker preferences changed depending on the contextual information provided, as well as speakers' knowledge of this contextual information. When speakers were unknowledgeable, as well as knowledgeable, of a positive context, children chose consistent speakers (over unknown speakers), more than inconsistent speakers (unknowledgeable: $t(36) = 4.16$, $p > .001$, $d = .94$; knowledgeable: $t(36) = 5.68$, $p > .001$, $d = 1.46$). Similarly, children chose consistent speakers (over unknown speakers) when speakers were unknowledgeable of a negative context ($t(36) = 5.53$, $p > .001$, $d = 1.34$); however, there was no difference in children's preferences when the speaker was knowledgeable of a negative context ($p = 1.0$). Thus, children's preference for consistency remained when the context was positive (i.e., congruent with the statement) as well as when the speaker was unaware of a negative context; however,

[6] Due to the restricted range in the choice data, non-parametric analyses on each age range were conducted using the Friedman test and then Wilcoxon signed-rank test with Bonferroni correction. Results showed an identical pattern.

when speakers were aware of a context that helped to explain the affect of the inconsistent speaker, children were less likely to avoid soliciting information from the inconsistent speakers.

Study 3 Discussion

The goal of Study 3 was to examine whether school-age children take into account contextual information when deciding whether to solicit information from speakers who show (in)consistency between their affect and words. As predicted, children integrated information from multiple sources to make decisions about speaker credibility. Specifically, children chose to solicit information from speakers using inconsistent communicative cues (i.e., a positive statement in a negative tone of voice) to a greater extent when the context was negative, compared to when it was positive, that is, when the context rendered the negative tone of voice more appropriate, compared to when it rendered it less appropriate. For example, children were more likely to decide to solicit information from a speaker who said, "I'm going to play my favourite game," delivered in a negative tone of voice, if it was raining outside (negative context), compared to if it was sunny outside (positive context). When looking at children's speaker choices relative to chance, children actively avoided inconsistent speakers when the context rendered the statement less appropriate, but chose inconsistent speakers at chance levels when the context rendered it more appropriate. This suggests that children consider the inconsistency of a statement against the contextual backdrop when judging the credibility of speakers. This finding extends previous research that demonstrates the flexibility with which children judge clues to speaker credibility. For example, despite preferring to solicit information from knowledgeable speakers, children solicit information from ignorant speakers if there is an explanation for their ignorance (i.e., the speaker lacks access to pertinent information; Nurmsoo

& Robinson, 2009). It should be noted, however, that while children in Study 3 were more likely to choose inconsistent speakers when the context rendered the statement more appropriate, they still did not completely override their preference for consistency, as they were choosing inconsistent speakers at chance levels. Similarly, children demonstrated sensitivity to context when deciding whether to solicit information from speakers who delivered consistent communicative cues. In particular, they chose the consistent speakers (over unknown speakers) more often when the context was positive as opposed to negative. For example, children were more likely to solicit information from a speaker who said, "I'm going to play my favourite game," in a positive tone of voice, if it was sunny outside (positive context) as opposed to if it was raining outside (negative context). Such a finding suggests that children expect that a speaker's tone will be consistent with the context (consistent with Chiarella & Poulin-Dubois, 2013). Further, while children generally preferred consistent speakers over inconsistent speakers when there were similar contexts and speaker knowledge, there was not a significant difference in children's preferences when the speakers were knowledgeable of negative contextual information. In other words, children no longer demonstrated a preference for consistently positive speakers (as they did in Study 1) when the positive cues delivered by the speaker were not appropriate given the context.

Impressively, children also demonstrated sensitivity to speaker perspective by choosing to solicit information from speakers who delivered inconsistent communicative cues (over an unknown speaker) to a greater extent when the speaker was aware, as opposed to unaware, of the negative context (i.e., the context that rendered the negative tone of voice appropriate). Findings suggest that children were sensitive to the fact that it would not be appropriate for a speaker to

use a negative tone of voice when they did not know about a negative context - for example, saying “I’m going to play my favourite game” in a negative tone when the speaker was unaware that it was pouring rain outside (i.e., due to the blinds being closed).

Together, the results suggest that children generally appreciate that inconsistent affective/communicative cues indicate that a speaker is a poor source of information. However, children are flexible in these judgments and show less avoidance of information from these speakers when the context renders their statements to be more appropriate (e.g., due to the context and knowledge state of the speaker).

General Discussion

A large body of research has determined that children are attuned to a number of speaker characteristics when deciding on the credibility of information sources (see Mills, 2013 for a review). However, this area of research has given limited attention to children's sensitivity to *how* speakers deliver information and whether this influences their judgments of speakers' credibility (see Birch et al., 2010 for an example). Certainly, to determine whether an individual will be a source of good quality information in the future, children must not only be able to determine speakers' characteristics and knowledge, but also speakers' ability to deliver clear, unambiguous information. Having multiple channels of communicative expression has the potential to create communicative ambiguity as these channels may not always be consistent with each other. Past work examining children's interpretation of inconsistent messages has shown that it is not until the age of 7 or 8 that children can explicitly detect inconsistencies between speakers' words and emotional display, with implicit appreciation being shown as early as 4 years of age (Morton & Trehub, 2001). However, it was unclear whether children use their sensitivity to communicative inconsistency to form impressions of the credibility of speakers, and if so, at what age. The goal of my dissertation was to assess whether children are attuned to emotional inconsistency in lexical and non-verbal cues (i.e., *what* words are said and *how* they are delivered) when determining whether to solicit information from speakers. I further investigated whether children were able to take cue consistency into account against the backdrop of contextual information to decide whether a speaker would be a good source of information in the future.

In Study 1, school-age children used cue consistency to decide from whom to solicit information. More specifically, school-age children demonstrated a preference to solicit information from consistently positive, as well as consistently negative, speakers (relative to unknown speakers) over both types of inconsistent speakers. This latter finding is important given that children have been shown to avoid soliciting information from speakers who display negative affect (Landrum et al., 2013; Mascaro & Sperber, 2009). Thus, school-age children show an ability to 'override' this tendency and take consistency into account. Further, when comparing children's speaker choices to chance levels, a pattern emerged whereby school-age children actively rejected the opportunity to gain information from inconsistent speakers; this demonstrates that school-age children were particularly attuned to the inconsistency of speakers' communicative cues.

While there was no significant difference between the two consistent speaker types, the consistently positive speakers were chosen at greater than chance levels and the consistently negative speakers were chosen at chance-levels. Further, the consistently positive speakers were rated as more believable than the consistently negative speakers. Thus, it appears that while inconsistency in affect cues is an important cue to speaker credibility, the school-age children show some evidence of preferring positive speakers. This is consistent with the work of Boseovski (2012), which demonstrates that, in general, children favour speakers who provide positive information. It would be interesting for future work to determine whether this preference for positivity changes through further development; it may be that the preference for positivity becomes nonexistent as individuals get older - adults may show a preference for consistency regardless of the affective valence of the information provided. However, work on older adults'

attention to affective valence suggests that in this population, greater attention is given to positive information (relative to younger adults; Carstensen & Mikels, 2005), suggesting that a preference for positivity may return (although, it should be noted that this research used different stimuli than was used in my dissertation research, that is, positive and negative images as opposed to lexical and vocal cues).

I believe that there are two likely explanations for children's sensitivity to cue consistency when judging speaker credibility. First, it is possible that children preferred consistent speakers, as opposed to inconsistent speakers, because they appreciate that inconsistent cues introduce ambiguity into communication. In other words, children recognized that an inconsistent speaker would be a poor source of information because she would likely provide ambiguous or poor quality information in the future. Indeed, in Study 2, school-age children's ratings of how weird/tricky speakers sounded were higher for inconsistent speakers than they were for consistent speakers, suggesting that children saw these speakers as providing poor quality information. Findings suggest that school-age children may be attuned to violations of Gricean conversational maxims when determining speaker credibility; in particular the Maxim of Manner, in which one tries to be as clear as possible and avoid ambiguity in speech. Indeed, children have previously been shown to demonstrate sensitivity to other Gricean Maxims when choosing information sources (Eskritt, Whalen & Lee, 2008). In addition, this explanation is supported by my Master's research demonstrating that school-age children use lexical ambiguity (i.e., accurate but insufficient information to identify a target) as a cue to speaker credibility (Gillis & Nilsen, 2013).

A second explanation is that school-age children may have seen inconsistent speakers as deceptive. Certainly, it is the case that when individuals are lying, they tend to show a mismatch between their communicative cues (DePaulo, Stone, & Lassiter, 1985; Feldman & White, 1980). Children may have assumed that the inconsistency in affective cues indicated that the speaker had something to hide. As a result, children may have avoided soliciting information from inconsistent speakers because they assumed that these speakers would be more likely to deceive them. Children as young as five years of age have been shown to trust information delivered by speakers identified as honest more than information delivered by speakers identified as dishonest (Li, Heyman, Xu & Lee, 2014). Indeed in Study 1, school-age children's ratings of speakers' believability were higher for consistent speakers than they were for inconsistent speakers, suggesting that children saw the inconsistency as a marker of deception. In addition, Rotenberg and colleagues (1989) found that school-age children predict that truth tellers will display consistent lexical / non-verbal cues, while liars will display inconsistent lexical / non-verbal cues.

Of course, these two explanations are not mutually exclusive and it is possible that children judged inconsistent speakers to both be deceptive *and* to provide poor quality, ambiguous information. Future research would be required to determine whether one, or both, of these judgments directly impact children's speaker choices.

Importantly, it does not appear that the school-age children's use of consistency as a cue to speaker credibility was driven by a globally positive view of these speakers. In particular, school-age children did not rate the consistently negative speakers as being more friendly or likeable than the inconsistent speakers (Study 2). Thus, when deciding on a speaker's

characteristics, children seem to be able to discern between attributes that are important to information acquisition (e.g., clarity of speech) relative to those that are not (e.g., likeability). Moreover, their choices of speakers across the first two studies suggest that they apply the consistency principle primarily in contexts where the goal is to acquire accurate information. More specifically, when children had the opportunity to use the personal preferences of a speaker to help them choose a sticker to keep (i.e., Study 2), consistency did not play an important role in children's speaker choices and children no longer actively rejected inconsistent speakers These results lend further support to my hypothesis that school-age children in Study 1 solicited information from consistent speakers (relative to unknown speakers) more than they solicited information from inconsistent speakers, because they inferred that inconsistent speakers would provide poor quality information. That is, when a correct answer is required, it is important to receive clear/trustworthy information in order to accurately determine the appropriate response; in contrast, when receiving information regarding personal preferences, there is not the same requirement to acquire clear information because there is no distinction between correct and incorrect information. Indeed, in the case of soliciting personal preferences, it may be more important to consider the likeability of the speaker. We found some evidence for this as school-age children rated consistently positive speakers as more friendly and likeable, and preferred their personal preferences at greater than chance.

In contrast to the performance of school-age children, preschoolers were not found to use a consistency principle to infer speaker credibility. In Study 1, all speakers, except the consistently positive speakers, were chosen by preschoolers at less than chance levels and did not differ from each other. The preschool-age children were at the age where they would be starting

to explicitly recognize that individuals can have feelings that are different from those being displayed (as per the real-apparent emotion task, which children pass at around 5-years-old; Wellman & Liu, 2004). However, it did not appear that they recognized the inconsistency in affective cues in Study 1. Study 2 confirmed that they had difficulty with explicitly detecting the inconsistency as they only demonstrated an emerging sensitivity to the inconsistency. This is consistent with previous work demonstrating that explicit recognition of inconsistency between lexical/non-verbal information does not begin until around 7 years of age (Morton & Trehub, 2001; Rotenberg et al. 1989). This difficulty with detecting inconsistency likely accounts for the preschool-age children's speaker choices. Indeed, it is likely that until children are able to integrate information from both lexical and non-verbal channels and comprehend the inconsistency, they will not be able to use it as a cue to speaker credibility. Instead of relying on the consistency principle, preschoolers seemed to avoid any type of negative information, non-verbal or lexical. Indeed, their choices, and ratings, of consistently negative speakers did not differ from the two inconsistent speaker types. This response pattern, which demonstrates younger children's awareness of negativity and subsequent avoidance of this type of information, is reflective of a more general negativity bias (Vaish et al., 2008). It also extends previous work demonstrating that children are less likely to trust speakers who provide negative attributions (Boseoviski, 2012).

Study1 showed that, by school-age, children are sensitive to the (in)consistency in a speaker's cues and tend to reject opportunities to acquire information from speakers who show a mismatch between the emotional valance of what they say and how they say it. Study 2 suggests that this pattern of speaker preferences is specific to situations where children need to acquire

information with a correct answer. However, in these studies children were not provided with contextual information. In everyday interactions, communication not only involves speakers and their messages, but also the context within which messages are delivered. Therefore, Study 3 examined whether children integrate information from a number of sources, including cue consistency, context, and speaker perspective, when assessing speaker credibility.

Results from Study 3 extended those from Studies 1 and 2 by demonstrating that children were able to take context into account when deciding whether to solicit information from speakers. Children were more likely to solicit information from inconsistent speakers when the context rendered the affective inconsistency more appropriate (i.e., a positive statement said in a negative tone of voice within a negative context). When comparing children's choices with chance, it is the case that children were actively avoiding inconsistent speakers when the context rendered the statement less appropriate, while children were choosing speakers at chance when the context rendered the statement more appropriate. Children were also less likely to solicit information from consistently positive speakers when the speakers were aware of a negative context, compared to when they were aware of a positive context. Therefore, children were less likely to trust consistent speakers when they delivered their statements within a context, of which they were aware, that rendered their statement less appropriate. When comparing children's choice with chance, we see that children were actively soliciting information from consistent speakers when the context rendered the statement more appropriate, while children were choosing speakers at chance when the context rendered the statement less appropriate. Finding that children are able to change their judgments of speakers depending on the context extends the growing literature demonstrating the flexibility with which children are able to apply the

heuristics they use to determine credible sources of information. For example, while children typically avoid soliciting information from unknowledgeable speakers, they will solicit information from an ignorant speaker if their ignorance is explained by the context (i.e., when the speaker is unable to see the information in question; Nurmsoo & Robinson, 2009). In addition, while previous research demonstrates that children generally prefer to learn from adults over children (Jaswal & Neely, 2006), they instead prefer to learn from children when the topic pertains to child interests (e.g., toys; VanderBorght & Jaswal, 2009). Further, children have been shown to mistrust individuals who deliver lies that serve their own interests, but trust individuals that deliver lies that benefit others (Fu, Heyman, Chen, Liu & Lee, 2015). My findings from Studies 1 and 2 also illustrate children's flexibility in determining credible sources of information; that is, school-age children used consistency to decide from whom to solicit information when a right answer was required, but not when the information in question pertained to personal preferences. Together this body of work demonstrates that children are able to judge speakers' credibility in a flexible manner by taking information from multiple sources into account.

Further, results from Study 3 demonstrate that children were able to take speakers' perspectives into account, in addition to the contextual information, to determine speakers' credibility. More specifically, children were less likely to solicit information from inconsistent speakers (i.e., a positive statement said in a negative tone of voice) within a negative context, if speakers did not have access to the contextual information. In other words, when speakers were unaware of contextual information that would render their inconsistent statement more appropriate, children's choices suggested that they did not see the speaker as a credible source of

information (i.e., presumably because the statement is still not appropriate from the speaker's perspective). This finding extends previous research investigating children's ability to take others' perspectives in communicative contexts. For instance, past research has shown that children are able to take a speaker's perspective, which differs from their own, to determine which object the speaker is referencing (Nadig & Sedivy, 2002; Nilsen & Graham, 2009). In addition, children are able to suppress their own perspective to determine whether an ambiguous statement uttered by a speaker is "tricky" for a listener based on this listener's perspective (Nilsen, Graham, Smith, & Chambers, 2008; Nilsen & Graham, 2012). My results suggest that children are able to appreciate speakers' communicative behaviour (both lexical and non-lexical) with sensitivity to their perspective, but also use this appreciation to decide on speakers' credibility.

Together the results provide information on the nuanced communicative cues children use as heuristics for determining the credibility of information sources; they further show that sensitivity to these cues develops across the preschool- and school- age years. The developmental pattern demonstrated in Study 1 suggests that there may be age-related cognitive changes that support children's ability to detect and use (in)consistency in a speaker's communication. I hypothesize that a number of executive functions (i.e., higher order cognitive processes that allow for the ability to plan and organize information; Diamond, 2006; Pennington, 1997; Pennington & Ozonoff, 1996) supported older children in their detection, and use of, inconsistent affective cues when judging the credibility of information sources. Indeed, children's executive functioning shows rapid growth in the preschool years (Garon, Bryson, & Smith, 2008) with these skills impacting a number of other areas of functioning (Best, Miller &

Jones, 2009). First of all, it is reasonable to assume that children relied on their working memory when making their judgments about the speakers' statements, as they had to hold in mind information of two different affect valences from two different communication streams. Certainly, verbal memory has been shown to play a role in children's emotion recognition ability (Buitelaar, Wees, Swaab-Barneveld, & Gaag, 1999). It is likely that working memory would have been required to hold information from multiple sources in mind (e.g., the affective valence of different cues) and to integrate this information before making a decision regarding speaker credibility. It is also likely that working memory helped children to keep their goal in mind (e.g., getting a right answer; determining a speaker's personal preference), while deciding what type of information would be relevant to help them determine speakers' credibility.

It is also possible that another executive function, cognitive flexibility, played an important role in children's ability to detect the inconsistency in speakers' statements. For example, previous research has discussed the importance of cognitive flexibility for recognizing the multiple properties of an object (e.g., colour and shape) and for switching between considering these different properties (e.g., Smidts, Jacobs & Anderson, 2004); Children seem to use this skill in communicative contexts, for example, to detect whether particular referential descriptions are ambiguous based on the context (Gillis & Nilsen, 2014). It may be that cognitive flexibility allowed children to notice the different aspects of speakers' statements (e.g., lexical and non-verbal) and to shift focus between these to determine whether they were congruent or not (both to each other and to the context).

Finally, inhibitory control may have allowed children to integrate their judgments of a speaker's (in)consistent cues with information regarding the speaker's perspective (in Study 3). That is, in order for the children to appreciate the perspective of the speaker, they were required

to inhibit their own knowledge (as children were always aware of the context in this study). Indeed, inhibition has been hypothesized to play a role in individuals' ability to override the 'curse of knowledge' (Birch & Bloom, 2004) and past work has found that children with more proficient inhibitory control skills were more able to suppress their own knowledge in order to appreciate the perspective of a speaker (Nilsen & Graham, 2009).

It would be interesting for future research to investigate the importance of these executive functions in children's decisions regarding speaker credibility. Indeed, the speaker credibility literature has tended to neglect the consideration of individual differences in children's ability to determine credible sources of information. This being said, some research has demonstrated that individual differences in social cognitive skills are associated with children's ability to take information regarding speakers' past (in)accuracy into account when evaluating their credibility. For example, Fusaro & Harris (2008) found that children who passed a false belief task were more likely to endorse previously reliable speakers. Further, Vanderbilt, Liu and Heyman (2011) found that children's selective trust of "helpers" compared to "trickers" was related to their ability to make inferences about mental states. It would be interesting to tease apart which skills are important for which aspects of specific tasks; that is, certain skills, such as working memory, may be important for all speaker credibility tasks, due to the importance of keeping relevant information in mind. However, a skill such as cognitive flexibility may only be important when children are confronted with inconsistent cues.

This research suggests that, by the age of 6, children are explicitly aware of affective inconsistency in communication and use this as a cue to selectively learn from others. It is interesting to consider how exposure to inconsistent affective cues may influence children within a broader context of interpersonal interactions. Certainly, children are presented with

inconsistency in individuals' affective cues in various contexts (e.g., when they mask their emotions). For example, parents may deliver inconsistent cues when trying to discipline their children (e.g., when finding an inappropriate behaviour, like swearing, to be amusing). Regular exposure to inconsistency between a parent's words and affective display may have a negative impact on children's behaviour. Indeed, it is worth noting that some researchers have concluded that individuals who are regularly exposed to inconsistent affective cues from family members (albeit messages that differ from what is being tested here) may be at risk for developing emotional and behavioural difficulties (e.g., Mehrabian & Weiner, 1967; Bugental, Love, Kaswan & April, 1979). Thus, it seems that being on the receiving end of messages containing conflicting affective cues may be problematic for children. However, my results suggest that when there is sufficient contextual information to understand the inconsistency, older children are able to make sense of it. More specifically, 9 – 10 year old children trusted inconsistent speakers more when the contextual information explained, as opposed to did not explain, the inconsistency. This finding indicates that it may not be problematic to expose older children to inconsistency, as long as they are provided with explanatory contextual information (i.e., as long as the inconsistent statement 'makes sense' given the context); however, it should be noted that children may be impacted negatively by inconsistent messages before they are old enough to consider contextual information. That being said, it may be through trying to make sense of speakers' inconsistent cues that children learn to appreciate the role of context and perspective when interpreting speakers' communicative behaviour. Indeed, it is likely that children are left with confusion regarding the speakers' intentions when there is no contextual information to assist with interpretation.

Further, while being skeptical of individuals who display inconsistent cues may be adaptive for children's knowledge acquisition, in our language system there are a number of ways in which inconsistency is intentionally exploited to achieve specific communicative goals. For example, figurative language, such as sarcasm, relies heavily on a mismatch between the words uttered and the affect with which the words are delivered (e.g., saying 'I really hated that' after completely finishing one's plate of food). Given that children are exposed to sarcasm in their everyday lives, it would be important to consider that children may need to be exposed to sarcasm by individuals they trust in order to learn how to interpret it appropriately. Indeed, some evidence indicates that children's comprehension of verbal irony is related to their parents' use of sarcasm (Pexman, Glenwright, James & Drol, 2005); suggesting that there may in fact be benefits to exposing children to inconsistent communicative cues. It would be interesting to further investigate the benefits and drawbacks of exposing children to inconsistent messages and whether there are differential effects depending on the type of inconsistency.

It is important to consider some of the limitations of this research. First of all, my methodology, which involved having children choose between a speaker and an unknown individual, differed from the typical speaker credibility methodology (e.g., Koenig & Harris, 2005; Scofield & Behrend, 2008). In most of the previous literature, children are exposed to two speakers and subsequently asked to choose between them. This difference in methodology was deliberate and had two main purposes: first, to make the study more ecologically valid, and second, to reduce the working memory demands of the task. However, by using an unknown speaker as a comparison, there is less information to indicate what children's choices are compared against; that is, some children may envision an unknown speaker as being

knowledgeable, while other children may envision an unknown speaker as being unknowledgeable. This being said, studies that have used methodologies where children judge only one speaker have shown similar results to studies where children judge two speakers (i.e., Birch et al., 2010; Koenig & Woodward, 2010; Nurmsoo & Robinson; 2009), suggesting that this change would not have reduced the ability to demonstrate an effect.

There are further limitations in a few aspects of my methodology that differ from the way children would experience inconsistencies in communicative messages on a daily basis. First of all, in my videos, speakers demonstrated exaggerated non-verbal cues. The stimuli were designed this way as this was an initial inquiry into this area and the goal was to determine whether children were picking up on discrepancies in any way. Interestingly, even with this exaggerated style, the preschool-age group demonstrated minimal sensitivity to the inconsistency in communicative cues. However, it would be interesting for future research to investigate whether similar results are noted when the non-verbal cues are reduced to more subtle levels, and further whether similar results are found if live, in-person interactions are used. Relatedly, the sentences used in Study 3 were the same across the different conditions. While this was done purposefully to maintain consistency across the different conditions, it may have created less typical statements/contexts. For example, while it would be 'more' appropriate for someone to say, "I get to play my favourite game, soccer" in a sad voice when the weather was bad, as opposed to good, it is still a relatively unnatural statement (i.e., compared to saying, "I *have to* play my favourite game, soccer, in the rain"). Further, in Study 3, the training on knowledge cues (i.e., learning that some pictures represented having knowledge, while others represented not having knowledge) might have helped children to be more sensitive to knowledge information

than they would be in a naturalistic context. Finally, in Study 3, to reduce the complexity and number of trials within the study, we did not include consistently negative speakers or inconsistent speakers that stated a negative statement in a positive tone of voice. It would be interesting for a future study to determine whether the same results are observed when the affective valence is different.

Despite the limitations, there are several strengths to the design of the three studies presented. Much of the speaker credibility literature has focused on isolating specific speaker characteristics of interest and has not tended to investigate children's ability to take information from multiple sources into account when determining speakers' credibility. In particular, Study 3 created a context that more closely parallels everyday communication than previous studies have. Further, my methodology does not require children to choose between two speakers who present conflicting information simultaneously, which I believe to be an improvement as it is unlikely that children would be presented with such a situation in everyday life.

Conclusion

The complex process by which children determine credible sources of information is important to understand. Indeed, gaining insight into how children interpret their communicative experiences could eventually provide valuable information regarding effective ways to pass on information to children. In turn, this could help children to develop more efficient or effective ways to learn from others. Overall, my dissertation demonstrates that school-age children (i.e., ages 7 – 8), but not preschool-age children (i.e., ages 4 – 5), take affective cue consistency (between lexical and non-verbal information) into account when determining speaker credibility. Even more impressively, results indicate that 9 – 10 year olds are capable of thinking flexibly

about how information is delivered in conjunction with other communicative and contextual cues to decide whether to solicit information from the speaker or not.

Overall, my findings add to a growing literature that demonstrates the variety of cues that children use when determining credible sources of information. More specifically, my research demonstrates that cues to speaker credibility extend beyond speaker characteristics and knowledge to the manner in which information is delivered and the context in which it is delivered (Birch et al., 2010; Chow et al., 2008). Further, while a lot of the speaker credibility research has focused on the preschool-age (see Mills, 2013), my results indicate that children are developing sensitivity to nuanced communicative cues into the school-age years. My results also demonstrate that children's decision-making process, when determining credible sources of information, is much more complex than previous studies have been able to show (i.e., integrating cue consistency, context and speaker perspective). Together, my research suggests that children's judgment of speakers' credibility becomes increasingly sophisticated as their sensitivity to speakers' communicative cues increases, along with their ability to integrate information from multiple sources.

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Table 1

Children's Speaker Choices and Speaker Ratings in the Speaker Affect Task and Speaker Feelings Rating Task Study 1

	Speaker Choice		Speaker Belief Ratings		Speaker Feeling Ratings	
	Proportion of speaker choices (SD)		Mean speaker ratings 1 – 4 (SD)		Mean speaker ratings 1 – 3 (SD)	
	Preschool-age	School-age	Preschool-age	School-age	Preschool-age	School-age
Consistent Speakers						
Positive lexical/ Positive non-verbal	.57 (.38)	.69 (.25)	3.49 (.57)	3.44 (.53)	3.00 (.00)	2.97 (.10)
Negative lexical/ Negative non-verbal	.27 (.28)	.56 (.30)	2.28 (1.18)	3.02 (.65)	1.15 (.20)	1.06 (.22)
Inconsistent Speakers						
Negative lexical/ Positive non-verbal	.30 (.39)	.11 (.19)	2.40 (.80)	1.45 (.47)	2.45 (.64)	2.27 (.75)
Positive lexical/ Negative non-verbal	.24 (.25)	.15 (.22)	2.37 (.86)	1.59 (.76)	1.74 (.73)	1.77 (.79)

Table 2

Children's Speaker Choices and Speaker Ratings Study 2

	Speaker Choice		Speaker Liking Ratings		Speaker Friendliness Ratings		Speaker Weirdness Ratings	
	Proportion of speaker choices (SD)		Mean speaker ratings 1 – 4 (SD)		Mean speaker ratings 1 – 4 (SD)		Mean speaker ratings 0 – 1 (SD)	
	Preschool	School	Preschool	School	Preschool	School	Preschool	School
Consistent Speakers								
Positive lexical/ Positive non-verbal	.51 (.26)	.71 (.30)	3.23 (.80)	3.48 (.49)	3.23 (.81)	3.73 (.36)	.06 (.13)	.03 (.10)
Negative-lexical/ Negative non-verbal	.33 (.30)	.46 (.31)	2.57 (1.00)	2.63 (.46)	2.72 (1.08)	2.94 (.70)	.07 (.14)	.03 (.10)
Inconsistent Speakers								
Negative-lexical/ Positive non-verbal	.57 (.29)	.43 (.41)	2.75 (.88)	2.63 (.68)	3.17 (.92)	2.97 (.79)	.26 (.35)	.60 (.43)
Positive-lexical/ Negative-non-verbal	.55 (.33)	.37 (.31)	2.60 (1.01)	2.40 (.67)	2.75 (1.04)	2.70 (.65)	.20 (.33)	.67 (.41)

Table 3

Example of Conditions for Study 3

Comparisons	Consistent (positive lexical / positive non-verbal)	Inconsistent (positive lexical / negative non-verbal)
Knowledgeable of:		
Negative context: (being given a type of candy she doesn't like)	My friend will share her candy with me / ☺	My friend will share her candy with me / ☹
Positive context: (being given a type of candy she does like)	My friend will share her candy with me / ☺	My friend will share her candy with me / ☹
Unknowledgeable of:		
Negative context: (being given a type of candy she doesn't like)	My friend will share her candy with me / ☺	My friend will share her candy with me / ☹
Positive context: (being given a type of candy she does like)	My friend will share her candy with me / ☺	My friend will share her candy with me / ☹

Note, ☺ = positive non-verbal cues, ☹ = negative non-verbal cues

Table 4

Mean Proportion of Times Children Chose Speakers (SD) in Study 3

Comparisons	Consistent	Inconsistent
Knowledgeable		
Negative context	.50 (.42)	.50 (.41)
Positive context	.78 (.34)	.26 (.37)
Unknowledgeable		
Negative context	.62 (.42)	.16 (.24)
Positive context	.62 (.34)	.30 (.34)

Figure 1. Example of Study 1 Inconsistent (e.g., Positive Lexical / Negative Non-Verbal) and Consistent (e.g., Positive Lexical / Positive Non-Verbal) Speaker Trials

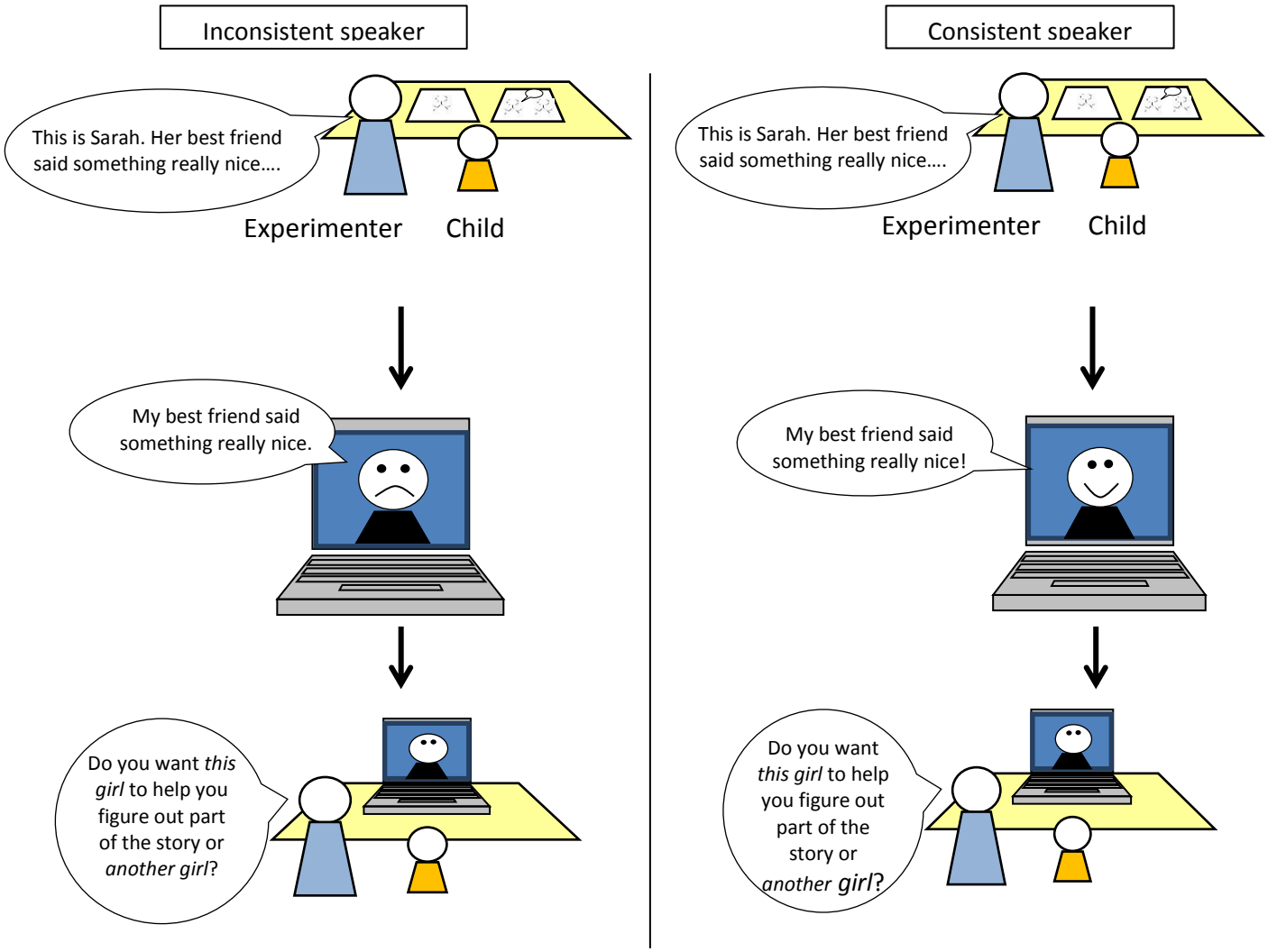
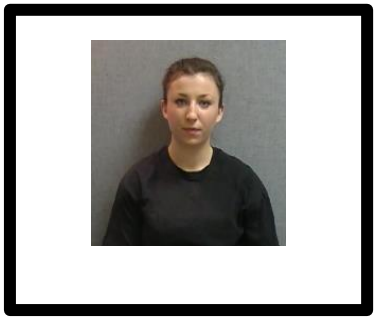
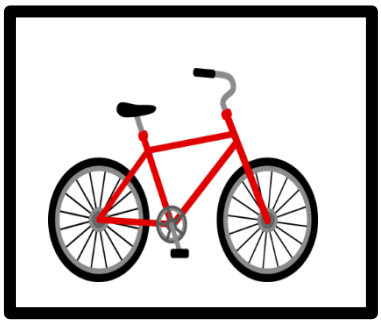


Figure 2. Example of Study 3 Stimuli Images

Knowledgeable / Positive Context

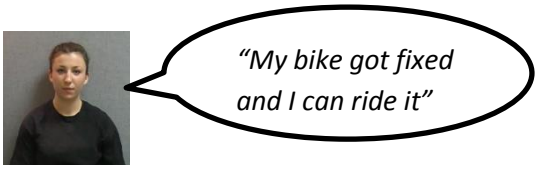


"This is Julia"



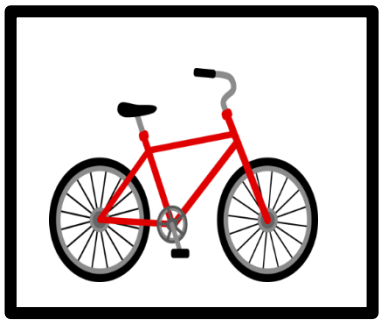
"Julia's bike just got fixed so she can go biking with her family today."

"Her family was planning to go on the fun route that Julia really likes. Julia knew this because she was standing right beside her mom when she said this, so she heard her mom clearly. Then Julia said…"



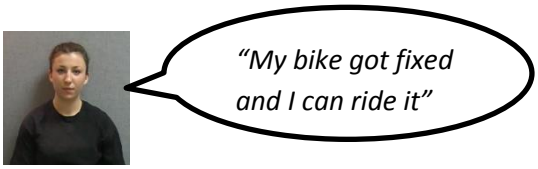
Unknowledgeable / Negative Context

"This is Julia"



"Julia's bike just got fixed so she can go biking with her family today."

"Her family was planning to go on the really hard route that she doesn't like. Julia did not know this because she was in the garage when her mom said this, so she did not hear her mom. Then Julia said…"



Appendix A

Study 1 Speaker Statements

Positive statements	Negative statements
I just got a brand new computer	I just lost my brand new computer
My best friend said something really nice	My best friend said something really mean
I found my favourite book today	I lost my favourite book today
My team just won an important game	My team just lost an important game
My friend will share her candy with me	My friend won't share her candy with me
I'm doing lots of fun things today	I can't do anything fun today
My bike got fixed and I can ride it	My bike broke and now I can't ride it
My friends can watch a movie with me	My friends can't watch a movie with me
My brother said he will help me out	My brother said he won't help me out
My new video game is working	My new video game will not work
My cat purred and played with me today	My cat hissed and scratched at me today
I just got the best present ever	I just got the worst present ever

Appendix B

Study 3 stories

1. **"I get to eat vanilla cake now"**

Negative / Unknowledgeable
This is Anna. Anna was going to eat a piece of the vanilla cake that her sister was baking. But her sister burnt the cake. Anna did not know this because the cake was still in the kitchen, so she couldn't see it. Then Anna said "I get to eat vanilla cake now"

Negative / Knowledgeable
This is Anna. Anna was going to eat a piece of the vanilla cake that her sister was baking. But her sister burnt the cake. Anna knew this because the cake was on the table in front of her, so she could see it clearly. Then Anna said "I get to eat vanilla cake now"

Positive / Unknowledgeable
This is Anna. Anna was going to eat a piece of the vanilla cake that her sister was baking. The cake looked really delicious. Anna did not know this because the cake was still in the kitchen, so she couldn't see it. Then Anna said "I get to eat vanilla cake now"

Positive / Knowledgeable
This is Anna. Anna was going to eat a piece of the vanilla cake that her sister was baking. The cake looked really delicious. Anna knew this because the cake was on the table in front of her, so she could see it clearly. Then Anna said "I get to eat vanilla cake now

2. **"My brother said he will help me out"**

Negative / Unknowledgeable
This is Kim. Kim's brother told her he would help her finish her chores this afternoon. But he had basketball practice for the whole afternoon. Kim did not know this because the TV was too loud when her dad said this, so she did not hear him. Then she said: "My brother said he will help me out"

Negative / Knowledgeable
This is Kim. Kim's brother told her he would help her finish her chores this afternoon. But he had basketball practice for the whole afternoon. Kim knew this because she was sitting right beside her dad when he told her this, so she heard her dad clearly. Then she said: "My brother said he will help me out"

Positive / Unknowledgeable

This is Kim. Kim's brother told her he would help her finish her chores this afternoon. Her dad thought it was a good idea for her brother to help her out. Kim did not know this because the TV was too loud when her dad said this, so she did not hear him. Then she said: "My brother said he will help me out"

Positive / Knowledgeable
This is Kim. Kim's brother told her he would help her finish her chores this afternoon. Her dad thought it was a good idea for her brother to help her out. Kim knew this because she was sitting right beside her dad when he said this, so she heard her dad clearly. Then she said: "My brother said he will help me out"

3. **"My friends can watch a movie with me"**

Negative / Unknowledgeable
This is Alison. Alison's friends came over to watch a movie with her. Her friends decided to watch a scary movie even though Alison doesn't like scary movies. Alison did not know this because she was in the kitchen when her friends chose the movie, so she did not see which one they chose. Then Alison said "My friends can watch a movie with me"

Negative / Knowledgeable
This is Alison. Alison's friends came over to watch a movie with her. Her friends decided to watch a scary movie even though Alison doesn't like scary movies. Alison knew this because she was in the basement with her friends when they chose the movie, so she saw which one they chose. Then, Alison said "My friends can watch a movie with me"

Positive / Unknowledgeable
This is Alison. Alison's friends came over to watch a movie with her. Her friends decided to watch Alison's favourite scary movie. Alison did not know this because she was in the kitchen when her friends chose the movie, so she did not see which one they chose. Then she said "My friends can watch a movie with me"

Positive / Knowledgeable
This is Alison. Alison's friends came over to watch a movie with her. Her friends decided to watch Alison's favourite scary movie. Alison knew this because she was in the basement with her friends when they chose the movie, so she saw which one they chose. Then, Alison said "My friends can watch a movie with me"

4. **"My best friend said something really nice"**

Negative / Unknowledgeable
This is Lauren. Lauren's best friend said something really nice about Lauren. But her friend was just kidding and did not mean the nice thing she had said. Lauren did not know this because the teacher started talking when her friend said she was kidding, so Lauren did not hear her. Then Lauren said "My best friend said something really nice"

Negative / Knowledgeable
This is Lauren. Lauren's best friend said something really nice about Lauren. But her friend was just kidding and did not mean the nice thing she had said. Lauren knew this because her friend said she was kidding in a strong voice, so Lauren heard her clearly. Then Lauren said "My best friend said something really nice"

Positive / Unknowledgeable
This is Lauren. Lauren's best friend said something really nice about Lauren. Her friend also wanted her to go to the park with her after school. Lauren did not know this because the teacher started talking when her friend asked her to go to the park, so Lauren did not hear her. Then Lauren said "My best friend said something really nice"

Positive / Knowledgeable This is Lauren. Lauren's best friend said something really nice about Lauren. Her friend also wanted her to go to the park with her after school. Lauren knew this because her friend asked her to go to the park in a strong voice, so she heard her clearly. Then Lauren said "My best friend said something really nice"

5. **"I'm going to play with my new toy"**

Negative / Unknowledgeable
This is Susan. Susan was going to play with her new toy. But her new toy was broken. Susan did not know this because her toy was still in the box, so she couldn't see it. Then Susan said "I'm going to play with my new toy"

Negative / Knowledgeable
This is Susan. Susan was going to play with her new toy. But her new toy was broken. Susan knew this because she had taken her toy out of the box, so she could see it clearly. Then Susan said "I'm going to play with my new toy"

Positive / Unknowledgeable
This is Susan. Susan was going to play with her new toy. Her knew toy looked exactly like it did on the box. Susan did not know this because her toy was still in the box, so she couldn't see it. Then Susan said "I'm going to play with my new toy"

Positive / Knowledgeable
This is Susan. Susan was going to play with her new toy. Her knew toy looked exactly like it did on the box. Susan knew this because she had taken her toy out of the box, so she could see it clearly. Then Susan said "I'm going to play with my new toy"

6. **"My cat purred and played with me today"**

Negative / Unknowledgeable
This is Sarah. Sarah was playing with her cat. But she had to give her cat away the next day. Sarah did not know this because she was outside when her mom said this, so she did not hear her mom. Then Sarah said: "My cat purred and played with me today"

Negative / Knowledgeable
This is Sarah. Sarah was playing with her cat. But she had to give her cat away the next day. Sarah knew this because she was in the living room with her mom when she said this, so she heard her mom clearly. Then Sarah said: "My cat purred and played with me today"

Positive / Unknowledgeable
This is Sarah. Sarah was playing with her cat. She was allowed to play with her cat for the rest of the afternoon. Sarah did not know this because she was outside when her mom said this, so she did not hear her mom. Then Sarah said: "My cat purred and played with me today"

Positive / Knowledgeable This is Sarah. Sarah was playing with her cat. She was allowed to play with her cat for the rest of the afternoon. Sarah knew this because she was in the living room with her mom when she said this, so she heard her mom clearly. Then Sarah said: "My cat purred and played with me today"

7. **"I get to play my favourite game"**

Negative / Unknowledgeable
This is Angela. Angela was going to play her favourite game, soccer. But it was pouring rain outside. She did not know this because the blinds were closed, so she couldn't see outside. Then Angela said "I get to play my favourite game"

Negative / Knowledgeable
This is Angela. Angela was going to play her favourite game, soccer. But it was pouring rain outside. She knew this because the blinds were wide open, so she could see outside. Then Angela said "I get to play my favourite game"

Positive / Unknowledgeable

This is Angela. Angela was going to play her favourite game, soccer. It was really nice and sunny outside. She did not know this because the blinds were closed, so she couldn't see outside. Then Angela said "I get to play my favourite game"

Positive / Knowledgeable This is Angela. Angela was going to play her favourite game, soccer. She knew that it was nice and sunny outside. She knew this because the blinds were wide open, so she could see outside. Then Angela said "I get to play my favourite game"

8. **"I found my favourite book today"**

Negative / Unknowledgeable
This is Stephanie. Stephanie found her favourite book under the couch. Her little sister had ripped out a bunch of the pages. Stephanie didn't know this because the book was in a box, so she couldn't see it. Then Stephanie said "I found my favourite book today"

Negative / Knowledgeable
This is Stephanie. Stephanie found her favourite book under the couch. Her little sister had ripped out a bunch of the pages. Stephanie knew this because the book was open, so she could see it clearly. Then Stephanie said "I found my favourite book today"

Positive / Unknowledgeable
This is Stephanie. Stephanie found her favourite book under the couch. The book was still in really good shape. Stephanie didn't know this because the book was in a box, so she couldn't see it. Then Stephanie said "I found my favourite book today"

Positive / Knowledgeable
This is Stephanie. Stephanie found her favourite book under the couch. The book was still in really good shape. Stephanie knew this because the book was open, so she could see it clearly. Then Stephanie said "I found my favourite book today"

9. **"I just got the best present ever"**

Negative / Unknowledgeable
This is Amanda. Amanda just got a present from her friend. Her mom decided that she wasn't allowed to keep the present because it was a pair of rollerblades and she thought they were too dangerous. Amanda did not know this because she was listening to loud music when her mom said this, so Amanda did not hear her mom. Then she said "I just got the best present ever"

Negative / Knowledgeable

This is Amanda. Amanda just got a present from her friend. Her mom decided that she wasn't allowed to keep the present because it was a pair of rollerblades and she thought they were too dangerous. Amanda knew this because her mom said it really loudly, so Amanda heard her mom clearly. Then she said "I just got the best present ever"

Positive / Unknowledgeable
This is Amanda. Amanda just got a present from her friend. It was a pair of rollerblades, and her mom decided that she could try them out right away. Amanda did not know this because she was listening to loud music when her mom said this, so Amanda did not hear her mom. Then she said "I just got the best present ever"

Positive / Knowledgeable This is Amanda. Amanda just got a present from her friend. It was a pair of rollerblades, and her mom decided that she could try them out right away. Amanda knew this because her mom said it really loudly, so Amanda heard her mom clearly. Then she said "I just got the best present ever"

10. "My bike got fixed and I can ride it"

Negative / Unknowledgeable
This is Julia. Julia's bike just got fixed so she can go biking with her family today. Her family was planning to go on the really hard route that she doesn't like. Julia did not know this because she was in the garage when her mom said this, so she did not hear her mom. Then Julia said: "My bike got fixed and I can ride it"

Negative / Knowledgeable
This is Julia. Julia's bike just got fixed so she can go biking with her family today. Her family was planning to go on the really hard route that she doesn't like. Julia knew this because she was standing right beside her mom when she said this, so she heard her mom clearly. Then she said: "My bike got fixed and I can ride it"

Positive / Unknowledgeable
This is Julia. Julia's bike just got fixed so she can go biking with her family today. Her family was planning to go on the fun route that Julia really likes. Julia did not know this because she was in the garage when her mom said this, so she did not hear her mom. Then she said: "My bike got fixed and I can ride it"

Positive / Knowledgeable
This is Julia. Julia's bike just got fixed so she can go biking with her family today. Her family was planning to go on the fun route that Julia really likes. Julia knew this because she was

standing right beside her mom when she said this, so she heard her mom clearly. Then she said: "My bike got fixed and I can ride it"

11. "I just got a brand new computer"

Negative / Unknowledgeable
This is Jane. Jane's mom gave her a brand new computer. It was the colour green, which Jane really does not like. She did not know this because the computer was wrapped, so she couldn't see the colour of the computer. Then she said "I just got a brand new computer"

Negative / Knowledgeable
This is Jane. Jane's mom gave her a brand new computer. It was the colour green, which Jane really does not like. . She knew this because it was unwrapped, so she could see the colour of the computer clearly. Then she said "I just got a brand new computer"

Positive / Unknowledgeable
This is Jane. Jane's mom gave her a brand new computer. It was Jane's favourite colour green. She did not know this because the computer was wrapped, so she couldn't see the colour of the computer. Then she said "I just got a brand new computer"

Positive / Knowledgeable This is Jane. Jane's mom gave her a brand new computer. It was Jane's favourite colour green. She knew this because it was unwrapped. So she could see the colour of the computer clearly. Then she said "I just got a brand new computer"

12. "I'm going to eat my special treat"

Negative / Unknowledgeable
This is Ashley. Ashley had saved a special treat to eat after dinner. But her dad had eaten almost all of it. Ashley did not know this because her treat was wrapped in tinfoil, so she couldn't see it. Then Ashley said "I'm going to eat my special treat"

Negative / Knowledgeable
This is Ashley. Ashley had saved a special treat to eat after dinner. But her dad had eaten almost all of it. Ashley knew this because her treat was in a clear container, so she could see it clearly. Then Ashley said "I'm going to eat my special treat"

Positive / Unknowledgeable
This is Ashley. Ashley had saved a special treat to eat after dinner. Her treat still looked really tasty. Ashley did not know this because her treat was wrapped in tinfoil, so she couldn't see it. Then Ashley said "I'm going to eat my special treat"

Positive / Knowledgeable
This is Ashley. Ashley had saved a special treat to eat after dinner. Her treat still looked really tasty. Ashley knew this because her treat was in a clear container, so she could see it clearly. Then Ashley said "I'm going to eat my special treat"

13. "My friend will share her candy with me"

Negative / Unknowledgeable
This is Natalie. Natalie's friend told her she would share her candy with her. Her friend only gave her green candies, which Natalie doesn't like. Natalie did not know this because the candies were in a paper bag, so she couldn't see them. Then Natalie said "My friend will share her candy with me"

Negative / Knowledgeable
This is Natalie. Natalie's friend told her she would share her candy with her. Her friend only gave her green candies, which Natalie doesn't like. Natalie knew this because the candies were in a clear bag, so she could see them clearly. Then Natalie said "My friend will share her candy with me"

Positive / Unknowledgeable
This is Natalie. Natalie's friend told her she would share her candy with her. Her friend only gave her the green candies, which are Natalie's favourite. Natalie did not know this because the candies were in a paper bag, so she couldn't see them. Then Natalie said "My friend will share her candy with me"

Positive / Knowledgeable This is Natalie. Natalie's friend told her she would share her candy with her. Her friend only gave her the green candies, which are Natalie's favourite. Natalie knew this because the candies were in a clear bag, so she could see them clearly. Then Natalie said "My friend will share her candy with me"

14. "My team just won an important game"

Negative / Unknowledgeable
This is Andrea. Andrea`s team just won an important game. Her coach thought that she had played really badly and decided that she wasn't allowed to play in the next game. Andrea did not know this because the gym was really noisy when her coach said this, so she did not hear him. Then Andrea said "My team just won an important game"

Negative / Knowledgeable
This is Andrea. Andrea`s team just won an important game. Her coach thought that she had played really badly and decided that she wasn't allowed to play in the next game. Andrea knew this because the gym was really quiet when her coach said this, so she heard him clearly. Then Andrea said "My team just won an important game"

Positive / Unknowledgeable
This is Andrea. Andrea`s team just won an important game. Her coach thought that she had played really well and he was really proud of her. Andrea did not know this because the gym was really noisy when her coach said this, so she did not hear him. Then Andrea said "My team just won an important game"

Positive / Knowledgeable This is Andrea. Andrea`s team just won an important game. Her coach thought that she played really well and he was really proud of her. Andrea knew this because the gym was really quiet when her coach said this, so she heard him clearly. Then Andrea said "My team just won an important game"

15. "My new video game is working"

Negative / Unknowledgeable
This is Kate. Kate got her new video game working for the first time. But her mom decided that she had to do homework and wasn't allowed to play her game tonight. Kate did not know this because she was in the basement when her mom said this, so she did not hear her mom. Then Kate said: "my new video game is working"

Negative / Knowledgeable
This is Kate. Kate got her new video game working for the first time. But her mom decided that she had to do homework and wasn't allowed to play her game tonight. Kate knew this because she was standing right in front of her mom when she said this, So Kate heard her mom clearly. Then Kate said: "my new video game is working"

Positive / Unknowledgeable
This is Kate. Kate got her new video game working for the first time. Her mom decided that she was allowed to play the game for the rest of the day. Kate did not know this because she was in the basement when her mom said this, so she did not hear her mom. Then Kate said: "my new video game is working"

Positive / Knowledgeable This is Kate. Kate got her new video game working for the first time. Her mom decided that she was allowed to play the game for the rest of the day. Kate knew this

because she was standing right in front of her mom when she said this, So Kate heard her mom clearly. Then Kate said: “my new video game is working”

16. “I’m doing lots of fun things today”

Negative / Unknowledgeable
This is Jennifer. Jennifer’s dad told her that they were going to do a lot of fun things today. But her dad was planning to do a bunch of chores with her. Jennifer did not know this because her dad was holding the list of activities they were going to do, so she couldn’t see the list. Then jennifer said: “I’m doing lots of fun things today”

Negative / Knowledgeable
This is Jennifer. Jennifer’s dad told her that they were going to do a lot of fun things today. But her dad was planning to do a bunch of chores with her. Jennifer knew this because her dad left the list of activities they were going to do on the counter, so she could see it clearly. Then she said: “I’m doing lots of fun things today”

Positive / Unknowledgeable
This is Jennifer. Jennifer’s dad told her that they were going to do a lot of fun things today. Her dad was planning to do activities like going for ice cream together. Jennifer did not know this because her dad was holding the list of activities they were going to do, so she couldn’t see the list. Then she said: “I’m doing lots of fun things today”

Positive / Knowledgeable
This is Jennifer. Jennifer’s dad told her that they were going to do a lot of fun things today. Her dad was planning to do activities like going for ice cream together. Jennifer knew this because her dad left the list of activities they were going to do on the counter, so she could see it clearly. Then she said: “I’m doing lots of fun things today”