Say it like you mean it: How children and adults interpret an intonation indicative of sarcasm and child-directed speech

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Abstract

Sarcasm and child-directed speech share many prosodic features, including high pitch, wide pitch range, and slow tempo. This study examined whether the same utterance spoken with exaggerated intonation would be interpreted as sarcasm by adults and child-directed speech by children. Adults and 5- and 7-year-old children completed an impossibly difficult memory task, and then received feedback on their performance from judges speaking in either an exaggerated or flat intonation. Participants were asked about each speaker’s feeling, intentions, and likeability. All participants rated the exaggerated intonation more positively than the flat when asked about the speakers’ feeling and intent, indicating that no participants identified the exaggerated intonation as sarcasm. Participants’ perceptions of their own performance were significantly less positive than ratings for the judges’ feeling, suggesting a positivity bias.
Sarcasm and child-directed speech  

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Sarcasm is one of the most prevalent forms of deceptive speech in our culture. A friend’s rude new boyfriend might lead one to comment “What a gentleman,” or a questionable entrée may elicit “Looks delicious!” from diners as the dish approaches the table. Although most people can identify sarcasm upon hearing it, researchers have had difficulty identifying the processes by which they do so. The complex mechanisms underlying an understanding of sarcasm make the task of investigating its development all the more difficult, due to the difficulty children may have in integrating various sources of social information.

Sarcasm is defined as “a sharp and often satirical or ironic utterance designed to cut or give pain” by Meriam-Webster’s dictionary; this type of speech falls under the category of verbal irony—a language device wherein a speaker’s true intent is masked by the literal meaning of words that are spoken. Winner, Levy, Kaplan and Rosenblatt (1988) suggested that a listener must complete three distinct steps in order to correctly identify an utterance as ironic. First step, the listener must be aware the speaker is speaking nonliterally—that a speaker’s words are incongruent with his intent. Next, the listener must realize the opposite relationship between what is said and what is meant. Finally, the listener must infer the unstated meaning of what is said based on knowledge of the speaker’s intent. For example, if a speaker tells an individual who is dressed sloppily “You look great!” the listener would first need to realize that the phrase is nonliteral. Then, he would need to realize that there is an inverse relationship between what was said and what was meant, and finally would need to detect the actual intended message—that his appearance is sub-par. As such, the understanding of sarcasm is complex and relies
heavily on factors of subtle social communication; it may require access to information about a speaker’s mood at the time, or even a personal history with a speaker.

Anolli and colleagues (2000) differentiated between two distinct forms of ironic speech: sarcastic irony and kind irony. Sarcastic irony occurs when a speaker expresses a negative intent with positive speech, and is reflected in the examples given so far. Kind irony is the opposite of this, and is seen when a speaker expresses positive intent with negative speech. For example, an individual telling a friend who has just won a marathon “You’re in terrible shape!” These two types of ironic speech exhibit significantly different prosodic features. Sarcastic irony has a higher pitch, higher vocal energy, and longer utterances than kind irony; which has a variable, mild pitch, moderate energy and a mild voice quality, which refers to an overall calmer tone.

The study to be presented here focuses on children’s and adults’ understanding of sarcastic irony, and therefore focuses on the vocal profile of that type of speech.

One important cue to sarcasm is an awareness of the social situation in which the speaker is operating. For example, knowledge of a person’s occupation can influence a listener’s judgment as to whether an utterance is literal or sarcastic. When adult participants were told that a statement, for example “Children are precious gems” came from an individual in an occupation that is regarded to be high in its use of irony, such as a comedian or taxi-cab driver, they were more likely to rate that statement as ironic (Katz & Pexman, 1997). This indicates that adults use social knowledge when making judgments about a speaker’s intent.

Sarcastic utterances also tend to have unique prosodic features (Laval & Bert-Erboul, 2005). In Rockwell (2000) speech samples of posed sarcasm, where speakers were instructed to produce sarcasm, spontaneous sarcasm, where speakers produced sarcasm naturally, and nonsarcasm were collected. All samples were content-filtered. Despite not having access to the
lexical content of the utterances, adult participants rated both types of sarcastic utterances as more sarcastic than the nonsarcastic ones. In addition, Rockwell conducted a vocal feature analysis of the samples, which showed that sarcasm was most effectively communicated by a slow tempo, low pitch, and greater volume than is typical of nonsarcastic speech.

In another study, Rockwell (2007) videotaped participants having conversations with a friend or relative. Participants then watched tapes of their own conversation, and identified those comments they intended to be sarcastic. Sarcastic and nonsarcastic utterances were analyzed for their fundamental frequency, pitch range, frequency range, length, and total amount of sound. The sarcastic utterances had higher pitch\(^1\), wider pitch range, longer vowel sounds, and fewer pauses than nonsarcastic utterances.

One reason to suspect that young children might be able to detect sarcasm is that they are sensitive to the vocal register a speaker uses. Vocal registers refer to a speaker’s chosen intonation and word choice, dependent on a social setting. For example, when speaking to a police officer an adult will use a serious tone of voice with word choice that shows respect, such as “Excuse me, sir,” whereas when speaking to a close friend the same adult is more likely to use a jovial tone and less formal speech. In Wagner et al. (2010), 3- to 5-year-olds heard speech samples in infant-directed speech, casual speech, formal speech, and Spanish. They were asked to match the register to the most likely target of the utterance: a baby, a little girl, a woman who appeared to be a teacher, or a little girl wearing traditional Peruvian clothing. By the age of five years, children were quite proficient in the task and could accurately match all speech samples to their appropriate targets.

\(^1\) Recall that Rockwell’s (2000) earlier study found that the sarcastic voice had a low pitch. It is unclear why these two studies came to different conclusions about the pitch that characterizes the sarcastic voice, yet for the purposes of this study the profile of the sarcastic voice with a higher pitch (Rockwell, 2007; Anolli, Ciceri & Infantino, 2000) was used.
Under some circumstances, children can identify sarcastic utterances as young as six years of age. For example, in Ackerman (1983) children were read a series of brief stories that consisted of a basic context and an utterance—contexts either suggested a literal or sarcastic (nonliteral) interpretation of the utterance, and utterances were spoken in either stressed or flat intonation. First and third grade children heard a story, and were then asked two questions: the first about the literal content of the story, the second about the speaker’s intent. To demonstrate an understanding of sarcasm, children must have answered that the speaker’s intent was opposite of what was literally said. For example, if a child came in from being outdoors wearing clothes that were dripping wet with rain and said “Great weather outside,” participants must have understood that the actual intended message, that the weather was poor, behind the literal utterance. Children as young as 6-years-old were able to identify sarcastic utterances, although the ability improved with age.

Although young children can identify sarcastic statements, there has been debate over whether the context in which the utterance is made or the intonation of the utterance drives the effect. Much of the early research on interpretation of sarcasm in children and adults pointed to the importance of context. This was largely influenced by the idea that in order for sarcasm to be identified, a listener must be aware of the discrepancy between what is meant and what is said, which is impossible without knowledge of the context (Winner, Levy, Kaplan & Rosenblatt, 1988).

However, other research points to the importance of intonation. In a study by Capelli and colleagues (1990), third and sixth graders and an adult comparison group heard a series of stories that contained either contextual cues to sarcasm, intonational cues to sarcasm, both types of cues, or no cues at all. An example of a story with both cues would be a boy who slipped and fell
while trying to catch a ball, to which a friend comments “Nice catch!” using a sarcastic intonation. For all participants, identification of sarcasm was most accurate when both types of cues were used. When intonation alone was included as a cue, children and adults correctly identified sarcastic utterances. However, when context alone was included as a cue, only the adults did so—suggesting that intonation is a driving factor that enables children’s identification of sarcasm.

Interestingly, several of the characteristics of the sarcastic voice can also be found in a particular kind of vocal register known as child-directed speech. Child-directed speech is thought to be especially important in facilitating language acquisition in young children, in that it helps to attract and maintain attention, emphasizes new information, and helps a child in making sense of a speech stream (Fernald, 1985). The voice typically used in child-directed speech has a higher pitch, wider pitch range, exaggerated intonation and is usually linguistically simple—features that overlap considerably with those of the sarcastic voice just described: both employ a higher pitch, wider pitch range and slower tempo that combine to create an overall more exaggerated intonation. As such, when children hear this particular intonation they are likely to attribute positive traits and intentions to a speaker.

The intonation of child-directed speech is particularly important because it almost always determines a speaker’s intent. In Fernald (1989), for example, adult participants listened to content filtered recordings of mothers’ speech to infants during a variety of activities, such as playing a game or providing comfort, as well as filtered recording of adult-directed speech in the same contexts. After hearing these samples, adults were asked to name the activity in which they

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2 Although this study focused on infant-directed speech rather than child-directed speech, the two intonations share many prosodic features: such as a higher pitch, more exaggerated pitch contours, longer utterances and a slower tempo (Cooper & Aslin, 1994). As such, these results can reasonably be applied for the present study, which deals with child-directed speech.
thought the utterance was embedded. Participants made significantly more accurate judgments of context for infant-directed speech than for adult-directed speech, suggesting that the intonation of infant-directed speech makes it easier to identify a speaker’s communicative intent than the intonation of adult-directed speech.

Given that sarcastic speech and child-directed speech share many of the same prosodic qualities—slower tempo, louder volume, higher pitch and longer vowel sounds (Rockwell, 2007; Fernald, 1989)—an utterance delivered with these prosodic features could be interpreted in different ways by different listeners. Children may interpret it as child-directed speech and therefore perceive it to be informative and helpful; adults may interpret the same utterance as sarcastic and perceive it to be negative or mocking.

In the present study, we presented children and adults with utterances spoken in either an exaggerated intonation typical of child-directed speech and sarcasm or a flat intonation—these utterances served as “feedback” for participants’ performance in an impossible memory task. This task was meant to make participants feel poorly about their performance, which may make them more susceptible to interpret feedback in a negative manner. Participants were asked to use a Likert scale to show how the speaker of each utterance felt about their performance, as well as how each speaker wanted the participant to feel; these two questions were included because realization of opposite feeling and communicative intent is integral to the understanding of sarcasm (Winner, Levy, Kaplan & Rosenblatt, 1988). If participants indicated that the speaker felt less positively than she wanted the listener to feel, this would suggest that they had interpreted the utterance as child-directed speech, or false praise. If, on the other hand, they indicated that the speaker’s intentions were less positive than her feelings, this would suggest a sarcastic interpretation of the utterance. Of interest was whether children would perceive the
exaggerated intonation more positively than the flat, due to their familiarity with child-directed speech, and whether adults would be more likely to perceive the same intonation negatively due to their familiarity with sarcasm.

Method

Participants

The participants for this study were 16 5-year-olds (M age = 66 months, SD = 3.13; 8 females, 8 males) 16 7-year-olds, (M age = 88 months, SD = 4.10; 10 females, 6 males) and 32 adults (M age = 18 years, SD = 23 months; 20 females, 12 males). Adult participants were undergraduate students at the University of Virginia that were enrolled in a Psychology class at the time. Child participants were contacted via a family database used by the University of Virginia and were compensated with a small toy or gift; adult participants received class credit for their participation. Copies of consent forms given to participants are included in Appendix A.

Design

We were interested in how different intonations may affect participants’ perceptions of a speaker’s feelings and intentions toward a listener. Participants heard two voices that gave “feedback” after completion of a memory task. Specifically, they heard a sentence ("Wow, you remembered a lot of things") that was spoken in either a flat or exaggerated intonation. Each voice corresponded to one of two faces on a computer screen. The order in which participants heard these voices, as well the faces to which they corresponded, was counterbalanced across conditions. Participants responded to a series of questions about their interpretation of the speaker’s feelings, intentions, overall likeability and capacity to act as a judge of performance.

Materials
The materials used in this study were a five point Likert scale, a memory game, a computer with prerecorded speech samples, and additional stimuli for Theory of Mind tasks.

**Likert scale.** The Likert scale used faces to represent emotions ranging from “Very Sad” to “Very Happy.” The scale was adapted from a popular pain scale, the Wong-Baker FACES Pain Rating Scale (Wong & Baker, 1988), which is used with children ages 3 years and older in medical settings. The scale was modified so that it would contain five points, rather than six. Refer to Appendix B for a copy of the scale.

**Memory game.** Children completed a purposefully difficult memory game at the beginning of the experiment, in which they were shown a box with 15 novel objects (for example: a segment of a tool) and 5 familiar objects (for example: a toy car). At the end of the experiment, children completed an easier memory game (10 familiar objects in the box) to ensure that they left feeling positively about their abilities. Adult participants also completed a difficult memory game at the beginning of the experiment, in which the box contained 30 novel objects and 10 familiar objects. More objects were included to make the task more difficult.

**Computer.** A PowerPoint presentation was created, featuring prerecorded speech samples. This presentation consisted of two slides, each slide featured two pictures of two different women’s faces. Although the pictures depicted different women, both were the same size and had the same smiling expression. Pictures used are included in Appendix C. The presentation also featured two speech samples, each saying the same phrase in different intonations.

**Speech samples.** The phrase heard by participants was “Wow, you remembered a lot of things,” spoken in either a monotone or an exaggerated intonation. The exaggerated intonation was typical of sarcasm and child-directed speech in that it had a louder volume, higher pitch,
slower tempo and the words were pronounced more slowly than would be typical of normal speech. (Rockwell, 2007; Fernald, 1985). Prior to their use in the study, the speech samples were piloted with a group of both adult and children participants to ascertain that individuals could discern between the two samples. Samples were played for 6 children ranging in ages from 5- to 7-years-old and 6 adults; all participants noted that the samples sounded different, and all children indicated that the exaggerated intonation sounded nicer than the flat intonation.

**Theory of Mind.** Materials from Wellman and Liu’s (2004) Theory of Mind Scale were also used. These included a picture of a closet and a backpack, along with a figurine of a boy, a band-aid box that had a toy monkey inside it, along with a figurine of a man, a picture of the back of a boy’s head and a three-point Likert scale that used faces.

**Procedure**

Families were invited to participate in the experiment, and participants were given consent forms, in which they were informed of the nature of the study and tasks they would be completing. Adult participants completed this form independently, whereas children received parental consent and 7 year old participants filled out minor assent forms as well. Participants were told that there were no large risks associated with their participation, and were debriefed at the end of the experiment regarding the memory game. Copies of consent forms given to participants are included in Appendix A.

After consent forms were signed, participants were given a few minutes to become acclimated to the lab setting, and were then led to the testing room. Participants were seated in front of a computer screen, with the experimenter to their right. First, participants were trained on how to use the five-point Likert scale, with an explanation of which emotion corresponded to which face. Emotions included on the were “very sad,” “a little bit sad,” “neutral,” “a little bit
happy” and “very happy.” Participants were then tested on their understanding of the scale during a brief warm up task in which they matched emotions to faces. If participants made an error, the experimenter would explain the scale again and proceed with the test. All participants were able to understand the scale after these explanations.

Children then played the memory game, in which they were presented with a box containing 20 items (15 novel and 5 familiar), and were given 20 seconds to look into the box. They then had 10 seconds to recall aloud as many items as they could remember. Participants were then told how many items they remembered, and that another participant was able to remember all of the items in the box. Then, participants were asked to rate how they felt about their performance using the Likert scale (Self-Evaluation question). This task was intended to be impossibly difficult for the participants so as to induce negative feeling, which was intended to lead to a negative interpretation of feedback.

The experimenter then told participants that two judges had been watching their performance through a hidden camera in the room. This cued the start of the PowerPoint presentation previously described. Participants were told that the judges wanted to give them feedback, and the experimenter played both speech samples. One speech sample was in an exaggerated intonation, saying “Wow, you remembered a lot of things” and the other speech sample was the same phrase in a flat intonation. After hearing both samples once, the experimenter played the first sample again and asked the participants to use the 5-point Likert scale to indicate “How did this person feel about how you did?” (Speaker Feeling question) and “How did this person want you to feel?” (Speaker Intent question) Then, the experimenter played the second speech sample again and asked the same two questions. Whether the utterance with exaggerated or flat intonation was played first was counter-balanced across participants. After
these questions, participants were asked which judge was nicer, which judge wanted them to feel good, who they would want to play another game with in the future, and who they would want to serve as a judge again in the future.

This first half of the experiment revolved around feedback that appeared to be about the participant’s own performance; and was referred to as self-performance trials. The second half of the experiment revolved around a story the participants heard about another participant completed the same memory task and received feedback from the judges. Participants were told that the fictional participant in the story had remembered five of the twenty items, and then the participants heard the speech samples affiliated with that performance (the same speech samples as used in self-performance trials) and were asked how the speaker felt about the character’s memory performance (Speaker Feeling) and how the speaker intended the character to feel (Speaker Intent). This portion of the experiment was referred to as other’s-performance trials. There was careful counterbalancing of the order of these trials.

Children were debriefed after answering the last series of questions. The experimenter told participants that they accidentally gave the child a memory game that was made for older children, and that there was another memory game for their age group. Children were then invited to play a second memory game, in which they had 20 seconds to look into a box with 10 familiar objects and then remember as many items as possible in 20 seconds. This was included to eliminate any negative feelings children might have had after their performance on the more difficult preliminary memory game.

After completing the experiment, children completed several brief Theory of Mind tasks, which were adapted from Wellman and Liu’s Theory of Mind Scale (Wellman & Liu, 2004). Children completed three different tasks from this scale, which were always presented in the
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same order. The tasks included were “Explicit False Belief”, “Contents False Belief” and “Real-Apparent Emotion.” These tasks were chosen because they assess various aspects of children’s theory of mind, and were shown to be among the most difficult for children in the early school years, such that the tasks were challenging for both 5 and 7 year old participants.3

The procedure for adult participants was similar to that for children. Adults completed a more difficult memory task, involving a box that had more total objects (40), with a higher ratio of novel (25) to known (15) objects. Additionally, adults received a written debriefing form that informed them of the nature of the study and memory tasks.

Results

Preliminary analyses showed that participants’ responses for questions pertaining to their own performance and another’s performance had no significant differences; subsequent analyses collapsed across this factor.

Adults and children rated the exaggerated intonation more positively than the flat, and adults believed that the speakers’ intentions were more positive than their feeling. Additionally, all participants’ perceptions of their own performance were significantly less positive than how they thought the speaker with an exaggerated intonation felt about their performance; adults were the only group to repeat this effect when asked about the speaker with the flat intonation.

To analyze these data, we performed a 2 x 2 x 3 analysis of variance (intonation: flat/exaggerated x question type: feeling/intention x age: 5’s/7’s/adults) on participants’ ratings of how positive a speaker was. This yielded a main effect of intonation, \( F(1, 61) = 163.01, p \)

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3 Although all children completed these Theory of Mind tasks, this set of data was not included in analyses because the majority of children in each age group gave correct answers. This lack of variation on the pass rate indicated that most children possessed a Theory of Mind, which enabled them to complete the cognitive processes required for the understanding of sarcasm. Therefore, these measures were not important in further analyses regarding detection of sarcasm, because most participants were cognitively capable of comprehending sarcasm.
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<.001, and a main effect of feeling versus intent, $F(1,61) = 1.75, p < .001$, which was driven by an interaction between age group and feeling versus intent, $F(2, 61) = 6.04, p < .005$.

Preference for exaggerated intonation

As Figures 1 and 2 show, when asked about the speakers’ feelings and intentions, all participants rated the exaggerated intonation more positively than the flat intonation. Specifically, participants indicated that the speaker with exaggerated intonation felt better about participants’ performance, and wanted them to feel better about their performance, than the speaker with flat intonation did. This difference between ratings of the exaggerated and flat intonation was true for all three age groups for the Speaker Feeling question, and for the Speaker Intent question, t’s > 3.44, p’s < .005.

Furthermore, the majority of participants (87%) rated the judge with the exaggerated intonation as nicer than the judge with the flat intonation. When asked who they would like to play a game with in the future, a majority of participants (73%) again chose the judge with the exaggerated intonation. Clearly, both children and adults perceived the exaggerated intonation as more positive than the flat one.

Interaction of feeling and intent by age group

A main effect of question type indicated that, collapsed across the three age groups, participants gave more positive responses to “How did this person feel about how you did?” than to “How did this person want you to feel?” regardless of the speaker’s intonation. However, this result must be interpreted in light of the interaction between question type and age. Specifically, as Figure 2 shows, the effect was driven primarily by adult participants. For the exaggerated intonation, children rated a speaker’s feeling and intent as very similar, whereas adults gave more positive ratings for a speaker’s intent (i.e., how the speaker wanted the listener to feel) than
for her feeling (i.e., how the speaker actually felt about the listener’s performance). There were no significant differences for 5-year-olds and 7-year-olds’ ratings of a speaker’s feeling and intent when asked about the exaggerated intonation. However, adults rated the exaggerated intonation’s intent rated significantly higher than feeling, \( t(31) = -3.31, p < .005 \). Similarly, for the flat intonation, there was no significant difference in 5-year-olds’ ratings of a speaker’s feeling and intent, \( t(15) = 0 \). However, both 7-year-olds and adults indicated that the speaker with flat intonation’s intent was significantly more positive than her feeling, 7-year-olds: \( t(15) = -3.52, p < .005 \), and adults: \( t(31) = -4.94, p < .001 \).

**Self-evaluation of performance and speaker feeling**

As seen in Figure 3, results also suggested that participants’ evaluations of their own performance were very different from their interpretation of how they thought the exaggerated speaker felt about it. All participants’ ratings of their own performance on the memory task were significantly lower than their ratings of how they thought the exaggerated intonation felt about their performance, \( t’s > -2.15, p’s < .02 \). Both children and adults on average felt only “okay” about their own performance, but thought that the judge with the exaggerated intonation felt anywhere from “a little bit happy” to “really happy” about their performance.

For the flat intonation, only adults distinguished between the judge’s feelings and their own self evaluation. They rated their own performances as significantly worse (\( M = 1.63, SD = .61 \)) than their ratings of how they thought the judge speaking in a flat intonation felt about their performance (\( M = 1.94, SD = .67 \), \( t(31) = -2.15, p < .05 \)). In other words, although all age groups perceived the feelings of the exaggerated intonation to be more positive than their own self evaluations, adults were the only age group to do so with the flat intonation.
Discussion

This study yielded three notable findings. First, both children and adults discriminated between the exaggerated and flat intonations. They indicated that the speaker who used the exaggerated intonation felt more positively about the participant’s memory performance than the speaker who used the flat intonation, and that she intended the participant to feel better about his or her performance. This is the pattern of results we had predicted for children, as we expected that they might interpret the exaggerated intonation as child-directed speech, which is associated with positive affect (e.g., Fernald, 1985). However, we had predicted a different pattern of results for adults. In particular, we had expected that adults might perceive the exaggerated intonation as sarcasm, because this intonation in the context of poor performance could be considered sarcastic (Rockwell, 2007). However, adults, like children, gave very positive ratings of the exaggerated intonation when asked about both speaker feeling and intent. An identification of sarcasm would involve moderate ratings for speaker’s feeling, and more negative ratings of intent; so the very positive ratings of both speaker’s feeling and intent do not suggest recognition of sarcasm.

There are several possible reasons why adults failed to interpret the exaggerated intonation as sarcasm. First, research shows that that adults use social information to make judgments about a speaker’s likelihood to use sarcasm (Katz & Pexman, 1997). Perhaps they failed to attribute sarcasm to the speaker given her role as a judge—which usually denotes a straightforward, serious evaluation rather than an ironic joke or insult. Perhaps if participants were told that they were being evaluated by an individual who is more likely to use sarcastic speech, such as a comedian, they would identify the feedback as sarcasm (Katz & Pexman, 1997). A speaker’s social situation also implicates the issue of context versus intonation in the detection of sarcasm—the present study failed to correctly identify sarcasm by intonation alone.
Previous research shows that for both adults and children, the most accurate perception of sarcasm is best facilitated by both context and intonation (Capelli, Nakagawa & Madden, 1990), suggesting that adults may be more likely to recognize sarcastic intonation when it is accompanied by an appropriate context.

Although participants did not perceive the exaggerated intonation as sarcastic speech, they did respond differently when asked how a speaker felt about their performance (Speaker Feeling) versus how that speaker wanted them to feel (Speaker Intent). Participants rated a speaker’s feelings about their performance as significantly lower than how the speaker intended them to feel. This ability to realize that what speaker’s thoughts are different from her literal speech is thought to be necessary for detecting sarcasm (Winner et al., 1988). A listener must realize that a speaker’s literal speech is different from the actual intent behind that message—a skill that is similar to the realization that how someone feels is different from intent. Despite their failure to identify sarcasm in the study, adults and some older children’s ability to differentiate between a speaker’s actual feelings and intent suggests a skill that is a precursor to the recognition of sarcasm in that they were aware of a discrepancy between a speaker’s belief, or feeling, and intent.

This tendency to perceive a speaker’s intent as more positive than her actual feeling about performance revealed important developmental trends. When 5-year-olds’ responses were analyzed, there were no significant differences between ratings of a speaker’s feeling and intent, for both exaggerated and flat intonations. When 7-year-olds’ responses were analyzed, there were significant differences between feeling and intent for a judge speaking in the flat intonation only. Adults were the only age group whose perceptions of a speaker’s feeling and intent were significantly different for both intonations. These findings suggest that the ability to differentiate
between a speaker’s feeling and intent improves with age, an idea that fits with previous
literature, showing that children’s capacity to identify sarcasm improves with age (Ackerman,
1983).

There also seems to be an effect of intonation on the listener’s ability to perceive
sarcasm. It is interesting that 7-year-olds detected a discrepancy between a speaker’s feeling and
intent when the flat intonation was used, but not when the exaggerated intonation was used. It is
possible that children’s perception of child-directed speech as a positive, helpful tool is so deeply
embedded that they are unable to analyze a speaker with this intonation in a more complex
manner and as such cannot perceive differences between a speaker’s feeling and intent. Perhaps
adults were the only age group to rate a speaker’s feeling as significantly different from intent for
the same reason: because they are further removed from child-directed speech they may be able
to make a more rational analysis and not take its truthfulness for granted.

Children may be less likely to perceive differences between a speaker’s feeling and intent
because of the positivity bias, an idea which posits that children are likely to attribute positive
characteristics to both themselves and others. Research shows that this positivity bias has a
strong effect on children’s personality judgments, even in the face of contrary evidence.
Boseovski and Lee (2008) showed that even after being shown tapes of a character acting in a
negative or antisocial manner, children still viewed that character in a positive light, as shown by
their responses predicting future behavior and judgments of personality. Given this tendency to
construe a character’s actions as positive, it is unlikely that children will attribute deceptive
speech, and specifically sarcasm, to a character.

Adults’ perception that a speaker’s feeling, regardless of intonation, was more positive
than her intent is also indicative of a positivity bias. Although only children were expected to
display this bias, adults’ ratings showed an overall positive interpretation of feedback. Adults were expected to interpret feedback in the flat intonation as an unenthusiastic evaluation, and feedback in the exaggerated intonation as sarcasm. Past research shows that most people perceive themselves in a positive light (Mezulis, Abramson, Hyde & Hankin, 2004), though this bias is most pronounced in children and older adults. It is surprising, then that relatively young adults in this study followed the same pattern as such different age groups. The tendency to see oneself in a positive light, even in the face of threat or negative feedback, has been identified as a useful mechanism for maintenance of mental health in adults (Taylor & Brown, 1988). The present study suggests that adults actively engage in this creation of a positive self-image, given that they rated all feedback as positive.

This leads to the discrepancy between participants’ evaluation of their own performance and their ratings of a speaker’s feeling. After completing the memory task, participants were asked to rate how they felt about their performance using a five point Likert scale that ranged in emotions from “really sad” to “really happy.” Participants’ perceptions of their own performance were significantly worse than their ratings of how the speaker with an exaggerated intonation felt about their performance. Despite recognition that their performance was only okay, participants still thought that the speaker with an exaggerated intonation felt positively about the number of items they remembered. Thinking of this finding in relation to the positivity bias draws an important connection: adults and children interpret the speech samples as more positive, perhaps in an attempt to maintain self-esteem. This is interesting, in that adults should be more perceptive than children, yet they interpret an ambiguous intonation in the same way. Children, as well as adults here, tended to think that all feedback was purely positive, despite earlier admitting that their own performance was poor.
It is also interesting that adults were the only age group to repeat this effect when asked about Speaker Feeling for the judge with the flat intonation. This may be due to the fact that adults gave lower self-evaluation ratings than children, so it is more likely that there were significant differences for their age group. Adults rated their own performance as just “okay” whereas children reported feeling “a little bit happy” about their own performance—which resulted in a greater discrepancy between this evaluation and ratings of Speaker Feeling for the judge with a flat intonation. However, further investigation is needed to more fully understand these results.

Thinking ahead to future research, and given that 5-year-olds did not perceive any differences between a speaker’s feeling and intent, it would be interesting to study an older sample of children, perhaps middle-schoolers. As the existing literature shows that detection of sarcasm becomes keener with age, it is reasonable to assume that middle-school aged children would detect sarcasm with greater accuracy. With increased age, children are further away from the use of child-directed speech, and have likely been in more social situations in which sarcastic speech is used.

The findings presented here indicate that neither adults, nor children aged five and seven, interpreted feedback in an exaggerated intonation as sarcasm, even though the feedback concerned performance on a task that the participants themselves recognized they did somewhat poorly on. A purposefully difficult task was chosen, so that participants would feel conflicted between their poor performance and the seemingly positive feedback they received, which we hoped would cause an interpretation of the exaggerated intonation as sarcasm. Rather, all participants preferred this intonation and rated it more positively than a speaker with a flat intonation. Despite this inability to identify sarcasm, participants in the study did recognize that
a speaker’s feelings are often different from intentions behind speech—in this case, that a speaker may feel neutral about one’s performance, yet still intend to make that individual feel positively. Similarly, participants indicated that judges wanted them to feel very happy about their performance, even after indicating that they only felt okay about the same performance. Although the study failed to produce an identification of sarcasm, it does shed light on how children and adults perceive two very different intonations.
Acknowledgments

I would like to thank the families and students that participated in my research. I would also like to thank Carrie Palmquist for her advice and support during every step of the project. Also, thank-you to the members of the Child Language and Learning lab for their help in scheduling and coding data. Finally, I would like to thank Vikram Jaswal for acting as my adviser and lending his knowledge and time to this endeavor.
References


Appendix A

Informed Consent Agreement (Parents of Children under 7)

Please read this consent agreement carefully before you decide to participate in the study.

The purpose of this research study is to investigate how children understand the intentions of speakers. For instance, are children able to distinguish between sarcasm and false praise? What factors influence this distinction? Are children more likely to attribute sarcastic intentions to a child than to an adult?

What your child will do in the study: Your child will be invited to play a game that involves hearing a story in which one character makes a statement about something that another character has done, or feedback is provided about the child’s own performance on a challenging task. For example, the child may hear a story in which a boy played a memory game in which he could remember 5 of 30 objects. A classmate may say “You have a great memory!” The feedback provided is always positive in content, but the intonation may sometimes (to an adult) suggest a sarcastic intent. Later, we will ask your child questions designed to see how they interpreted the comments. Your child will be videotaped during the study, and responses to the questions will be coded at a later time.

The time required for your child’s participation will be one or two 10- to 15-minute sessions, for a maximum total time of 30 minutes.

There are no risks to your child from participating in this study, other than some of the tasks are intentionally challenging. At the end of the study, your child will participate in activities that are well within his/her abilities to ensure that s/he leaves with confidence.

There are no direct benefits to you or your child for participating. The study may help us understand how children make sense of new (and sometimes unexpected) information.

The information that your child provides in the study and his/her videotape will be kept completely confidential. Each child will be assigned a code number, and the list connecting his/her name to this code will be kept in a locked file. When the study is completed and the data have been analyzed, this list will be destroyed. The videotapes will be archived for later analysis, and will be viewed only by trained research assistants unless you have given separate, explicit permission for other uses (e.g., showing in classes or presentations). Your child’s name will never be used in any report of this research.

You and your child’s participation in this study is completely voluntary. You and/or your child have the right to stop the study and/or withdraw from it at any time without penalty. If you or your child chooses to withdraw from the study, all video and data from your child’s session will be destroyed. If at any point you or your child want to stop participating or to withdraw from the study, simply tell the researcher and the session will be ended immediately. There is no penalty for withdrawing.

You will receive no payment for participating in the study.

For questions about the study, contact: Dr. Vikram Jaswal, Associate Professor; Dept. of Psychology; University of Virginia; P.O. Box 400400; Charlottesville, VA 22904-4400. Phone: (434) 243-2409; Email: jaswal@virginia.edu.

For questions about your rights in the study, contact: Dr. Tonya Moon, Chair, Institutional Review Board for the Social and Behavioral Sciences, One Morton Dr Suite 500, P.O. Box 800392, University of Virginia, Charlottesville, VA 22908-0392. Phone: (434) 924-5999. Email: irbsbhelp@virginia.edu; http://www.virginia.edu/vprgs/irb
**Agreement:**

I give permission _______  I do not give permission _______
for my child __________________________________________ (Name) to participate in the study described above.
Child’s birthdate:_____________________________________
Teacher’s name (if applicable): __________________________

Parent’s signature: ____________________________________
Parent’s printed name: ________________________________ Date: ________________

If you would like to receive occasional newsletters from our laboratory, including summaries of the results, please provide your email or postal address by email at childlearninglab@virginia.edu, or by phone at (434) 924-3986.

You will receive a copy of this form for your records (this copy is either attached or will be given to you at the end of your visit to the Child Language and Learning Lab).

*Thank you for your participation in this project.*
**Informed Consent Agreement (Parents of 7- to 12-year-olds)**

Please read this consent agreement carefully before you decide to participate in the study.

The **purpose of this research study** is to investigate how children understand the intentions of speakers. For instance, how do children perceive intonation when it may be related to sarcasm? What factors influence this distinction? How do these perceptions differ from those of adults?

**What your child will do in the study:** Your child will be invited to play a game that involves hearing a story in which one character makes a statement about something that another character has done, or feedback is provided about the child’s own performance on a challenging task. For example, the child may hear a story in which a boy played a memory game in which he could remember 5 of 30 objects. A classmate may say “You have a great memory!” The feedback provided is always positive in content, but the intonation may sometimes (to an adult) suggest a sarcastic intent. Later, we will ask your child questions designed to see how they interpreted the comments. Your child’s responses to the questions will be coded.

The **time required** for your child’s participation will be one or two 10- to 15-minute sessions, for a maximum total time of 30 minutes.

There are no **risks** to your child from participating in this study, other than some of the tasks are intentionally challenging. At the end of the study, your child will participate in activities that are well within his/her abilities to ensure that s/he leaves with confidence.

There are no direct **benefits** to you or your child for participating. The study may help us understand how children make sense of new (and sometimes unexpected) information.

The information that your child provides in the study will be kept completely **confidential**. Each child will be assigned a code number, and the list connecting his/her name to this code will be kept in a locked file. When the study is completed and the data have been analyzed, this list will be destroyed. Your child’s name will never be used in any report of this research.

You and your child’s participation in this study is completely **voluntary**. You and/or your child have the **right to stop the study and/or withdraw from it** at any time without penalty. **If at any point you or your child want to stop participating or to withdraw from the study,** simply tell the researcher and the session will be ended immediately. There is no penalty for withdrawing.

You will receive no **payment** for participating in the study.

**For questions about the study, contact:** Dr. Vikram Jaswal, Associate Professor; Dept. of Psychology; University of Virginia; P.O. Box 400400; Charlottesville, VA 22904-4400. Phone: (434) 243-2409; Email: jaswal@virginia.edu.

**For questions about your rights in the study, contact:** Tonya R. Moon, Ph.D., Chair, Institutional Review Board for the Social and Behavioral Sciences, One Morton Dr Suite 500, P.O. Box 800392, University of Virginia, Charlottesville, VA 22908-0392. Telephone: (434) 924-5999. Email: irsbshelp@virginia.edu. Web: www.virginia.edu/vprgs/irb.
Agreement:

I give permission _______  I do not give permission _______
for my child __________________________ (Name) to participate in the study described above.
Child’s birthdate: ________________________________
Teacher’s name (if applicable): __________________________

Parent’s signature: ________________________________
Parent’s printed name: ___________________________  Date: ______________

If you would like to receive occasional newsletters from our laboratory, including summaries of the results, please provide your email or postal address by email at childlearninglab@virginia.edu, or by phone at (434) 924-3986.

You will receive a copy of this form for your records (this copy is either attached or will be given to you at the end of your visit to the Child Language and Learning Lab).

Thank you for your participation in this project.
Minor Informed Assent Agreement (Ages 7-12)
Please read this assent agreement with your parent(s) or guardian(s) before you decide to participate in the study. Your parent or guardian will also give permission to let you participate in the study.

Have you ever wondered how people understand what others are trying to say? At the University of Virginia, we’re trying to find out, and we need your help!

We want to know if you’d like to help us with a game. You might be asked to play a game, look at some pictures or listen to a story. Then we’ll ask you some questions about the game, or what you saw or heard—questions like, “How do you think you did on the game?” You’re not going to be graded on how you answer the questions—we just want to know how kids think. The game will take about 10 or 15 minutes, and you may be asked to play two different games on different days.

You can decide for yourself if you want to or not. Just check the “Yes” or “No” box below, and then sign your name. Also, if you say now that you want to participate and then later change your mind—even if it’s while you’re playing the game—that’s OK. Just tell the researcher, and you can stop right away.

Thanks for your help!

_____ Yes, I want to participate in the study
_____ No, I do not want to participate in the study

Signature: ___________________________________________ Date: _____________
Printed name: __________________________________________
Teacher’s name: _________________________________________
Informed Consent Agreement (Adults)

Please read this consent agreement carefully before you decide to participate in the study.

**Purpose of the research study:** This research investigates how children (and adults) interpret the intentions of speakers.

**What you will do in the study:** You will be asked to respond to a number of questions about a statement made by a character in a story, and/or about feedback provided about your performance (or that of another person) on a cognitive task. Questions will be presented live and/or on the computer. All information collected will remain confidential.

**Time required:** The total time you will spend participating in this study is 30 minutes.

**Risks:** There are no risks associated with this study other than a very minor one that you may find some of the activities challenging.

**Benefits:** There are no direct benefits to you for participating in the study other than learning about research being conducted in developmental psychology. Your data may help us to design appropriate tasks for children, and may serve as a reference point for interpreting children’s data.

**Confidentiality:** The information that you give in the study will be handled confidentially. Your information will be assigned a code number. The list connecting your name to this code will be kept in a locked file. When the study is completed and the data have been analyzed, this list will be destroyed. Your name will not be used in any report.

**Voluntary participation:** Your participation in the study is completely voluntary.

**Right to withdraw from the study:** You have the right to withdraw from the study at any time without penalty. Your data will be excluded and erased should you choose to withdraw.

**How to withdraw from the study:** If you want to withdraw from the study, tell the experimenter quietly and leave the room. You will be debriefed if you withdraw from the study. There is no penalty for withdrawing. You will still receive full credit for the experiment.

**Payment:** You will receive a 1/2-hour participation credit for participating in this study and/or you will receive our thanks!

**Who to contact if you have questions about the study:** Dr. Vikram Jaswal, Assoc. Professor of Psychology, Psychology Department; 102 Gilmer Hall, P.O. Box 400400; University of Virginia, Charlottesville, VA 22904-4400. Telephone: (434) 243-2409; email: jaswal@virginia.edu.

**Who to contact about your rights in the study:** Tonya R. Moon, Ph.D., Chair, Institutional Review Board for the Social and Behavioral Sciences, One Morton Dr Suite 500, P.O. Box 800392, University of Virginia, Charlottesville, VA 22908-0392. Telephone: (434) 924-5999. Email: irbsbhelp@virginia.edu. Web: www.virginia.edu/vprgs/irb

**Agreement:** I agree to participate in the research study described above.

**Signature:** _____________________________________________ **Date:** _____________

**Printed name:** _____________________________________________________

You will receive a copy of this form for your records.
Emotions included, from left to right, “Really happy”, “A little bit happy”, “Just okay”, “A little bit sad” and “Really sad.” Emotions correspond to numbers 0-4, with 0 representing “Really sad” and 4 representing “Really happy.”
Appendix C

Pictures used in PowerPoint presentation
Figure 1. Participants’ responses to questions for Speaker Feeling (How did this judge feel about how you did?) and Speaker Intent (How did this judge want you to feel?) for both intonations. Scores range from 0-4 on a Likert scale of faces, with 0 corresponding to “really sad” and 4 corresponding to “really happy.”
**Figure 2.** Participants’ responses, split by age group, to questions for Speaker Feeling (How did this judge feel about how you did?) and Speaker Intent (How did this judge want you to feel?) for both intonations. Scores range from 0-4 on a Likert scale of faces, with 0 corresponding to “really sad” and 4 corresponding to “really happy.”
Figure 3. Participants’ responses, split by age groups, to questions about their own performance (How do you feel about how many items you remembered?) and Speaker Feeling (How did this judge feel about how you did?) for both intonations. Scores range from 0-4 on a Likert scale of faces, with 0 corresponding to “really sad” and 4 corresponding to “really happy.”