

**What Are You *Really* Saying? Verbal Irony Understanding in Children with  
Social Anxiety Symptoms and Shy Negative Affect**

by

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A thesis

presented to the University of Waterloo

in fulfilment of the

thesis requirement for the degree of

Master of Arts

in

Psychology

Waterloo, Ontario, Canada, 2011

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## **Author 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.

I understand that my thesis may be made electronically available to the public.

## **Abstract**

Verbal irony, a form of figurative language, uses the discrepancy between a speaker's intended meaning and the literal word meanings to achieve social goals. Yet, little research exists on individual differences that may disrupt irony understanding. Verbal irony may challenge shy children, who tend to interpret ambiguous stimuli as being threatening, and who have difficulties with mentalizing in social contexts. This study assessed whether shy children interpret ironic statements differently than do non-shy children. Children (8- to 11-year-olds) listened to stories wherein one character made a statement to another character that was a literal or ironic criticism or a literal or ironic compliment. Children appraised the speaker's belief and communicative intention. Shyness was assessed using self report measures of social anxiety symptoms and shy negative affect. Shy children did not differ from non-shy peers in comprehending speakers' beliefs. However, shy children rated speakers who made ironic criticisms as being more mean than did children low in shyness. Thus, while understanding that speakers intended to communicate their true beliefs, shy children construed the social meaning of irony differently, indicating difficulties with pragmatics. Such subtle differences in pragmatic understanding may underlie some of the social difficulties facing shy children.

## **Acknowledgements**

I would like to thank my supervisor, Dr. Elizabeth Nilsen and the members of the Cognitive Development Lab at University of Waterloo for their support, guidance and input to this project. I would also like to thank my husband David Buist for love and support and for creating the visual stimuli for the project. Thanks also goes to the students, teachers, and principals at the participating schools. Thanks also to Jonathan Fugelsang for advice on the statistical analyses.

This research was supported by a Social Sciences and Humanities Research Council (SSHRC) Standard Research Grant awarded to my supervisor, Dr. Elizabeth Nilsen and a SSHRC Canadian Graduate Scholarship to Tracy Mewhort-Buist.

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## List of Abbreviations

SCARED...	.....	Screen for Childhood Anxiety and Related Disorders
SNA.....	.....	Shy Negative Affect Scale
TOLD-I:4...	.....	Test of Language Development – Intermediate, 4 <sup>th</sup> Edition



## Introduction

Communicative competence requires that children learn more than the semantics and syntax of language. To be effective communicators, children also require an appreciation of pragmatics; the functional use of language in social contexts. In mature communication, the intended meaning of a speaker's utterance often goes beyond the literal meaning of the words spoken. In fact, our language is inherently ambiguous; the same words can have various meanings depending on the beliefs and intentions of the speaker. To reduce this ambiguity, speakers and listeners must use contextual cues, tonality, and knowledge of their conversational partners' mental states to infer meaning. Figurative language, which includes metaphor, hyperbole, understatement and irony, highlights this communicative ambiguity, since the literal meaning of the words differs from the speaker's intended meaning. While previous research on figurative language understanding has predominantly focused on the developmental sequence of children's burgeoning communicative competence, or on the cognitive skills supporting this development, the present study focuses on whether children's trait characteristics play a role. Specifically, we assessed whether children who report high levels of shyness have more difficulty interpreting figurative language, and, in particular, verbal irony.

Counterfactual verbal irony is one form of figurative language, where the literal meaning of the words spoken is directly opposite to the intended meaning of the speaker (Katz & Lee, 1993). Irony, thus defined, can exist as either ironic criticisms, where the intended meaning is negative or mocking (e.g. saying "nice shot" after a friend misses making a basketball toss), or as ironic compliments, where the intended meaning is positive (e.g. saying "I hated it!" after finishing a delicious dessert).

The incongruity between the literal word meaning and the intended meaning of ironic statements serves several social functions. People choose to use verbal irony to be humorous, to soften insults, and to demonstrate control of their emotions (Dews, Kaplan, & Winner, 1995). Using verbal irony, especially when criticizing another, achieves these latter social goals because the meaning of the statement is muted by the literal word meaning (Dews and Winner, 1995). Thus, ironic criticisms are

considered less negative than literal criticisms, thereby allowing speakers to state their opinion whilst maintaining their friendship by doing so in a less aggressive manner. However, at the same time, the muting function of irony renders ironic compliments less positive than literal compliments. Speakers may use ironic compliments when they are envious of a listener's accomplishments (Dews et al., 1995) or to highlight a listener's unwarranted expectations of failure (e.g., when a student believes she has failed an exam when she actually aced it).

Children encounter verbal irony frequently. For example, verbal irony is common during conversations within the family environment (Recchia, Howe, Ross, & Alexander, 2010) and it is commonly found in children's television programming (Dews & Winner, 1997). Considering the ubiquity of irony in everyday conversation and experience, as well as the social functions it serves, verbal irony understanding is an important component of developing social and communicative competence.

Several studies have examined the course of verbal irony development in typically developing children (e.g., Capelli, Nakagawa, & Madden, 1990; also see Pexman, 2008 for a review). Recent work has demonstrated that children as young as 5 or 6 years old are able to understand the beliefs and ironic intent of speakers making ironic *criticisms*, in presented stories about 20-50% of the time (Climie & Pexman, 2008; Filippova & Astington, 2008). Specifically, for ironic criticisms children understand that speakers can say something different than they believe before they understand the speaker's teasing intention and attitude (i.e., how mean or nice the speaker is trying to be), which occur together (Pexman & Glenwright, 2007).

While the ability to understand ironic criticisms has been shown in young school-aged children, the ability to understand ironic *compliments* begins to emerge at 8 to 9 years of age (Climie & Pexman, 2008), with many 10- and 11-year-olds demonstrating difficulty comprehending this form of figurative language (Pexman, Glenwright, Krol, & James, 2005). In contrast to the developmental sequence of ironic criticism comprehension, for ironic compliments, children understand that speakers

can say something different than they believe and that they intend to tease the target of an ironic compliment before they understand the speaker's attitude (Pexman & Glenwright, 2007).

In addition to the studies examining the developmental progression of verbal irony understanding, several studies have elucidated the underlying cognitive skills that are required for children to appreciate the pragmatics of irony. Filippova and Astington (2008), for example, found that children's vocabulary skills and theory of mind (i.e., ability to understand the knowledge, beliefs and intentions of others), were good predictors of verbal irony comprehension. Theory of mind has been found to facilitate verbal irony comprehension in both typically developing populations (Nilsen, Glenwright, & Huyder, in press; Sullivan, Winner, & Hopfield, 1995) and in clinical populations, such as children with autism (Happé, 1995). Verbal irony comprehension may also be supported by executive function skills (Hala, Pexman, Climie, Rostad, & Glenwright, 2010). For example, children's working memory has been found to relate to verbal irony understanding (Filippova & Astington, 2008). In addition, studies with right hemisphere brain-damaged adult patients, have found a link between executive functioning and verbal irony comprehension (Martin & McDonald, 2006). Thus, several underlying skills assist children's appreciation of irony, including vocabulary, theory of mind, working memory and executive functioning.

In addition to possessing the underlying cognitive skills necessary for successful irony comprehension, children also require exposure to social contexts to learn about this language form (Hala et al., 2010). Communicative interactions provide children with the opportunity to access the private mental states of others (Nelson, 2005). Such experience is important for irony comprehension, where understanding the mental state of the speaker is essential for successful interpretation. If children are not provided with adequate social exposure, they may not have the same experiential learning to support pragmatic development. There is likely a bidirectional relationship, however, in that children with poor pragmatic skills may not be able to keep up with the social demands of peer interactions. For example, research suggests that children with language deficits, including pragmatics, have peer difficulties (Conti-Ramsden & Botting, 2004). Pragmatic language understanding, in particular, is

considered an important component of social competence (Leinonen, Ryder, Ellis, & Hammond, 2003), and has been shown to be related to prosocial behavior with peers (Coplan & Weeks, 2009). Furthermore, poor performance on the faux pas task, where children must determine the intentions of a speaker who unwittingly insults another character, is related to negative peer relations. Specifically, children who show poor faux pas understanding are rated by their classmates less favorably than are children who perform well on the task (Banerjee & Watling, 2005). Thus, difficulties with pragmatic language can lead to negative social outcomes including decreased quality or quantity of social experience, which, reciprocally, may exacerbate communicative difficulties.

Although relationships exist between pragmatic communication skills and social outcomes, little work has been done investigating the role of individual differences in social behaviour that could impact children's pragmatic understanding, including understanding figurative language. One way to examine the role that socially relevant individual differences play in children's interpretations of figurative language is to study the comprehension of this language form in a population of children who exhibit difficulties in social contexts. Children who are shy, or who experience symptoms of social anxiety, constitute one group of children who demonstrate social difficulties. Shy children are understood as being temperamentally 'behaviorally inhibited' (Kagan, 1989). Behavioral inhibition is the biologically-based tendency to be withdrawn and emotionally subdued in unfamiliar situations. Children with this temperament are characterized as quiet, vigilant and restrained when assessing novel stimuli. Behavioral inhibition is associated with anxiety symptoms in non-clinical adolescents (Muris, Merckelbach, Wessel, & van de Ven, 1999; Muris, Meesters, de Kanter, & Timmerman, 2005). Given that children who are shy avoid unfamiliar peers and speak less during social interactions (Asendorpf, 1990) it is likely they are not being provided with the same opportunities to learn the nuances of social communication.

Children who are shy or socially withdrawn have also been found to have language skills that differ from their same-aged peers. For example, shyness is associated with learning disorders (Elliott, 1968), including specific language impairment (Stanfon-Chapman, Justice, Skibbe, & Grant, 2007).

Specifically, reticent school-aged children perform poorly on tests of both receptive and expressive language (Evans, 1996), and shy children have been shown to speak less when interacting with others (Asendorpf & Meier, 1993). Furthermore, a recent study found that shyness and pragmatic language abilities are negatively correlated (Coplan & Weeks, 2009). That is, children who were less able to provide socially appropriate verbal responses to common social scenarios were rated by their peers as demonstrating greater social withdrawal (Coplan & Weeks, 2009). In the present study we examined whether children's degree of shyness was related to another aspect of pragmatic competence: their ability to successfully appreciate verbal irony. Since verbal irony is clearly evaluative, involving criticism or praise, the social costs of misinterpreting verbal irony could be significant.

There is reason to believe that verbal irony could pose a particular difficulty for shy children. As stated above, by nature of the incongruity between the literal word meaning and intended meaning of the speaker, verbal irony has an element of ambiguity. In light of the difficulties that shy children have with language and pragmatics, it is likely that shy children will have difficulty with language that is less straightforward. Furthermore, several lines of research indicate that anxious children have an interpretation bias for ambiguous information, leading them to interpret ambiguous stimuli as threatening. For example, when homographs were presented to anxious children and adolescents, anxious children were more likely to form sentences using the threatening or hostile interpretation of the homographs than were their non-anxious peers (Taghavi, Moradi, Neshat-Doost, Yule, & Dalglish, 2000). Furthermore, when asked what they would do in several ambiguous scenarios, anxious children tended to interpret the situations as threatening, and suggest avoidant responses (Chorpita, Albano, & Barlow, 1996). Thus, their tendency to experience ambiguous information as hostile or threatening may lead children with anxiety to misinterpret verbal irony. If this were the case, for ironic criticisms, there could be a reduced muting effect of irony. That is, shy children may perceive ironic criticisms as being similar to literal criticisms in terms of the attitude of the speaker. For ironic compliments, it may be that shy children make literal interpretations of the statements, failing to note the praise in these utterances.

Listeners use speaker characteristics (Katz, Blasco, & Kazmerski, 2004), facial expression and tone of voice (Dews & Winner, 1997) as cues in interpreting ironic remarks. Moreover, children rely on these cues, in particular, intonation, when interpreting sarcasm (Capelli et al, 1990). Interpreting subtle social cues and non-verbal communication have been shown to be difficult for children with social anxiety. For example, these children have been found to confuse sad and fearful voices (McClure & Nowicki, 2001). Moreover, another study demonstrated that children with higher shyness ratings had more difficulty appreciating the change of characters' emotions during a taped dialogue, especially when the emotions were negatively valenced (Rothenberg, 1970). This decreased ability to interpret subtle social cues is likely to impact verbal irony understanding where facial expression, tone of voice and contextual cues must be detected and evaluated correctly for the speaker's ironic intent to be accurately gauged.

Children who are shy have also demonstrated weaker performance on tasks assessing the skills that underlie successful appreciation of verbal irony, such as theory of mind and reasoning within a social context. For example, anxious children were as accurate as non-anxious children at identifying overtly hostile actions on video, but were more likely than their non-anxious peers to label non-hostile accidental actions as being hostile (e.g., one child accidentally knocking over another child's blocks; Bell-Dolan, 1995). Similarly, work by Banerjee and Henderson (2001) demonstrates that children with shyness and shy negative affect, although able to pass 2<sup>nd</sup> order false belief tasks, have difficulty understanding faux pas. Understanding faux pas is considered an advanced second order theory of mind task, representing the ability to infer what one person thinks about another person's thoughts. However, to a greater extent than 2<sup>nd</sup> order false belief tasks, which also measure theory of mind, faux pas understanding involves a social component. That is, often in the faux pas stories one of the actors is unwittingly insulted. Faux pas tasks assess both the cognitive and motivational components of understanding the connection between people's thoughts and behaviors (Banerjee, 2000). Thus, when given ambiguous social stimuli, like verbal irony, shy or socially anxious children may have difficulty understanding the thoughts or intentions of others.

The main purpose of the present work was to examine the role shyness plays in children's comprehension and appreciation of verbal irony. To address this goal, children listened to stories wherein a speaker made a comment that was either a literal criticism, an ironic criticism, a literal compliment, or an ironic compliment. Children were asked to rate the speaker's belief as it related to the statement (i.e., whether the speaker thought the listener was "good" or "bad" at a certain activity), and the speaker's communicative intention (i.e., whether the speaker was being mean or nice). Children also rated whether they felt the speaker was teasing the listener. A secondary goal was to examine whether other social cognitive skills were affected by shyness. As such, children were also tested on their 2<sup>nd</sup> order false belief and faux pas understanding.

Children were asked to rate themselves on two aspects of shyness, social anxiety symptoms and shy negative affect (Banerjee & Henderson, 2001). While social anxiety symptoms tap into the social fears of shy youth, the shy negative affect scale assesses the negative emotions that are often associated with shy temperament. It was hypothesized that children with social anxiety symptoms and shy negative affect would have difficulty comprehending verbal irony. Due to previous findings that children with shyness have global language deficits, we were interested in examining whether these children have difficulty interpreting irony over and above any language deficits. Specifically, it was hypothesized that shy children, with their tendency to interpret others in a hostile manner, would interpret ironic compliments literally, since the literal interpretation of the utterance is negative. Furthermore, similar to how shy children have difficulty appreciating speaker intentions in the faux pas task (Banerjee & Henderson, 2001), it was expected that shy children would rate ironic speakers of both ironic criticisms and ironic compliments as being meaner than would children who are not shy. That is, shy children would be less likely to appreciate the muting function of ironic criticisms, while concurrently finding ironic compliments as being less nice than literal compliments.

## Method

### Participants

Participants were recruited from English-speaking elementary school classes (3<sup>rd</sup>-6<sup>th</sup> grade) in a mid-sized North American city. In total, 99 children participated. Ten participants were excluded because their scores on the receptive vocabulary measure (described below) were below the Average Range (scaled score < 8, below the 25<sup>th</sup> percentile), and one was excluded due to insufficient demographic information. The final dataset included 88 participants (51 boys;  $M_{Age} = 9$  years, 10 months; range: 8 years, 1 month – 11 years, 9 months). Excluded participants did not differ from the remaining participants on age, gender, parental education, or measures of social anxiety and shy negative affect.

### Materials and Procedure

Consent forms and demographic questionnaires were sent home with children at each participating school. Children with returned consent forms were tested by an experimenter within a quiet room in their schools. All children first completed the verbal irony task, then the 2<sup>nd</sup> order false belief and faux pas tasks, followed by the shyness scales and the receptive language measure. All tasks were completed in one 45 minute session.

**Verbal irony task.** The verbal irony task was comprised of 12 scenarios. Four versions of each scenario were created for a total of 48 stories. Stories depicted a female and a male character engaging in an activity that would be typical of the participants' age range, such as soccer and mini-golf. The stories depicted either a negative or a positive context (e.g. a child completely missing the hole, or a child scoring a hole-in-one playing mini-golf, respectively), followed by a statement (literal or ironic) made by the other child in the story. The statement was either a criticism or a compliment depending on the context of the story. Thus, four versions of each story were created, in which the speaker made a literal or ironic criticism (negative context) or a literal or ironic compliment (positive context). Each story included an introduction to the situation (e.g., *Chris and Tara are playing mini-golf on a field trip. They are on the same team.*) followed by an explicit reference to the beliefs of the character who



was the object of the final statement (e.g., *Tara thinks she is a really good mini-golf player.*) This reference was included because previous studies have shown that verbal irony comprehension is improved when statements include an explicit echo of violated beliefs or norms (Keenan et al., 1999). Next, the negative or positive context was described (e.g., *Tara hits the ball and completely misses the hole.*; negative context), followed by the statement (e.g., *Chris says: "Boy, that was an awesome shot!"*; ironic criticism). Stories were of equal length in terms of number of words and number of sentences. Gender of speaker was counterbalanced across participants for each story type. Each participant heard one version of each of the 12 stories, and the 4 versions of each story were counterbalanced across participants, so that all 48 stories were approximately equally represented. This method of counterbalancing ensured that children's performance across story types did not vary as a function of the story salience. There were thus four sets of 12 stories. Within each set, the stories were presented in pseudo-randomized order with the requirement that the same story type did not occur three times in succession. A sample story demonstrating all four story types is included in Appendix A.

The story events were presented to children in audio recordings to ensure standardized procedures. The final statements made by the speakers were presented with appropriate intonation. That is, the literal criticisms were made using a blunt, sincere tone; the ironic criticisms were made using a mocking tone; the literal compliments were made using a pleasant, sincere tone; and the ironic compliments were made using a pleasant, teasing tone. These statements were isolated from the rest of the recording and rated by psychology graduate students to ensure appropriate intonation. These students rated each statement as "literal" or "ironic". Any stories that were not endorsed as being the appropriate story type were rerecorded until greater than 50% of raters agreed that the intonation matched the story type. A *t*-test comparing the literal and ironic intonation ratings of the final recordings confirmed that the ratings differed significantly ( $t(46) = 17.52, p < .001$ ).

Children were introduced to the task by being told that they would be listening to a series of stories while looking at comic strips. At the beginning of the verbal irony task, children were trained on the use of the response cards and on the speaker characteristic rating scales, using scenarios that did not

include any figurative language. Then they were presented with the complete comic strip and heard the story events unfold on the recording. Following each story, children were asked questions to assess their interpretation of the scenario and final statement. These questions assessed the children's understanding of speaker belief, speaker intention, and whether or not the speaker was teasing. Children responded by pointing to cards and rating scales, which were adapted from Pexman, Glenwright, Hala, Kowbel, and Jungen, (2006), and Climie and Pexman (2008). In the speaker belief question children indicated using a "thumb up" or "thumb down" card whether the speaker thought the object of the final statement was good or bad (e.g., *Did Chris think that Tara was a good mini-golf player or a bad mini-golf player?*). When responding to the speaker intention question children used a 5-point Likert type scale depicting faces ranging from "very nice" to "very mean" to indicate the attitude of the speaker. Similarly, in the speaker teasing question children used a card depicting a "teasing", "neutral" or "real" face to depict whether the speaker was teasing. The order that the response options were read was counterbalanced across trials to prevent response bias.

**Second order false belief task.** The 2<sup>nd</sup> order false belief task was adapted from Coull, Leekam and Bennett (2006; see Appendix B). This task involved presenting children with two stories wherein two characters interacted. In both stories one character deceived a second character, while, unbeknownst to the first character, the second character witnessed the truth. Therefore the first character had a false belief about the second character's knowledge state. Children heard two audio-recorded vignettes outlining the story details, accompanied by comics, provided frame-by-frame, to aid in comprehension and to serve as a memory aid. After listening to the story, children were asked a question to assess their 2<sup>nd</sup> order false belief understanding, and were asked to justify their response. In order to be successful on these questions children were required to think about a character's thoughts about another characters' mental state. They were also asked probe questions to assess their understanding and memory of the story. Children received one point for correctly answering the false belief question, and received a second point if their justification explicitly referred to the thoughts of the character. Thus, children could earn a score of 0, 1 or 2 on each of the 2<sup>nd</sup> order false belief stories.

The two stories were averaged to obtain the children's mean false belief score, which was used in the final analyses.

**Faux pas task.** Children's ability to interpret the intentions of characters within a social context was assessed using a faux pas task (Banerjee, 2000). In this task, children heard two audio-recorded stories in which one character unwittingly insulted another character, see Appendix C. The stories were accompanied by comic strips to aid in comprehension and to serve as a memory aid. After listening to the story, children were asked four questions. They were first asked if someone had said something wrong in the story, and if so, who. If they answered these questions correctly, they were asked if the character meant to hurt the other's feelings, and why. Children were awarded one point for correct responses to each of these latter two questions. Thus children could earn 0, 1 or 2 points on each faux pas story. The scores on the two faux pas stories were averaged to yield the mean faux pas score, which was used for further analyses.

**Social anxiety and shy negative affect measures.** Symptoms of social anxiety and shy negative affect were measured using rating scales. In order to assess children's perceptions of their social anxiety symptoms, the social phobia subscale of the Screen for Childhood Anxiety and Related Disorders (SCARED; Birmaher, Khetarpal, Cully, Brent & McKenzie, 1995) was administered to children. This measure probes the specific social fears that shy children experience, while also including one question directly probing shyness (i.e. "I am shy"). The seven statements were read aloud to children who responded verbally or by pointing to their answers on an answer card to indicate how true (0 "not true/hardly ever true" to 2 "always true/often true") the statement was for them. A score was created by summing across the items. A recent meta-analysis concluded that the social phobia subscale of the SCARED is a reliable screening tool for social anxiety, with reported reliability alphas ranging from .69-.89 (Hale, Crocetti, Raaijmakers, & Meeus, 2011).

To assess children's degree of shy negative affect, the Shy Negative Affect Scale (SNA; Banerjee & Henderson, 2001) was administered to children verbally. This scale assesses the negative emotions and cognitions that are often experienced by children with shy temperament. Twelve

statements (ten negative, two positive, which were reverse coded) were read aloud to children, and they responded how often they had each feeling by pointing to or stating their response (0“Never/Hardly Ever” to 2“Most of the time/Always). A score was created by summing across the items. This measure has been shown in the past to have acceptable internal consistency (Cronbach’s alpha = .74; Banerjee & Henderson, 2001).

**Receptive vocabulary measure.** In order to assess children’s receptive vocabulary skills, they were administered the Picture Vocabulary subtest of the Test of Language Development-Intermediate, 4<sup>th</sup> Edition (TOLD-I:4). This task required that children point to the picture (from a group of 6 pictures on a card) that corresponded to a two word phrase spoken by the researcher. The task was administered in a standardized fashion as outlined in the manual. Children completed all 9 picture cards included in the task. All children started at the first item of the first picture card and continued until all items for the card were completed or the ceiling criterion for the card (two incorrect responses in a row) was met. Children received one point for every correct response; these points were summed to create a raw score (out of 80). Children’s raw scores on this task were included in the analyses as a covariate.

## Results

### Social Anxiety Symptoms and Shy Negative Affect

Children's responses on the self report measures of social anxiety symptoms (i.e., SCARED) and shy negative affect (i.e., SNA) were examined. Reliability analysis of children's responses to the SCARED revealed that one item had a much lower intraclass correlation ( $r(86) = 0.18$ ) than any of the other items ( $r(86) = 0.36 - 0.68$ ). This item was removed, leaving 6 items (maximum possible score = 12) in the scale. Removal of this item increased the Cronbach alpha value from .78 to .82. Similarly, intraclass correlations of the items on the SNA revealed 4 items that did not correlate well to the other items of the measure ( $r(86) = 0.01 - 0.11$  versus  $0.30 - 0.50$ ). As such, these items were removed, leaving the final scale with 8 questions (maximum possible score = 16), and increasing the Cronbach's alpha from .62 to .70. Children's total scores on the revised SCARED and SNA were positively correlated ( $r(86) = 0.31, p < .01$ ).

Participants were median split on their self report ratings on the SCARED (*Median* = 5.5) and the SNA (*Median* = 5). Preliminary analyses revealed that the groups formed differed on age, receptive vocabulary, and parental level of education (Table 1). As we were interested in examining the relationship between children's characteristics and communicative skill over and above language abilities, age and verbal skills were covaried out of subsequent analyses. Parental education was not correlated to any of the dependent variables ( $r(dfs \text{ ranging from } 64-83) = -.20 \text{ to } .15, \text{ all } ps \geq .07$ ), and thus was not used as a covariate for this study.

### 2<sup>nd</sup> Order False Belief and Faux Pas

Separate 2(Group: low SCARED versus high SCARED) x 2(Group: low SNA versus high SNA) ANCOVAs were performed for the 2<sup>nd</sup> order false belief task. There was a marginal main effect of SCARED ( $F(1,82) = 3.29, \eta_p^2 = .04, p = .07$ ). Children high in social anxiety symptoms were slightly better at understanding a character's expectations about another character's beliefs ( $M = 1.33, SE = .06$ )

than those low in shyness ( $M = 1.17$ ,  $SE = .06$ ). Neither the effect of SNA grouping, nor the interaction between the two measures, was significant ( $ps > .40$ ).

When children’s performance on the faux pas task was examined, there were no statistically significant effects of social anxiety symptoms ( $p = .26$ ), nor of shy negative affect ( $p = .21$ ), nor was there a significant interaction ( $p = .42$ ). Children’s overall mean score on this task was 1.43 ( $SE = .06$ ), with 38.6% of children getting both questions correct on both stories. Thus, floor or ceiling effects are unlikely. Therefore, neither social anxiety symptoms nor shy negative affect appeared to be related to children’s ability to comprehend faux pas.

The lack of significant findings between shyness measures and faux pas understanding was surprising, given previous results of Banerjee (2001) demonstrating that shy negative affect was negatively correlated to faux pas performance in children who were high on shyness. In order to directly compare our results, we repeated our analyses of the faux pas task using the same statistical methodology that was used by Banerjee. The correlation between SCARED score and faux pas score was determined separately for children in the low SNA and high SNA groups. There were no significant correlations between SCARED score and faux pas for either group ( $rs(40-44) = -.03-0.1$ ,  $ps > .50$ ). Thus, the results of Banerjee (2001) were not replicated.

**Table 1.** *Demographics and shyness measure scores for each of the four groups.*

Group	Age	TOLD-I:4	Parental Education	SCARED	SNA
Low SCARED/ Low SNA	9.92(0.70)	50.07(6.12)†	3.31(1.08)†	2.54(1.71)†	2.93(1.02)†
Low SCARED/ High SNA	10.17(0.98)†	47.00(6.77)	2.77(1.36)	2.94(1.44)†	6.25(1.84)*
High SCARED/ Low SNA	9.78(0.88)	45.00(7.51)*	3.36(1.26)	8.14(1.23)*	2.36(1.34)†
High SCARED/ High SNA	9.61(0.75)	46.20(8.36)*	2.64(1.11)*	8.83(1.42)*	6.67(1.86)*

Mean(*SD*) \*Differs from Low SCARED/Low SNA †Differs from High SCARED/High SNA

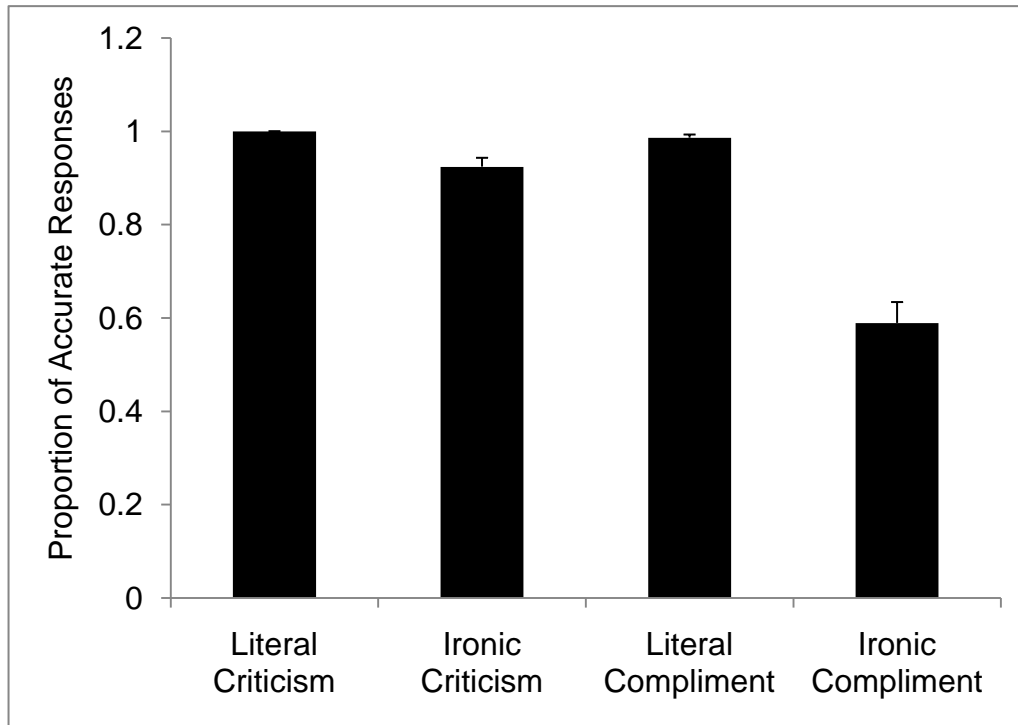
### Verbal Irony Task

Three 2(Group: low SCARED versus high SCARED) x 2(Group: low SNA versus high SNA) x 4 (Story Type: literal criticism, ironic criticism, literal compliment or ironic compliment) mixed model ANCOVAs were performed for each of the variables probed during the verbal irony task. The 2x2x4 ANCOVAs were shown to violate the sphericity assumption (Mauchly's tests of sphericity;  $W(5) = .041-.633$ ,  $ps < .001$ ), thus, the Greenhouse-Geisser correction was applied to the data. Follow up analyses were performed when the results of the omnibus ANCOVA were significant ( $p < .05$ ). Since we hypothesized that shy children would react differently to criticism and praise, we followed up significant results with ANCOVAs examining criticisms and compliments separately. Tukey's HSD was used to compare individual means, as indicated for specific results, below.

**Speaker belief.** Children's accuracy on the speaker belief questions was analyzed. A response was considered accurate if, for criticisms, the child rated that the speaker thought the context of the story was bad. For compliments, children were deemed accurate when they correctly identified that the speaker thought the context was good. The proportion of times that the child correctly identified the speaker's belief for each statement type was used for analyses.

The omnibus 2x2x4 ANCOVA revealed a main effect of story type ( $F(1.34, 109.93) = 5.41$ ,  $\eta_p^2 = .06$ ,  $p < .05$ ; Figure 1). Tukey's HSD procedure was used to compare the age- and TOLD-I:4-corrected mean belief scores for the four story types. Using this test, any mean differences greater than 0.217 were deemed significant at the .01 level ( $r = 4$ ,  $df = 60$ ). While children were near ceiling on their responses to the speaker belief question for literal criticisms, literal compliments and ironic criticisms, their performance on ironic compliments was significantly lower ( $p < .01$ ). Children responded as though the ironic compliments were literal criticisms (i.e. the speaker believed the performance of the addressee was "bad") on approximately 40% of the trials. No significant effects of social anxiety symptoms nor shy negative affect were found for the speaker belief question ( $ps > .25$ ). Thus, children with social anxiety symptoms and shy negative affect were able to understand that

speakers' beliefs about the situation differed from the literal meaning of their utterances as well as their peers without anxiety or negative affect.



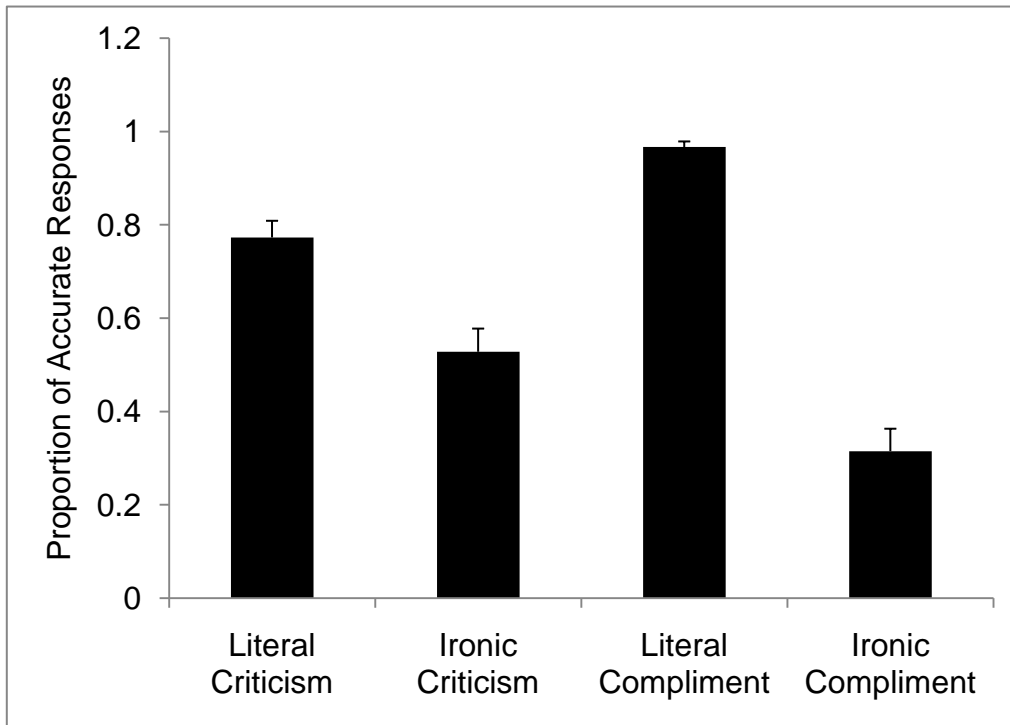
**Figure 1.** Children's understanding of the speakers' belief varied as a function of story type. Children performed significantly worse on ironic compliments ( $p < .01$ ), than for any of the other story types.

**Speaker intent.** Similar to the speaker belief question, children's ratings of speaker intent were coded for accuracy. That is, for criticisms, when the child rated the speaker as being "a little bit mean" or "very mean", the child was considered accurate. For compliments, children were considered accurate when they indicated that the speaker was being "a little bit nice" or "very nice". The proportion of times that the child correctly identified the speaker's intent was used in further analyses.

Only those trials where the participant was accurate on the speaker belief question were included in these analyses. This was done because understanding that the speaker's belief differs from the literal meaning of the statement is a necessary prerequisite to understanding that the statement is



ironic. These analyses revealed a significant main effect of story type ( $F(2.40, 150.99) = 3.75, \eta_p^2 = .06, p < .05$ ; Fig. 2). Children’s understanding of speaker intent was most accurate, and near ceiling for



**Figure 2.** Children’s understanding of the speakers’ intent varied as a function of story type. Children did equally well on both literal statement types, but significantly poorer on ironic criticisms ( $p < .05$ ) and ironic compliments, for which accuracy was the lowest of all four story types ( $p < .05$ ).

both types of literal statements, which did not significantly differ from each other (Tukey’s HSD(4, 120) = 0.215, at  $p = .05$ ). Their performance was less accurate on ironic criticisms ( $p < .05$ ) and the least accurate on ironic compliments, on which their performance was marginally below ironic criticisms (difference between means = 0.213). Approximately two thirds of the time, children indicated that speakers making an ironic compliment were being “a little bit mean” or “very mean”. There was a marginal three way interaction between story type, SCARED grouping and SNA grouping ( $F(2.40, 150.99) = 2.68, \eta_p^2 = .04, p = .06$ ).

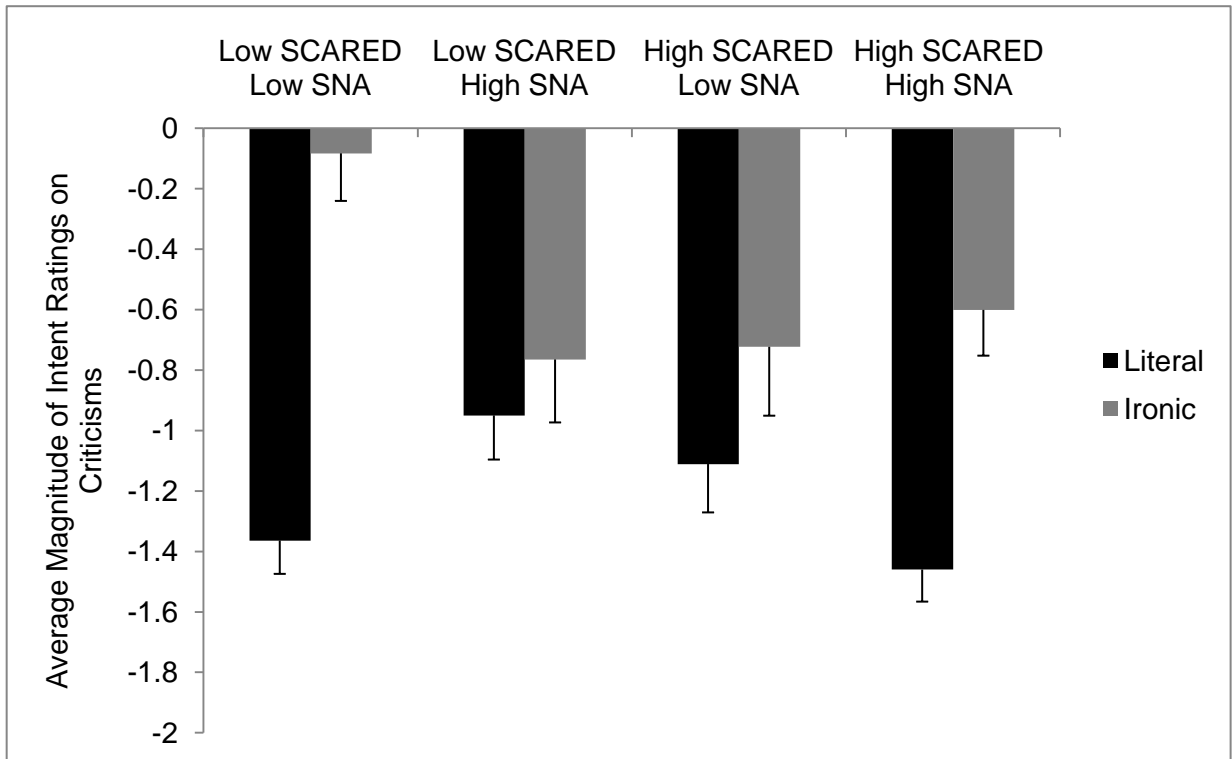
Thus, children’s accuracy in comprehending speakers’ intentions did not differ as a function of their ratings on social anxiety symptoms nor shy negative affect. Of interest, however, was whether

these children rated ironic speakers as being *meaner* overall than did the children who did not struggle with these difficulties. Thus, rather than looking at whether children's responses were in the correct direction as we did for the accuracy variables, above, we calculated a separate variable that examined the magnitude of children's negative or positive attitude ratings for the speakers in each story. Since children rated speaker meanness on a 5 point scale, numeric values were assigned to each rating, with -2 representing "very mean", -1 representing "a little bit mean", 0 representing "not mean, but not nice either", 1 representing "a little bit nice", and 2 representing "very nice".

The omnibus 2x2x4 ANCOVA revealed a main effect of story type ( $F(2.09,131.80) = 3.86, \eta_p^2 = .06, p < .05$ ). Tukey's HSD (4, 120) determined that any mean differences greater than 0.549 were significant at the .05 level. Overall, children rated speakers who made literal criticisms as being the meanest ( $M = -1.18, SE = .08, p < .05$ ), followed by ironic criticisms ( $M = -.511, SE = .10$ ) and ironic compliments ( $M = -.082, SE = .13$ ), which were rated as being nicer than literal criticisms ( $p < .05$ ), but which did not significantly differ from one another. Literal compliments were rated as being "very nice" on almost all trials ( $M = 1.80, SE = .04; p < .01$ ). However, these results are qualified by a significant three-way interaction ( $F(2.09,131.80) = 3.78, \eta_p^2 = .06, p < .05$ ). Planned follow-up analyses revealed that the interaction between social anxiety symptoms, shy negative affect and story type was significant when comparing literal and ironic criticisms ( $F(1,81) = 13.41, \eta_p^2 = .14, p < .001$ ; Fig.3), and was marginal for literal and ironic compliments ( $F(1,63) = 3.76, \eta_p^2 = .06, p = .06$ ).

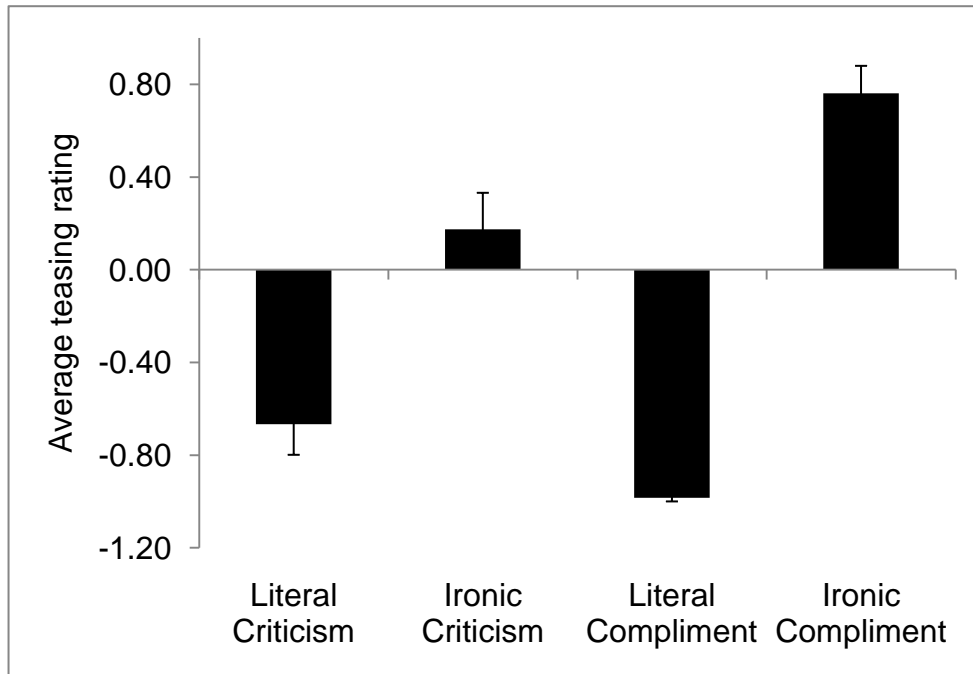
Children with social anxiety symptoms, shy negative affect, or both, rated speakers who made ironic *criticisms* as being significantly meaner than did children who were low on both social anxiety and shy negative affect (Tukey's HSD(8, 60) = 0.508, at  $p = .01$ ). Children with shyness and shy negative affect did not rate speakers who made *literal* criticisms as any meaner than did children low on both of these dimensions ( $p > .05$ ).

**Speaker teasing.** Children's ratings of whether speakers were teasing were also analyzed. These data only include stories for which children answered the speaker belief and intent questions in



**Figure 3.** The average magnitude of children’s ratings of the speaker’s communicative intent varied as a function of their social anxiety symptoms and shy negative affect, for criticisms. Children made ratings on a 5 point Likert scale where 2 = very nice, 0 = not nice but not mean either, and -2 = very mean.

the correct direction, to ensure that the results only included cases where the children accurately comprehended sarcastic intent. However, this left too few data points to allow the children to be broken into groups based on their SCARED and SNA scores (e.g., the high SCARED/low SNA group only has three participants with data). As such, these data were analyzed using a univariate ANCOVA collapsed across children’s ratings of social anxiety and shy negative affect. Overall, when asked whether speakers in the stories were “teasing” or “being real”, children’s ratings depended on story type ( $F(1.87, 37.37) = 43.621, \eta_p^2 = .69, p < .001$ ; Fig.4). Children correctly identified that speakers were “being real” for literal criticisms and compliments, which did not differ from each other (Tukey’s HSD (4, 24) = 0.763, at  $p = .05$ ), and that they were “teasing” for ironic compliments, but their average



**Figure 4.** Children’s comprehension of the teasing function of irony varied by story type. Children rated speakers as either ‘teasing’ (rating = 1), ‘being real’ (rating = -1) and ‘not teasing but not real either’ (rating = 0). While children correctly identified that speakers making literal statements were not teasing, and that speakers of ironic compliments were teasing, they had significantly greater difficulty understanding that speakers of ironic criticisms were teasing ( $p < .05$ ).

ratings of speakers who made ironic criticisms did not significantly differ from a response of “not teasing, but not real either” (i.e. a score of 0 on the scale, which ranged from -1 to 1;  $p > .05$ ).

### **Relationship between 2<sup>nd</sup> Order False Belief, Faux Pas, and Verbal Irony**

Regressions were performed to examine whether SCARED or SNA scores predicted performance on any of the verbal irony measures over and above age, receptive vocabulary (as measured by the TOLD:I-4), 2<sup>nd</sup> order false belief skills, and the faux pas task. Separate hierarchical multiple regressions were performed for ironic criticisms and ironic compliments on the speaker belief ratings, and magnitude of intent ratings (Table 2). Age, and TOLD:I-4 score were entered on the first step, followed by 2<sup>nd</sup> order false belief and faux pas scores on the second step, SCARED score on the third step and SNA score on the fourth step. The SCARED and SNA scores were entered on separate steps

since they were used as measures of two separable components of children's experience of shyness. Furthermore, adding SCARED and SNA scores on separate steps of the hierarchical regression made it possible to determine whether the inclusion of each in the model would cause a significant change in the model's predictive ability (i.e. whether each would cause a significant change in  $R^2$ ).

For ironic criticisms, shy negative affect was the only statistically significant predictor of children's responses to the speaker belief question ( $t(81) = 2.415, p < .05$ ), accounting for 6.0% of the variance. Social anxiety symptoms predicted speaker belief responses marginally ( $t(81) = 1.75, p = .08$ ), accounting for 3.2% of the variance. When looking at children's responses to the speaker intent question, TOLD:I-4 score was a statistically significant predictor ( $t(80) = 2.90, p < .01$ ), accounting for 8.5% of the variance, as was shy negative affect ( $t(80) = 2.06, p < .05$ ), accounting for 4.3% of the variance in children's intent ratings. In contrast, for ironic compliments, 2<sup>nd</sup> order false belief understanding accounted for 5.0% of the variance children's responses to the speaker belief ( $t(81) = 2.14, p < .05$ ) and marginally predicted their responses to the speaker intent questions ( $t(62) = 1.91, p = .061$ ), for which age was also a significant predictor ( $t(62) = 3.18, p < .01$ ), accounting for 12.6% of the variance. Thus, while shy negative affect predicted a modest proportion of the variance in children's ratings of speakers' communicative intentions for ironic criticisms, age was the most significant predictor of children's ratings of communicative intention for ironic compliments.

**Table 2.** Summary of Stepwise Regression Analyses for Verbal Irony Variables

Variable	Criticisms Belief	Criticisms Intent	Compliments Belief	Compliments Intent
<i>Step 1:</i>				
Age	<b>.191</b> ; 0.040(0.026)	<b>-.152</b> ; -0.171(0.136)	<b>.184</b> ; 0.090(0.062)	<b>.445**</b> ; 0.595(0.187)
TOLD:I-4	<b>.101</b> ; 0.002(0.003)	<b>.337**</b> ; 0.041(0.014)	<b>.073</b> ; 0.004(0.007)	<b>-.181</b> ; -0.026(0.018)
<i>Step 2:</i>				
2 <sup>nd</sup> Order False Belief	<b>.179</b> ; 0.079(0.049)	<b>-.056</b> ; -0.129(0.253)	<b>.241*</b> ; 0.248(0.116)	<b>.238†</b> ; 0.630(0.330)
Faux Pas	<b>-.040</b> ; -.012(.032)	<b>-.091</b> ; -.146(.166)	<b>0.148</b> ; .106(.077)	<b>.096</b> ; .191(.226)
<i>Step 3:</i>				
SCARED	<b>-.200†</b> ; -0.010(0.006)	<b>-.104</b> ; -0.028(0.030)	<b>-.065</b> ; -0.008(0.014)	<b>-.072</b> ; -0.023(0.041)
<i>Step 4:</i>				
SNA	<b>.270*</b> ; 0.019(0.008)	<b>-.227*</b> ; -0.082(0.040)	<b>.088</b> ; 0.014(0.019)	<b>-.168</b> ; -0.076(0.056)
R <sup>2</sup>	.064	.116	.046	.109
ΔR <sup>2</sup> Step 2	.02	.005	.064†	.078†
ΔR <sup>2</sup> Step 3	.011	.030†	.001	.016
ΔR <sup>2</sup> Step 4	.061*	.043*	.006	.023
N	87	86	88	68

Results are β; B(SE B); †, \*, \*\* indicate significance at the 90%, 95% and 99% levels, respectively

## Discussion

This study examined whether children with shyness, as indexed by social anxiety symptoms and shy negative affect, have more difficulty appreciating verbal irony. It was hypothesized that shy children would rate ironic speakers as being meaner than would their non-shy peers. To examine this hypothesis, children were presented with vignettes where one child character made a criticism or a compliment of another child that was either literal or ironic. Several key findings about the interplay between social-communicative measures and temperamental features emerged.

First, similar to previous studies on irony comprehension (e.g., Climie & Pexman, 2008; Harris & Pexman, 2003), 8- to 11-year-old children, were able to interpret ironic criticisms on the majority of trials, but interpreted ironic compliments correctly on fewer than half of the trials. That is, children had difficulty understanding that speakers who made ironic compliments believed that the context was good, and that the speaker was being nice. Furthermore, children correctly identified that speakers making ironic compliments were teasing, but had more difficulty identifying the teasing function of ironic criticisms. Thus, for ironic criticisms, children had the most difficulty understanding the teasing function of the statements, while, for ironic compliments, children had the most difficulty understanding the communicative intentions of the speakers.

The results from this study are generally consistent with previous work demonstrating that children's understanding of the components of verbal irony follows a predictable sequence that differs for ironic criticisms and ironic compliments. For example, similar to our findings, Pexman and Glenwright (2007) found that for both ironic criticisms and ironic compliments children understand the speaker's belief first. For ironic criticisms, after understanding that speakers' beliefs differ from the literal meaning of their utterances, children next understand the speaker's attitude (i.e., whether the speaker is being mean or nice; labeled "intent" in this study) and whether the speaker is teasing (i.e., these skills emerge together). Our results for children's appreciation of ironic criticisms diverged from

those of Pexman and Glenwright (2007). While children in our study understood that speakers who made ironic criticisms intended to be mean, they did not fully appreciate the teasing function of ironic criticisms. This finding, however, is consistent with studies demonstrating that the social functions of irony, such as humor, are the last components of irony comprehension to develop (Dews et al, 1996).

Children had difficulty interpreting the communicative intention of speakers who made ironic compliments. Approximately two thirds of the time children responded that speakers who made ironic compliments were being “a little bit mean” or “very mean”. However, when children responded correctly to the intention question, they were also able to correctly identify that the speakers of ironic compliments were teasing. This is consistent with results from Pexman and Glenwright (2007) who found that children understand the teasing nature of ironic compliments before they understand the speaker’s communicative intent.

Central to the main purpose, we examined whether children who possessed higher levels of social anxiety symptoms and shy negative affect interpreted ironic language differently than their non-shy peers. Results demonstrated that children with social anxiety symptoms and shy negative affect did not differ from their peers in their ability to correctly *identify* ironic statements. That is, they were as capable of identifying the speaker’s belief on the ironic stories as children with low social anxiety symptoms and shy negative affect. What differed, however, was the degree of negative attitude that children with social anxiety symptoms and/or shy negative affect ascribed to speakers who made ironic criticisms. One significant social function of irony is its muting effect on the intended message. That is, the use of irony renders criticisms less aggressive, and praise less complimentary, than would be direct literal statements. While children without difficulties in social anxiety or shy negative affect rated ironic criticisms as less “mean” than literal criticisms, children with social anxiety symptoms and negative affect showed less of this muting effect, rating speakers who made ironic criticisms as being significantly meaner than did their peers.

The difference in understanding of the attitude of ironic speakers evidenced by shy children did not appear to be a result of impaired mentalizing ability, since children with social anxiety symptoms



and shy negative affect were able to correctly answer questions assessing 2<sup>nd</sup> order false belief and faux pas understanding as well as their non-shy peers. The latter finding is contrary to findings by Banerjee and Henderson (2001) who found that shy negative affect predicted faux pas understanding in children with social anxiety symptoms. The discrepancy in these findings may be due to differences in methodology. Banerjee and Henderson (2001) median split participants on social anxiety symptoms, and then used correlation to examine the relationship between shy negative affect and faux pas understanding. In the current study, participants were median split on both social anxiety symptoms and shy negative affect, and ANCOVA was used to assess both constructs individually, as well as their interaction. This was done under the assumption that social anxiety symptoms and shy negative affect are related but separate components of a child's experience of shyness. Nevertheless, when the analyses were repeated to in the manner of Banerjee and Henderson (2001), the finding that in children who were high on social anxiety symptoms, shy negative affect was correlated to faux pas understanding (albeit marginally). Thus, it is likely that there is a relationship between shyness and faux pas understanding, although the power of our study was not able to reveal this relationship using ANCOVA.

It is also unlikely that the difference in construal of the attitude of ironic speakers is due to a general negativity bias in shy children. Specifically, these children did not rate speakers of *literal* criticisms any more negatively than did children low on social anxiety symptoms and shy negative affect. Instead, in line with research showing that children with social anxiety symptoms tend to interpret ambiguous stimuli as threatening (e.g., Muris et al, 2003), it is likely that the ambiguity inherent in the ironic statements requires more inference on the part of the child, allowing these threat biases to be revealed.

Regression analyses revealed that shy negative affect significantly predicted children's understanding of speaker's beliefs and intentions (although the latter had marginal statistical significance) over and above age, receptive vocabulary, and 2<sup>nd</sup> order false belief performance. Thus, shy negative affect appears to be a characteristic of children that may be related to their ability to

understand figurative language. However, for ironic compliments, no effects of social anxiety symptoms or shy negative affect were found. Only 2<sup>nd</sup> order false belief performance was found to predict children's performance on the speaker belief question, and with age, to predict ratings of speakers' communicative intention (i.e., how mean or nice they were being). This finding is consistent with studies demonstrating that theory of mind predicts verbal irony comprehension (e.g., Filippova & Astington, 2008), but does not support our hypothesis that shyness would affect interpretation of both ironic criticisms and ironic compliments. However, all children, regardless of shyness ratings, experienced significant difficulty comprehending ironic compliments, identifying the irony less than half the time. It may be that once, in general, children gain a better understanding of ironic compliments an effect of shyness would emerge. This notion is supported by the fact that age was the most significant predictor of children's ratings of speakers' communicative intent, suggesting that comprehension of this language form is still developing in this age group. Therefore, to fully elucidate the potential impact of shyness on children's understanding of ironic compliments, an older sample should be assessed.

Our research demonstrates that shy children have a different appreciation of the pragmatics of verbal irony, perceiving ironic speakers as being more negative than do children who are not shy. These findings add to previous work demonstrating that children's shyness is related to the appropriate use of language in common social contexts (Coplan & Weeks, 2009). A negative interpretation of the attitude of ironic speakers could lead shy children to be more easily offended by their peers, leading to adverse social outcomes. Indeed, there is evidence demonstrating that pragmatic language ability may actually have a buffering effect on shyness (Coplan & Weeks, 2009). For example, shy children with better pragmatic language abilities (as measured by knowledge of social conventions) at the beginning of the school year had fewer negative social outcomes and more prosocial behavior at the end of the school year. Furthermore, boys with strong expressive pragmatic language skills showed a decrease in shyness over the school year (Coplan & Weeks, 2009). If mastery of basic social conventions is associated with such positive outcomes for children with shyness, it may be that sophisticated

understanding of more complex social language, such as figurative language, could serve an additional protective function for shy children. At the same time, it could be that those children who are more socially engaged have the opportunity to develop stronger pragmatic language understanding. Interventions aimed at improving pragmatic language understanding, including figurative language, could help to tease apart these two potential pathways. Therefore, more research in this area is indicated.

Since our language system is inherently ambiguous, children are continually faced with having to reason between different interpretive options. In this study we show that shy children have a negative bias when interpreting ironic criticisms. It may be that this bias is present in other aspects of communication not examined here. Furthermore, it may be that poor communicative competence is one mechanism causing shy children to experience negative psychological trajectories and social difficulties. Shy children's appraisal of ironic speakers as being meaner than non-shy peers would rate them, revealed in this study, could lead to misunderstandings and to shy children taking greater offence to ironic teasing than other children would. Since irony is used to save face while providing negative feedback and to avoid damaging relationships (Dews et al., 1995), shy children's interpretations of irony are likely to be especially problematic when it comes to maintaining peer relationships. Negative peer encounters could lead to further withdrawal from social interactions. Increased isolation would further limit these children's exposure to figurative language and other social stimuli, preventing experiential learning, and potentially leading to further difficulties in social understanding. Indeed, shy children report poor friendship quality with their mutually identified best friends (Rubin, Wojslawowicz, Rose-Krasnor, Booth-LaForce, & Burgess, 2006). These peer difficulties are especially problematic, since having high quality friendships has been found to be a protective factor against developing internalizing problems, poor self esteem (Rubin, Dwyer, Booth-LaForce, Kim, & Krasnor, 2004) and symptoms of depression (Gazelle & Ladd, 2003), of which shy children are at risk of developing (Coplan & Armer, 2005; Coplan, Closson, & Arbeau, 2007; Prior, Smart, Sanson, & Oberklaid, 2000). Improving communicative competence, therefore, could be one avenue through

which to improve shy children's peer relationships, and to reduce other negative psychological and social sequelae of shyness.

In sum, although children who reported higher levels of social anxiety symptoms and shy negative affect comprehended ironic language, they judged ironic speakers to be meaner than did their peers. This negative perception of others' attitudes in social situations is likely to lead to misunderstandings or negative social interactions which may further limit shy children's exposure to figurative language. Improving figurative language understanding and pragmatic competence are avenues worthy of exploration for reducing the negative social outcomes experienced by these at risk youngsters.

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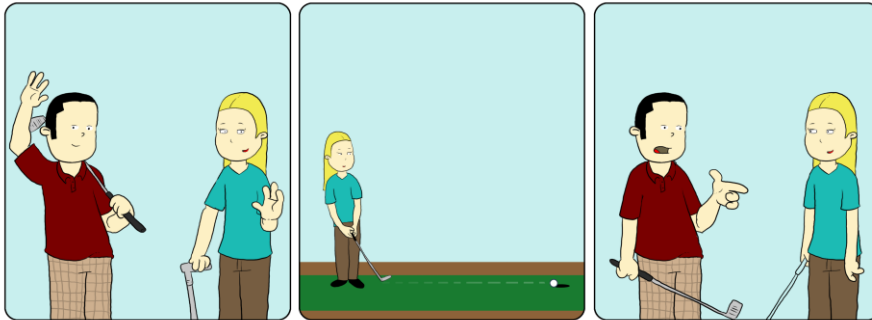
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## Appendix A

### Sample Verbal Irony Vignette

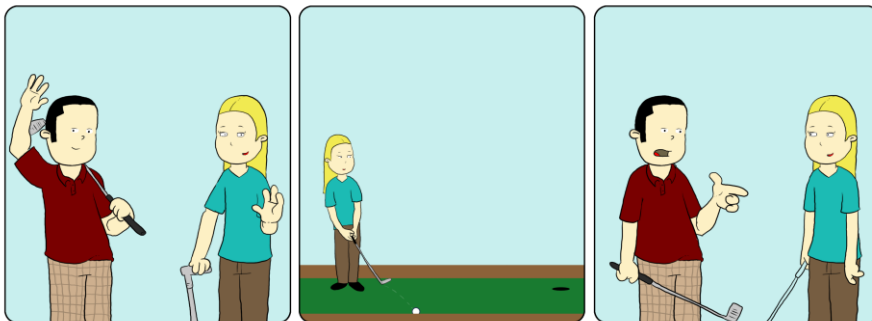
#### Positive Context



**Literal compliment.** ‘Chris and Tara are playing mini-golf on a field trip. They are on the same team. Tara thinks she is a really good mini-golf player. Tara hits the ball and he scores a hole-in-one. Chris says, “Boy, that was an awesome shot!”’

**Ironic compliment.** ‘Chris and Tara are playing mini-golf on a field trip. They are on the same team. Tara thinks she is a really awful mini-golf player. Tara hits the ball and he scores a hole-in-one. Chris says: “Boy, that was an awful shot!”’

#### Negative Context



**Literal criticism.** ‘Chris and Tara are playing mini-golf on a field trip. They are on the same team. Tara thinks she is a really awful mini-golf player. Tara hits the ball and completely misses the hole. Chris says, “Boy, that was an awful shot!”’

**Ironic criticism.** ‘Chris and Tara are playing mini-golf on a field trip. They are on the same team. Tara thinks she is a really good mini-golf player. Tara hits the ball and completely misses the hole. Chris says: “Boy, that was an awesome shot!”’

## Appendix B

### Sample Second Order False Belief Vignette

Story text and questions from Coull, Leekam, and Bennett (2006, p.563) – based on Sullivan, Zaitchik, and Tager-Flusberg, 1994.



‘Tonight it is Peter’s birthday and Mum is surprising him with a puppy. She has hidden the puppy in the basement. Peter says, “Mum, I really hope you get me a puppy for my birthday.” Remember, Mum wants to surprise Peter with a puppy. So, instead of telling Peter she got him a puppy, Mum says, “Sorry Peter, I did not get you a puppy for your birthday. I got you a really great toy instead.”’

Probe question 1: ‘Did Mum really get Peter a toy for his birthday?’

Probe question 2: ‘Did Mum tell Peter she got him a toy for his birthday?’

Probe question 3: ‘Why did Mum tell Peter that she got him a toy for his birthday?’

‘Now, Peter says to Mum, “I’m going outside to play.” On his way outside, Peter goes to the basement to fetch his football. In the basement room, Peter finds the birthday puppy! Peter says to himself, “Wow, Mum didn’t get me a toy, she really got me a puppy for my birthday.” Mum does not see Peter go down to the basement and find the birthday puppy.’

Nonlinguistic control question: ‘Does Peter know that his Mum got him a puppy for his birthday?’

‘Now, the doorbell rings, ding-a-ling! Peter’s grandmother is at the door to find to bring the cake for the party. Grandma asks Mum, “Does Peter know what you really got him for his birthday?”’

Second-order ignorance question: ‘What does Mum say to Grandma?’

Memory aid: ‘Now remember, Mum does not know that Peter saw what she got him for his birthday.’

‘Then, Grandma says to Mum, “What does Peter think you got him for his birthday?”’

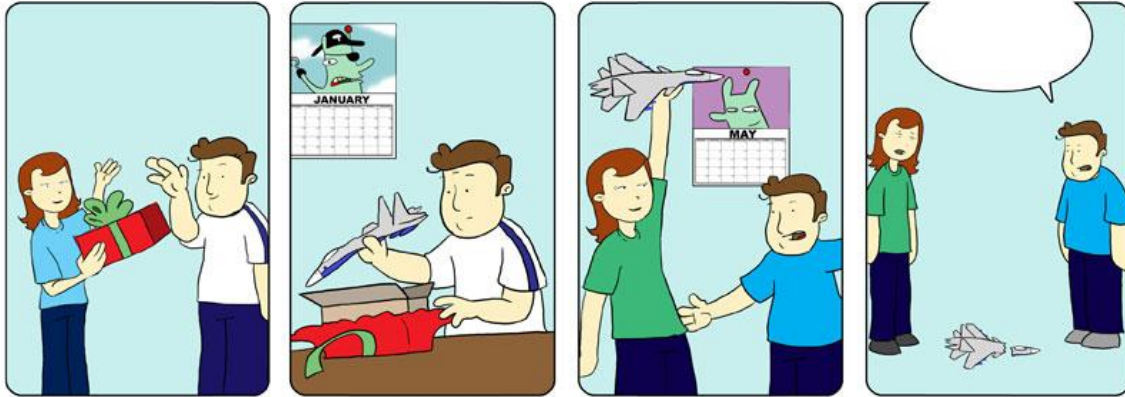
Second-order false-belief question: ‘What does Mum say to Grandma?’

Justification question: ‘Why does Mum say that?’

## Appendix C

### Sample Faux Pas Vignette

Story text from Baron-Cohen, O’Riordan, Stone, James, and Plaisted (1999, p.416) and questions adapted from those of Banerjee (2000).



‘This is Jeff and this is Cara. Cara bought Jeff a toy airplane for her birthday. A few months later, they were playing with it, and Cara accidentally dropped it. “Don’t worry” said Jeff, “I never liked it anyway. Someone gave it to me for my birthday.”’

‘Did somebody say something wrong in this story? Who?’ (Next questions only asked if the first two were answered correctly). ‘Did Jeff upset Cara on purpose? How do you know that Jeff [child’s response]? What did Cara give Jeff for his birthday? Did Jeff remember Cara had given him the toy airplane for his birthday?’