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Shy children's understanding of irony: Better comprehension does not always mean better socio-emotional functioning

Abstract

Childhood shyness is a risk factor for negative socio-emotional outcomes including loneliness and depression. Childhood shyness has also been found to relate to various aspects of pragmatic language. For instance, shyer children rate ironic criticisms (i.e., where a speaker's intended meaning is the opposite of what is literally said) as meaner than do less shy children. This study examined whether relations between shyness and socio-emotional functioning (i.e., loneliness, depression, peer experiences) in children (9-12 years old; $N = 169$) were moderated by irony comprehension ability. Using a series of vignettes and self-report measures, it was found that shy children with better irony comprehension skill reported increased loneliness and depression symptoms, as well as fewer prosocial experiences with peers. Similarly, for girls, better comprehension strengthened the relationship between shyness and peer victimization. In contrast, for shy boys, better irony comprehension was associated with a reduction in peer victimization. Thus, for certain vulnerable populations, having better socio-communicative skills may not be advantageous. (160 words)

KEYWORDS: shyness; verbal irony; pragmatic competence; communication; social anxiety; sarcasm

Shyness refers to a temperamental trait involving wariness, self-consciousness, embarrassment, and discomfort when faced with social situations that are novel or involve perceived evaluation (Rubin, Coplan, & Bowker, 2009; Crozier, 1995). Shy children (also termed anxious solitary or socially reticent children) are thought to experience a conflict in approach and avoidance motivations, such that although they desire to approach their peers, they tend to withdraw due to anxiety (Asendorpf, 1990; Gazelle & Ladd, 2003). Shyness elevates children's risk for later social and psychological difficulties (Booth-LaForce & Oxford, 2008; Fordham & Stevenson-Hinde, 1999; Gazelle & Ladd, 2003; Rubin et al., 2004; Rubin, Wojslawowicz, Rose-Krasnor, Booth-LaForce, & Burgess, 2006). For instance, youth who report high levels of shyness view themselves more negatively (Cheek & Melchior, 1990; Crozier, 1995) and report greater levels of worry, depression, and symptoms of anxiety disorders than those with lower shyness levels (Muris, Merkelbach, Wessel, & van de Ven, 1999). A number of research groups have found a stronger association between shyness and internalizing problems for school-age boys (e.g., Colder, Mott, & Berman, 2002; Coplan, Closson, & Arbeau, 2007; Eisenberg, Shepard, Fabes, Murphy, & Guthrie, 1998; Rubin, Chen, & Hymel, 1993; although see Crick & Ladd, 1993), potentially due to parents' acceptance of shy behaviours in girls, but discouragement in boys (e.g., Coplan, Prakash, O'Neil, & Armer, 2004; Stevenson-Hinde & Glover, 1996). In terms of social difficulties, shy children often experience poor friendship quality, peer exclusion, and victimization, with these social difficulties relating to many of the negative psychological outcomes that are commonly associated with shyness, including loneliness and depression (Crick & Grotpeter, 1996; Gazelle & Ladd, 2003; Rubin et al, 2006).

However, not all shy children experience such negative outcomes and there are a number of factors that influence the degree to which shyness relates to negative socio-emotional

functioning, such as peer support (Murberg, 2009) and high quality friendships (Fordham & Stevenson-Hinde, 1999). Understanding the individual differences that influence the impact shyness has for a child's socio-emotional functioning has both theoretical and applied relevance. The present study explored whether communicative skill, in particular verbal irony comprehension, affects the relationship between shyness and social and emotional difficulties, and further, whether the pattern of association is similar for girls and boys. Past work has found that shyness is associated with weaker pragmatic language understanding (as assessed by a standardized pragmatic judgement subtest; Coplan & Weeks, 2009). However, it may be the case that those shy children with better communicative skills are more successful in their social interactions, which reduces their risk for negative social and emotional outcomes. Speaking to this notion, Coplan and Armer (2005) demonstrated that language skills moderate the associations between parent-rated shyness and teacher-rated asocial behaviour, teacher attention, and self-perceived competence: Four- to 6-year-olds who had stronger expressive language skills (as measured by a standardized expressive vocabulary test) at the beginning of the school year were somewhat protected from the negative psychosocial outcomes associated with shyness at the end of the preschool year. Furthermore, basic pragmatic skills, such as understanding social conventions, moderate the relationship between shyness and socio-emotional outcomes. For instance, Coplan and Weeks (2009) found that shy children (6 to 7 years old) with stronger pragmatic skills at the beginning of the school year demonstrated greater prosocial behaviour and lower loneliness and social anxiety at the end of year. Moreover, for boys, better pragmatic language skills were associated with a decrease in parent-reported shyness over time (Coplan & Weeks, 2009).

However, effective communication goes beyond knowledge of words and the appropriate social conventions of language. Much of what we say is ambiguous, such that the intended meaning of our statements cannot be gleaned by the literal meanings of the words alone. One example of this is figurative language (e.g., metaphor, hyperbole, and irony), where meaning is implied, rather than stated literally. Counterfactual verbal irony (i.e., sarcasm), where a speaker's intended meaning is directly opposite to the literal meaning of the spoken words (e.g., saying *"smooth move"* after a friend trips), is ranked as both the most discrepant and most socially-motivated form of figurative language. This language form can be used to criticize a person, where the intended meaning is negative or mocking (e.g., *"Boy, that was an awesome shot!"* when someone misses a goal), or compliment someone, where the intended meaning is positive (e.g., *"You sure are an awful gardener"* after someone shows you their award-winning roses). The teasing nature of ironic statements includes both elements of humour and aggression towards the same person (Shapiro, Baumeister, & Kessler, 1991).

There are different theories as to whether irony is processed similarly to non-ironic language (e.g., Gibbs, 1986) or as sequential process wherein the literal meaning is first accessed before the ironic interpretation (i.e., the graded salient hypothesis; Giora, 1997; 1999; Giora & Fein, 1999). Regardless of how irony is processed, children's comprehension of the different forms of counterfactual irony shows a developmental progression. Children begin to comprehend that a speaker's beliefs are opposite to the literal meaning of his or her statement for ironic criticisms at the age of 5-6 years (Climie & Pexman, 2008; Filippova & Astington, 2008), with other research showing some understanding in children as young as 3 years (Angeleri & Airenti, 2014). Children's comprehension of *ironic compliments* lags behind their comprehension of ironic criticisms, emerging between the ages of 7-12 years (Harris & Pexman, 2003; Mewhort-

Buist & Nilsen, 2013; Whalen & Pexman, 2010). While past work has not found gender differences in comprehension (Harris & Pexman, 2003), school-aged boys endorse more willingness to use sarcasm than do girls (Mewhort-Buist, Nilsen, & Bowman-Smith, 2018). Certainly, for adults, men enjoy sarcastic humour more than women and endorse using this language form more often than women (Drucker, Fein, Bergerbest, & Giora, 2014; Gibbs, 2000; Martin, Puhlik-Doris, Larsen, Gray, & Weir, 2003).

Children encounter verbal irony frequently, such as during conversations with their families (Pexman, Zdrazilova, McConnachie, Deater-Deckard, & Petrill, 2009; Recchia, Howe, Ross, & Alexander, 2010), in television programming (Dews & Winner, 1997), and within classroom settings (Piirainen-Marsh, 2011). Adults use irony in 8% of conversations with friends and strangers (Gibbs, 2000) and use figurative language more generally in almost all (94%) emails (though sarcasm is used less frequently than hyperbole; Whalen, Pexman, & Gill, 2009). However, it could be asked why people would choose to use this language form at all given the increased risk of misinterpretation.

Irony is used because it serves important social functions (Dews, Kaplan, & Winner, 1995; Dews & Winner, 1995). Speakers may use ironic compliments when they are envious of a listener's accomplishments (Dews et al, 1995; Pexman & Zvaigzne, 2004), to highlight a listener's unwarranted expectations of failure (Garmendia, 2010), or to convey both positive and negative messages simultaneously. Similarly, verbal irony may be a way of communicating failed expectations (Pexman, 2008). Aside from the social overtures present in the content and structure of the ironic utterance, irony serves social functions such as being humorous or jocular, mocking, distancing oneself emotionally, and softening insults (Dews, et al 1995; Dews & Winner, 1995; Gibbs & Izett, 1999, Pexman & Zvaigzne, 2004). The Tinge Hypothesis argues

that using verbal irony achieves the positive social goals of softening insults, saving face, and preserving relationships because the meaning of the ironic criticisms is muted by the literal word meaning (Dews & Winner, 1995). Thus, ironic criticisms are considered less negative than literal criticisms, thereby allowing speakers to state their opinions in a less aggressive manner, and ironic compliments are less positive than literal compliments. Though findings from a number of studies support the Tinge hypothesis (e.g., Dews et al, 1995; Dews & Winner, 1995; Harris & Pexman, 2003; Pexman & Glenwright, 2007; Pexman & Zvaigzne, 2004) there remains question as to whether the muting effect of irony occurs in all contexts. Some researchers have suggested that ironic utterances (ironic criticisms, in particular) are used to enhance the contempt communicated in an insult (Bowes & Katz 2011; Colston, 1997). Specifically, when irony is used to comment on morally contentious behaviour or character traits (e.g., Colston, 1997) or is embedded within already aggressive conflict discourses (Bowes & Katz, 2011), ironic criticisms are viewed as more contemptuous and mean than literal criticisms.

Children's irony understanding is related to other aspects of their socio-cognitive development (Matthews, Biney, & Abbot-Smith, 2018), such as representing other's mental states (Filippova & Astington, 2008; Massaro, Valle, & Marchetti, 2013) mental state vocabulary (Massaro, Valle, & Marchetti, 2014), and executive functioning (Filippova & Astington, 2008; Godbee & Porter, 2013). Moreover, considering the ubiquity of irony in children's everyday experiences, and its purported social functions, verbal irony understanding is relevant to the development of communicative and social competence. If a child is not able to appreciate the communicative function of ironic utterances, he or she may be at greater risk of social difficulties, in keeping with the finding that children's general pragmatic competence relates to their social standing (Conti-Ramsden & Botting, 2004), teachers (Coplan & Weeks, 2009), and

peers (Banerjee & Watling, 2005). Indeed, children referred for mental health services show poorer figurative language skills than their non-referred peers, with this skill predicting the youths' social cognitive maturity (Cohen, Farnia, & Im-Bolter, 2013; Im-Bolter, Cohen, & Farnia, 2013). The relation between verbal irony comprehension and social functioning may be particularly salient for shy individuals who have been found to interpret irony differently than their non-shy peers. For example, shy individuals view ironic speakers as meaner than do their non-shy peers when these speakers deliver both criticisms (in a school-aged sample; Mewhort-Buist & Nilsen, 2013) and compliments (in an adult sample; Mewhort-Buist & Nilsen, 2017). Similarly, 6 to 11-year-old children who show both social anxiety and shy negative affect demonstrate difficulty in appreciating other socio-communicative behaviour that relies on mental state understanding, such as faux pas (Banerjee & Henderson, 2001), with this skill holding a bidirectional relationship with peer relations (Banerjee, Watling, & Caputi, 2011).

The objective of the present work was to examine whether verbal irony comprehension ability moderated the relationship between shyness and poorer socio-emotional functioning and whether similar patterns existed for school-aged boys and girls. It was anticipated that elevated shyness would relate to elevated depression, loneliness and peer victimization. However, it was anticipated that shy children who had better verbal irony comprehension skills might have fewer socio-emotional difficulties (relative to shy children with weaker verbal irony comprehension). That is, successfully appreciating the intentions of speakers using this socially complex language form might better allow them to navigate their social worlds thereby leading to fewer socio-emotional difficulties. We also anticipated gender might interact with these relations. That is, given that shy boys are particularly at risk for internalizing problems (Coplan et al., 2007), and that boys in general are more likely to use verbal irony with social partners relative to girls

(Mewhort-Buist et al., 2018), strong verbal irony comprehension skills for shy boys may be an important protective factor, as it would allow them to more successfully enter a social group. In contrast, this pattern may not occur for girls who use verbal irony less frequently and tend to show fewer internalizing problems associated with shyness. Supporting this hypothesis, past work has found that basic pragmatic language skills moderate the relationship between shyness and negative social and emotional outcomes, particularly for boys (Coplan & Weeks, 2009). While we had anticipated that better verbal comprehension ability would be advantageous (as per the aforementioned work), past work has found that in some contexts better socio-cognitive skills have the potential to elevate sensitivity to negative information, such as criticism from others (Mizokawa & Lecce, 2017). Thus, better ability in detecting the ironic nature of statements, particularly those that are critical, may similarly operate as a risk factor for children. If this were the case, the results would be contrary to predictions above.

To address our aim, 9 to 12-year-old children completed a verbal irony task and completed a series of questionnaires assessing their level of shyness, loneliness, depression, and previous peer experiences (positive and negative). This age range was chosen since it is when children begin to comprehend ironic compliments, but would not yet be at ceiling for their comprehension of ironic criticisms (Climie & Pexman, 2008). Moreover, it is a time when a child's level of shyness is more stable than it is at early points in development (Karevold, Ystrom, Coplan, Sanson, & Mathiesen, 2012). During the verbal irony task, children saw and heard a series of vignettes depicting an interaction between two characters. Following an event in which a character demonstrated success or failure (e.g., a girl either scoring a hole-in-one or completely missing the hole during mini golf), another character made a remark that was either a criticism or compliment which sometimes used ironic language. Children's understanding of the

ironic speaker's belief and communicative intentions were examined. Hierarchical linear regressions were used to explore the potential 3-way interaction between gender, shyness and verbal irony comprehension on socio-emotional functioning, along with all possible 2-way interactions.

Method

Participants

Children, 9-12 years old, were recruited from elementary school classes (4rd-6th grade) within the school boards of a mid-sized Canadian city through information letters sent home to parents. Of the 182 children whose parents consented, two declined participation, and eleven were excluded due to missing significant aspects of the study (e.g., missing one testing session or neglecting to complete an entire questionnaire). Thus, 169 students were included in the analyses (M_{age} = 10 years, 6 months, *SD* = 10 months; 49% male). Eighty-six percent of participants were reported to have English as their first language[1]. Seventy-two percent of participants' mothers, and 68% of fathers had completed post-secondary education (college degree/diploma or higher).

Procedure

This work was part of a larger study on temperament and socio-communication that involved an individual session (socio-communicative tasks; 30-45 minutes) and a group testing session (questionnaires; 30-75 minutes). The verbal irony task, which was the primary measure of interest, was administered in the individual session.

Verbal Irony Task.

[1] Results did not differ when participants for whom English was not their first language were excluded, so they were included for all analyses.

Vignettes. Vignettes were revised from previous work (Mewhort-Buist & Nilsen, 2012) and involved twelve story scenarios in which two characters engaged in an activity (e.g., playing soccer). Four versions of each of the 12 scenario were used, such that the stories either included a negative context, wherein one character, the "target", failed at the activity (e.g., fails to score a goal by completely missing the net), or a positive context, wherein the target succeeded (e.g., scores the game winning goal). The other character, the "speaker", then made a statement about the target's performance that was either an ironic or literal criticism when in negative contexts or an ironic or literal compliment when embedded in positive contexts. See Appendix A for example story. In this way each scenario (e.g., mini golf scenario) was presented across participants in every context and statement type combination: ironic criticisms, literal criticisms, ironic compliments, literal compliments. More specifically, these combinations were counterbalanced across participants so that each participant was exposed to 12 scenarios, that is, three stories in each of the four conditions. Though children's irony comprehension score was based on the ironic trials only, literal trials were included to vary the type of statement made so participants did not experience only ironic remarks.

Gender of the speaker in the story was counterbalanced across participants for each statement type. Within each set, the stories were presented in a fixed order, with the stories distributed in a pseudo-randomized order, with the requirement that the same context/statement type did not occur three times in succession.

The stories, which were presented on a laptop, were narrated with a female voice (pre-recorded), accompanied by comics. The final statements made by the speaker characters, which involved an ironic/literal criticism/compliment, were delivered with appropriate intonation. That is, literal criticisms involved a blunt, sincere tone; ironic criticisms involved a mocking tone;

literal compliments had a pleasant, sincere tone; and ironic compliments used a pleasant, teasing tone. To assess the tone, the final statements from each story were isolated from the rest of the recording and presented without the comics to 10 graduate students who rated each statement as "literal" or "ironic". The ratings of literal and ironic statements significantly differed ($p < .001$), with raters correctly identifying literal or ironic statements based on speaker tone of voice for 95% and 97% of literal criticisms and compliments, respectively, and for 95% and 88% of ironic criticisms and compliments, respectively.

Verbal irony task administration. Children sat at a table with the laptop in front of them. The researcher informed them that they would be listening to a series of stories while looking at comic strips depicting the story events. The researcher then provided instruction on the use of the response options and rating scales, using scenarios that did not include any figurative language. Following the practice scenarios, the researcher presented the stories, by showing the comic strip and playing the story events through the recording via the computer (e.g., soccer scenario, ironic criticism: "John plays on a soccer team with Shannon. Shannon tells John she is a great soccer player. It is the last few minutes of a game. Shannon kicks the ball and misses the net. John says, "That was a *really* excellent play!"). The entire comic was displayed and remained visible while the children answered questions about the story, to serve as a memory aid. Children responded on the laptop by clicking on radio buttons associated with rating scales, which were adapted from Pexman, Glenwright, Hala, Kowbel, and Jungen (2006). For the first question, Speaker Belief, children indicated whether the speaker thought the object of the final statement was good or bad (e.g., Did John think Shannon as a good or bad soccer player?) by clicking a "thumb's up" or "thumb's down" image, with the words "good" and "bad" below the images. A response was accurate if, for criticisms, the child rated that the speaker thought the performance

of the target was bad. For compliments, children were accurate when they identified that the speaker thought the performance was good. The next question assessed children's understanding of the Communicative Intentions of the speaker. Children indicated whether the speaker intended to communicate his/her belief (e.g., Did John want Shannon to believe he thought she was a [child's answer: good or bad soccer player]?) with "yes", "no", or "I don't know". To be correct, children needed to indicate that the speaker intended to communicate his/her true belief (i.e., which would distinguish the statement from a lie). Children earned one point for correctly answering "yes" to this question[2].

A total irony score was created by awarding one point for each trial on which the participant correctly identified the speaker's belief, and an additional point for each trial on which the participant correctly identified the speaker's intent. The second point was only awarded when the participant got both the speaker belief and speaker intent questions correct (as a child would need to comprehend speaker's belief to accurately appreciate the belief the speaker intended to convey). Therefore, in total, participants could earn up to twelve points (two points for each of three ironic criticism stories and three ironic compliment stories).

Receptive Vocabulary. To control for basic language skills when examining relations between the measures, children were administered the Picture Vocabulary subtest of the Test of Language Development-Intermediate, 4th Edition (TOLD-I:4; Hammill & Newcomer, 2008). This task, with a total possible score of 80, required that children point to a picture that corresponded to a two-word phrase.

Socio-emotional Measures.

[2] Children were also asked about speaker attitude, but this question was not included in the composite as there was not one correct response to this question.

Shyness. Children completed the Children's Shyness Questionnaire (CSQ; Crozier, 1995), a self-report questionnaire assessing both fearful and self-conscious aspects of shyness. This task was originally developed using words generated by children to describe the phrase "being shy", and, as such, demonstrates good face validity for this age group. The resulting scale consists of 26 statements with children responding whether the statement was true for them. This measure has been shown to have good internal consistency, with a Cronbach's α value of .82 (Crozier, 1995). In the present study, seven items originally phrased as questions were reworded for this study to make all items consistently first person statements, (e.g., the item, "Do you blush a lot?" was reworded to "I blush a lot") and specific terms were changed to make items more applicable to North American school children (e.g., "Head Teacher" was changed to "Principal"). The responses options were 0 (*No*), 1 (*don't know*), or 2 (*Yes*), with items reversed scored where appropriate. An average score was used to account for missing items, which represented 1.37% of the responses to this measure.

Loneliness. Loneliness was assessed using the Loneliness Questionnaire (Asher & Wheeler, 1985), with 16 self-report items and 8 filler items. Children rated how true each statement was using a 5-pt Likert scale ranging from 4 (*That's not true at all about me*) to 0 (*That's always true about me*), with the higher scores representing more feelings of loneliness (items reverse-coded as appropriate). This measure has been shown to have good internal reliability (Cronbach's $\alpha = .90$), and has been shown to correlate with responses to a single item measure of loneliness in a large scale national survey (Asher & Wheeler, 1985). Scores were averaged to create an overall score, to account for missing items, which represented 2.76% of the responses.

Depression symptoms. The Children's Depression Inventory 2 (CDI2, Kovacs, 2011) was used to assess depressive symptoms. This measure, developed for children aged 7-17 years, consists of 28 groups of three statements, for which the child chooses the statement that best represents his or her feelings over the past two weeks. The CDI2 has good psychometric properties for children aged 7-12, with a Cronbach's α value of .90 for the overall depression scale (Kovacs, 2011). An average score (with higher scores representing more depressive feelings) was computed to account for missing items, which represented 1.14% of the responses.

Peer Experiences. To examine the impact of verbal irony comprehension on peer relationships, the Social Experiences Questionnaire (SEQ; Crick & Grotpeter, 1996) was used. The SEQ is a self-report measure that assesses the degree to which children experience peer victimization, or, conversely, receive prosocial advances from others. This 15-item measure loads onto three factors, termed "relational victimization" (5 items), "overt victimization" (5 items), and "prosocial recipient" (5 items). The relational victimization subscale measures the degree to which children are actively isolated or manipulated in a social manner. The overt victimization subscale measures the degree to which children are victims of physical aggression and the prosocial scale assesses the degree to which children experience positive overtures from others. These subscales were analyzed separately due to the gender differences found in previous work (Crick & Bigbee, 1998; Crick & Grotpeter, 1995). Children rated how often each situation occurs for them using a 5-pt Likert scale ranging from 4 (*All the time*) to 0 (*Never*) with higher scores representing more peer victimization. Scores were averaged to account for missing data, which represented 1.66% of item responses.

Results

Preliminary Analyses

Statistical outliers for the predictor variables were Winsorized to be within 3 standard deviations of the mean (TOLD-I:4: n = 3, CSQ: n = 1, Loneliness n = 1, CDI2: n = 3, SEQ: n = 2-4 depending on subscale). Children's responses and Cronbach's alphas for the measures are presented on Table 1. Correlations between measures are shown on Table 2. The accuracy rates and pattern of responses on the verbal irony task were consistent with past work wherein children showed more difficulty identifying ironic speakers' beliefs and intentions than those of the literal speakers (Harris & Pexman, 2003; Pexman & Glenwright, 2007; see Appendix B).

Does Verbal Irony Comprehension Moderate Relations Between Shyness and Socio-emotional outcomes?

Hierarchical linear regressions were used to explore the potential 2 and 3-way interactions between gender, shyness and irony comprehension on each socio-emotional measure. Predictors were centred prior to calculating interaction variables. Age, child's gender and vocabulary scores were entered on the first step, followed by shyness on the second step, verbal irony score on the third step, all possible two-way interactions (i.e., shyness x verbal irony, gender x shyness, gender x verbal irony) on the fourth step, and the three-way interaction between shyness, gender and verbal irony comprehension on the fifth step (Table 3).[3]

Loneliness. Shyness was a significant positive predictor of loneliness (β = 0.434, p < .001), explaining 9.0% of the variance. Although the model including shyness, age, gender and vocabulary (i.e., Step 2) fit the data well (F(4, 164) = 7.151, p < .001), there was a marginal improvement in predicting the variance in loneliness when the two-way interaction between

[3] While the two statement types that made up the overall irony score (i.e., criticisms and compliments) were related (p=.001), data were also analysed separately to determine if one statement type played a greater role in the findings than the other. Results for the ironic criticisms showed an identical pattern to that of the full composite, while ironic compliments yielded largely null findings. Thus, the pattern reported are likely driven mainly by children's comprehension of ironic criticisms.

shyness and the verbal irony score was added at the 4th step ($F(8,160) = 4.675$, $p < .001$; $\Delta R^2 = .039$, $p = .058$). Examination of the individual predictors revealed a significant two-way interaction between shyness and verbal irony ($\beta = .211$, $p = .008$), which explained 3.6% of the variance. Tests of simple slopes suggested that, at low levels of verbal irony comprehension, the strength of the relation between shyness and loneliness was reduced ($\beta = .218$, $p = .029$), whereas the relation between shyness and loneliness was strong at higher levels of verbal irony comprehension ($\beta = .581$, $p < .001$; Figure 1). Thus, for shy children, strong verbal irony comprehension increases the degree to which they experience loneliness.

Depression symptoms. Shyness was a significant positive predictor of depression symptoms ($\beta = .544$, $p < .001$), which explained 14.2% of the variance. While a model including only shyness, age, gender and vocabulary (i.e., Step 2) fit the data well ($F(4, 164) = 12.156$, $p < .001$), the model predicted more of the variance in depression symptoms when the two-way interaction between shyness and the verbal irony score was added at the 4th step ($F(8,160) = 7.841$, $p < .001$; $\Delta R^2 = .042$, $p = .027$). Examination of the predictors revealed that there was a significant two-way interaction between shyness and the verbal irony score in the prediction of depression symptoms ($\beta = .216$, $p = .004$), which explained 3.8% of the variance. As can be seen in Figure 2, higher verbal irony comprehension was associated with an increase in the relation between shyness and depression symptoms, similar to the findings for loneliness. Likewise, tests of simple slopes suggested that at low levels of verbal irony comprehension the strength of the relation between shyness and depression symptoms was reduced ($\beta = .311$, $p = .001$), whereas the relation between shyness and depression symptoms was strong at higher levels of verbal irony comprehension ($\beta = .678$, $p < .001$).

Peer Experiences.

Overt victimization. Shyness was a significant positive predictor of self-reported overt victimization, explaining 7.1% of the variance (β = .386, p < .001). Gender was also a significant predictor (β = .154, p = .037), which explained 2.3% of the variance, with boys reporting greater overt victimization than girls. While the model including shyness, age, gender and vocabulary (i.e., Step 2) fit the data well (F(4, 164) = 5.111, p = .001), the model predicted more of the variance in overt victimization scores when the three-way interaction between gender, shyness and the verbal irony score was added to the model at the 5th step (F(9,159) = 3.822, p < .001; ΔR^2 = .056, p = .001). This three-way interaction (β = -.382, p = .001) explained 5.6% of the variance.

To explore this three-way interaction, separate hierarchical regressions were conducted split by gender. For girls, there was a significant two-way interaction between shyness and verbal irony comprehension (β = .229, p = .026), which explained 5.1% of the variance in overt victimization. Figure 3 (a) shows that better verbal irony comprehension strengthened the relationship between shyness and overt victimization for girls. Tests of simple slopes suggested that at low levels of verbal irony comprehension, the relation between shyness and overt victimization was not significant (β = .148, p = .304), whereas the relation between shyness and overt victimization was strong at higher levels of irony comprehension (β = .613, p < .001). There was also a significant two-way interaction between shyness and verbal irony score for boys (β = -.290, p = .027; 5.7% of variance explained); however, the direction of effects was opposite to that of girls. As shown in Figure 3b, better verbal irony comprehension was found to weaken the relation between shyness and overt victimization, such that increasing shyness was no longer associated with increased overt victimization (simple slope β = -.066, p = .710). In contrast, at low levels of verbal irony comprehension, there was a strong relation between

shyness and overt victimization (simple slope, β = .494, p = .002). In summary, for shy girls, results were similar to those for loneliness and depression scores, such that strong verbal irony comprehension increased experience of negative peer encounters. In contrast, for boys, better verbal irony comprehension eliminated the relation between shyness and overt victimization.

Relational victimization. Shyness was a significant positive predictor of self-reported relational victimization, explaining 9.3% of the variance in this measure (β = .441, p < .001). While the model including shyness, age, gender and vocabulary (Step 2) fit the data well (F(4, 164) = 4.015, p = .004), the model predicted more of the variance in relational victimization scores when the three-way interaction between gender, shyness and the verbal irony score was added to the model at the 5th step (F(9, 159) = 3.250, p = .001; ΔR^2 = .038, p = .008). The three-way (β = -.315, p = .008) explained 3.8% of the variance in relational victimization scores.

To explore the three-way interaction further, separate hierarchical regressions were conducted split by gender. When this was done, there was no significant interaction between verbal irony comprehension and shyness for girls (ΔR^2 = .026, p = .117). In contrast, for boys, a significant two-way interaction was found between shyness and verbal irony comprehension (β = -.261, p = .046, 4.6% variance explained), as can be seen in Figure 4, good verbal irony comprehension reduced the relation between shyness and relational victimization, similar to the results for overt victimization. Tests of simple slopes suggested that for boys at high levels of verbal irony comprehension, the relation between shyness and relational victimization was eliminated (β = -.075, p = .673), whereas the relation between shyness and victimization was strong at lower levels of verbal irony comprehension (β = .429, p = .006).

Prosocial responses. Shyness was a significant negative predictor of ratings of prosocial responses from peers (β = -.281, p < .001), which explained 7.6% of the variance. While a model

including only shyness, age, gender and vocabulary (i.e., Step 2) fit the data well ($F(4, 164) = 3.623$, $p = .007$), the model predicted more of the variance in prosocial experiences when all the possible two-way interactions were added at the 4th step ($F(8,160) = 3.527$, $p = .001$; $\Delta R^2 = .067$, $p = .007$). Examination of the predictors revealed that there was a significant two-way interaction between gender and verbal irony comprehension ability ($\beta = -.295$, $p = .006$), which explained 4.1% of the variance. The data were split by gender, and the regression was re-run with age and vocabulary on the first step, shyness on the second step and verbal irony on the third step. There was no significant relationship between verbal irony comprehension and ratings of prosocial responses for girls ($p = .367$). In contrast, for boys, increasing verbal irony comprehension ability was related to decreased ratings of prosocial responses from peers ($\beta = -.247$, $p = .040$).

Central to the research question, there was a significant two-way interaction between shyness and the verbal irony score in the prediction of ratings of prosocial responses from peers ($\beta = -.249$, $p = .002$), which explained 5.0% of the variance. As can be seen in Figure 5, for children who were lower in verbal irony comprehension ability, there was no significant relationship between shyness and ratings of prosocial responses by peers ($p = .209$). However, at high levels of verbal irony comprehension ability, increasing shyness was significantly related to decreases in perceptions of prosocial responses from peers ($\beta = -.460$, $p < .001$).

Discussion

The present work explored the potential moderating role verbal irony comprehension ability has for the relationship between shyness and socio-emotional functioning. Interestingly, better verbal irony comprehension skills strengthened the relationship between shyness and symptoms of loneliness and depression. Similarly, in terms of negative peer interactions, for girls, higher verbal irony comprehension ability was associated with an increase in the strength

of the relationship between shyness and overt victimization. A consistent pattern was shown for positive peer interactions wherein shyer children with better verbal irony comprehension skills reported fewer prosocial responses from peers.

Although these findings did not fit with our initial assumption that better irony comprehension skills would result in better socio-emotional functioning, they are consistent with a growing body of research demonstrating that proficiency in socio-cognitive skills may increase the risk for the development of negative outcomes in vulnerable populations. For example, in their prospective, longitudinal study, Hoglund, Lalonde and Leadbeater (2008) demonstrated that children who were rejected or neglected by their peers had an increased risk of demonstrating aggression, anxiety, sadness, and social withdrawal when they also had strong interpersonal perspective co-ordination. Interpersonal perspective coordination refers to the awareness of others' emotions and motives during social interactions; therefore, this skill may lead children to be more sensitive to negativity from their peers. Of note, the direct effects of strong interpersonal perspective coordination were in-line with more traditional views that better socio-cognitive skills yield positive outcomes. It was only when looking at the relation between peer rejection/neglect and emotional problems that the risk moderation pattern emerged. Thus, whilst conferring social and emotional benefits broadly, strong social cognition may have a downside for vulnerable children. In the present findings, those shy children who have good verbal irony understanding may be more aware of their social challenges and possible lower social standing. Supporting this notion, it has been demonstrated that better theory of mind skills in preschool children predicts greater sensitivity to teacher criticism (Dunn, 1995; Cutting & Dunn, 2002). In addition, young school-aged children with better theory of mind skills rate their abilities more negatively than their peers with weak theory of mind skills following criticism from a teacher

(Mizokawa & Lecce, 2017). Whereas for some children this enhanced sensitivity to criticism may provide some benefit (such as enhanced academic achievement; Lecce, Caputi, & Hughes, 2011), for vulnerable populations such benefits may not accrued.

However, it may also be the case that certain characteristics of the shy children who experience worse socio-emotional functioning facilitate better verbal irony comprehension ability. For instance, in adult populations, those individuals who are high on both shyness and sociability experience the greatest disturbance across cognitive, behavioural and somatic components of social anxiety (i.e., conflicted shyness; Poole, Lieshout, & Schmidt, 2017). Thus, in the present work, it may be that the shy children who report the most socio-emotional difficulties are those who experience conflicted shyness wherein they are socially inhibited, but also socially interested. It may be that this latter characteristic, social interest, leads children to be more observant of social interactions which results in better verbal irony comprehension. Certainly, there is evidence to suggest that having a shy temperament may result in better understanding of other's minds due to increased opportunity for observing others. For instance, children with a shy temperament at 18 months showed better reasoning of other's mental states when 3 years old (Mink, Henning, & Aschersleben, 2014) and shyer preschoolers demonstrate better theory of mind (LaBounty, Bosse, Savicki, King & Eisenstat, 2017). Within adulthood, those individuals with elevated social anxiety show an over-interpretation of others' mental states (Hezel & McNally, 2014; Washburn, Wilson, Roes, Rnic, Harkness, 2016). It would be of interest to know the impact of such (over)sensitivity. That is, similar to the present findings, such a processing style might relate to worse socio-emotional functioning. It is also possible the findings reflect the cognitive biases often associated with social reticence. That is, children who are socially anxious have been shown to interpret non-hostile or ambiguous situations as

threatening (e.g., Bell-Dolan, 1995; Stopa & Clark, 2000). In the case of ironic criticisms in particular, interpreting this ambiguous utterance as hostile could mean children are better able to identify sarcastic intent (i.e., versus interpreting statements as a 'white lie'). Regardless of the interpretation, results highlight the need to consider multiple child characteristics before assuming that strong socio-communicative skills are universally related to better socio-emotional functioning.

Whereas the results for loneliness and depression did not show gender differences, the results with respect to the negative peer experiences were different for boys and girls, potentially due to the different social norms for girls and boys at this age. When looking specifically at overt victimization, distinct patterns for each gender: for girls, better verbal irony comprehension related to an increase in the strength of the relation between shyness and victimization; while for shy boys, verbal irony comprehension was protective, with strong verbal irony comprehension eliminating the relation between shyness and overt victimization. Similarly, when looking at relational victimization, good verbal irony comprehension was protective for shy boys, in that those shy boys who had better verbal irony comprehension were found to experience lower levels of relational victimization, whereas shyness did not interact with irony comprehension skill for girls in predicting relational victimization.

These differential gender results may reflect an important role that verbal irony comprehension ability may play in male relationships. There is research in the adult literature to suggest that men enjoy sarcastic humour more than women, and that both genders prefer sarcasm that is directed at men (Drucker, Fein, Bergerbest, & Giora, 2014). Gibbs (2000) also found that men endorse making more sarcastic remarks than do women, which matches general perceptions that men are more likely to make ironic statements (Colston & Lee, 2004) as well as recent

findings that school-aged boys indicate more willingness to use sarcasm (Mewhort-Buist et al., 2018). As verbal irony use is related to gender-typical behaviour for boys, the gender differences in peer victimization may be driven by the social implications of acting in a gender-typical (or atypical) way.

Moreover, it has been postulated that boys experience greater emotional and social difficulties as a result of shyness because the behaviours associated with shyness contradict typical male gender norms of dominance and social assertion (e.g., Rubin & Coplan, 2004). Indeed, a stronger association between shyness and internalizing problems has been found for boys (Colder et al., 2002; Coplan et al., 2007; Coplan & Weeks, 2009; Eisenberg et al, 1998; Gest, 1997; Kienbaum, Volland, & Ulrich, 2001; Rubin et al, 1993; Stevenson-Hinde & Glover, 1996; although see Gazelle, Peter, & Karkavandi, 2014 for a critique of this view). There is some evidence to show that parents accept/reward shy behaviours in girls, whilst discouraging or negatively responding to similar behaviours in boys, particularly for moderately shy children (e.g., Coplan et al, 2004; Stevenson-Hinde & Glover, 1996). Furthermore, boys tend to socialize in larger groups engaging in physical activity (Maccoby, 1990; 1995), which may be intimidating for shy children, making it more difficult for them to integrate in same-gendered peer groups (Gazelle & Ladd, 2003). Thus, competence with interpreting verbal irony may allow shy boys to better enter the social milieu of their same-sex peer groups, overcoming some of the above barriers to social inclusion. In sum, if the use of verbal irony and sarcasm corresponds to gender norms for boys, but runs contrary to gender norms for girls, it makes sense that verbal irony comprehension skills would be related to decreased victimization for boys, and increased negative experiences for girls, as was observed in this study. However, when examining children's prosocial experiences, an opposite finding emerged wherein for boys (not girls) better

irony comprehension skills was associated with fewer prosocial responses from peers. One explanation for this finding is that the specific behaviours being asked about in this scale (i.e., prosocial behaviours) are ones that conform to more typical behaviour for girls (Holmgren, Eisenberg, & Fabes, 1998; Rose & Rudolph, 2006; Zimmer-Gembeck, Geiger, & Crick, 2005). Thus, this pattern may too reflect a (mis)match between a particular skill such as verbal irony comprehension and gender-typical social behaviour.

While providing some interesting findings related to the impact of socio-communicative skills for temperamentally shy children, this study is not without its limitations. First, we have conceptualized children's performance on the verbal irony task as their ability to draw inferences generally. However, it is important to note that this score was comprised of both ironic criticisms and ironic compliments. Though children's comprehension of ironic criticisms and compliments were related, it may be the case that sensitivity to ironic criticisms operates differently than sensitivity to ironic compliments. Certainly past work has found that children interpret the humor irony differently for criticisms versus praise (Filippova, 2014). With respect to the present questions, greater access to the inferences of ironic criticisms may be more detrimental to socio-emotional functioning as, when successfully comprehended, these statements convey more negative information. Indeed, when comprehension of these two statement types was analyzed separately, the results for ironic criticisms was parallel to that of the overall irony score whereas the results from ironic compliments yielded non-significant results. However, we are hesitant to make strong conclusions about this discrepancy as the non-significant effects may be due to lower performance generally for ironic compliments. Future work further exploring the impact of accessing negative versus positive communicative intentions on socio-emotional functioning would be useful for clarifying this issue.

Second, consistent with much of the verbal irony literature (e.g., Filippova & Astington, 2008; Pexman & Glenwright, 2007), the current study used a third person perspective paradigm. This format is easy to control and deliver. Yet, to get a deeper understanding of how verbal irony use relates to interpersonal relationships, it would be useful to explore how children respond when verbal irony is directed at them. That is, enhanced understanding of the critical aspects of ironic language may have a more detrimental impact on a child's emotional state when they are the recipient of an ironic remark as opposed to merely observing an interaction. Moreover, if a child has particular biases (e.g., with respect to their views of themselves/others), these might play out to a greater extent when interpreting statements directed at them versus those directed at others. Future work using confederates or computer-mediated interactions could be used to explore children's irony understanding when immersed in the interaction. Another limitation is the reliance on self-report measures for the assessment of socio-emotional variables. Much of the social withdrawal and shyness literature has used peer-nomination strategies to measure shyness and social variables (e.g., Gazelle & Ladd, 2003). Nevertheless, the relations between shyness and socio-emotional difficulties found in the current study were consistent with the results found using peer nomination in other studies (e.g., Gazelle & Ladd, 2003; Rubin et al, 2006). In addition, the speaker intent question (e.g. Did Conner want Lucy to believe that he thought the cake was bad?) was linguistically complex, which may have been difficult for children to understand. This in and of itself would not necessarily explain the shyness effects that emerged, however, it would be important to rule out that effects were due to the stimuli as opposed to the wording of questions. It is also important to note that as data was collected concurrently, any notion about the direction of results is speculative. It would be of interest for future work to involve longitudinal methodology to fully appreciate how these relations evolve over time.

Finally, a large amount of variance in the outcome measures was left unexplained, which suggests that there are a number of other contributing factors to children's socio-emotional functioning.

In conclusion, verbal irony comprehension ability moderated the relationship between shyness and symptoms of loneliness and depression, interestingly, with better skills relating to socio-emotional difficulties for shy children. Furthermore, for girls, verbal irony comprehension skill moderated the relationship between shyness and overt peer victimization, in the same negative direction. For this vulnerable population, having better skills may be representative of more sensitivity to the social sphere within which they face challenges. In contrast, for shy boys, better verbal irony comprehension was associated with lower victimization. It would be interesting to extend this work through an examination as to how shy children form inferences for more subtle forms of irony (e.g., such as hyperbole or jocularity) and whether greater sensitivity leads to similar outcomes as demonstrated here or functions in more advantageous ways. Moreover, continued research into the varied influences of intra-child factors and environmental factors will shed light on developmental trajectories of at-risk children.

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Table 1.

Children's responses on the verbal irony task and socio-emotional questionnaires

	M (SD)	Cronbach's alpha
Age	10 yrs; 6 mos (10 mos)	
Verbal Irony Score (/12)	6.21 (2.80)	
Receptive Vocabulary (TOLD-I:4)	46.44 (9.45)	
Shyness (CSQ)	.77 (.31)	.82
Loneliness (LQ)	.85 (.62)	.89
Depression (CDI2)	.23 (.22)	.88
Peer Experiences (SEQ)		
Over Victimization (SEQ-OV)	.63 (.69)	.80
Relational Victimization (SEQ-R)	.73 (.76)	.81
Prosocial Responses	2.84 (.87)	.84

Table 2.

Bivariate correlations between measures

	Vocab	Shyness	Loneliness	Depression	Overt Victimization	Relational Victimization	Prosocial Experiences	Verbal Irony
Age	.264***	-.112	-.016	-.087	.000	.019	-.037	.140
Vocabulary		-.126	-.078	-.044	-.030	.000	-.052	.334***
Shyness			.382***	.465***	.283***	.291***	-.255***	-.080
Loneliness				.603***	.490***	.587***	-.629***	.007
Depression					.421***	.455***	-.476***	.071
Overt victimization						.755***	-.330***	.000
Relational victimization							-.413***	.029
Prosocial Responses								-.051

† = $p < .100$, * = $p < .050$, ** = $p < .010$, *** = $p < .001$

Table 3.

Summary of regression analyses

Factors	Statistic	Loneliness	Depression	Overt Victimization	Relational Victimization	Prosocial Responses
Step 1 (Age, Gender, Vocab)	R^2	.007	.010	.019	.000	.005
Step 2 (Shyness)	R^2	.149	.229	.111	.089	.081
	ΔR^2	.141***	.219***	.092***	.089***	.076***
Step 3 (Verbal Irony)	R^2	.151	.239	.111	.091	.083
	ΔR^2	.002	.011	.000	.001	.001
Step 4 (Shyness x Gender/ Shyness x Verbal Irony/ Gender x Verbal Irony)	R^2	.189	.282	.122	.117	.150
	ΔR^2	.039†	.042*	.011	.027	.067**
Step 5 (Shyness x Gender x Verbal Irony)	R^2	.190	.282	.178	.155	.150
	ΔR^2	.000	.000	.056**	.038**	.000

Note: All values are derived from the full model with all variables included. † = $p < .100$, * = $p < .050$, ** = $p < .010$, *** = $p < .001$.

Figures

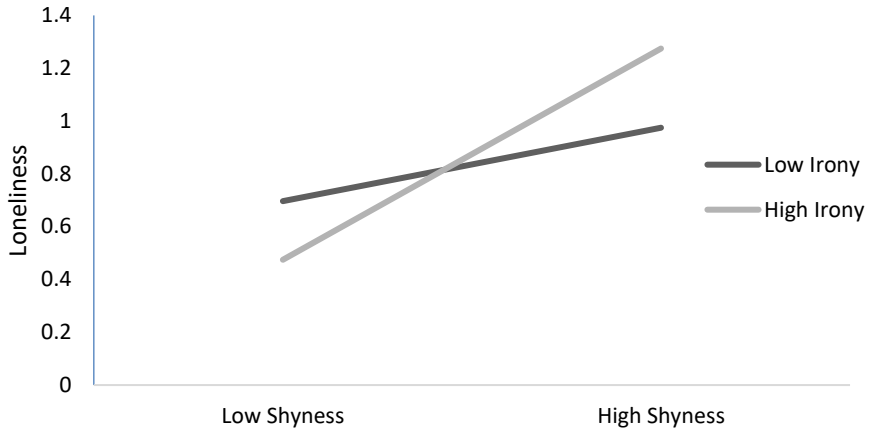


Figure 1. Two-way interaction between shyness and irony score in predicting loneliness.

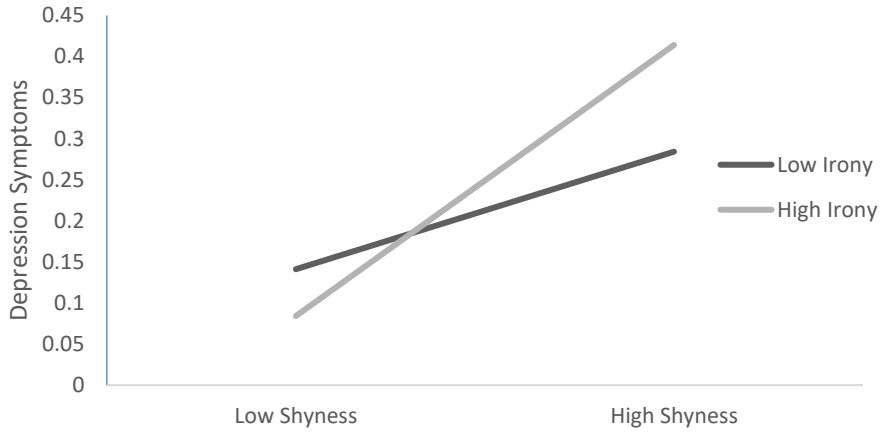


Figure 2. Two-way interaction between shyness and irony score in predicting depression symptoms.

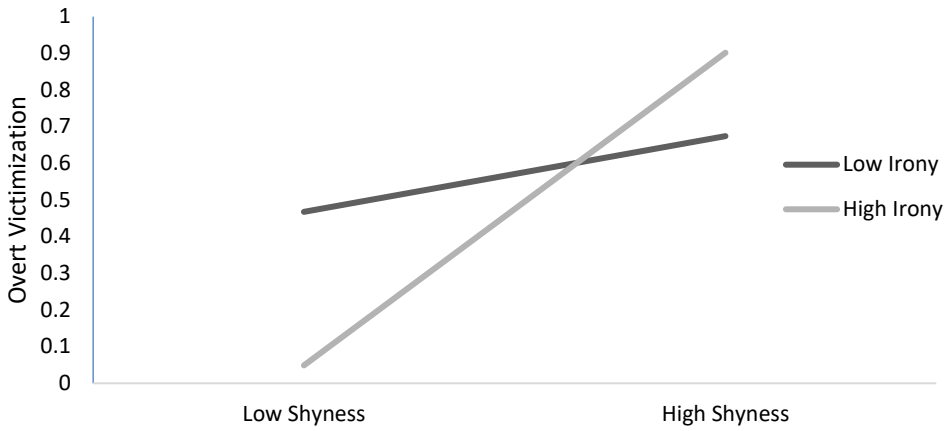


Figure 3 (a). Two-way interaction between shyness and irony score in predicting overt victimization for girls.

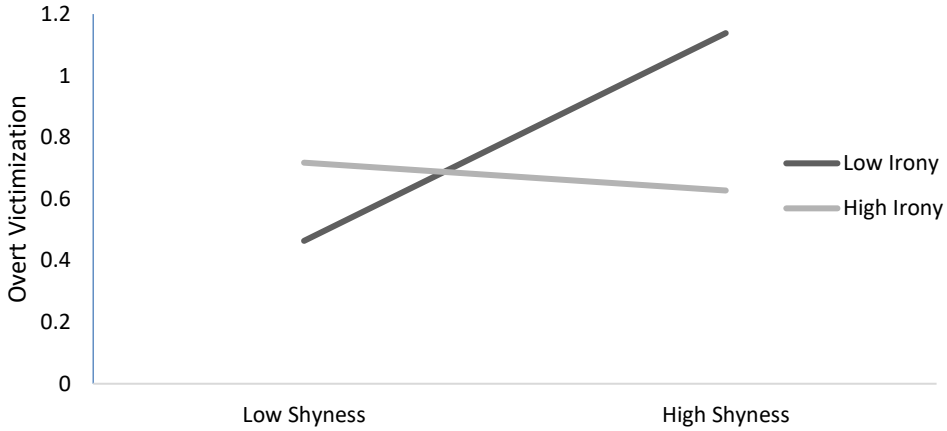


Figure 3 (b). Two-way interaction between shyness and irony score in predicting overt victimization for boys.

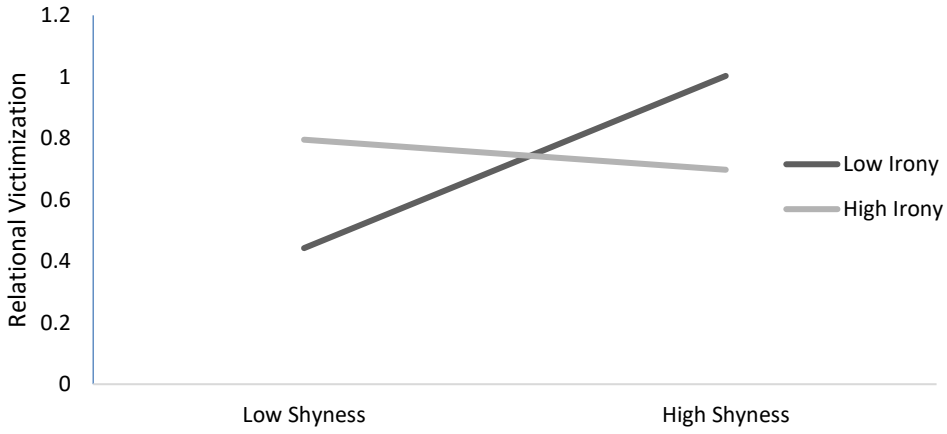


Figure 4. Two-way interaction between shyness and irony score in predicting relational victimization for boys.

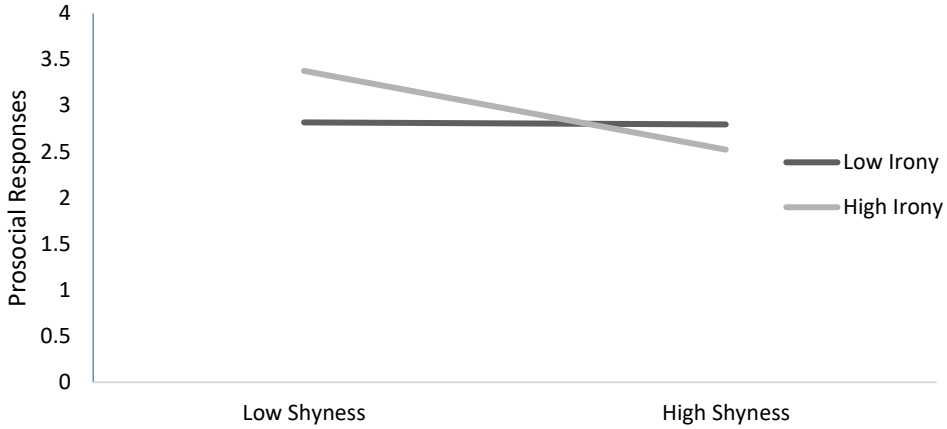
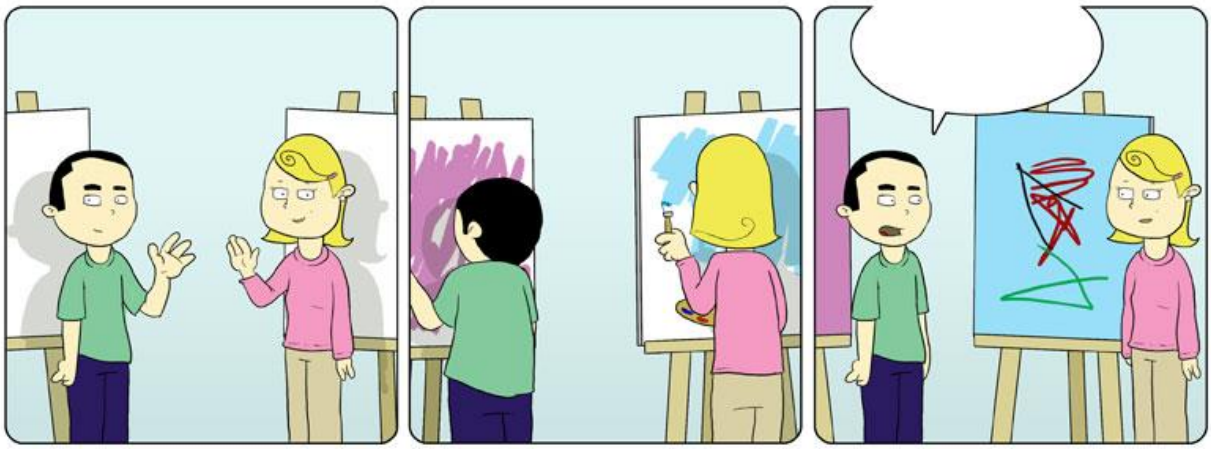


Figure 5. Two-way interaction between shyness and irony score in predicting ratings of prosocial responses from peers.

Appendix A: Sample trial (ironic criticism)

Trials were presented on computer, with the stories and questions pre-recorded. The comic remained visible for each of the questions to serve as a memory aid for the stories.



Shawn and Ava attend art classes. Ava tells Shawn she is a good artist. In the class they paint a picture of a rose. Ava's painting is ugly and doesn't even resemble a rose. Shawn says, "Woah, you are a *terrific* artist."

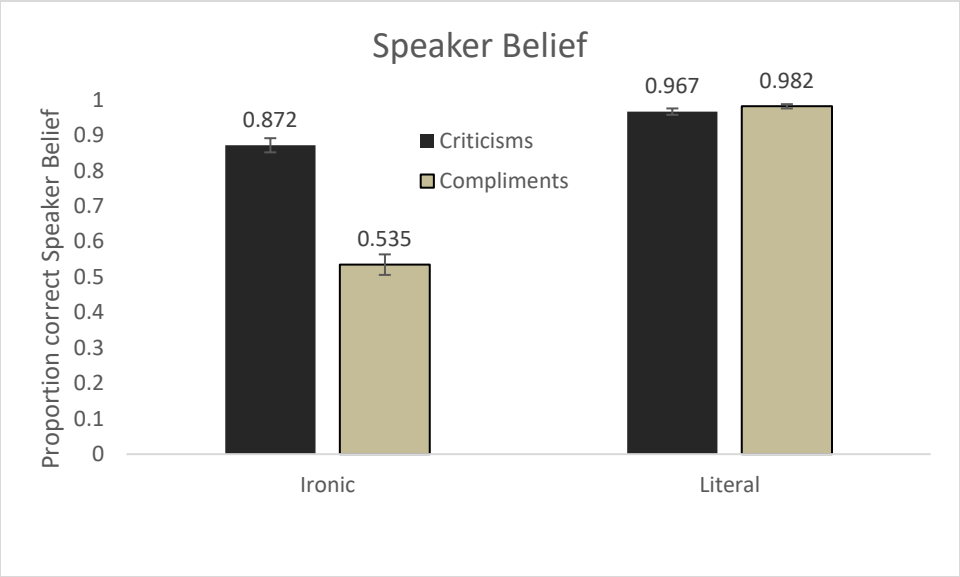
Same story in other conditions (comic varied accordingly):

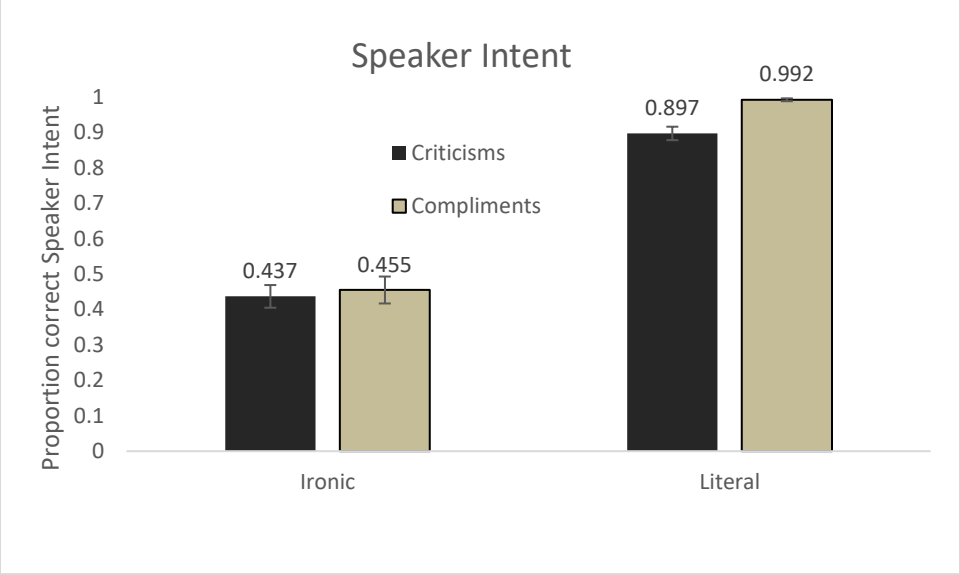
Ironic Compliment
Shawn and Ava attend art classes. Ava tells Shawn she is a bad artist. The class is told to paint a picture of a rose. Ava's painting is beautiful and looks just like a rose. Shawn says, "Woah, you are a *terrible* artist."

Literal Criticism
Shawn and Ava attend art classes. Ava tells Shawn she is a bad artist. In the class they paint a picture of a rose. Ava's painting is ugly and doesn't even resemble a rose. Shawn says, "Woah, you are a terrible artist."

Literal Compliment
Shawn and Ava attend art classes. Ava tells Shawn she is a good artist. In the class they paint a picture of a rose. Ava's painting is beautiful, and looks just like a rose. Shawn says, "Woah, you are a terrific artist."

***Appendix B*: Children's performance on the Verbal Irony Task**





Note: Performance on Speaker Intent was only considered for trials where the Speaker Belief was accurately answered.