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Teaching children with autism to detect and respond to deceptive statements

Jennifer Ranick [a,b], Angela Persicke [a,b], Jonathan Tarbox [a,b,*], Jake A. Kornack [a,b]

[a] Autism Research Group, United States
[b] Center for Autism and Related Disorders, United States

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ABSTRACT

Previous research has shown that children with autism often have deficits in deception, both in the ability to lie to others and in the ability to detect when they are being lied to. Additionally, children with autism are frequently the victims of bullying and difficulty with understanding deception likely makes the population more vulnerable to bullying. The purpose of this study was to teach individuals with autism to identify when others were lying to them, specifically to exclude them or to take their possessions. The treatment package consisted of multiple exemplar training, including rules, modeling, role-play, and immediate feedback. The results indicated that the procedure was effective for all three participants. Additionally, generalization was demonstrated to novel, untrained lies and to same-age peer confederates who were not involved in training.

Deficits in the development of language are characteristic of autism spectrum disorders (ASD) and a significant amount of research has documented the effectiveness of applied behavior analytic teaching procedures for remediating basic language and communication deficits (National Autism Center, 2009). However, less research has been published on remediating deficits in complex language. Non-literal language, in particular, is an area of language development that is often-overlooked in intervention research. Generally speaking, non-literal language involves statements where the *actual* meaning is different from the *literal* meaning of what is said. Individuals with ASD have documented deficits in various areas of non-literal language, including sarcasm (Pexman, Rostad, McMorris, Climie, Stowkowy, & Glenwright, 2011), metaphor (Adachi, Koeda, Hirabayashi, Maeoka, Shiota, Wright, & Wada, 2004), humor (Emerich, Creaghead, Grether, Murray, & Grasha, 2003), and deception (Hala, Chandler, & Fritz, 1991; Happe, 1995; Sodian & Frith, 1992).

Unfortunately, lying is a normal part of everyday interaction between humans. For example, it has been estimated that the average person will tell one to two lies per day (DePaulo, Lindsay, Malone, Muhlenbruck, Charlton, & Cooper, 2003) and that typically developing children as young as three years old are able to detect deception and are able to use deceptive strategies at the age of four (Sodian, Taylor, Harris, and Perner, 1991). People engage in deception for a variety of reasons, ranging from "white lies" that are told to avoid hurting others' feelings, to lies that are told for the purposes of taking advantage of others, as in the case of bullying. Tragically, individuals with ASD suffer a higher rate of bullying than typical peers, with prevalence rates of victimization among adolescents with ASD estimated at 46.3%, compared to only10.6% for the general population (Sterzing, Shattuck, Narendorf, Wagner, & Cooper, 2012). Research has found that children with ASD who experience bullying one or more times per week have higher levels of anxiety and engage in higher levels of self injurious or stereotypic behaviors (Cappadocia, Weiss, & Pepler, 2012). The higher rates of bullying that children with ASD endure, although morally reprehensible, may not be surprising, given the challenges with social relations and the fewer friendships

* Corresponding author.
E-mail address: j.tarbox@centerforautism.com (J. Tarbox).

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that children with ASD often suffer from (Cappadocia, Weiss, & Pepler, 2012; van Roekel, Scholte, & Didden, 2010). In other words, if a child with ASD already has difficulty understanding when he is being lied to and then has few or no friends to "stand up" for him, it may make him a particularly vulnerable target for bullies.

Given the important negative social consequences that children with ASD may face if they cannot identify when others are lying to them, it would seem important to develop interventions for teaching this ability. Lie-detection is a complex topic that is well-studied in typically developing adults (Bond & DePaulo, 2008). A review of this literature is beyond the scope of this paper and is not likely necessary for addressing lying as it occurs amongst children, since the latter is likely more straightforward. When children with ASD are being bullied, bullies may tell lies that are simply not plausible at school but are effective because the child with ASD does not discriminate this implausibility. For example, a bully might say to a child with ASD, "You have to give me that ball because the teacher said so," or "I'm a girl, so I get to have two turns and you only get one." Although obviously false to most typically developing children, many children with ASD have difficulty with statements such as these because they have little or no history with responding to language in non-literal ways. Indeed, many children with ASD may not use the words "lie" and "truth" because they may have essentially no history of communicating in non-truthful ways. Colloquially speaking, from the perspective of many children with ASD, "people say what they mean and mean what they say."

How is the ability to discriminate truth from falsehood learned and therefore how can it be taught? A contemporary behavioral approach to complex language and cognition, Relational Frame Theory (RFT), posits that understanding the relations between events in one's environment is, in itself, generalized operant behavior, learned via a history of multiple exemplar training. In short, relating, per se, is learned behavior. Understanding deception involves successfully relating the lie as *different* from reality (Mchugh, Barnes-Holmes, Barnes-Holmes, Stewart, & Dymond, 2007). Identifying the "truth" in an episode of deception amounts to describing the actual state of reality as different from the description that the lie provided. For example, "No, I don't have to give you my ball because the teacher didn't say that." According to RFT, relating events as *different* is a skill that can be trained through multiple exemplar training, although no previous research of which we are aware has attempted this with children with ASD. One of the strengths of the RFT analysis is that, even if one does not adopt the theory that relating is behavior, the RFT recommendations for how relating can be taught are inherently practical and testable: Multiple exemplar training.

Although little or no previous research has attempted to teach lie-detection to children with autism, a small number of previous studies have taken an RFT-based approach to teaching other non-literal language skills. For example, Persicke, Tarbox, Ranick, and St. Clair (2013) used multiple exemplar training to teach three children with ASD to detect and respond appropriately to sarcasm. Sarcasm is similar to deception, in that what is said is different from what is meant. However, in sarcasm, what is said is not just different from what is meant, it is the logical *opposite* of what is meant. Persicke and colleagues successfully taught children with autism to distinguish between sarcastic and sincere statements in the course of normal conversational interactions by presenting multiple examples of both and giving the participants feedback on which statements were congruent with reality, and therefore likely sincere, and which were the *opposite* from reality and therefore likely sarcastic (e.g., saying "Nice shot" when someone shoots a basketball and misses).

In another recent study on the use of multiple exemplar training to teach non-literal language, Persicke, Tarbox, Ranick, and St. Clair (2012) taught children with autism the generalized ability to comprehend the meaning of novel metaphors. Metaphors are non-literal because they involve calling a thing something other than what it actually is. Understanding the meaning of metaphors requires complex reasoning of the similarities and differences between the relational properties of the thing and the metaphor used to describe it (Stewart, Barnes-Holmes, Hayes, & Lipkens, 2001). Practice across numerous exemplars, combined with specific explanatory feedback and visual supports produced the generalized ability to solve untrained metaphors for all participants.

Although little or no previous research has demonstrated that children with autism can be taught to distinguish between lies and honest statements, the two studies on teaching non-literal language comprehension described above support a general hypothesis: The complex relating behaviors involved in non-literal language can be taught to children with autism through the use of multiple exemplar training. The current study aimed to evaluate a multiple exemplar training package, including rules, modeling, practice, and feedback for teaching three children with autism to detect deceptive statements and how to resist them. The specific types of deception targeted in this study were deceptive statements used to exclude the participants from activities and deceptive statements used to take the participant's personal items, as these were concerns commonly raised by participants' parents. To evaluate generalization to natural play interactions with peers, probes were included pre and post-training, in which peers who had not been present during training told novel lies to the participants.

1. Method

1.1. Participants and setting

Three children participated in the study – Erik, Lafayette, and Jason. All participants had a diagnosis of autism and were clients of a large-scale, home-based behavioral intervention provider. Throughout the course of the study, Erik was 6 years old and was receiving approximately 12 h per week of ABA-based therapy; Lafayette was 7 years old and was receiving approximately 2 h per week of treatment; and Jason was 9 years old and was receiving approximately 4 h per week of treatment. At the onset of the study Lafayette and Jason had been in treatment for approximately four years and Erik had

been in treatment for two years. Participants' parents and clinical teams prioritized the ability to identify and respond appropriately to deception as an important target for clinical intervention. None of the participants had any previous training on deception and throughout the course of the study deception was not targeted outside of the study by the participants' clinical therapy team. In order to be eligible, participants needed to have already completed or be near completion of the following lessons from the Skills© curriculum (www.Skillsforautism.com): (1) thinking, (2) sensory perspective taking, (3) cause and effect, (4) knowing, and (5) beliefs.

The majority of the sessions were conducted in each participant's primary residence as a regular part of the participants' ongoing behavior intervention sessions, with the exception of Lafayette, whose sessions were conducted in his home in his free time during after-school hours. Sessions occurred 1–2 times per week and lasted no more than an hour. No more than one session was conducted in a single day.

1.2. Response measurement and interobserver agreement

During all sessions data were collected on the percentage of correct responses to each deceptive comment. A response was scored as correct if the participant identified that the therapist or peer was being deceptive by asserting that he/she could not exclude the participant or take his personal items. Each session contained four deceptive statements (2 exclusion and 2 to obtain personal items).

The majority of sessions were surreptitiously recorded with the use of small video recorders (e.g., Flip© or Sony Bloggie©) or the therapists' wireless smart phones placed throughout the environment. A second independent observer scored videos from 50% of Erik's sessions, 54% of Lafayette's sessions and 29% of Jason's sessions. Trial-by-trial interobserver agreement (IOA) was calculated by dividing the number of agreements by the sum of agreements and disagreements and multiplying by 100. Mean IOA scores for Erik, Lafayette and Jason's sessions were 99.4%, 100%, and 99.5% respectively.

1.3. Procedure

1.3.1. Baseline

During baseline sessions, the therapist stated four deceptive comments to the participant during play – two comments of exclusion from activities (e.g., "you're a boy so you can't play.") and two to obtain tangible items belonging to the participant ("Your mom said I could keep this"). Table 1 displays sample deceptive statements used across conditions. No differential consequences were provided for any participant responses to the lies.

1.3.2. Multiple exemplar training

The teaching procedure was adapted from activities in the "deception" lesson of the Skills© curriculum (www.skillsforautism.com). In the beginning of the first three training sessions, the researcher would provide the participant with the following rule, "People lie when they don't want another person to know the truth. They say something that isn't true to make another person think what they are saying is true and to cover up the real truth." During each training session, the therapist would engage in play activities with the participant and present a deceptive comment in the context of normal conversation. If the participant responded correctly (i.e., questioned or stated evidence contrary to the comment and/or blocked the deceptive action from occurring) he received reinforcement in the form of social praise (e.g., 'That's right, I wasn't telling the truth. There's no fooling you!'). If the participant responded incorrectly to the deceptive comment, the experimenter used leading questions to help the participant identify the deception and how to respond appropriately. For example, "Wait a minute, was I telling the truth just now?", "Hold on, why would I get to have three turns just because I'm a girl?", or "Hold your horses, that's ridiculous, what do you think is really true?" If the participant was not able to identify the deceptive comment by answering leading questions, the therapist restated the deception and asked the participant if the statement seemed to be the truth or a lie and to explain his answer. If this did not work, the therapist told the participant the correct answer and a one-sentence explanation for why.

Each session during training included two novel deceptive comments and at least two previously trained deceptive comments, with the exclusion of the first session, which only contained two novel deceptive comments. Note that novel lies were included during each session because the purpose of the intervention was to teach the participants the generalized

Table 1
Examples of lies included in the study.

Lies to take an item away from the participant:
"Your mom said I could have this."
"I'm the guest so you have to give me one of your toys."
"This is mine; I brought it from home."
"You said I could have this the last time I came over."
Examples of lies to exclude participant from an activity:
"You didn't spin a four so I get to go again."
"Only people with brown hair can play this game."
"You have to be six or older to play."
"You didn't find us quick enough, so you have to count again."

ability to detect lies, not to learn particular lies. Each deceptive comment was presented 2–3 times per session (separated by at least 10 min), for a total of 8–10 times that the therapist attempted to deceive the participant.

All training was embedded within normal ongoing play activities between therapist and child. That is, nothing about the training procedure was structured or contrived–the therapist merely lied to the participant 8–10 times per hour, and gave specific feedback to the participant based on his response, as described above.

1.3.3. Post training and follow up

Once a participant scored 100% on the first trial of novel deceptive statements across three sessions, the post-training phase was initiated. Post-training sessions were identical to baseline sessions. During post-training, all deceptive comments from baseline were repeated and no differential consequences were provided for responses. Note that none of these comments were included in the training phase, so accurate performance in this phase represents generalization across deceptive comments. A one-month follow-up session was conducted with each participant and included novel exemplars never included in any previous session and no differential consequences were provided for participant responding.

1.3.4. Peer/sibling probes

During each phase, probe sessions were conducted by peers or siblings (Erik only) in order to determine if generalization was occurring across liars. Peers/siblings were initially trained by the first and second authors prior to each peer probe session through modeling, practice, and feedback until the comments were stated proficiently. Peers/siblings stated four deceptive comments and no differential consequences were provided to the participants for responding. For each participant, two different peers/siblings were included in the study – one peer/sibling participated in baseline and post-training sessions and a second peer/sibling participated in training sessions. An experimenter was present during these probes to help facilitate accurate presentation of deceptive comments stated by the peers/siblings.

1.3.5. Generalization

Generalization was assessed throughout by scoring participants accuracy on the first trial of each novel exemplar in each session. That is, accurate performance the first time a new deceptive comment was introduced represents generalization across comments and provided an ongoing estimate of the emergence of the generalized operant throughout training. In addition, none of the exemplars included in baseline, post-training, or peer/sibling probe sessions were included in training. Therefore, all trials during post-training and peer/sibling probes represented generalization to untrained stimuli.

2. Results

Fig. 1 depicts the data for the three participants across all phases. Jason's baseline accuracy was low (m = 17%). During the training phases, the percentage of correct responses to the first trial of each novel deceptive comment (two per session) was graphed separately from previously trained deceptive comments. The objective of the study was to produce generalization to untrained deceptive comments; therefore, increasing trends in the data on first trials of novel deceptions were used as the primary indicator of the desired behavior change. Jason's response to multiple exemplar training for trained exemplars was consistently 90% or higher, while his response to the first untrained exemplar session was 50% and then stabilized at 100%, including the peer probe. In post training, Jason scored 100% for all sessions, including the final peer probe. However, during the one-month follow up, his score decreased to 75% (3 out of 4 correct).

Lafayette's accuracy during baseline was low (m = 13%). Lafayette's response on first trials of novel deceptive comments were consistently 100%, including the peer probe, while his scores on previously trained exemplars stabilized above eighty percent for the entire phase. Lafayette scored 100% for all post-training sessions, including both the peer probe and the one-month follow up.

Erik's baseline accuracy was low (m = 20%). During training, Erik's response to trained exemplars was consistently 80% or higher, while his response to the first novel session was 50% and then stabilized at 100%. Additionally, Erik scored 100% on the peer probe with novel exemplars during the training phase. Erik scored 75% (3 out of 4 correct) accuracy at the one-month follow-up.

3. Discussion

Our findings suggest that the ability to detect and respond effectively to deception may be teachable in some children with ASD. All of the participants in this study were able to acquire this skill through multiple exemplar training and generalization was observed to novel exemplars and peers. All of the participants maintained accurate responding after feedback was withheld during the post-training phase. Furthermore, accuracy remained substantially higher than baseline during one-month follow-up probes, albeit lower than earlier in post-training.

The results have important implications for how Theory of Mind and perspective-taking are conceptualized. The traditional approach in the Theory of Mind literature is to assume that effective perspective-taking skills such as detecting deception are due to the presence of cognitive mechanisms (Baron-Cohen, 1995). Regardless of one's theoretical orientation, relegating the cause of a skill to a cognitive mechanism makes it difficult to do something practical when that skill is missing or disordered. The strength of treating that same skill as a learned operant behavior is that well-established behavioral

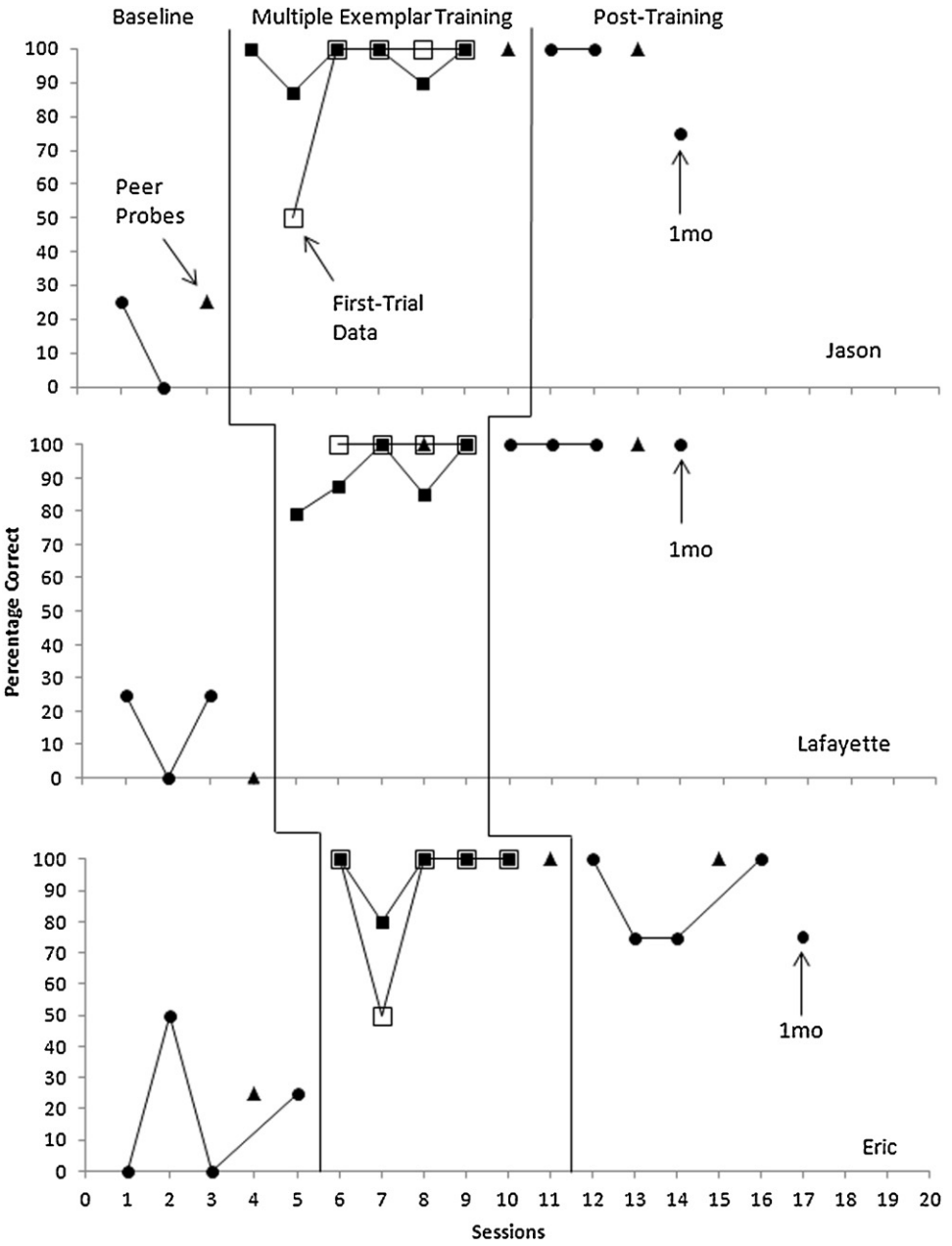

Fig. 1. Percentage of correct responding across baseline, multiple exemplar training, and post-training phases for all participants. Triangles denote sessions that included peers and open squares display data for the very first trial that a particular deception was presented.

teaching procedures can be implemented and tested, as was done in this study. The current results suggest that it may be useful to conceptualize the ability to detect deception as learned behavior. It is also possible that other perspective-taking skills can be taught successfully using behavioral procedures. The literature in this area is still in its infancy, but the current results have positive implications for the possibility of teaching other perspective-taking skills discussed in the Theory of Mind literature, such as detecting and responding to others' desires, intentions, beliefs, preferences, physical states, and many others. Future research should attempt to analyze these situations in terms of the behaviors and environmental variables involved, as well as how the skills can be analyzed and taught as generalized operants.

One limitation to this study is that other forms of deception, such as deceptive comments to brag or to generate humor, were not used. Therefore, it is uncertain how the participants would respond if they encountered a deceptive comment that was not specifically for exclusion or to gain a tangible. It is possible that the results of the current treatment would not generalize to these situations. Another limitation is that the experimenter was present during the peer probes. Although it is

common for family members and therapists to be present during participants' play dates, the presence of the therapist could have contributed to the generalization that was observed to peers. Future research should broaden the types of deceptive comments used as well as fadeout the presence of the experimenter during peer probes.

In conclusion, this study used multiple exemplar training to teach the generalized skill of identifying deceptive comments and responding appropriately to those statements across all three participants. All participants demonstrated the skill with two peers and with untrained and novel exemplars. Additionally, accuracy during one-month follow-up probes was substantially higher than baseline. This study provides further evidence that behavioral teaching procedures can be used to teach complex social skills to children with autism.

References

Adachi, T., Koeda, T., Hirabayashi, S., Maeoka, Y., Shiota, M., Wright, E., et al. (2004). The metaphor and sarcasm scenario test: A new instrument to help differentiate high functioning pervasive developmental disorder from attention deficit/hyperactivity disorder. *Brain & Development, 26*, 301–306.

Baron-Cohen, S. (1995). *Mindblindness: An essay on autism and theory of mind*. Cambridge, MA: Bradford Books/MIT Press.

Bond, C. F., & DePaulo, B. M. (2008). Individual differences in judging deception: Accuracy and bias. *Psychological Bulletin, 134*, 477–492.

Cappadocia, M. C., Weiss, J. A., & Pepler, D. (2012). Bullying experiences among children and youth with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*(2), 266–277.

DePaulo, B. M., Lindsay, J. J., Malone, B. E., Muhlenbruck, L., Charlton, K., & Cooper, H. (2003). Cues to deception. *Psychological Bulletin, 129*, 74–118.

Emerich, D. M., Creaghead, N. A., Grether, S. M., Murray, D., & Grasha, C. (2003). The comprehension of humorous materials by adolescents with high-functioning autism and Asperger's syndrome. *Journal of Autism and Developmental Disorders, 33*, 253–257.

Hala, S., Chandler, M., & Fritz, A. S. (1991). Fledgling theories of mind: Deception as a marker of 3-year olds' understanding of false Belief. *Child Development, 62*, 83–97.

Happe, F. G. E. (1995). The role of age and verbal ability in the theory of mind task performance of subjects with autism. *Child Development, 66*, 843–855.

Mchugh, L., Barnes-Holmes, Y., Barnes-Holmes, D., Stewart, I., & Dymond, S. (2007). Deictic relational complexity and the development of deception. *The Psychological Record, 57*, 517–531.

National Autism Center. (2009). *National standards report*. Randolph, MA: National Autism Center.

Persicke, A., Tarbox, J., Ranick, J., & St Clair, M. (2012). Establishing metaphorical reasoning in children with autism. *Research in Autism Spectrum Disorders, 6*, 913–920.

Persicke, A., Tarbox, J., Ranick, J., & St Clair, M. (2013). Teaching children with autism to detect and respond to sarcasm. *Research in Autism Spectrum Disorders, 6*, 913–920.

Pexman, P. M., Rostad, K. R., McMorris, C. A., Climie, E. A., Stowkowy, J., & Glenwright, M. R. (2011). Processing of ironic language in children with high-functioning autism spectrum disorder. *Journal of Autism and Developmental Disorders, 41*, 1097–1112.

Sodian, B., & Frith, U. (1992). Deception and sabotage in autistic, retarded and normal children. *Journal of Child Psychology and Psychiatry, 33*, 591–605.

Sodian, B., Taylor, C., Harris, P. L., & Perner, J. (1991). Early deception and the child's theory of mind: False trails and genuine markers. *Child Development, 62*, 468–483.

Sterzing, P. R., Shattuck, P. T., Narendorf, S. C., Wagner, M., & Cooper, B. P. (2012). Bulling involvement and autism spectrum disorders: Prevalence and correlates of bullying involvement among adolescents with an autism spectrum disorder. *Archives of Pediatrics & Adolescent Medicine,* 1–7.

Stewart, I., Barnes-Holmes, D., Hayes, S. C., & Lipkens, R. (2001). Relations among relations: Analogies, metaphors, and stories. In S. C. Hayes, D. Barnes-Holmes, & B. Roche (Eds.), *Relational frame theory: A post-Skinnerian account of human language and cognition*. NY: Kluwer Academic/Plenum Publishers.

van Roekel, E., Scholte, R. H., & Didden, R. (2010). Bullying among adolescents with autism spectrum disorders: Prevalence and perception. *Journal of Autism and Developmental Disorders, 40*, 63–67.