An evaluation of multiple exemplar instruction to teach perspective-taking skills to adolescents with Asperger Syndrome

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ABSTRACT

The goal of this study was to investigate the effects of multiple exemplar instruction for teaching perspective-taking skills to young adults with autism. Using a multiple probe design, participants were trained and tested using protocols evaluating the deictic frames of I-You, Here-There, and Now-Then. Generalization of perspective-taking skills was evaluated using two standardized assessments designed to evaluate theory of mind, which were administered at pre and posttest. Generalization of perspective-taking skills to a more natural language situation was also assessed. Results showed the emergence of perspective-taking for all participants following multiple exemplar instruction, and varying degrees of generalization of perspective-taking skills to a natural presentation of social interaction were observed based on the complexity of the perspective-taking relation.

KEYWORDS: multiple exemplar instruction, perspective-taking, deictic relations

DEFICITS IN SOCIAL INTERACTION and communication are two of the defining features of autism spectrum disorders (American Psychiatric Association, 2000). For instance, individuals with autism often struggle with perspective-taking skills, such as reading emotion in others, deceiving or understanding deception, and anticipating what others might think of one's actions (Downs & Smith, 2004; Howlin, Baron-Cohen, & Hadwin, 1999). If not addressed, deficits in social skills can result in a minimal number of friendships and peer relationships (Orsmond, Wyngaarden Krauss, & Mailick Seltzer, 2004). Additionally, low levels of self-perceived social competence are observed to occur in individuals with diagnoses of high-functioning autism or Asperger syndrome who have average or above average intellectual abilities (Vickerstaff, Heriot, Wong, Lopes, & Dossetor, 2007).

Cognitive researchers have traditionally described perspective-taking skills as resulting from a theory of mind (TOM) that emerges naturally throughout the course of typical development. Perspective-taking deficits observed in individuals with autism are, therefore, considered to be a result of a deficit in the TOM construct (Howlin et al., 1999). Cognitive researchers have developed a variety of methods to assess TOM, but have been unsuccessful in teaching perspective-taking to children with autism in a manner that will promote generalization of skills (Yun Chin & Bernard-Opitz, 2000).

The behavioral approach to perspective-taking based on Relational Frame Theory (RFT) offers an analysis of this behavior that is directly aimed at promoting generality of learning (Hayes, Barnes-Holmes, & Roche, 2001). According to RFT, perspective-taking is verbal behavior or derived relational responding, which involves responding to relations between stimuli in the absence of a history of direct reinforcement for responding to those particular relations. Although derived relational responding to novel stimuli is not directly reinforced, it is considered generalized operant behavior that is learned from a history of reinforcement for engaging in relational responding (Hayes et al., 2001). A specific type of derived relation, called a deictic relation, is the basis for perspective-taking behavior. Deictic relations involve a specification of the stimuli to be related based on the perspective of the speaker as opposed to the formal properties of the stimuli. For example, the perspective of the speaker is key to understanding relations such as left versus right or mine versus yours (Hayes, Fox, Gifford, Wilson, Barnes-Holmes, & Healy, 2001). A relation such as *mine-yours* is always dependent on the point of view of the speaker as the individual to which *yours* refers will constantly change throughout the course of different social interactions.

The RFT perspective-taking literature to date has emphasized the analysis of three specific types of deictic relations related to person, place, and time, which are I-You, Here-There, and Now-Then (McHugh, Barnes-Holmes, & Barnes-Holmes, 2004). These deictic relations are evaluated according to simple, reversed, and double reversed levels of relational complexity. An example

of a simple relation is, "I have a red brick and you have a green brick. Which brick do I have? Which brick do you have?" An example of a reversed relation is, "I have a red brick and you have a green brick. If I was you and you were me, which brick would I have? Which brick would you have?" Double reversed relations involve the combination of two reversed relations. An example of a double reversed relation is, "I am sitting here on the blue chair and you are sitting there on the black chair. If I was you and you were me and if here was there and there was here, where would I be sitting? Where would you be sitting?" (McHugh et al., 2004).

According to RFT, a history of instruction using multiple exemplars is necessary to engage in derived relational responding and deictic relations. In multiple exemplar instruction (MEI) direct reinforcement is provided for responding relationally to certain stimuli. Following a sufficient history of contacting reinforcement, an individual is able to respond relationally to novel stimuli in the absence of direct reinforcement for that particular response (Hayes, Fox, et al., 2001). An instructional program relying on MEI has been recommended for teaching perspective-taking skills to children with autism. McHugh, Barnes-Holmes, and Barnes-Holmes (2009) outlined an instructional sequence based on the McHugh, Barnes-Holmes, and Barnes-Holmes (2004) protocol that included instruction on all three types of deictic relations (i.e., I-You, Here-There, and Now-Then) and all three levels of relational complexity (i.e., simple, reversed, and double reversed).

The use of MEI in teaching perspective-taking skills has been shown to be effective in typically developing children. Davlin, Rehfeldt, and Lovett (2011) taught deictic relational responding incorporating multiple exemplars to children between 5–7 years using a perspective-taking protocol developed from children's storybooks. Following instruction, all three participants met criterion on simple, reversed, and double reversed relations. Weil, Hayes, and Capurro (2011) used multiple exemplars to instruct children between 4–5 years to respond relationally using the McHugh et al. (2004) protocol and observed improvements in relational responding for all participants. Additionally, these authors conducted pre- and posttest evaluations of TOM performance using tasks from the cognitive literature, and following instruction, all children showed some improvements in performance on the TOM tasks. Both the investigation by Davlin et al. (2011) and Weil et al. (2011) lend support to the use of MEI to teach perspective-taking skills, and the results of Weil et al. demonstrated generalization of deictic responding to novel TOM tasks. The utility of MEI for teaching this skill to individuals with autism remains to be evaluated.

In order to gain further knowledge regarding the instructional history needed to teach perspective-taking skills, the current study addressed two issues. The primary goal of the study was to evaluate the use of MEI to teach perspective-taking skills to adolescents with Asperger syndrome. A secondary aim was to examine generalization of perspective-taking skills following instruction. Generalization was assessed using standardized assessments evaluating TOM performance. As well, generalization of deictic responding to a more natural social interaction format was evaluated.

» METHOD

Participants and setting

Participants were three young adults diagnosed with Asperger syndrome ranging in age from 17–18 years. School records indicated that all participants read at grade level, and no reading comprehension difficulties were observed throughout the course of this study. Participants were recruited from a boarding school for adolescents located in Southern Illinois, and diagnoses were verified using school records. Gift cards to a local store were provided to participants as compensation for their time.

Sessions were 30–45 min in duration and were conducted one to three times per week during the participants' school day. Participation in the entire study ranged from four to six weeks for the three participants. Sessions were held in an office on the campus of the boarding school. The office was located in a school building, contained a desk and three chairs, and was approximately 3 m × 4 m. Participants sat at the desk for the duration of the session, and all distractions were removed from the room (e.g., iPod, cell phone, peers). The option of taking a short 3–5 min break was offered at minimum every 15 min during the session.

Apparatus and stimulus materials

Instructional and testing perspective-taking protocols were presented on a laptop computer equipped with an external mouse, and the keyboard of the laptop was covered. Instructional and testing protocols were created using Microsoft PowerPoint and programmed using the Microsoft Visual Basic Editor. Each trial included a picture from the Social Language Development Scenes Adolescent therapy cards, which depict situations and social interactions that are developmentally appropriate for adolescents between 12–18 years of age (LinguiSystems, 2011). Each trial also included two to four sentences describing the perspective of the character(s) in the picture as well as a question regarding the perspective of the character(s). Textual response options for answering the question were presented on four buttons located along the bottom of the screen.

Experimental design

A concurrent multiple-probe design across participants (Horner & Baer, 1978) was used in this study in conjunction with scores from standardized assessments (Twohig, Schoenberger, & Hayes, 2007). All participants were exposed to an initial pretest probe that included simple, reversed, and double reversed relations following which, instruction commenced for the first participant. Following the demonstration of mastery criterion on the instructional protocol by the first participant, posttest probes were conducted for all participants. When the performance of the first participant reached criterion on the posttest probe, instruction began for the second participant. The administration of test probes and the introduction of instruction was conducted in this manner for the third participant as well.

Dependent measure and reliability

The primary dependent measure in this study was the percentage of correct responses on pre and posttest probes for simple, reversed, and double reversed relations. A correct response consisted of making an appropriate selection on the PowerPoint

slide by clicking on one of the four response options with the mouse. The criterion for inferring mastery of deictic relational responding was 80% on simple, reversed, and double reversed relations. Interobserver agreement was not calculated during test probes or instruction because all procedures and data collection were automated. Secondary measures included scores on two standardized instruments, the *Social Language Development Test Adolescent* (SLDT-A; Bowers, Huisingh, & LoGuidice, 2010) and *Theory of Mind Inventory* (TOMI; Lerner, Hutchins, & Prelock, 2010), as described below. The percentage of correct responses on generalization probes evaluating simple, reversed, and double reversed relations was also examined. Interobserver agreement was collected for both pre and posttest generalization probes and was calculated by dividing the number of trial-by-trial agreements by the total number of trials and multiplying that value by 100%. Interobserver agreement was collected for at least 30% of generalization probes for each participant. The mean percentage of agreement for all participants was 100%.

Procedure

Perspective taking protocol. Testing and instructional perspective-taking protocols specifically created for the developmental level of the participants were used in this study. As stated previously, the protocols designed for this study were developed using the Social Language Development Scenes Adolescent therapy cards (LinguiSystems, 2011) in order to create relevant perspective-taking scenarios. Each trial in the current protocols included a picture from the Social Language Development Scenes Adolescent therapy cards that was presented at the top of the computer screen. A brief statement describing the relevant activities, locations, and feelings of the characters depicted in the picture was presented in the center of the screen, and a question regarding perspective appeared below the statement. Four buttons containing response options appeared along the bottom of the screen.

The testing protocol (see Appendix A) and instructional protocol (see Appendix B) each consisted of 36 trials. Both protocols included the three types of deictic frames (i.e., I-You, Here-There, and Now-Then) and the three levels of relational complexity (i.e., simple, reversed, and double reversed) used in the McHugh et al. (2004) protocol. The I-You relations require a change in perspective between the participant and a character in the scenario as well as a change in perspective between different characters in the scenario. An example of an I-You relation is as follows: "Ms. Foster is glad because she enjoys watching her students give presentations. Travis is nervous because he is reading a paper in front of class. Kelly is relieved because the teacher did not ask her to read her paper. Fred is worried because he doesn't want Ms. Foster to catch him with his phone in class.

How does Travis feel?" Here-There relations require the participant to change perspective between different locations described in the scenario. An example of a Here-There relation is as follows: "Ryan is worried because there at school he has not found a date to the dance. Here at the dance Ryan is pleased because he asked Peggy to go with him. Todd is anxious because there on the bus he was talking to Dolly. Here in the cafeteria Todd is excited because Dolly said she would go to the dance with him.

How does Ryan feel there?" The Now-Then relations require the participant to change perspective between different times presented in the scenario. An example of a Now-Then relation is as follows: "Before, Cassie was disappointed because she couldn't find a good book at the library. Now, Cassie is pleased because the librarian helped her find a good book. Yesterday, the librarian was upset because she lost her glasses. Now, the librarian is relieved because a friend found her glasses. How does Cassie feel now?"

Relational responding according to each of the three types of deictic frames was evaluated and instructed according to the three levels of relational complexity. Simple relations require no change in perspective, and ask the participant to respond directly to the information specified in the scenario. All three of the examples presented in the previous paragraph for I-You, Here-There, and Now-Then relations are simple relations. Reversed relations require the participant to change perspective according to one deictic frame (i.e., either I-You, Here-There, or Now-Then) in order to respond correctly. An example of a Now-Then reversed relation is as follows: "Before, Cassie was disappointed because she couldn't find a good book at the library. Now, Cassie is pleased because the librarian helped her find a good book. Yesterday, the librarian was upset because she lost her glasses. Now, the librarian is relieved because a friend found her glasses. If now were then, how would Cassie feel now?" Double reversed relations require the participant to change perspective according to two deictic frames. Three forms of double reversed relations can be evaluated based on the three deictic frames: I-You/Here-There, I-You/Now-Then, and Here-There/Now-Then. An example of an I-You/Here-There double reversed relation is as follows: "Eric is angry because here by his locker he cannot open his combination lock. There in the classroom Eric is thankful that Jennifer returned his lunch money. Jennifer is concerned because here in the hallway she found money on the floor. There in gym class Jennifer is embarrassed because she forgot to bring a change of clothes.

If Eric were Jennifer and if here were there, how would Eric feel here?" Responses to simple, reversed, and double reversed relations were made by clicking on one of the four response options at the bottom of the screen.

Unlike previous versions of the perspective-taking protocol that included two questions per trial, the protocols created for this study included only one question per trial. For example, in previous protocols a simple I-You relation included two response options and two questions regarding the perspectives of both relevant individuals, such as, "Travis is nervous because he is reading a paper in front of class. Kelly is relieved because the teacher did not ask her to read her paper.

How does Travis feel? How does Kelly feel?" Weil et al. (2011) noted that a correct response to the first question of a trial could serve as a discriminative stimulus and occasion a correct response on the second question of the trial. Presenting one question per trial avoided this issue and ensured that participants were responding according to the appropriate deictic relation on all questions. Although the training and instructional protocols in Appendices A and B show two questions following from each scenario, the questions were presented as separate trials, and presentation of the trials was randomized in order to ensure that participants were responding relationally.

Pre and posttest probes. Test probes were administered before and after each participant mastered the instructional relations. Pre and posttest probes were presented in an identical manner using the testing protocol presented in Appendix A. The testing protocol included a total of 36 trials with 12 trials of each simple, reversed, and double reversed relations. All 36 trials of the testing protocol including the three levels of relational complexity were completed in a single session. For simple and reversed relations, there were 4 trials for each I-You, Here-There, and Now-Then frames. For double reversed relations, there were 4 trials for each I-You/Here-There, I-You/Now-Then, and Here-There/Now-Then frames. The 36 trials of the testing protocol were presented in a predetermined random sequence, and no feedback on response accuracy was provided. Prior to the presentation of test probes, the following instructions were presented on the computer screen: "You are about to read some stories and answer questions about those stories. To answer the questions you will click on one of the buttons at the bottom of the screen with the computer mouse. You won't be told whether your answers are correct or incorrect, but please do the best you can."

Multiple exemplar instruction. The independent variable consisted of MEI using the previously described instructional protocol and was introduced for the first participant when pretest probe performance was observed to be visually stable. Instruction commenced for subsequent participants when pretest probe performance was visually stable and when the participant in the previous tier of the multiple probe design showed mastery of the posttest probe relations. The instructional protocol is presented in Appendix B and included a total of 36 trials with 12 trials of each simple, reversed, and double reversed relations. For simple and reversed relations, there were 4 trials for each I-You, Here-There, and Now-Then frames. For double reversed relations, there were 4 relations for each I-You/Here-There, I-You/Now-Then, and Here-There/Now-Then frames. Instruction for each level of relational complexity was introduced sequentially. Instruction on simple relations was conducted first, and when the participant performed at or above mastery criterion for three consecutive presentations of the simple relations, instruction on reversed relations was introduced. Training for reversed and then double reversed relations was conducted in the same manner as for simple relations. Mastery criterion for all levels of relational complexity was 80%. Following performance at mastery criterion for three consecutive presentations of the double reversed relations, the full instructional protocol, including simple, reversed, and double reversed relations, was presented. Participants were assumed to have mastered the relations when performance on simple, reversed, and double reversed relations reached 80% or above for three consecutive presentations of the full instructional protocol.

Instructional trials were presented in a predetermined random sequence. During instruction automated feedback and error correction were delivered. Following correct responses the word "Correct" appeared on the screen. Following incorrect responses the words "Try Again" appeared on the screen, and the trial was re-presented until the participant responded correctly. Prior to the presentation of the instructional protocol, the following instructions were presented on the screen: "You are about to read some

stories and answer questions about those stories. To answer the questions you will click on one of the buttons at the bottom of the screen with the computer mouse. This time you will be told whether your answers are correct or incorrect. Please do the best you can."

Pre and posttest generalization probes. Generalization probes were conducted at the beginning of the study before the initial pretest probes for perspective-taking were presented and again following each subsequent pretest and posttest probe for perspective-taking. Generalization probes consisted of a video presentation of three scenarios the participants could potentially encounter in daily life, and university students enacted all scenarios. Each of the three scenarios included two questions for each simple, reversed, and double reversed relations for a total of six trials. Trials required the participant to report how one of the actors in the scenario felt. The first scenario included probe questions for simple and reversed I-You relations as well as double reversed I-You/Here-There relations, the second scenario included probe questions for simple and reversed Now-Then relations as well as double reversed I-You/Now-Then relations, and the third scenario included probe questions for simple and reversed Here-There relations as well as double reversed Here-There/Now-Then relations. Although each scenario included six questions, each question was scored as a separate item for a total of 18 generalization probe trials (6 simple, 6 reversed, and 6 double reversed trials). Descriptions of each scenario and a list of generalization probe trials are presented in Appendix C. After the participant observed each scenario, a sheet of paper with four text response options was presented. The experimenter presented each probe question orally, and the participant responded by circling one of the text response options.

If the participant did not perform at or above the 80% mastery criterion on the initial administration of the posttest generalization probes, additional information regarding the emotion experienced by the actors in the videos was provided. This information consisted of orally providing the appropriate tact for the emotion each actor felt during each scene in the video after the participant viewed the video. The tact for each emotion was provided to Sarah and Brent on the third administration of the generalization probes at posttest and to Douglas on the second and third administrations of the generalization probes at posttest.

Pre and posttest standardized assessments. The SLDT-A and TOMI were administered at the beginning of the study before the pretest probe for perspective taking was presented and again at the end of the study after the final posttest probe for perspective taking was presented. The experimenter conducted all standardized assessments. Training in implementation of the assessments included review of the instructional manual and assessment materials as well as practice sessions with a pilot participant.

Social Language Development Test Adolescent. The SLDT-A is a standardized instrument that measures social language skills related to TOM for children between 12–17 years. The first subtest of the SLDT-A evaluating making inferences about the thoughts and feelings of others was completed. Individual items within a subtest are scored with a numerical value of 0 or 1 with higher scores indicating a greater degree of social language skills, and the scores from individual items are combined to create an overall score for each subtest. Scales are provided to determine age
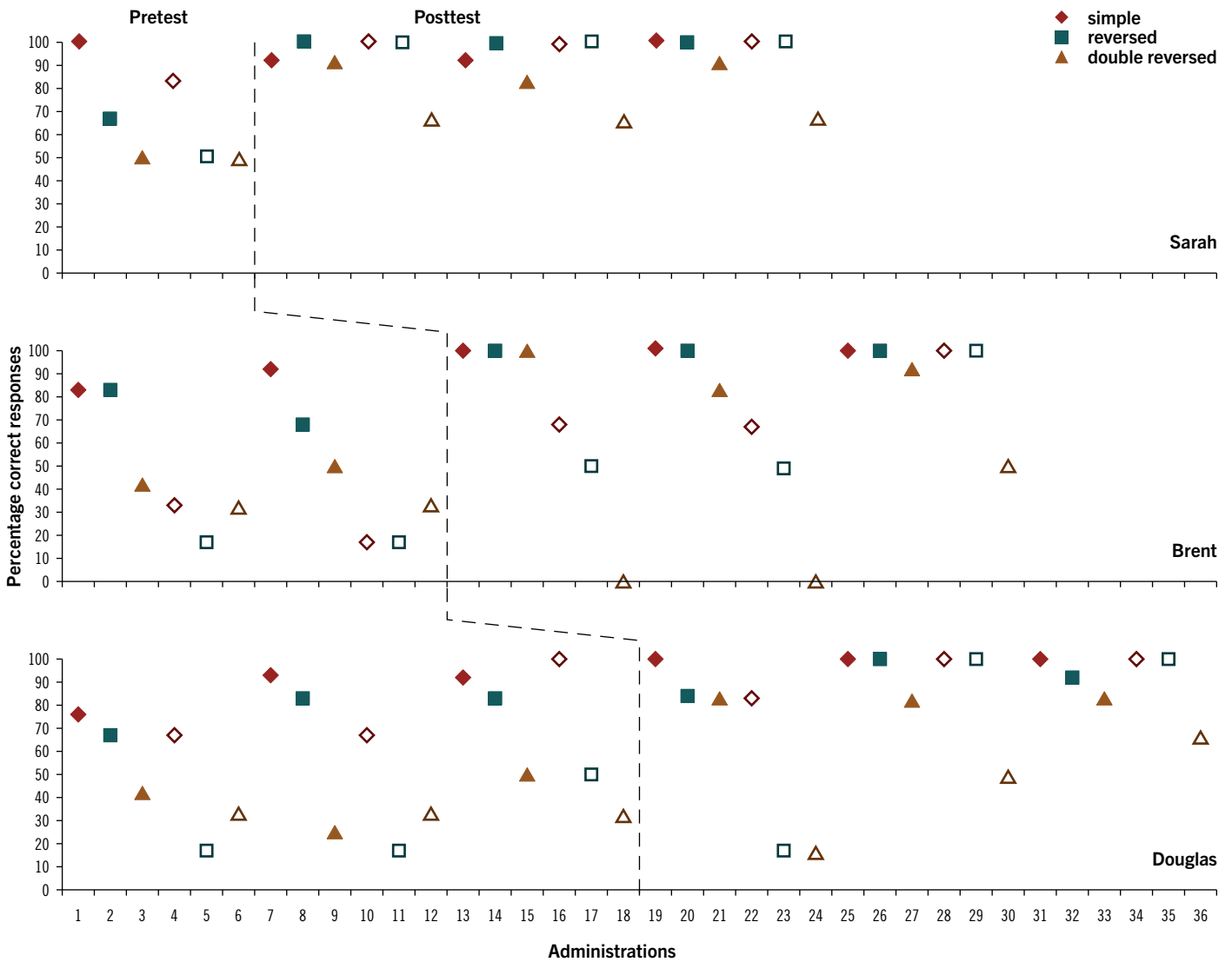
Figure 1. Percentage correct responses on pretest and posttest probes for simple, reversed, and double reversed relations. Solid data points indicate test probes and open data points indicate generalization probes.

equivalency, percentile rank, and standard score for performance on each subtest (Bowers, Huisingh, & LoGuidece, 2010).

Theory of Mind Inventory. The TOMI is a 48-item caregiver-report measure that evaluates caregiver's perceptions of the perspective-taking skills of adolescents with autism, including concepts such as false belief, visual perspective-taking, and irony. When responding, the caregiver makes a hash mark on an anchored scale, and the placement of the mark is later measured with a ruler to provide a score ranging between 0–20. Higher ratings on the scale represent a greater degree of TOM or perspective-taking skills (Lerner, Hutchins, & Prelock, 2010). The 48 items on this measure correspond to three different factors: Early, Basic, and Advanced TOM corresponding to the age a typical child masters the TOM skills (i.e., infancy or todderlhood, preschool, and middle to late childhood).

» RESULTS
Pretest probes
Results for test probes are depicted in Figure 1 as indicated by the solid data points. During each pretest probe session, simple, reversed, and double reversed relations were presented in a single trial block in a predetermined random sequence. Results for simple, reversed, and double reversed relations that were collected in a single probe session are presented as separate data points in Figure 1 in order to analyze responding at each level of complexity. Each succession of three closed data points was collected as part of a single test probe session and included simple, reversed, and double reversed relations as indicated by the closed diamonds, closed squares, and closed triangles, respectively. Participants were exposed to one probe session per day.

Table 1. Number of trial blocks to criterion during MEI for experiment 1

	Trial blocks to criterion			
Participant	Simple	Reversed	Double reversed	Mixed
Sarah	3	6	5	3
Brent	3	3	8	3
Douglas	3	4	4	3

Note. The minimum number of trial blocks required to meet the mastery criterion was three.

Table 2. Pretest and posttest results on the SLDT-A

	Pretest		Posttest	
Participant	Percentile rank	Standard score	Percentile rank	Standard score
Sarah	2	67	26	90
Brent	2	67	2	67
Douglas	2	67	17	86

Note. Standard scores are evaluated using a mean of 100 and a standard deviation of 15.

Results for each participant will be described individually, and participants will be identified using pseudonyms in order to protect their identities. Sarah responded with 100% accuracy on simple relations, 67% accuracy on reversed relations, and 50% accuracy on double reversed relations on one administration of the pretest probes. These data indicate that Sarah was responding above the 80% mastery criterion for simple relations at pretest, and she required instruction on reversed and double reversed relations.

Brent responded between 42–92% correct on two administrations of the pretest probes. The mean percentage correct across the two administrations of the probes was 87.5% for simple relations, 75% for reversed relations, and 46% for double reversed relations. These data indicate that Brent was responding above the mastery criterion for simple relations at pretest. Visual inspection of the graphical data shown in Figure 1 reveals that Brent responded at mastery criterion for the first administration of the reversed relations. Performance on reversed relations deteriorated during the second administration of the test probes, and Brent, therefore, required instruction on reversed as well as double reversed relations.

Douglas responded with between 25–92% accuracy on three administrations of the pretest probes. The mean percentage correct across the three administrations of the probes was 86.3% for simple relations, 77.7% for reversed relations, and 39% for double reversed relations. Visual inspection of the data presented in Figure 1 reveal that Douglas responded slightly below mastery criterion on simple and reversed relations during the first administration of the pretest probes. Performance on simple and reversed relations during subsequent pretest probes increased to meet the mastery criterion. Douglas required instruction only on double reversed relations.

Multiple exemplar instruction

As stated previously regardless of pretest probe performance, participants were exposed to instruction on all three levels of relational complexity. Instruction for simple, reversed, and double reversed relations was presented using separate blocks of trials for each level of complexity followed by a final block in which simple, reversed, and double reversed relations were randomized and presented in a single trial block. The criterion to infer mastery of the instructional relations was 3 trial blocks at 80% accuracy.

As shown in Table 1, Sarah met mastery criterion following 3 administrations of simple relations, 6 administrations of reversed relations, 5 administrations of double reversed relations, and 3 administrations of the mixed trial block including all three levels of complexity. Brent met mastery criterion following 3 administra-

tions of simple relations, 3 administrations of reversed relations, 8 administrations of double reversed relations, and 3 administrations of the mixed trial block including all three levels of complexity. Douglas met mastery criterion following 3 administrations of simple relations, 4 administrations of reversed relations, 4 administrations of double reversed relations, and 3 administrations of the mixed trial block including all three levels of complexity. Multiple trial blocks were presented in a single session during instruction with an instructional session lasting no longer than 45 minutes. Criterion for all instructional relations was met for all three participants in three to four sessions.

Posttest probes

The criterion for inferring the emergence of deictic relational responding to novel relations was 80% accuracy on three consecutive probes. As shown in Figure 1, Sarah responded between 83–100% correctly on three administrations of the posttest probes. The mean percentage correct across the three administrations of the probes was 95% for simple relations, 100% for reversed relations, and 89% for double reversed relations.

Brent responded between 83–100% correctly on three administrations of the posttest probes. The mean percentage correct across the three administrations of the probes was 100% for simple relations, 100% for reversed relations, and 91.7% for double reversed relations.

Douglas responded between 83–100% correctly on three administrations of the posttest probes. The mean percentage correct across the three administrations of the probes was 100% for simple relations, 91.7% for reversed relations, and 83% for double reversed relations.

Generalization probes

Pretest generalization probes. Results for generalization probes are presented alongside pre and posttest probe data in Figure 1 as indicated by the open data points. Like the test probes, each succession of three generalization probes was collected during a single session, and the results for simple, reversed, and double reversed relations are presented separately for analysis. At pretest Sarah responded with 83% accuracy on simple relations, 50% accuracy on reversed relations, and 50% accuracy on double reversed relations for one administration of the generalization probe. These data indicate that Sarah was performing above the 80% mastery criterion on simple relations at pretest, but below mastery criterion on reversed and double reversed relations.

Table 3. Pretest and posttest results on the ᴛᴏMI

	Pretest				Posttest			
Participant	Early	Basic	Advanced	Overall	Early	Basic	Advanced	Overall
Sarah	16.7	16	13.4	16.5	15.2	18.3	11.1	14.7
Brent	20	20	20	20	20	20	20	20
Douglas	17.1	15.3	16.2	16.9	13.1	14.3	12.4	13.5

Note. Scores on the ᴛᴏMI range from 0-20 with higher scores indicating a greater degree of ᴛᴏM. Early, basic, and advanced refer to three skill levels of ᴛᴏM corresponding to infancy/toddlerhood, preschool, and middle/late childhood, respectively.

At pretest Brent responded between 17–33% correctly on two administrations of the generalization probes. The mean percentage accuracy across the two administrations of the generalization probes was 25% on simple relations, 17% accuracy on reversed relations, and 33% accuracy on double reversed relations. These data indicate that Brent was performing below mastery criterion on all three relational types at pretest.

At pretest Douglas responded between 17–100% correctly on three administrations of the generalization probes. The mean percentage accuracy across the three administrations of the generalization probes was 78% on simple relations, 84% accuracy on reversed relations, and 33% accuracy on double reversed relations. Visual inspection of the data presented in Figure 1 reveals that Douglas responded slightly below mastery criterion on simple relations for the first and second administrations of the generalization probe. Performance on simple relations during the final generalization probe increased to meet the mastery criterion. Performance on reversed and double reversed relations remained below mastery criterion for all three administrations of the generalization probes.

Posttest generalization probes. At posttest Sarah responded between 67–100% correctly on three administrations of the generalization probes. The mean percentage accuracy across the three administrations of the generalization probes was 100% accuracy on simple relations, 100% accuracy on reversed relations, and 67% accuracy on double reversed relations. These data indicate that Sarah was performing above the 80% mastery criterion on simple and reversed relations at posttest. Performance on double reversed relations slightly improved between pretest and posttest, but remained below mastery criterion for two administrations of the generalization probes. On the third administration of the generalization probes, the tact for each emotion the actors in the video were experiencing was orally presented to Sarah immediately following the video presentation. No change was observed in performance on the double reversed relations following the introduction of the tacts.

At posttest Brent responded between 0–100% correctly on three administrations of the generalization probes. The mean percentage accuracy across the three administrations of the generalization probes was 78% accuracy on simple relations, 66.7% accuracy on reversed relations, and 16.7% accuracy on double reversed relations. Visual inspection of the data presented in Figure 2 reveals modest improvements in performance on simple and reversed relations following MEI, but performance remained below mastery criterion on all three levels of relational complexity at posttest. On the third

administration of the generalization probes, the tact for each emotion the actors in the video were experiencing was orally presented to Brent following the video presentation. With the addition of the tact, performance on simple and reversed relations increased to 100% accuracy meeting the mastery criterion. Performance on double reversed relations increased to 50% accuracy, but remained below mastery criterion.

At posttest Douglas responded between 17–100% correctly on three administrations of the generalization probes. The mean percentage accuracy across the three administrations of the generalization probes was 94.3% accuracy on simple relations, 72.3% accuracy on reversed relations, and 45.7% accuracy on double reversed relations. Visual inspection of the data presented in Figure 1 reveals that accurate responding to simple relations maintained following MEI, but performance on reversed and double reversed relations deteriorated at posttest. On the second and third administrations of the generalization probes, the tact for each emotion the actors in the video were experiencing was orally presented to Douglas following the video presentation. With the addition of the tact, performance on reversed relations increased to 100% accuracy meeting the mastery criterion. Performance on double reversed relations increased to 50% and subsequently 67% accuracy, but remained below mastery criterion.

SLDT-A

Pretest. Results for the SLDT-A are presented in Table 2. At pretest all three participants scored in the 2nd percentile indicating that 2% of children in the participants' age group score below this level. All three participants received a standard score of 67 at pretest indicating that all participants scored two standard deviations below the average of the peer group.

Posttest. At posttest Sarah's performance improved such that her score ranked in the 26th percentile, and her standard score increased to 90 within one standard deviation of the mean. Brent's score remained in the 2nd percentile at posttest, and his standard score remained at 67. Douglas' performance improved such that his score ranked in the 17th percentile, and his standard score increased to 86 within one standard deviation of the mean.

Anecdotal information. At pretest Sarah and Douglas were both observed to identify what each model in the test materials was thinking based on irrelevant stimulus features (e.g., if a man's face is oriented slightly upward and to the right, it means he's thinking deeply about something). Brent was unable to identify the complex emotion expressed in several of the test items.

At posttest Sarah was observed to imitate the gestures of the models in the photos before responding to each test item. Douglas was observed to respond in voices as though he were actually the model in the test item (e.g., identifying what a female model is thinking using a feminine voice). Brent remained unable to identify the majority of the emotions expressed in the test items.

TOMI

Pretest. Results for the TOMI are presented in Table 3. At pretest Sarah received an overall score of 16.5 on the TOMI with scores of 16.7, 16, and 13.4 on the Early, Basic, and Advanced TOM factors, respectively. Brent received an overall score of 20 with scores of 20 on each of the individual TOM factors as well. Douglas received an overall score of 16.9 on the TOMI with scores of 17.1, 15.3, and 16.2 on the Early, Basic, and Advanced TOM factors, respectively.

Posttest. At posttest Sarah received an overall score of 14.7 with scores of 15.2, 18.3, and 11.1 on the Early, Basic, and Advanced TOM factors, respectively. Brent again received an overall score of 20 with scores of 20 of each of the individual TOM factors. Douglas received an overall score of 13.5 with scores of 13.1, 14.3, and 12.4 on the Early, Basic, and Advanced TOM factors, respectively.

Summary of results

During pretest probes, all three participants performed with highest accuracy on simple relations, followed by reversed relations, and then double reversed relations. All three participants performed at mastery criterion on simple relations at pretest, and Douglas also performed at mastery criterion on reversed relations. Sarah and Brent required instruction on reversed and double reversed relations, while Douglas required instruction only on double reversed relations. During MEI participants mastered the instructional relations with 3 presentations of simple relations, 3–6 presentations of reversed relations, 4–8 presentations of double reversed relations, and 3 presentations of the full instructional protocol including all three levels of relational complexity. At posttest all three participants showed the emergence of deictic relational responding skills in the presence of novel relations for three administrations of the test protocol.

For generalization probes, Sarah and Douglas performed at mastery criterion on simple relations. All three participants performed below criterion on reversed and double reversed relations. Following MEI, Sarah's performance improved to meet criterion for simple and reversed relations, and increases were observed on double reversed relations. Brent and Douglas improved to mastery criterion on simple and reversed relations following introduction of the tact of each actor's emotion. Improvements on double reversed relations were observed for Brent and Douglas as well, but performance did not meet criterion.

Results of standardized assessments revealed that all three participants were scoring in the 2nd percentile with scores two standard deviations below the mean at pretest. At posttest Sarah and Douglas' standard scores increased to within one standard deviation of the mean. Results of the TOMI revealed that participants scored between 16.5–20 at pretest and 13.5–20 at posttest.

» DISCUSSION

Findings from the present investigation show MEI to be an effective instructional method for teaching young adults with Asperger syndrome to engage in deictic relational responding in the presence of novel relations. Testing and instruction of deictic relations was conducted using a protocol created for the developmental level of the participants, and following MEI, all participants attained criterion on posttest probes for all three levels of relational complexity. Regarding assessment of generalization following MEI, improvements in percentile rank and standard scores on the SLDT-A for Sarah and Douglas were observed at posttest, while little change was observed in ratings on the TOMI caregiver report measure from pretest to posttest. Findings from the present study also show varying degrees of generalization to a natural social interaction based on level of relational complexity. Following completion of MEI, Sarah's performance on generalization probes using video-based scenarios of social interactions increased to meet criterion for both simple and reversed relations. Performance for Brent and Douglas improved following introduction of the tact for each emotion experienced by the characters in the videos.

The majority of previous evaluations on the use of MEI to teach deictic relational responding skills have involved instruction of typically developing children using the McHugh et al. (2004) protocol (Weil et al., 2011) or a story-based protocol designed for young children (Davlin et al., 2011). Results of the current study lend support to use of the perspective-taking curriculum for individuals with autism created by McHugh et al. (2009) that outlines an instructional sequence for providing a history of MEI through teaching first simple, reversed, and finally double reversed relations. In contrast to previous research (e.g., Davlin et al., 2011; Weil et al., 2011), participants in the current study had a basic perspective-taking repertoire at pretest as evidenced by all three participants responding at mastery criterion on simple relations before instruction. According to the RFT analysis of perspective-taking, simple relations are the only level of relational complexity that does not require a relational response, and the participants respond directly to the question (Barnes-Holmes et al., 2004). For higher-functioning adolescents, correct responding to a direct question regarding characters in a scenario may be expected.

As stated previously, the perspective-taking protocol used in the current study evaluated three levels of relational complexity (i.e., simple, reversed, and double reversed) and three types of deictic relations (i.e., I-You, Here-There, and Now-Then) as in the McHugh et al. (2004) protocol. However, the structure of the I-You relations was designed differently in the current protocol. The I-You relations in the current protocol may better be described as You-Other You relations because the trials inquiring about perspective according to person included only the characters in the scenario. The perspectives of the actual participants (i.e., I) were not included in the relations. The You-Other You relation is aimed at an observational aspect of the perspective-taking repertoire. For example, an individual may observe two people interacting with one another before deciding to join the interaction. It is possible that an I-You

relation is necessary in order to successfully respond to a You-Other You relation because the participant must change perspective from I to You in order to then change perspective from You to Other You.

Another point of difference between the current protocol and the McHugh et al. (2004) protocol is the inclusion of an emotion component in trials. In an RFT analysis perspective-taking and empathy are viewed as two separate, albeit related, repertoires. Empathy involves a transformation of emotional functions that occurs according to the perspective of another individual, and perspective-taking skills are, therefore, a necessary component of an empathic repertoire (Valdivia-Salas, Luciano, Gutierrez-Martinez, & Visdomine, 2009). Although emotions were included in the scenarios in the present study, direct training promoting a transformation of functions was not attempted or evaluated. Based on the current results it cannot be determined if empathy followed from the instruction provided in the present study or if another component must be added to the intervention in order for this to occur. This would be a fruitful area of investigation for future research.

The current study also adds to the literature examining generalization of perspective-taking skills. The generalization probes in this study appear to require at least two different repertoires in order to achieve a correct response. The first repertoire involves deictic relational responding, and the second repertoire involves tacting emotions of other individuals. Results of the generalization probes suggest that these skills must *both* be taught in order for generalization to occur on this task. Evidence for this can be seen in an evaluation of Brent and Douglas' responding, as their performance on reversed relations increased following MEI only after tacts for the characters' emotions were introduced. This suggests a deficit in tacting emotions, rather than a deficit in relational responding, was the factor impacting Brent's initially low posttest scores. It may, therefore, be beneficial to teach both tacting of complex emotions as well as deictic relational responding in order to demonstrate meaningful generalization of skills to a more natural setting.

Results for performance on the SLDT-A can also be viewed as an assessment of generalization. Improvements in percentile rank and standard scores for Sarah and Douglas were observed at posttest. These results may reflect the findings of performance on the generalization probes because one of the main skills required to respond correctly on the SLDT-A is accurate tacting of a person's emotion. Anecdotal observations of Sarah and Douglas involving the imitation of the models' gesture and voices at posttest also suggest a stronger I-You relation following MEI. Results from the SLDT-A must, however, be interpreted with caution as this study spanned only a short time period of four to six weeks for all participants. It is possible that practice effects exerted influence on results on this assessment during the posttest administration.

A final aspect to consider in regards to generalization is performance on the TOMI. The lack of increase in scores on the TOMI are in contrast to previous research conducted by Weil et al. (2011) in which performance on TOM tasks designed for young children (e.g., false belief test) was shown to increase following MEI for deictic relations. Results of the current study may reflect a limitation of the TOMI measure. While the TOMI has been shown to be a reliable measure with time periods as short as four week intervening between administrations (Lerner et al., 2010), this measure has not been used to detect changes in TOM skills over such a short time period. Furthermore, as noted previously, participants in this study attended a boarding school, and academic advisors with whom they had daily contact were selected to complete the TOMI. The lack of a central caregiver in the boarding school environment likely decreased the probability of capturing changes in these skills across the course of the present study.

Continued research evaluating deictic responding would be beneficial in providing a knowledge base for teaching necessary social skills to individuals with Asperger syndrome. For example, when planning a shopping trip with a friend, an individual must respond according to I-You, Here-There, and Now-Then frames to plan a trip that will satisfy both that individual and the friend as well as account for both persons' schedules. Deictic relations are also needed when resolving conflicts by responding to an I-You relation in order to make a compromise that is acceptable to both parties. Better understanding of how to build the basis for complex social skills, such as those just mentioned, is needed in order to effectively teach those skills. This study provides the foundation for how to teach deictic responding to individuals with Asperger syndrome, which can serve as a starting point for teaching more complex interpersonal skills.

Limitations of the current study should be considered. Current results have been compared to previous work examining basic deictic frames. However, due to the inclusion of You-Other You relations in place of the traditional I-You relations, it is unclear how directly comparable these two frames related to the perspective of the speaker are. Future work evaluating the relationship between these relations is needed to clarify this issue. Another limitation involves the lack of a clear method for measuring the overt responses noted as anecdotal observations (i.e., the use of gestures or voices while completing the SLDT-A). These collateral responses may be important indicators of perspective-taking performance and deserve more direct attention in future research. Despite these limitations, the current study extends previous work and demonstrates the effectiveness of MEI to teach perspective-taking skills to young adults with Asperger syndrome. Perspective-taking instruction is an area rich with opportunities for future research, and quality instructional methods for teaching this skill are sorely needed in order to help those with deficits in this area. The current literature suggests that the RFT analysis of perspective-taking has the potential to provide the conceptual foundation needed to create effective instructional programs that promote generalization of skills, and continued examination of methods to promote generalization beyond the instructional environment would be a beneficial addition to the field. ◼

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APPENDIX A

» SIMPLE RELATIONS
I-You
Ms. Foster is glad because she enjoys watching her students give presentations. Travis is nervous because he is reading a paper in front of class. Kelly is relieved because the teacher did not ask her to read her paper. Fred is worried because he doesn't want Ms. Foster to catch him with his phone in class.

How does Travis feel?
   (*nervous*, relieved, glad, worried)

How does Kelly feel?
   (*relieved*, nervous, glad, worried)

Vince is thirsty because he ate some cookies. Vince's sister is angry because Vince didn't leave her any cookies. Vince's dad feels rushed because he forgot to stop at the grocery store after work. Vince's mother is annoyed because Vince drank from the milk carton.

How does Vince feel?
   (*thirsty*, annoyed, rushed, angry)

How does Vince's mother feel?
   (*annoyed*, thirsty, rushed, angry)

Here-There
Eric is angry because here by his locker he cannot open his combination lock. There in the classroom Eric is thankful that Jennifer returned his lunch money. Jennifer is concerned because here in the hallway she found money on the floor. There in gym class Jennifer is embarrassed because she forgot to bring a change of clothes.

How does Eric feel there?
 (*thankful*, angry, concerned, embarrassed)

How does Eric feel here?
 (*angry*, thankful, concerned, embarrassed)

Ryan is worried because there at school he has not found a date to the dance. Here at the dance Ryan is pleased because he asked Peggy to go with him. Todd is anxious because there on the bus he was talking to Dolly. Here in the cafeteria Todd is excited because Dolly said she would go to the dance with him.

How does Ryan feel there?
 (*worried*, pleased, anxious, excited)

How does Ryan feel here?
 (*pleased*, worried, anxious, excited)

Now-Then

Before, Cassie was disappointed because she couldn't find a good book at the library. Now, Cassie is pleased because the librarian helped her find a good book. Yesterday, the librarian was upset because she lost her glasses. Now, the librarian is relieved because a friend found her glasses.

How does Cassie feel now?
 (*pleased,* disappointed, upset, relieved)

How did Cassie feel then?
 (*disappointed*, pleased, upset, relieved)

Yesterday, DeShawn was excited because he made a 3-point shot at basketball practice. Now, DeShawn is miserable because he fouled out at the basketball game. Yesterday, Carlos was confident because his team did great at basketball practice. Now, Carlos is disappointed because his team might lose the game.

How does DeShawn feel now?
 (*excited*, miserable, confident, disappointed)

How did DeShawn feel then?
 (*miserable,* excited, confident, disappointed)

» REVERSED RELATIONS
I-You

Ms. Foster is glad because she enjoys watching her students give presentations. Travis is nervous because he is reading a paper in front of class. Kelly is relieved because the teacher did not ask her to read her paper. Fred is worried because he doesn't want Ms. Foster to catch him with his phone in class.

If Travis were Kelly, how would Travis feel?
 (*relieved*, nervous, glad, worried)

If Kelly were Travis, how would Kelly feel?
 (*nervous*, relieved, glad, worried)

Vince is thirsty because he ate some cookies. Vince's sister is angry because Vince didn't leave her any cookies. Vince's dad feels rushed because he forgot to stop at the grocery store after work. Vince's mother is annoyed because Vince drank from the milk carton.

If Vince were his mother, how would Vince feel?
 (*annoyed*, thirsty, rushed, angry)

If Vince's mother were Vince, how would Vince's mother feel?
 (*thirsty*, annoyed, rushed, angry)

Here-There

Eric is angry because here by his locker he cannot open his combination lock. There in the classroom Eric is thankful that Jennifer returned his lunch money. Jennifer is concerned because here in the hallway she found money on the floor. There in gym class Jennifer is embarrassed because she forgot to bring a change of clothes.

If here were there, how would Eric feel here?
 (*thankful*, angry, concerned, embarrassed)

If there were here, how would Eric feel there?
 (*angry*, thankful, concerned, embarrassed)

Ryan is worried because there at school he has not found a date to the dance. Here at the dance Ryan is pleased because he asked Peggy to go with him. Todd is anxious because there on the bus he was talking to Dolly. Here in the cafeteria Todd is excited because Dolly said she would go to the dance with him.

If here were there, how would Ryan feel here?
 (*worried*, pleased, anxious, excited)

If there were here, how would Ryan feel there?
 (*pleased*, worried, anxious, excited)

Now-Then

Before, Cassie was disappointed because she couldn't find a good book at the library. Now, Cassie is pleased because the librarian helped her find a good book. Yesterday, the librarian was upset because she lost her glasses. Now, the librarian is relieved because a friend found her glasses.

If now were then, how would Cassie feel now?
 (*disappointed*, pleased, upset, relieved)

If then were now, how would Cassie feel then?
 (*pleased*, disappointed, upset, relieved)

Yesterday, DeShawn was excited because he made a 3-point shot at basketball practice. Now, DeShawn is miserable because he fouled out at the basketball game. Yesterday, Carlos was confident because his team did great at basketball practice. Now, Carlos is disappointed because his team might lose the game.

If now were then, how would DeShawn feel now?
 (*excited*, miserable, confident, disappointed)

If then were now, how would DeShawn feel then?
 (*miserable*, excited, confident, disappointed)

» DOUBLE REVERSED RELATIONS
I-You and Here-There

Eric is angry because here by his locker he cannot open his combination lock. There in the classroom Eric is thankful that Jennifer

returned his lunch money. Jennifer is concerned because here in the hallway she found money on the floor. There in gym class Jennifer is embarrassed because she forgot to bring a change of clothes.

If Eric were Jennifer and if here were
there, how would Eric feel here?
   (*embarrassed*, angry, thankful, concerned)

If Jennifer were Eric and if there were here,
how would Jennifer feel there?
   (*angry*, thankful, concerned, embarrassed)

Ryan is worried because there at school he has not found a date to the dance. Here at the dance Ryan is pleased because he asked Peggy to go with him. Todd is anxious because there on the bus he was talking to Dolly. Here in the cafeteria Todd is excited because Dolly said she would go to the dance with him.

If Ryan were Todd and if there were
here, how would Ryan feel there?
   (*excited*, worried, pleased, anxious)

If Todd were Ryan and if here were
there, how would Todd feel here?
   (*worried*, pleased, anxious, excited)

I-You and Now-Then

Now, Travis is nervous because he is reading a paper in front of class. Later, Travis will be excited because he is going to the arcade after school. Now, Kelly is relieved because the teacher did not ask her to read her paper. Later, Kelly will feel thirsty because she forgot her water bottle in her locker.

If Travis were Kelly and if now were
then, how would Travis feel now?
   (*thirsty*, nervous, excited, relieved)

If Kelly were Travis and if then were
now, how would Kelly feel then?
   (*nervous,* excited, relieved, thirsty)

Now, Vince is thirsty because he ate some cookies. Later, Vince will be upset because he was grounded for drinking from the milk carton. Now, Vince's mother is annoyed because Vince drank from the milk carton. Later, Vince's mother will be glad because she can watch her favorite show without hearing Vince's radio.

If Vince's mother were Vince and if now were
then, how would Vince's mother feel now?
   (*upset,* thirsty, annoyed, glad)

If Vince were his mother and if then were
now, how would Vince feel then?
   (*annoyed,* thirsty, upset, annoyed, glad)

Here-There and Now-Then

Yesterday, Cassie was disappointed because she couldn't find a good book there at the library, and Cassie was bored because she had nothing to read here at the park. Now, Cassie is elated because she won a free movie pass there at school, and Cassie is pleased because the librarian helped her find a good book here at the library.

If then were now and if here were there, how
would Cassie feel here and then?
   (*elated*, disappointed, bored, pleased)

If now were then and if there were here, how
would Cassie feel there and now?
   (*bored*, disappointed, elated, pleased)

Yesterday, DeShawn was excited because he made a 3-point shot there at basketball practice, and he was confident because here at home his dad told him he is a great player. Now, DeShawn is nervous because there at school Mary said she would come to his game, and DeShawn is miserable because he fouled out here at the basketball game.

If then were now and if there were here, how
would DeShawn feel there and then?
   (*miserable*, excited, confident, nervous)

If now were then and if here were there, how
would DeShawn feel here and now?
   (*excited*, confident, nervous, miserable)

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APPENDIX B

» SIMPLE RELATIONS

I-You

Becky is sad because Jake said he doesn't want to be her boyfriend. Jake feels guilty because he hurt Becky's feelings. Alan is excited that Becky and Jake broke up because he likes Becky. Linda is worried that Alan will ask Becky to the dance instead of her.

How does Becky feel?
   (*sad,* guilty, excited, worried)

How does Jake feel?
   (*guilty,* sad, excited, worried)

Martin is annoyed because his Mom is texting him while he's at lunch with his friends. Jay is nervous because he had to sit with people he doesn't know at lunch. Lance is excited to meet a new person. Kelly feels giddy because she thinks Lance is smiling at her.

How does Jay feel?
   (*nervous,* excited, disappointed, giddy)

How does Lance feel?
   (*excited,* nervous, disappointed, giddy)

Here-There

Kim is shocked because here in the hallway her soda sprayed all over her dress. There in the classroom Kim is miserable because her dress is wet and sticky from the soda. Here in the hallway Juan is surprised because Kim opened her soda can after dropping it on the floor. Juan feels confused there in the classroom because he forgot to do his homework.

How does Kim feel here?
(*shocked,* miserable, surprised, confused)

How does Kim feel there?
(*miserable,* shocked, surprised, confused)

Danny is irritated because here in computer class he can't concentrate on his assignment. There on the bus Danny is confused because he can't find his wallet. Here in class Kyle is happy because he is playing a computer game. Kyle feels guilty there in the hallway because Danny said that he was upset with him for laughing too loud during class.

How does Danny feel here?
(*irritated,* confused, happy, guilty)

How does Danny feel there?
(*confused,* irritated, happy, guilty)

Now-Then

Yesterday, Clare's music teacher was concerned because her students were struggling with new music. Now, Clare's music teacher is relieved because her students learned a new song. Yesterday, Clare was frustrated because she couldn't play a song on her clarinet. Now, Clare is glad because her music teacher helped her play the new song on her clarinet.

How does Clare feel now?
(*glad,* frustrated, concerned, relieved)

How did Clare feel then?
(*frustrated,* glad, concerned, relieved)

Before, Chloe was happy because she found a cool music video online. Now, Chloe is shocked because her friend posted an embarrassing photo of her on Facebook. Before, Cindy was amused because she found a funny photo of Chloe. Now, Cindy feels bad because Chloe was offended by the photo she posted on Facebook.

How does Chloe feel now?
(*shocked,* happy, amused, bad)

How did Chloe feel then?
(*happy,* shocked, amused, bad)

» REVERSED RELATIONS
I-You

Becky is sad because Jake said he doesn't want to be her boyfriend. Jake feels guilty because he hurt Becky's feelings. Alan is excited that

Becky and Jake broke up because he likes Becky. Linda is worried that Alan will ask Becky to the dance instead of her.

If Becky were Jake, how would Becky feel?
(*guilty,* sad, excited, worried)

If Jake were Becky, how would Jake feel?
(*sad,* guilty, excited, worried)

Martin is annoyed because his Mom is texting him while he's at lunch with his friends. Jay is nervous because he had to sit with people he doesn't know at lunch. Lance is excited to meet a new person. Kelly feels giddy because she thinks Lance is smiling at her.

If Jay were Lance, how would Jay feel?
(*excited,* nervous, disappointed, giddy)

If Lance were Jay, how would Lance feel?
(*nervous,* excited, disappointed, giddy)

Here-There

Kim is shocked because here in the hallway her soda sprayed all over her dress. There in the classroom Kim is miserable because her dress is wet and sticky from the soda. Here in the hallway Juan is surprised because Kim opened her soda can after dropping it on the floor. Juan feels confused there in the classroom because he forgot to do his homework.

If there were here, how would Kim feel there?
(*shocked,* miserable, surprised, confused)

If here were there, how would Kim feel here?
(*miserable,* shocked, surprised, confused)

Danny is irritated because here in computer class he can't concentrate on his assignment. There on the bus Danny is confused because he can't find his wallet. Here in class Kyle is happy because he is playing a computer game. Kyle feels guilty there in the hallway because Danny said that he was upset with him for laughing too loud during class.

If there were here, how would Danny feel there?
(*irritated,* confused, happy, guilty)

If here were there, how would Danny feel here?
(*confused,* irritated, happy, guilty)

Now-Then

Yesterday, Clare's music teacher was concerned because her students were struggling with new music. Now, Clare's music teacher is relieved because her students learned a new song. Yesterday, Clare was frustrated because she couldn't play a song on her clarinet. Now, Clare is glad because her music teacher helped her play the new song on her clarinet.

If then were now, how would Clare feel then?
(*glad,* frustrated, concerned, relieved)

If now were then, how would Clare feel now?
(*frustrated,* glad, concerned, relieved)

Before, Chloe was happy because she found a cool music video online. Now, Chloe is shocked because her friend posted an embarrassing photo of her on Facebook. Before, Cindy was amused because she found a funny photo of Chloe. Now, Cindy feels bad because Chloe was offended by the photo she posted on Facebook.

If then were now, how would Chloe feel then?
(*shocked,* happy, amused, bad)

If now were then, how would Chloe feel now?
(*happy,* shocked, amused, bad)

» DOUBLE REVERSED RELATIONS
I-You and Here-There

Danny is irritated because here in computer class he can't concentrate on his assignment. There on the bus Danny is confused because he can't find his wallet. Here in class Kyle is happy because he is playing a computer game. Kyle feels guilty there in the hallway because Danny said that he was upset with him for laughing too loud during class.

If Danny were Kyle and if there were here, how would Danny feel there?
(*happy,* irritated, confused, guilty)

If Kyle were Danny and if here were there, how would Kyle feel here?
(*confused,* irritated, happy, guilty)

Kim is shocked because here in the hallway her soda sprayed all over her dress. There in the classroom Kim is miserable because her dress is wet and sticky from the soda. Here in the hallway Juan is surprised because Kim opened her soda can after dropping it on the floor. Juan feels confused there in the classroom because he forgot to do his homework.

If Kim were Juan and here were there, how would Kim feel here?
(*confused,* shocked, miserable, surprised)

If Juan were Kim and there were here, how would Juan feel there?
(*shocked,* miserable, surprised, confused)

I-You and Now-Then

Earlier, Becky was happy because Jake said he would take her to the movies. Now, Becky is sad because Jake said he doesn't want to be her boyfriend. Earlier, Jake was frustrated because Becky texts him all the time. Now, Jake feels guilty because he hurt Becky's feelings.

If Jake were Becky and if now were then, how would Jake feel now?
(*happy,* sad, frustrated, guilty)

If Becky were Jake and if then were now, how would Becky feel then?
(*guilty,* happy, sad, frustrated)

Earlier, Jay was nervous because he had to sit with people he didn't know at lunch. Now, Jay feels comfortable because his new friend Lance is in his chemistry class. Earlier, Lance was excited to meet a new person. Now, Lance is glad because Jay agreed to do a group project with him in chemistry class.

If Jay were Lance and if now were then, how would Jay feel now?
(*excited,* nervous, comfortable, glad)

If Lance were Jay and if then were now, how would Lance feel then?
(*comfortable,* nervous, excited, glad)

Here-There and Now-Then

Yesterday, Clare was frustrated because there at home she couldn't play a song on her clarinet, and Clare was jealous because here at the mall her brother got new shoes. Now, Clare is glad because here at school her music teacher helped her play the new song on her clarinet, and Clare was disappointed because there at the state fair she missed watching the race.

If then were now and if here were there, how would Clare feel here and then?
(*glad,* frustrated, jealous, disappointed)

If now were then and if there were here, how would Clare feel there and now?
(*jealous,* frustrated, glad, disappointed)

Before, Chloe was happy because here at home she found a cool music video online, and Chloe was frustrated because there at the restaurant her favorite meal was not available. Now, Chloe is shocked because here at the library she found an embarrassing photo of herself on her friend's Facebook page, and Chloe was angry because there at school she forgot her homework.

If then were now and if there were here, how would Chloe feel there and then?
(*shocked,* happy, frustrated, angry)

If now were then and if here were there, how would Chloe feel here and now?
(*frustrated,* happy, shocked, angry)

APPENDIX C

Andy and Liz are walking into a building. Andy is walking sluggishly, carrying a basketball, and appears to be fatigued. Liz appears excited to see Andy and asks if he would like to go hang out in the common room. Later, Liz and Anna are sitting at the picnic table. Liz is talking on the phone and laughing loudly. Anna is reading a book and glaring at Liz with an annoyed expression.

Simple I-You:
How did Andy feel on the sidewalk? (tired)
How did Liz feel on the sidewalk? (excited)

Reversed I-You:
If Andy were Liz, how would Andy feel on the sidewalk? (excited)
If Liz were Andy, how would Liz feel on the sidewalk? (tired)

Double Reversed I-You/Here-There:

If Andy were Liz and if the sidewalk were the picnic table, how would Andy feel at the picnic table? (talkative)
If Anna were Liz and if the picnic table were the sidewalk, how would Anna feel on the sidewalk? (excited)

Anna and Lilith are sitting at a table having lunch. Anna is eating salad and has a disappointed facial expression, and Lilith is smiling and eating a bag of candy. Later in the afternoon, Anna and Lilith are sitting at a picnic table. Anna has a neutral or content facial expression and is eating potato chips, and Lilith has a pained expression and is grasping her stomach.

Simple Now-Then:

How does Anna feel in the afternoon? (content)
How did Lilith feel at lunch? (happy)

Reversed Now-Then:

If the afternoon were lunchtime, how would Anna feel in the afternoon? (disappointed)
If lunchtime were the afternoon, how would Lilith feel at lunchtime? (pained)

Double Reversed I-You/Now-Then:

If Anna were Lilith and if afternoon were lunchtime, how would Anna feel in the afternoon? (happy)
If Lilith were Anna and if lunchtime were the afternoon, how would Lilith feel at lunchtime? (content)

In the morning Lilith and Anna are sitting in class while the teacher is talking. Lilith is writing down notes and has an attentive facial expression, and Anna is looking at a magazine inside her book and smiling slyly. Later in the afternoon, the Lilith and Anna are seated at a table completing schoolwork. Lilith is fully concentrated on her schoolwork and confidently writing answers down. Anna has a frustrated facial expression and is flipping through the pages of her book as though she cannot find an answer.

Simple Here-There:

How did Lilith feel in the classroom? (attentive)
How does Anna feel at the study table? (confused)

Reversed Here-There:

If the classroom were the study table, how would Lilith feel in the classroom? (confident)
If the study table were the classroom, how would Anna feel at the study table? (sly)

Double Reversed Here-There/Now-Then:

If the study table were the classroom and if the morning were the afternoon, how would Lilith feel at the study table in the morning? (confident)
If the classroom were the study table and if the afternoon were the morning, how would Anna feel in the classroom in the afternoon? (sly)