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# Descriptive Assessment of Conversational Skills: Towards Benchmarks for Young Adults with Social Deficits

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## Abstract

Descriptive assessments are necessary to identify social norms and establish a foundation for experimental analysis. Much of the social skills intervention literature involves goals that have been selected through interviews and direct observation of behavior without a reference to desired outcomes. The purpose of the

current study was to extend research on descriptive assessments of conversations by including additional measures and examining conversational behavior across contexts. We conducted a descriptive assessment of social skills exhibited by 16 neurotypical young adults. Participants had 10-min conversations in groups and 1-on-1 with friends and novel individuals. We then assessed variability within and across participants on a wide array of relevant measures. Throughout the conversations, participants shared the conversation time equally, spent most of the conversation time making on-topic comments, and gazed at their conversation partner more frequently while listening than while speaking. These descriptive data extend current research, inform future experimental analyses, and may guide clinical decisions.

Successful conversations are essential to the initiation and maintenance of both personal and professional relationships, such as friendships and employment. Individuals who exhibit skill deficits (e.g., not initiating conversations) or excesses (e.g., perseverating on a preferred topic) related to conversations may experience barriers to social inclusion (Black & Hazen, 1990; Hazen & Black, 1989). Social skill deficits persist into adulthood and can decrease the likelihood of making and maintaining friendships and gaining and sustaining employment (Farley et al. 2018; Howlin et al., 2004; Taylor et al. 2015; Taylor & Seltzer, 2011). Although meaningful relationships are desired by adults with autism spectrum disorder (ASD), most report having no meaningful friendships (Farley et al. 2018; Howlin et al., 2004; Orsmond et al., 2004). Awareness of one's differences is correlated with an increase in depressive symptoms (Hedley & Young, 2006) and loneliness (Bauminger & Kasari, 2000) among individuals with ASD. In addition, only about 9% of adults with ASD who do not have an intellectual disability reach full independence and maintain full-time competitive employment (Shattuck et al., 2012). Farley et al. (2018) surveyed 169 adults with ASD. Twenty percent were unemployed and 47% were participants in day programs and sheltered workshops. Only 12% held full-time unassisted jobs. Adults with full-time jobs reported holding as many as nine previous jobs and had difficulty sustaining employment. These outcomes bear a sharp contrast to 90% of the general U.S. population who hold full-time unassisted employment. Taken together, adults with autism have limited quality of life outcomes related to friendships, work placements, and independent living (Farley et al. 2018; Howlin et al., 2004).

Increasing adolescents' and adults' social repertoires has the potential to have a significant impact on their quality of life. In the context of a conversation, the number of different words spoken and the mean length of an utterance on a given topic is predictive of meaningful friendships (Friedman et al., 2019). Prior behavioral interventions have demonstrated effectiveness in teaching children, adolescents, and young adults to: (a) ask and answer questions (Bambara et al., 2016; Beaulieu et al., 2013; Dotson et al., 2010; Grob et al., 2019; McConnell et al., 1991; Minkin et al., 1976; Nuernberger et al., 2013); (b) initiate a conversation (Koegel et al., 2001); (c) wait for their turn to speak so as to not interrupt their conversation partner (Beaulieu et al., 2013; Hood et al., 2017); (d) provide positive feedback (Dotson et al., 2010; Minkin et al., 1976); (e) give or accept compliments (Hood et al., 2020; Leaf et al., 2009); (f) sustain conversation on a given topic (Bambara et al., 2016; Fisher et al., 2013; Hood et al., 2017; Koegel & Frea, 1993; Leaf et al., 2009; Nuernberger et al., 2013; Stocco et al., 2021); (g) respond to indices of uninterest by confirming the conversation partner's availability (Mann et al., 2020), inviting them to contribute (Mann et al., 2020; Peters & Thompson, 2015); or changing the topic (Hood et al., 2017; Mann & Karsten, 2020; Peters & Thompson., 2015); (h) make eye contact throughout a conversation (Koegel et al., 1993; Nuernberger et al., 2013); and (i) not engage in distracting nonvocal behavior (Hood et al., 2017; Hughes et al., 1998; see also Reichow & Volkmar, 2010, and Wang et al., 2013 for reviews). Behavioral interventions have demonstrated success in addressing such conversational concerns but have largely occurred in the absence of a thorough account of what constitutes a mutually reinforcing conversation.

As Bijou et al.'s (1968) influential article suggests, descriptive assessments can identify social norms and inform experimental analyses aimed at ameliorating concerns. Descriptive data can also help to identify individuals in need of intervention and guide the selection of behavioral goals (e.g., instructional targets, mastery criteria; Bell

& Barnett, **1999**). McGee et al. (**1997**) compared the peer-related social behaviors of 32 children with autism to those of 32 neurotypical children during free-play classroom observations. Neurotypical children engaged in low levels of social bids and child-focused interactions ( $M = 0.09 - 0.11$ ,  $M = 0.09 - 0.14$  of 5-s intervals, respectively). Clinical benchmarks for teaching children with autism to play with others that require almost continuous interactions ( $M = 0.8 - 1.0$ ) may result in unnatural repertoires. Such discrepancies highlight the need for benchmarks guided by descriptive data.

Some prior researchers selected conversational goals and target skills based on informal interviews and direct observations of the participants' behaviors (e.g., Dotson et al., **2010**; Hood et al., **2017**; Leaf et al., **2012**). Although these procedures may have face validity, the lack of established or validated selection criteria may inadvertently deplete clinical time and resources, or worse, produce unnatural repertoires that do not reflect the diverse ways of successfully conversing. An alternative is to base these decisions on peer micronorms by conducting direct observations of conversations exhibited by adolescents and adults with advanced social repertoires (e.g., Beaulieu et al., **2013**; Mann & Karsten, **2020**; Peters & Thompson, **2015**). For example, Mann and Karsten (**2020**) observed four neurotypical college students' conversations to develop definitions of both experimenter behavior and correct responses to indices of uninterest (i.e., confirming availability, inviting contribution, and changing the topic). Next, neurotypical college students watched videos of the experimenter conversing according to the developed definitions and rated the awkwardness. The process of obtaining peer micronorms prior to an intervention may increase the ecological validity of the study and the likelihood of high levels of social acceptability. However, obtaining peer micronorms is laborious and requires access to a peer population. This may limit the extent to which clinicians and researchers can independently obtain these data.

Hughes et al. (**1998**) outlined a comprehensive approach to validating critical social behaviors worthy of clinical intervention by collecting descriptive data. These authors suggested observing social interactions in a relevant context, developing a reliable measurement system, and establishing a range of performance prior to experimentally manipulating and assessing social acceptability of behavior change. For example, Hughes et al. observed the conversations of two groups (individuals with and without disabilities) of 12 high school students during unstructured lunch times among their naturally occurring lunch groups. The authors identified significant differences in the level of initiating, responding, attending, and engaging in distracting motor behavior between students with and without disabilities. The authors also identified significant differences in the frequency of topics (e.g., peers, social events) discussed in the groups. However, the researchers observed similarities in the social context such as conversation partners' gender, group size, and overall positive to neutral affect between individuals with and without disabilities. An analysis of the means and standard deviations of Hughes et al.'s measures produced normative ranges for each skill that was later validated by ratings of simulated video conversations.

Turkstra et al. (**2003**) observed 50 typically developing adolescents in brief 3-min conversations to measure the frequency of vocal-verbal and nonvocal verbal behaviors. Researchers asked participants to choose another participant to converse with regarding three topics of their choice. The authors summarized those behaviors that occurred at relatively low frequencies across conversations (e.g., repeating a portion of the speaker's utterance) and high frequencies (e.g., positive facial expressions).

In addition to researchers identifying the normative frequency of various conversational behaviors, researchers should study how behaviors of interest change in various conversational contexts. For example, Turkstra (**2001**) compared 24 typically developing individuals' conversational behavior in three different arrangements: one-on-one with a same sex partner (participants 1-8), one-on-one with an opposite sex partner (participants 9-16), and one-on-one with a professional Speech-Language Pathologist (participants 17-24). Each pair participated in a brief 3-min conversation for a total of 72 min of conversation. The authors summarized the similarities and differences across pairs of different conversation partners. Results suggested that individuals who had a

conversation with an opposite sex partner or a professional partner tended to ask fewer direct questions and make less eye contact, but they exhibited more nonverbal behavior (e.g., smiling, nodding) compared to individuals who had conversations with a same-sex, nonprofessional partner.

The few descriptive studies that exist on conversational skills with adolescents and adults provide a good starting point for understanding conversational behavior. The purpose of the current study was to address remaining gaps in describing neurotypical conversational behavior to inform learning benchmarks for adults with conversational deficits. In the present evaluation, researchers collected repeated measures of the same individual engaged in conversations across four distinct contexts: one-on-one with a friend, one-on-one with a novel partner, in a group of friends, and in a mixed-group of friends and novel partners. This arrangement allowed for assessments of variability within and between participants in contexts omitted from past research, but nonetheless relevant to social wellbeing in adolescence and young adulthood. Participants engaged in 10-min conversations during which researchers observed critical conversational behaviors (e.g., indices of uninterest and changes in conversation topic) that were less likely to occur in shorter conversations assessed in past research (e.g., Turkstra et al., **2003**). Rather than instructing prearranged conversation topics that may influence the ebb and flow of conversation, we allowed participants to initiate topics of their choice. Finally, some past descriptive studies combined measures of skills that researchers subsequently taught as distinct behaviors in clinical intervention. For example, initiating as defined by Hughes et al. (**1998**) encompassed two skills taught by Hood et al. (**2017**; i.e., changing the topic of conversation and following the conversation). Thus, we sought to improve the precision and to expand the number of skills measured based on a comprehensive review of past descriptive studies, experimental studies, and published manuals on conversational skills.

## Method

### Participants and Setting

Sixteen participants, ages 19 to 35 ( $M = 25.5$ ,  $Mdn = 25.0$ ), were recruited for the study through flyers placed around the California State University, Northridge campus. Participants were recruited in quads consisting of four friends. The researchers corresponded with one interested participant and this individual then identified three additional friends that were interested in participating. Quad 1 consisted of three cisgender males and one who identified as “other,”<sup>1</sup> quad 2 consisted of three cisgender males and one cisgender female, quad 3 consisted of four cisgender females, and quad 4 consisted of four cisgender males. Twelve participants identified their sexual orientation as heterosexual, two as pansexual, one as bisexual, and one as gay. One participant listed their race as Asian, three as Caucasian, and seven as Latinx or Hispanic. Five participants listed their race as mixed (two participants listed Caucasian and Latinx/Hispanic; one listed Caucasian, Latinx/Hispanic, and Asian; one listed Caucasian and Middle Eastern; and one participant did not further specify). Seven participants reported their highest or current level of education as a senior in college, three as a junior in college, three as a sophomore in college, two as a freshman in college, and one as a high school education (did not attend college). Nine participants reported an individual annual income of less than \$20,000, four reported between \$20,000 and \$34,999, one reported between \$35,000 and \$49,999, one between \$50,000 and \$74,999, and one between \$75,000 and \$99,999. Participants had no presenting social deficits as identified by their score on the *Social Responsiveness Scale, 2<sup>nd</sup> edition* (SRS-2; Constantino & Gruber, **2012**) and self-report. One participant self-reported an Attention-Deficit/Hyperactivity Disorder (ADHD) diagnosis. For their time commitment, participants received \$20 Amazon gift cards immediately following their completion of the study.

Observations took place in a university-based clinic equipped with cameras to record interactions. Six cameras were used: two Kimire 1920 x 1080 Full HD Digital Camcorders, two Zoom Q8 Handy Video Recorders, one Panasonic HC-V770 50x i.zoom Full HD video camera, and one Panasonic 20x Optical Zoom Full HD video camera. Each camera was placed at the end of the table upon a tripod. Additionally, each participant wore a

Shure WH20XLR Dynamic Headset Microphone which plugged into a Tascam DR-60D mkII Linear PCM Recorder for DSLR to record the audio of the conversation. Participants wore the microphones around the back of their head, with the ends over the top of their ears and the microphone positioned by the corner of their mouth. The researchers pressed record on the audio and video recorders before delivering the instructions and stopped the recording after the participants completed the postconversation form (see Supporting Information). All data were collected using the video and audio recordings.

## Response Definition and Measurement System

Researchers developed operational definitions from a review of published social skills research and curricula. The PsycInfo database and Google Scholar were used to search for any combination of terms including: social skills interventions, conversation skills, communication skills, ASD social deficits, and neurotypical conversation skills. Each topography of conversational behavior was individually defined and summarized; see Supporting Information for the list of social skills training sources we consulted as well as final operational definitions and measurement methods for each conversational behavior. We recorded the following speaker behaviors: (a) time in the speaker role, (b) gaze, (c) body orientation, (d) on-topic comments, (e) initiating change of topic, (f) speaking about nonpreferred topics, (g) changes in the conversation following an index of uninterest, (h) repeating utterances, (i) completing utterances, (j) sharing private information, (k) teasing and criticizing, (l) asking questions, including questions used to initiate a new topic of conversation; follow-up questions; asking for clarification; and asking for confirmation, (m) answering questions, including answering own question, (n) unintelligible responses, (o) appropriate gestures, and (p) giving and accepting compliments. We recorded the following listener behaviors: (a) time in the listener role, (b) gaze, (c) body orientation, (d) interruptions, (e) positive feedback, and (f) negative feedback. In addition, researchers recorded engagement in indices of uninterest, and subtle and gross-motor distracting nonvocal behavior throughout each conversation.

Data collectors were undergraduate and graduate students pursuing degrees in psychology and behavior analysis. Observers collected second-by-second data from recorded videos viewed in Microsoft's Movie and TV application. Data collectors could pause and rewind the videos as they recorded data on Excel spreadsheets. Data collectors used the separate audio file recorded from the Shure Dynamic Headset if the video audio did not fully capture the participants' utterances. Each observer scored a subset of the measures across all participants in an attempt to prevent observer fatigue. Researchers trained each observer to collect data from mock videos until they scored all dependent measures at 80% agreement or above on at least two conversations compared to the primary data collector. When observers' data disagreed with the researchers' data during training, both parties discussed the instance of behavior until they reached an agreement. Observers then scored additional videos. Observers recorded the exact time of each frequency measure and the exact onset and offset time of each duration measure.

A second data collector independently scored conversational behaviors for 30% of conversations across all conditions. For frequency measures, an agreement was scored if the secondary observer scored the same response within 2 s of the primary data collector's recording (Mudford et al., 2009). For duration measures, an agreement was scored if the secondary observer recorded the same response within a  $\pm 2$ -s window as the primary data collector. We calculated interobserver agreement by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100 to convert to a percentage. Mean agreement across all measures was 95.88% (range, 81% - 100%; See Supporting Information for a summary of these data across each dependent measure).

## Procedure

The researchers conducted observations across 2 days, with two quads participating each day. After gathering informed consent, participants completed an SRS-2 to confirm that the participants did not have significant

social skill deficits, and a participant information form to identify their preferred and nonpreferred topics of conversation. Participants' conversational partners were randomized. The researchers pre-identified the sequence of conversations to ensure all participants would have a conversation partner concurrently available and in similar order (see Supporting Information). The researchers randomized each participant to one of the prearranged sequences. All participants experienced each conversation type in the same order. That is, participants first alternated between novel and friend conversation partners in a one-on-one context. Next, each participant conversed with their quad of friends (all four friends). Last, two friends had a conversation in a group with the two novel conversation partners that they had not yet met (i.e., "mixed-group"). In total, the study included 40 distinct conversations, or 400 min of conversation.

Prior to conversations with friends, a researcher asked the participants to converse with their conversation partner as they typically would outside of this study, but to refrain from planning any upcoming events. The researcher made this request in an attempt to keep conversation topics similar across conversational partners; participants are not likely to plan upcoming events with unknown people. Prior to conversations with unknown individuals, the researcher informed the participants that they were to have a 10-min conversation with someone new, and that they should interact with each other as they typically would when meeting someone for the first time outside of this study. The conversations were not structured and the participants were free to engage in any topic of conversation other than planning upcoming events.

Following each 10-min conversation, the researcher reentered the room and asked participants to independently complete a postconversation form. The brief postconversation form provided a measure of social acceptability of their partner's conversational skills. The researcher instructed participants to increase the distance between them such that their answers to the questionnaire remained private. Participants described how long they had known the conversation partner and any common interest(s) between them. Each participant then used a 5-point Likert scale to rate how likely they were to have another conversation and become friends with the conversation partner, respectively. Last, each participant rated the other conversation partner's overall social skills during the conversation. After the participants completed the questionnaire, the researcher collected the surveys. Researchers gave the participants a 2-min break between completing a postconversation form and beginning the next conversation.

After the final conversation, researchers brought participants back into one room together. Each participant then completed a form regarding their demographic information including date of birth, race, education level, individual and family income, diagnoses, assigned sex at birth, gender identity, and sexual orientation.

## Results

Table 1 displays the means and standard deviations for each behavior across each conversation type in Table 1. Figures 1-5 depict within-subject data for each conversation type; means and standard deviations across all conversation types are also depicted in the figures. For some dependent measures (e.g., percent of conversation time speaking), a visual analysis of the data in Table 1 showed clear differences in the means of one-on-one compared to group conversations, and in these cases, the data were separated into two graphs (e.g., percentage speaking, eye gaze, and body orientation; combined graphical depictions are available upon request). Figure 1 depicts overall speaker and listener roles, gaze, and body orientation. Figure 2 depicts various aspects of the speaker's behavior. Figure 3 depicts asking and answering questions. Figure 4 depicts the listener's interruptions and positive feedback, distracting nonvocal behavior in both listener and speaker roles, and gestures made while speaking. Finally, Figure 5 depicts giving and accepting compliments.

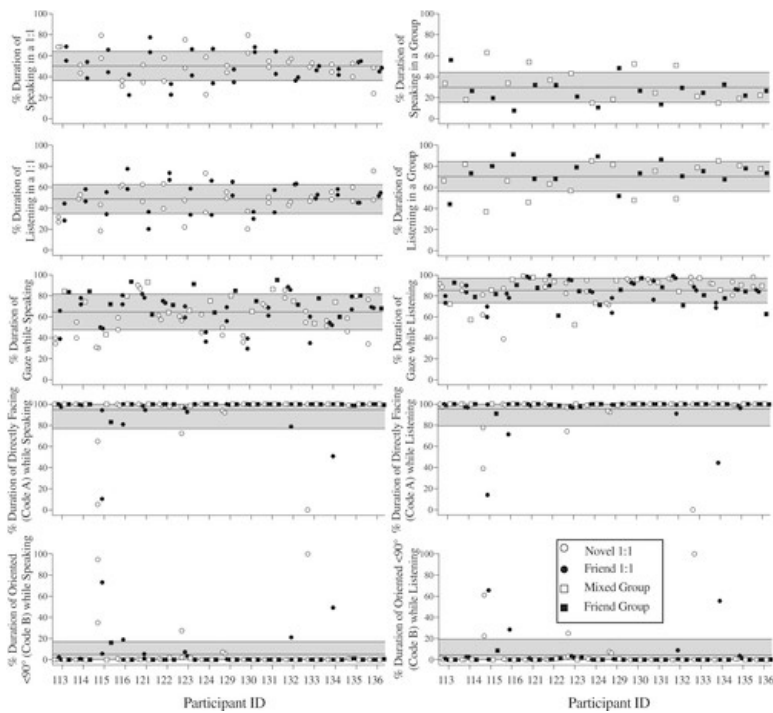
**Table 1. Descriptive Statistics Results**

	<b>Novel 1:1</b>		<b>Friend 1:1</b>		<b>Mixed group</b>		<b>Friend group</b>	
<b>Dependent measures</b>	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>	<b>M</b>	<b>SD</b>
Speaker role**	50.93	13.99	49.38	13.78	32.55	15.78	26.81	12.39
Listener role **	47.23	13.87	50.16	14.01	67.45	15.78	73.16	12.40
Speaker gaze *	55.53	16.50	62.76	15.89	73.81	12.84	77.17	11.01
Listener gaze *	88.07	12.32	84.65	10.50	85.41	12.54	80.95	10.11
Speaker orientation code A *	94.39	18.01	93.43	18.03	99.79	0.58	98.93	4.12
Speaker orientation code B *	5.57	18.04	6.07	15.68	0.21	0.58	1.05	4.02
Speaker orientation code C	0.00	0.00	0.50	2.81	0.00	0.00	0.00	0.00
Listener orientation code A *	95.86	12.04	93.68	18.12	99.84	0.37	99.20	2.26
Listener orientation code B *	4.10	11.95	5.67	15.33	0.16	0.37	0.78	2.21
Listener orientation code C	0.00	0.00	0.65	3.67	0.00	0.00	0.01	0.05
On topic comments *	95.27	3.74	96.08	4.05	96.06	3.08	94.42	3.56
Initiating change of topic *	6.74	4.81	6.00	4.81	5.06	3.13	8.30	5.01
Topics per min*	0.42	0.25	0.41	0.33	0.35	0.27	0.43	0.29
Average number of exchanges per topic **	7.90	2.73	9.10	4.66	5.35	1.97	3.06	1.06
Talking about non-preferred topics	100.0	0.00	83.34	23.57			91.67	16.67
Interruptions *	25.75	9.91	25.72	10.11	26.05	9.81	32.50	9.36
Interruptions per total min in listener role*	5.67	2.64	5.33	2.11	3.82	1.23	4.71	1.39
Engaging in indices of uninterest	0.03	0.20	0.02	0.11	0.14	0.41	0.50	1.17
Changes in conversation following an index of uninterest	100.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Repeating utterance *	8.03	5.68	10.55	5.34	14.88	8.64	14.33	6.16
Completing utterance*	3.65	5.94	2.66	2.56	1.62	1.34	2.82	2.49
Teasing and criticizing	0.30	0.99	0.30	0.73	0.00	0.00	0.49	1.38
Sharing private information	1.58	3.42	1.09	3.97	0.91	2.44	0.23	0.62
Asking questions **	20.69	10.28	17.39	9.08	17.47	10.03	12.90	6.86
Questions asked per min**	1.44	0.86	1.26	0.78	1.20	0.87	0.71	0.47
Questions initiating a new topic*	19.65	14.27	13.01	11.21	15.61	21.14	30.89	32.92
Open-ended questions to initiate a new topic	10.33	12.46	5.31	7.11	8.14	17.94	7.09	11.71
Closed-ended questions to initiate a new topic	9.33	9.54	10.07	11.89	7.47	9.32	23.80	32.37
Follow-up questions *	55.67	18.20	50.06	20.38	64.09	22.04	44.97	30.42
Open-ended follow-up questions	15.88	11.59	8.53	8.23	23.45	21.47	24.30	24.02
Closed-ended follow-up questions	39.59	23.51	42.84	18.80	41.41	28.26	28.06	26.83
Open-ended follow-up questions on a related topic	6.73	10.88	10.50	14.96	8.28	9.38	5.30	8.84
Closed-ended follow-up questions on a related topic	18.14	13.73	22.75	15.45	11.25	9.50	11.45	12.41
Asking for confirmation *	8.76	6.21	6.48	4.83	8.09	6.19	4.14	3.96
Asking for clarification *	0.33	0.82	0.47	1.21	0.78	1.45	0.67	1.08
Answering question *	96.04	3.95	94.08	6.88	95.20	4.97	92.46	8.47
Answering own question *	13.97	11.25	12.81	8.85	13.27	9.65	21.31	24.05



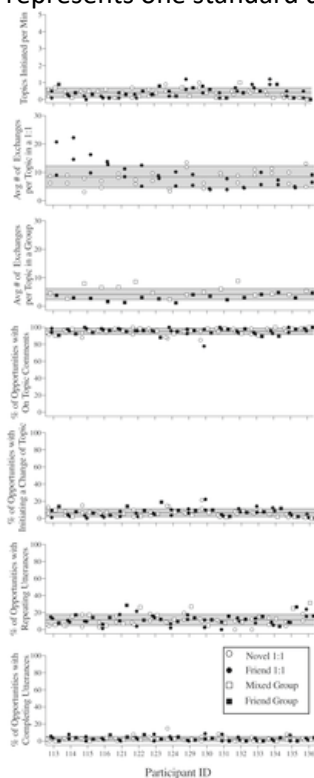
Positive feedback *	27.30	9.76	26.77	12.03	23.37	5.86	24.76	9.55
Negative feedback	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Unintelligible responses	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subtle-motor distracting non-vocal behavior *	24.78	23.16	29.54	30.49	29.82	31.06	41.41	26.17
Gross-motor distracting non-vocal behavior *	18.59	21.43	20.87	21.35	20.99	18.50	19.05	14.43
Gestures while speaking *	37.43	19.30	33.36	15.96	35.02	18.85	33.75	19.33
Rate of compliments given *	1.00	1.10	0.22	0.42	0.75	0.86	0.06	0.25
Giving compliments on appearance *	0.10	0.38	0.03	0.18	0.00	0.00	0.00	0.00
Giving compliments- partner brings up appearance *	19.44	17.35	25.00	35.36	0.00	0.00	0.00	0.00
Giving compliments on performance *	1.48	1.85	0.17	0.55	0.95	1.24	0.13	0.51
Giving compliments- partner brings up performance *	33.65	37.49	28.57	48.80	53.13	33.91	0.00	0.00
Giving compliments on possessions *	0.17	0.61	0.15	0.48	0.47	0.89	0.00	0.00
Giving compliments- partner brings up possession *	44.44	50.92	12.50	35.36	60.00	54.77	0.00	0.00
Accepting compliments- smiling, saying "thank you," or both *	17.59	35.46	28.57	48.80	50.00	50.00	0.00	0.00
Accepting compliments- smiling and pleased*	6.48	15.27	0.00	0.00	7.14	18.90	0.00	0.00
Accepting compliments- smiling and embarrassed*	0.00	0.00	0.00	0.00	7.14	18.90	0.00	0.00
Accepting compliments- smiling and tempered*	2.78	11.79	28.57	48.80	0.00	0.00	0.00	0.00
Accepting compliments- pleased *	7.41	24.40	0.00	0.00	21.43	39.34	0.00	0.00
Accepting compliments- tempered *	7.41	24.40	0.00	0.00	0.00	0.00	0.00	0.00

- *Note.* A single asterisk indicates data that also appear in graphical form. A double asterisk indicates data that are in graphical form with 1:1 conversation data separated from group data.



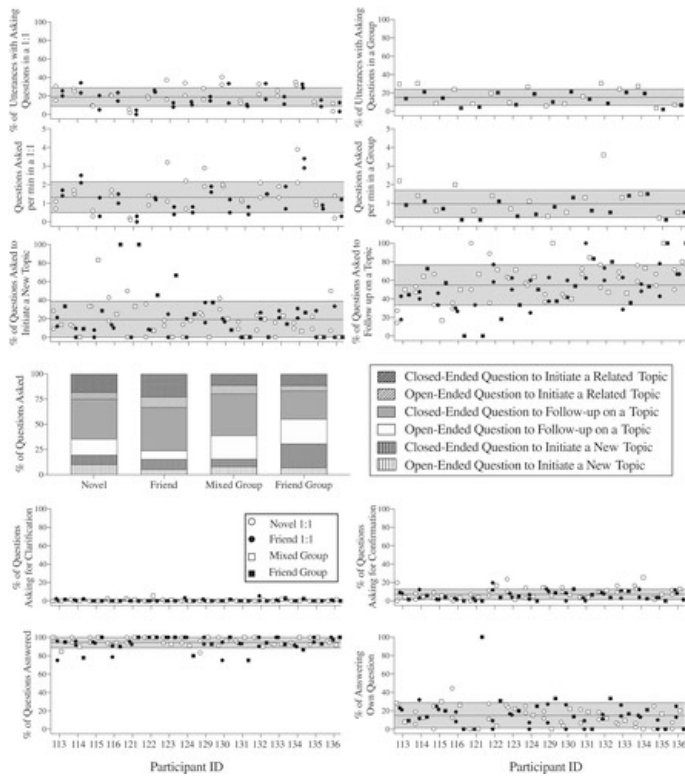
**Figure 1** *Speaker and Listener Role, Eye Gaze, and Body Orientation*

*Note.* The line in the middle of the gray area represents the average across all participants. The gray area represents one standard deviation above and below the average or the general range.



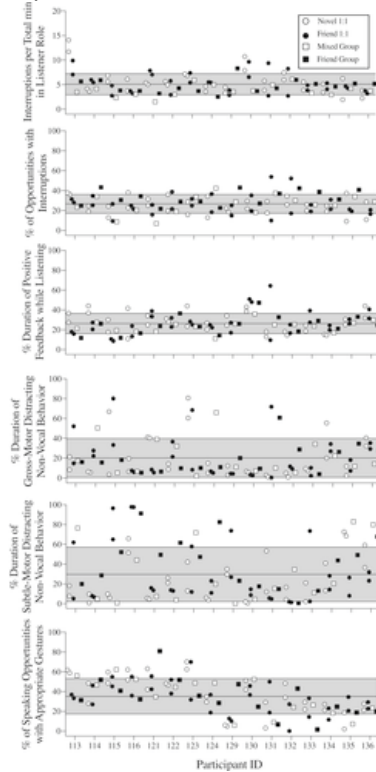
**Figure 2** *Topics Discussed, Uninterest, Interruptions, Repeating and Completing Utterances, Sharing Private Information, and Teasing and Criticizing*

*Note.* The line in the middle of the gray area represents the average across all participants. The gray area represents one standard deviation above and below the average or the general range.



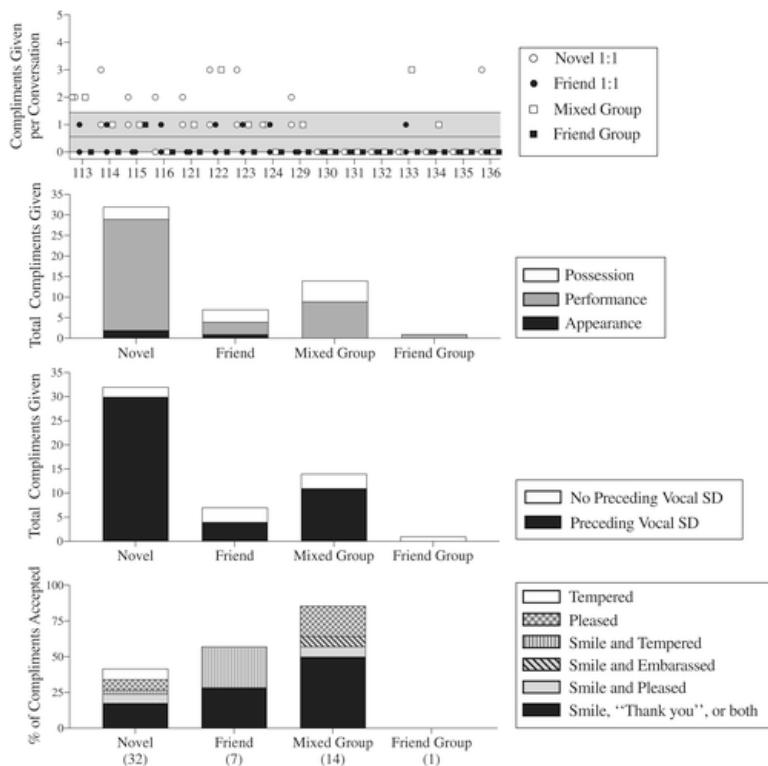
**Figure 3** Asking and Answering Questions

*Note.* The line in the middle of the gray area represents the average across all participants. The gray area represents one standard deviation above and below the average or the general range.



**Figure 4** Feedback, Distracting Behaviors, and Appropriate Gestures

*Note.* The line in the middle of the gray area represents the average across all participants. The gray area represents one standard deviation above and below the average or the general range.



**Figure 5** Giving and Accepting Compliments

*Note.* In the top panel the line in the middle of the gray area represents the average across all participants. The gray area represents one standard deviation above and below the average or the general range.

The top left and right panels of Figure 1 display the mean percentage of conversation time speaking per participant. The percentage of time in the speaker role approximated 50% in one-on-one conversations and 30% in group conversations, showing that conversation was nearly continuous during the sessions. The percentages deviated around the mean by 14% (novel 1:1), 13.8% (friend 1:1), 15.8% (mixed-group), and 12.4% (friend group), creating a “general range” (defined as one standard deviation above and below the mean for these and all subsequent measures) of speaking between 36-65% of the time in one-on-one conversations and speaking 16-45% of the time in group conversations. Seventeen percent of one-on-one conversations (Figure 1, top left panel), and 19% of group conversations (Figure 1, top right panel) yielded a data point above that general range, showing dominance of the conversation by one participant. Participant 116, by contrast, spoke more than 1 SD below the mean for 3 out of their 4 one-on-one conversations. They reported that they had finished working a night shift, thus, fatigue may have contributed to their low levels of conversation. The second panels of Figure 1 display the mean percentage of conversation time listening; the range was 36%-63% of time spent listening in one-on-one conversations and 53%-84% of time spent listening in group conversations.

Participants gazed at their conversation partner less frequently while speaking ( $M = 64.6\%$  of the duration in the speaker role) than they did while listening ( $M = 85.3\%$  of the duration in the listener role) across all conversation types (Figure 1, third panels). The general range of gazing was also wider in the speaker role (48%-82%) than the listener role (74%-97%) across all conversation types. In the speaker role of the conversation, participants gazed at their conversation partners less on average while in one-on-one conversations ( $M = 62.76\%$  and  $55.53\%$  of the time for friend and novel conversations, respectively) compared to group conversations ( $M = 77.17\%$  and  $73.81\%$  of the time for friend group and mixed conversations, respectively). For example, all but 1 of the 18 data points that fell below the general range (i.e., relatively low eye gaze; Figure 1, third left panel) occurred during a one-on-one conversation. In the listener role of the conversation (Figure 1, third right panel), participants gazed

at their conversation partner in approximately equal amounts across all conversation types ( $M = 88.07\%$ ,  $84.65\%$ ,  $85.41\%$ , and  $80.95\%$  of the time in the listener role in novel 1:1, friend 1:1, mixed-group, and friend group, respectively).

Participants spent most of the conversation time directly facing ("Orientation code A") their conversation partner in both the speaker and listener roles (Figure 1, fourth panels). The range of conversation time spent directly facing a conversation partner was 78%-100%. The most commonly observed physical orientation after code A was code B (i.e., facing the conversation partner at less than a 90-degree angle; Figure 1, fifth panels). Only one participant in one conversation (1:1 friend) was oriented greater than 90 degrees from their conversation partner ("Orientation code C," see Supporting Information).

Participants initiated an average of 0.4 topics per minute during a conversation (Figure 2, top panel), and the average number of exchanges between partners on any given topic was 8.5 volleys in the one-on-one conversations and 4.2 volleys in group conversations (Figure 2, second and third panels). Conversation partners' comments remained on topic for most of the conversation ( $M = 95.5\%$  of opportunities; Figure 2, fourth panel), with low levels of interactions ( $M = 6.5\%$  of opportunities initiating a change in the topic (Figure 2, fifth panel). Repeating (Figure 2, sixth panel) and completing (Figure 2, seventh panel) a speaker's utterance occurred at relatively lower levels, with means of 11% and 2.6% of speaking opportunities, respectively. The researchers rarely observed sharing of private information (e.g., sharing or asking questions on medical condition, status of their financials, or intimate details of their life; see Supporting Information) or teasing and criticizing (see Supporting Information). However, sharing of private information was about three times more likely to occur in one-on-one conversations (1.6% of opportunities) compared to group conversations (0.57% of opportunities). On rare occasions (i.e., in 8 of 40 conversations), a topic that the speaker previously reported as nonpreferred was initiated by the conversation partner, and on those occasions, the speaker spent a high percentage of time discussing the topic anyway (see Supporting Information). Participants engaged in indices of uninterest during only eight total conversations (see Supporting Information). The speaker immediately changed the topic following an index of uninterest during one conversation (see Supporting Information).

Figure 3 displays the data related to asking and answering questions. An average of 19% of utterances were in the form of a question during one-on-one conversations (Figure 3, top left panel). A slightly lower percentage, 15% of utterances, were in the form of a question during group conversations (Figure 3, top right panel). This resulted in an average rate of 1.35 and 0.96 questions asked per minute in one-on-one and group conversations, respectively (Figure 3, second panels). Participants asked questions to initiate a new topic an average of 18.8% of the time that a question was asked (Figure 3, third left panel); data on questions that changed the topic were relatively variable, with a general range from 0% to 38.5% of questions asked. Participants initiated topics of conversation about equally through open- and closed-ended questions but participants were most likely to initiate a topic with an open-ended question with a novel conversation partner ( $M = 10.3\%$  of opportunities in novel 1:1; Figure 3, fourth panel). In contrast, participants were most likely to initiate a new topic of conversation through a closed-ended question in a friend group conversation ( $M = 23.8\%$  of opportunities in novel 1:1). Questions most commonly occurred as a follow-up on the ongoing topic of conversation and occurred a little over half of the time a question was asked on average (Figure 3, third right panel), but varying considerably with a general range from 32% to 76%. Specifically, closed-ended questions occurred most frequently across all conversations ( $M = 39.6\%$ ,  $M = 42.8\%$ ,  $M = 41.4\%$ ,  $M = 28.1\%$  of questions asked across Novel 1:1, Friend 1:1, Mixed group, and Friend group, respectively; Figure 3, fourth panel). Participants were most likely to initiate a related topic through a closed-ended question while speaking to a friend ( $M = 22.8\%$  of questions asked, Friend 1; Figure 3, fourth panel). In contrast, questions rarely involved asking for clarification ( $M = 0.5\%$  of questions asked, Figure 3, fourth left panel) or confirmation ( $M = 7.1\%$  of questions asked, Figure 3, fourth right panel).

Participants 122 and 124 conversed with partners for whom English was not their first language and who spoke with accents. This may have influenced higher levels of asking for clarification or confirmation and repeating or completing an utterance. For example, when participant 115 paused during an utterance (perhaps to think of a word), participant 124 would complete the sentence for him. Most questions were answered by listeners ( $M = 94.7\%$ , Figure 3, bottom left panel), and regardless of an open- or closed-ended question, participants elaborated on their answers. Occasionally, the speaker followed up their own question with an answer as well ( $M = 14.7\%$  of opportunities, Figure 3, bottom right panel). For example, a speaker may have asked, "What is your favorite class?" to which the listener answered, "Statistics." The speaker then followed up with, "I like my Research Methods class best."

Figure 4 displays data related to listener interruptions and positive feedback, as well as the use of gestures while speaking and nonvocal distracting behavior. Participants frequently interrupted the speaker ( $M = 5.1$  interruptions per minute spent in the listener role; Figure 4, top panel). The listener interrupted the speaker during 27% of speaking opportunities (Figure 4, second panel). The participants engaged in positive feedback while in the listener role an average of 26% of the conversation time, with a general range of 16%-36% (Figure 4, third panel). No participant engaged in negative feedback (e.g., furrowed brow, pursed lips, brief expression of disgust; see Supporting Information) in any conversation. A large degree of variability was observed in the measure of gross-motor distracting nonvocal behavior (e.g., acontextual arm movements, moving body in chair, touching head and face; Figure 4, fourth panel), with a general range from 0% to 39.5% duration of the conversation time ( $M = 19.8\%$ ). However, it is important to note that 11 conversations included gross-motor distracting nonvocal behavior well above the top of that range, with two conversations including gross-motor distracting nonvocal behavior during approximately 80% of the conversation time. Researchers observed an even larger general range of subtle-motor distracting nonvocal behavior (e.g., small hand movement or foot tapping; Figure 4, fifth panel) from 2.2% to 57.7%, with a mean of 30% of conversation time. A small number of conversations included subtle-motor distracting nonvocal behavior close to 100% of the conversation time. Participants engaged in these subtle-motor distracting nonvocal behaviors approximately equal amounts in the novel one-on-one, friend one-on-one, and mixed-group conversations ( $M = 24.78\%$ ,  $M = 29.54\%$ ,  $M = 29.82\%$  duration of the conversation time, respectively), but at slightly higher percent duration ( $M = 41.41\%$ ) in the friend group conversation. Researchers found a moderate correlation between both subtle and gross-motor distracting nonvocal behavior and Speaker Orientation Code C (greater than 90 degrees from their conversation partner;  $r = .250$ ,  $p = .014$ ;  $r = .314$ ,  $p = .002$ , respectively), as well as with listener Orientation code C (greater than 90 degrees from their conversation partner;  $r = .251$ ,  $p = .014$ ;  $r = .314$ ,  $p = .002$ , respectively). Finally, participants made appropriate nondistracting gestures while speaking (e.g., talking with your hands, pointing, etc.) during approximately 35% of speaking opportunities (Figure 4, sixth panel).

Participants rarely gave compliments regarding a partner's appearance, performance, and possessions ( $M = 0.6$  times per conversation; Figure 5, top panel). Thus, analyses of compliments should be interpreted conservatively. Figure 5 (second panel) shows the proportion of compliments given about a possession, performance, or appearance across conversations in each conversation type. Compliments on performance were the most frequent and compliments on appearance were least frequent. Compliments occurred at a higher frequency in conversations that involved at least one novel conversation partner. Participants preceded most compliments with reference to their own appearance, performance, or possessions (Figure 5, third panel); however, not all references to appearance, performance, or possessions were followed by a compliment (data available upon request). Participants most frequently accepted compliments by smiling, by saying "thank you," or by both smiling and saying, "thank you." With these three variations taken together, compliments were accepted appropriately in 17.59% of opportunities in novel one-on-one, in 28.57% of opportunities in friend one-on-one, and in 50.00% of opportunities in mixed-group conversations (Figure 5, bottom panel). Participants also accepted compliments occasionally by expressing their pleasure with the object of the compliment and a

smile (pleased acceptance;  $M = 6.48\%$  of opportunities for novel 1:1 and  $7.14\%$  of opportunities for mixed-group), or by acknowledging the compliment with tempered acceptance (e.g., “thanks, but my wife bought it”;  $M = 2.78\%$  of opportunities for novel 1:1,  $28.57\%$  of opportunities for friend 1:1). No participants gave a reciprocal compliment (e.g., one participant said, “I like your shirt,” and the other replied “I like your shirt too”) across all conversation types.

Table 2 displays the means and ranges of each participant's ratings regarding how much they would like to have another conversation, would want to be friends, and would rate the overall social skills of their conversation partners on a scale of 1 (lowest) to 5 (highest). Participants' average rating for having another conversation was 4.7, for wanting to be friends was 4.7, and for overall social skills was 4.7 out of 5. In 97.5% of all conversations, each of the three measures of social acceptability were rated between 3 (neutral) to 5 (definitely would have a conversation or be friends or strongly agree). These data suggest that all participants were young adults with intact conversational skills.

**Table 2.** *Social Validity Ratings*

	<b>Conversation Partner Wants to Have Another Conversation</b>		<b>Conversation Partner Wants to Be Friends</b>		<b>Overall Social Skills Rating During Conversation</b>	
<b>Participant ID</b>	<i>M</i>	Range	<i>M</i>	Range	<i>M</i>	Range
113	4.9	4.0-5.0	4.9	4.0-5.0	4.8	4.0-5.0
114	4.8	4.0-5.0	4.8	4.0-5.0	4.9	4.0-5.0
115	4.6	3.0-5.0	4.6	3.0-5.0	4.8	4.0-5.0
116	4.8	4.0-5.0	4.8	4.0-5.0	4.5	2.0-5.0
121	4.6	3.0-5.0	4.6	3.0-5.0	4.5	4.0-5.0
122	4.9	4.0-5.0	4.9	4.0-5.0	4.9	4.0-5.0
123	4.9	4.0-5.0	4.9	4.0-5.0	4.8	4.0-5.0
124	4.7	3.0-5.0	4.7	3.0-5.0	4.5	3.0-5.0
129	4.5	3.0-5.0	4.5	3.0-5.0	4.7	3.0-5.0
130	4.6	4.0-5.0	4.6	4.0-5.0	4.9	4.0-5.0
131	4.3	2.0-5.0	4.3	2.0-5.0	4.3	3.0-5.0
132	4.4	4.0-5.0	4.4	4.0-5.0	4.8	4.0-5.0
133	4.5	3.0-5.0	4.5	3.0-5.0	4.6	4.0-5.0
134	4.6	3.0-5.0	4.6	3.0-5.0	4.8	4.0-5.0
135	4.5	2.0-5.0	4.5	2.0-5.0	4.3	3.0-5.0
136	4.8	4.0-5.0	4.8	4.0-5.0	4.8	4.0-5.0
Overall mean	4.7		4.7		4.7	

## Discussion

The present study produced a thorough descriptive account of conversations of neurotypical young adults and contributes to existing research on conversation skills in multiple ways. First, researchers culled the literature to identify, define, and score a comprehensive list of speaker and listener behaviors during conversations. In addition to including many of the measures from previous research, researchers introduced several new measures including: rate of topics discussed per minute; average number of volleys per topic; response to nonpreferred topics; response to indices of uninterest; discussion of private information; types of questions

asked; subtle and gross-motor distracting nonvocal behavior; and a comprehensive break down of types of compliments given and accepted. Second, researchers collected repeated measures of individual conversational skills across one-on-one conversations with friends and novel conversation partners and in two group contexts. Results from these assessments move the literature one step closer to empirically driven conversational benchmarks for adults with social skills deficits.

We replicated the findings of Turkstra et al. (2003) in that most of the conversation comments were on topic, individuals asked questions less than 20% of the times they spoke, and individuals rarely engaged in a subset of behaviors (i.e., turning away from their conversation partner, engaging in negative feedback, asking for confirmation and clarification, and repeating or completing the conversation partner's utterance). Current results were also consistent with those obtained by Beaulieu et al. (2013) in that individuals interrupted their conversation partner about four to five times per minute when in the listener role, and they asked one to two questions per minute. Notwithstanding the commonalities across the current study and other published descriptive assessments of conversations, the points of variability within and across studies represent avenues for future research. High levels of variability within and across studies are a result of unknown or uncontrolled variables (Kazdin, 2011). Without a conceptual understanding of the relation between these variables and the behaviors of interest, it is unlikely that behavior analysts will achieve sufficient control or ideal outcomes during intervention.

For example, the amount of participants' eye gaze was notably different while in the speaker versus listener role. Participants gazed at the conversation partner about 65% of the time while speaking and 85% of the time while listening across all contexts in the present study. By contrast, neurotypical adolescents in Turkstra et al. (2003) gazed at their friend 43% of the time while speaking and 69% of the time while listening; neurotypical adolescents in Turkstra (2001) gazed at their conversation partner over 92% of the time while speaking and 85%-97% while listening. In contrast to Turkstra and Turkstra et al., the present study included intrasubject repeated measures across known and unknown conversation partners that could be interpreted to support partner familiarity as a source of control. However, some participants engaged in similar amounts of eye gaze across all conversation partners (e.g., participants 130 and 134) and others did not (e.g., participants 115 and 122). Thus, variability appears controlled by more than just the degree of familiarity among conversation partners. Differences in participant characteristics or experimental arrangement between studies may constitute alternative sources of control. In the present study, participants were 19-35 years of age in comparison to 13-21 in Turkstra and Turkstra et al. In addition, participants conversed for 10 min across repeated conversations with various conversation partners in the present study in comparison to one conversation of 3-min in Turkstra and Turkstra et al.

When a high degree of variability is obtained, a conceptual analysis should guide additional experimental research aimed to isolate the controlling variables. For example, with respect to eye gaze, the listener's eye gaze may serve in part as a reinforcer for the speaker's utterance. The conditions under which eye contact serves as a reinforcer in isolation or in combination with other listener behaviors is yet to be analyzed. It is likely that the additive effect of vocal and nonvocal stimuli such as shifts of eye gaze to indicate a turn exchange, prosody of vocal-verbal behavior, facial expressions, or gestures are necessary to occasion a response from the conversation partner. Michael et al. (2011) described this type of stimulus control over performance as convergent multiple control. A high degree of stimulus control may occasion each conversation partner quickly changing roles between speaking and listening. However, at times, when meeting new people or engaging in problem solving (covert thinking), stimulus control is weaker (Palmer, 2009; Palmer 2014). During these moments of weak stimulus control, a speaker may shift their gaze (gaze aversion) away from the conversation partner to neutral stimuli to decrease sources of potential competing stimuli or to strengthen potential covert stimulus control, ultimately occasioning the next response. A speaker also may divert their eye gaze due to a



history of punishment contingent on various responses. Finally, cultural variables are likely to control the normative frequency or duration of eye gaze to some extent (Akechi et al. **2013**; Senju et al. **2013**).

The complexity of the conceptual account briefly outlined above illustrates the many opportunities for future conceptual and experimental analyses, each of which will be best guided by descriptive outcomes like those obtained in the current study. However, functional accounts rather than topographical accounts of conversational behavior are needed to thoroughly understand the interaction of controlling variables between speaker and listener behaviors. Given the current limited empirical understanding of relevant maintaining variables for conversational behavior, a thorough topographical account of conversation was required. Based on methods and results of this study, the next step for researchers is to study controlling variables for those behaviors with great conceptual implications for conversational success. Another important avenue for future research is to compare conversational skills across clinical populations with common deficits (e.g., autism spectrum disorder and social anxiety disorder). Such analyses should outline the similarities, differences, and impact on quality of life. The identification of common deficits, sources of control, and the impact on quality of life can guide researchers in the development of the scope and sequence of goal development.

Current clinical practice in teaching conversation skills lacks sufficient research to guide clinicians in evaluating a client's current level of performance. The lack of norms or criteria for desirable levels of behavior may result in clinicians selecting goals that are not of highest priority for intervention. An example of this may be the decision to decrease a client's distracting nonvocal behavior. In the present study, gross-motor and subtle-motor distracting nonvocal behavior occurred across all participants and conversation types for a combined mean of 24.91% of the conversation time with a high degree of variability. Differences observed in gross-motor and subtle-motor distracting nonvocal behavior in the present study suggest these response forms should be scored separately as they may have differential effects on the conversation partner. For instance, large acontextual arm movements may be more distracting or aversive to a conversation partner than someone fidgeting with a pen. In Hood et al. (**2017**), data were aggregated in one measure of distracting nonvocal behavior and some participants' baseline rates were within the general range found in the present study. Future studies should explore the impact of topography-specific distracting nonvocal behavior on the reinforcing value of a conversation for speaker and listener alike. Identification of the most impactful topographies may increase the efficacy and efficiency of conversation interventions.

Equally important to goal selection is the standard to which researchers and clinicians are teaching each conversation skill to occur. Koegel and Frea (**1993**) defined appropriate eye gaze as looking at the conversation partner throughout the conversation without looking away for more than 3 s. As a result of discrimination training and self-management, a participant's eye gaze increased to nearly 100% of the conversation. Dotson et al. (**2010**) produced a similar treatment effect. However, achieving near-continuous eye gaze while both speaking and listening may have shifted the clinical concern from too little eye gaze to too much eye gaze. Additional research should determine the conditions under which a particular verbal community reinforces more versus less eye contact. However, data obtained through the current descriptive assessment suggest near-continuous eye gaze may not be typical. As another example, Beaulieu et al. (**2013**) and Hood et al. (**2017**) decreased participant's interruptions to near-zero levels; however, near-zero levels of interruptions were rarely observed in the present study. This clinical outcome could result in a decreased number of speaking opportunities for a client. Discrepancies between descriptive micronorm data and previous clinical research and practice highlights the need for continued evaluations of clinical benchmarks. As with goal selection, descriptive and subsequent experimental evaluations are essential to guide clinical goals and the associated socially important outcomes.

The present study developed a comprehensive measurement system to describe various conversational skills either evaluated in prior efficacy studies or suggested in clinical manuals. Towards the goal of establishing

empirically based benchmarks, additional research is needed to demonstrate the impact of each conversational skill on social acceptability or likability. Various conversational errors may affect the conversation partner's motivation to continue conversing and to partake in future interactions. Black and Hazen (1990), for example, observed decreased social likeability for individuals with less on-topic contributions to a conversation (see also Place & Becker, 1991).

High levels of social acceptability in the present study could be due to the selection of socially competent participants. Alternatively, the rating scale used in the present study may not have been sensitive to differences in likeability between partners. Open-ended questions about participants' ratings would allow for more variability in responding; thus, open-ended social validity questions should supplement participant ratings in future descriptive studies.

Additional research is needed to understand the isolated and combined effects of conversational errors on the reinforcing value (or likeability) of the interaction. Researchers could compare conversational skills at various parameters obtained in the present study and recruit naïve observers to rate their relative acceptability (Minkin et al., 1976). Alternatively, researchers could arrange for participants to experience conversations with someone engaging in various amounts of one or more conversation skills and then directly assess which variation of conversation the participant selects to experience themselves (Hanley, 2010). Such an analysis could guide the sequence of intervention goals when a client presents with multiple areas in need of intervention.

Relatively little research has been published on advanced social skills such as conversations in adolescents and young adults with and without disabilities, despite the clear impact of such skills on quality of life. The field of behavior analysis is equipped with the conceptual, descriptive, and experimental tools needed to better understand and intervene on social skills deficits. The current study provided a descriptive account of conversational skills limited to a particular population and laboratory setting. Because participants sought out the present study, the findings may be representative of only those young adults who seek face-to-face social interactions with new people. Future research should expand descriptive assessment contexts to include less structured and more naturalistic interactions. Continued evaluations that cut across all levels of analysis will be necessary to provide a thoroughgoing functional account of conversations.

<sup>1</sup>Participant wrote in that they identified as human on the demographic form.

## References

- Akechi, H., Senju, A., Uibo, H., Kikuchi, Y., Hasegawa, T., Hietanen, J. K. (2013). Attention to eye contact in the West and East: Autonomic responses and evaluative ratings. *Plos One*, 8(3), 1- 10. <http://doi.org/10.1371/journal.pone.0059312>
- Bambara, L. M., Cole, C. L., Kunsch, C., Tsai, S.-C., & Ayad, E. (2016). A peer-mediated intervention to improve the conversational skills of high school students with autism spectrum disorder. *Research in Autism Spectrum Disorders*, 27, 29- 43. <https://doi.org/10.1016/j.rasd.2016.03.003>
- Bauminger, N., & Kasari, C. (2000). Loneliness and friendship in high-functioning children with autism. *Child Development*, 71(2), 447- 456. <https://doi.org/https://doi.org/10.1111/1467-8624.00156>
- Beaulieu, L., Hanley, G. P., & Santiago, J. L. (2013). Improving the conversational skills of a college student with peer-mediated behavioral skills training. *The Analysis of Verbal Behavior*, 30(1), 48– 53. <http://doi.org/10.1007/s40616-013-0001-8>
- Bell, S. H., & Barnett, D. W. (1999). Peer micronorms in the assessment of young children: Methodological review and example. *Topics in Early Childhood Special Education*, 19(2), 112- 122. <http://doi.org/10.1177/027112149901900205>

- Bijou, S. W., Peterson, R. F., & Ault, M. H. (1968). A method to integrate descriptive and experimental field studies at the level of data and empirical concepts. *Journal of Applied Behavior Analysis*, 1(2), 175- 191. <https://doi.org/10.1901/jaba.1968.1-175>
- Black, B., & Hazen, N. L. (1990). Social status and patterns of communication in acquainted and unacquainted preschool children. *Developmental Psychology*, 26(3), 379- 387. <https://doi.org/10.1037/0012-1649.26.3.379>
- Constantino, J. N., & Gruber, C. P. (2012). *Social responsiveness scale, second edition (SRS-2)*. Western Psychological Services.
- Dotson, W. H., Leaf, J. B., Sheldon, J. B., & Sherman, J. A. (2010). Group teaching of conversational skills to adolescents on the autism spectrum. *Research in Autism Disorders*, 4(2), 199- 209. <https://doi.org/10.1016/j.rasd.2009.09.005>
- Farley, M., Cottle, K. J., Bilder, D., Viskochil, J., Coon, H., & McMahon, W. (2018). Mid-life social outcomes for a population-based sample of adults with ASD. *International Society for Autism Research*, 11(1), 142- 152. <https://doi.org/10.1002/aur.1897>
- Fisher, W. W., Rodriguez, N. M., & Owen, T. M. (2013). Functional assessment and treatment of perseverative speech about restricted topics in an adolescent with Asperger syndrome. *Journal of Applied Behavior Analysis*, 46(1), 307- 311. <https://doi.org/10.1002/jaba.19>
- Friedman, L., Sterline, A., DaWalt, L. S., & Mailick, W. R. (2019). Conversational language is a predictor of vocational independence and friendships in adults with ASD. *Journal of Autism and Developmental Disorders*, 49, 4294- 4305. <https://doi.org/10.1007/s10803-019-04147-1>
- Grob, C. M., Lerman, D. C., Langlinais, C. A., & Villante, N. K. (2019). Assessing and teaching job-related social skills to adults with autism spectrum disorder. *Journal of Applied Behavior Analysis*, 52(1), 150- 172. <https://doi.org/10.1002/jaba.503>
- Hanley, G. P. (2010). Toward effective and preferred programming: A case for the objective measurement of social validity with recipients of behavior-change programs. *Behavior Analysis in Practice*, 3(1), 13- 21. <https://doi.org/10.1007/BF03391754>
- Hazen, N. L., & Black, B. (1989). Preschool peer communication skills: The role of social status and interaction context. *Child Development*, 60(4), 867- 876. <https://doi.org/10.2307/1131028>
- Hedley, D., & Young, R. (2006). Social comparison processes and depressive symptoms in children and adolescents with Asperger syndrome. *Autism*, 10(2), 139- 153. <https://doi.org/10.1177/1362361306062020>
- Hood, S. A., Luczynski, K. C., & Mitteer, D. R. (2017). Toward meaningful outcomes in teaching conversation and greeting skills with individuals with autism spectrum disorder. *Journal of Applied Behavior Analysis*, 50(3), 459- 486. <https://doi.org/10.1002/jaba.388>
- Hood, S. A., Olsen, A. E., Luczynski, K. C., & Randle, F. A. (2020). Improving accepting and giving compliments with individuals with developmental disabilities. *Journal of Applied Behavior Analysis*, 53(2), 1013- 1028. <http://doi.org/10.1002/jaba.662>
- Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult outcomes for children with autism. *Journal of Child Psychology and Psychiatry*, 45(2), 212- 229. <https://doi.org/10.1111/j.1469-7610.2004.00215.x>
- Hughes, C., Lorden, S. W., Scott, S. V., Hwang, B., Derer, K. R., Rodi, M. S., Pitkin, S. E., & Godshall, J. C. (1998). Identification and validation of critical conversational social skills. *Journal of Applied Behavior Analysis*, 31(3), 431- 446. <https://doi.org/10.1901/jaba.1998.31-431>
- Kazdin, A. E. (2011). Underpinnings of scientific research. In A. E. Kazdin (Ed.), *Single-case research design* ( 2nd ed., pp. 24– 48). Oxford University Press. <https://doi.org/10.1080/07317107.2012.654458>
- Koegel, L. K., Koegel, R. L., Frea, W. D., & Fredeen, R. M. (2001). Identifying early intervention targets for children with autism in inclusive school settings. *Behavior Modification*, 25(5), 745- 761. <https://doi.org/10.1177/0145445501255005>
- Koegel, R. L., & Frea, W. D. (1993). Treatment of social behavior in autism through the modification of pivotal social skills. *Journal of Applied Behavior Analysis*, 26(3), 369- 377. <https://doi.org/10.1901/jaba.1993.26-369>

- Leaf, J. B., Oppenheim-Leaf, M. L., Call, N. A., Sheldon, J. B., Sherman, J. A., Taubman, M., & Leaf, R. (2012). Comparing the teaching interaction procedure to social stories for people with autism. *Journal of Applied Behavior Analysis*, 45(2), 281- 298. <https://doi.org/10.1901/jaba.2012.45-281>
- Leaf, J. B., Taubman, M., Bloomfield, S., Palos-Rafuse, L., Leaf, R., McEachin, J., & Oppenheim, M. L. (2009). Increasing social skills and pro-social behavior for three children diagnosed with autism through the use of a teaching package. *Research in Autism Spectrum Disorders*, 3(1), 275- 289. <https://doi.org/10.1016/j.rasd.2008.07.003>
- Mann, C. C., & Karsten, A. M. (2020). Efficacy and social validity of procedures for improving conversational skills of college students with autism. *Journal of Applied Behavior Analysis*, 53(1), 402- 421. <http://doi.org/10.1002/jaba.600>
- McConnell, S. R., Sisson, L. A., Cort, C. A., & Strain, P. S. (1991). Effects of social skills training and contingency management on reciprocal interaction of preschool children with behavioral handicaps. *The Journal of Special Education*, 24(4), 473- 495. <https://doi.org/10.1177/002246699102400407>
- McGee, G. G., Feldman, R. S., & Morrier, M. J. (1997). Benchmarks of social treatment for children with autism. *Journal of Autism and Developmental Disorders*, 27(4), 353- 364. <https://doi.org/10.1023/A:1025849220209>
- Michael, J., Palmer, D. C., & Sundberg, M. L. (2011). The multiple control of verbal behavior. *The Analysis of Verbal Behavior*, 27(1), 3- 22. <https://doi.org/10.1007/BF03393089>
- Minkin, N., Braukman, C. J., Minkin, B. L., Timbers, G. D., Timbers, B. J., Fixsen, D. L., Phillips, E. L., & Wolf, M. M. (1976). The social validation and training of conversational skills. *Journal of Applied Behavior Analysis*, 9(2), 127- 139. <https://doi.org/10.1901/jaba.1976.9-127>
- Mudford, O. C., Taylor, S. A., & Martin, T. (2009). Continuous recording and interobserver agreement algorithms reported in the *Journal of Applied Behavior Analysis* (1995-2005). *Journal of Applied Behavior Analysis*, 42(1), 165- 169. <https://doi.org/10.1901/jaba.2009.42-165>
- Nuernberger, J. E., Ringdahl, J. E., Vargo, K. K., Crumpecker, A. C., & Gunnarsson, K. F. (2013). Using a behavioral skills training package to teach conversation skills to young adults with autism spectrum disorders. *Research in Autism Spectrum Disorders*, 7(2), 411- 417. <https://doi.org/10.1016/j.rasd.2012.09.004>
- Orsmond, G., Krauss, M. W., & Mailick, M. (2004). Peer relationships and social recreational activities among adolescents and adults with autism. *Journal of Autism and Developmental Disorders*, 34(3), 245- 256. <https://doi.org/10.1023/B:JADD.0000029547.96610.df>
- Palmer, D. C. (2009). Response strength and the concept of the repertoire. *European Journal of Behavior Analysis*, 10, 49- 60. <https://doi.org/10.1080/15021149.2009.11434308>
- Palmer, D. C. (2014). Verbal behavior. In F. K. McSweeney & E. S. Murphy (Eds.), *Handbook of operant and classical conditioning* (pp. 369- 391). Wiley.
- Peters, L. C., & Thompson, R. H. (2015). Teaching children with autism to respond to conversation partners' interest. *Journal of Applied Behavior Analysis*, 48(3), 544- 562. <https://doi.org/10.1002/jaba.235>
- Place, K. S., & Becker, J. A. (1991). The influence of pragmatic competence on the likeability of grade-school children. *Discourse Processes*, 14(2), 227- 241. <https://doi.org/10.1080/01638539109544783>
- Reichow, B., & Volkmar, F. R. (2010). Social skills interventions for individuals with autism: Evaluation for evidence-based practices within a best evidence synthesis framework. *Journal of Autism and Developmental Disorders*, 40(2), 149- 166. <https://doi.org/10.1007/s10803-009-0842-0>
- Senju, A., Verneti, A., Kikuchi, Y., Akechi, H., Hasegawa, T., & Johnson, M. H. (2013). Cultural background modulates how we look at other persons' gaze. *International Journal of Behavioral Development*, 37(2), 131- 136. <https://doi.org/10.1177/0165025412465360>
- Shattuck, P. T., Narendorf, S. C., Cooper, B., Sterzing, P. R., Wagner, M., & Taylor, J. L. (2012). Postsecondary education and employment among youth with an autism spectrum disorder. *Pediatrics*, 129(6), 1042- 1049. <http://doi.org/10.1542/peds.2011-2864>

- Stocco, C. S., Saavedra, I., Fakharzadeh, S., Patel, M. R., & Thompson, R. H. (2021). A comparison of intervention for problematic speech using reinforcement with and without preferred topics. *Journal of Applied Behavior Analysis, 54*(1), 217- 230. <https://doi.org/10.1002/jaba.770>
- Taylor, J. L., Henninger, N. A., & Mailick, M. R. (2015). Longitudinal patterns of employment and postsecondary education for adults with autism and average-range IQ. *Autism: The International Journal of Research and Practice, 19*(7), 785- 793. <http://doi.org/10.1177/1362361315585643>
- Taylor, J. L., & Seltzer, M. M. (2011). Employment and post-secondary educational activities for young adults with autism spectrum disorders during the transition to adulthood. *Journal of Autism and Developmental Disorders, 41*(5), 566- 574. <http://doi.org/10.1007/s10803-010-1070-3>
- Turkstra, L. S. (2001). Partner effects in adolescent conversations. *Journal of Communication Disorders, 34*(1-2), 151- 162. [https://doi.org/10.1016/S0021-9924\(00\)00046-0](https://doi.org/10.1016/S0021-9924(00)00046-0)
- Turkstra, L., Ciccio, A., & Seaton, C. (2003). Interactive behaviors in adolescent conversation dyads. *Language, Speech, and Hearing Services in Schools, 34*(2), 117– 127. [https://doi.org/10.1044/0161-1461\(2003/010\)](https://doi.org/10.1044/0161-1461(2003/010))
- Wang, S.-Y., Parrila, R., & Cui, Y. (2013). Meta-analysis of social skills intervention of single-case research for individuals with autism spectrum disorders: Results from three-level HLM. *Journal of Autism and Developmental Disorders, 43*(7), 1701- 1716. <https://doi.org/10.1007/s10803-012-1726-2>