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Expressive Behavior in Parkinson's Disease as a Function of Interview Context

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Abstract

OBJECTIVE—Parkinson's disease affects the ability to express motivation through face, body, and voice; contextual factors may facilitate or inhibit expressive behavior. The purpose of this study was to determine whether qualities of the interview context are associated with client motivational behavior in Parkinson's disease.

METHOD—Men and women with Parkinson's disease (N = 106) discussed 2 topics (enjoyable activity vs. frustrating activity) during an assessment with a female or male interviewer. From videotaped clips, displays of 4 categories of motivation and 12 verbal and 18 nonverbal behavioral patterns were rated.

RESULTS—During the discussion of enjoyable activities, participants used more positive words, smiled more, and were more facially expressive. Participants were less talkative about their negative feelings and appeared to be more apathetic with the same-gender interviewer.

CONCLUSION—Occupational therapy practitioners should vary the emotional tone of their questions to improve the validity of motivation assessments.

Keywords

behavior; environment; interviews as topics; motivation; nonverbal communication; Parkinson disease

Parkinson's disease is a degenerative movement disorder of the central nervous system that affects more than 500,000 people in the United States (National Institute of Neurological Disorders and Stroke, 2010). The signs of Parkinson's disease—tremor, muscle rigidity, and *bradykinesia* (slowness of movement)—can occur in facial, oral, and respiratory musculature. The consequence is less fluent adjustment of one's facial and vocal expression (facial masking) to one's changing emotional state. The desynchronization of mind and

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expression can have a profound effect on communication ability and quality of life (Lyons & Tickle-Degnen, 2003), such as that experienced by actor Michael J. Fox (2002):

> My ability to form thoughts and ideas into words and sentences is not impaired; the problem is translating those words and sentences into articulate speech.... I often appear sad on the outside while actually smiling, or at least smirking, on the inside.... These impediments to self-expression are not the most painful or debilitating features of Parkinson's disease, yet they madden me more than even the most teeth-rattling full body tremor. (pp. 214–215)

Despite this desynchronization, some evidence (Griffin & Greene, 1994; Simons, Pasqualini, Reddy, & Wood, 2004) has suggested that behavior and symptom severity in Parkinson's disease is influenced by context. For example, when Fox testified during a Senate Appropriations Subcommittee on Health and Human Services (Michael J. Fox Foundation for Parkinson's Research, 2002), his facial expression was stiff, with lips tightened and little eye movement. This expression gave an impression of being very ill. However, when talking to his wife right after he testified, Fox had a big smile that gave an impression of being healthy without any Parkinson's symptoms. This shift in symptoms was so large that radio talk show host Rush Limbaugh accused Fox of deceiving people by faking his look of illness during his testimony (Golden, 2006). An alternative hypothesis is that people with Parkinson disease, like the general population, behave differently in different contexts. The purpose of this study was to understand how interview context is associated with the behavior of men and women with Parkinson's disease. Specifically, we examined verbal and nonverbal behavior that appears to express an individual's motivational states. We did not address actual motivational state but rather the apparent motivational state of the individual on the basis of the individual's behavior alone. We examined this verbal and nonverbal behavior in relationship to two contextual factors: interview topic and gender of both interviewer and participant.

Expressive Behavior in the Clinical Context

Occupational therapy practitioners automatically and spontaneously observe verbal and nonverbal behavior to detect a client's motivation and adjust their rehabilitation treatment accordingly (Fleming, 1994). If a client is not showing any facial expression or is talking little, therapists may judge the client to be more ill, apathetic, or hopeless. Likewise, if a client shows an angry facial expression and words, therapists may judge a client to be resistant, but if he or she is smiling and making positive comments, they may judge the client to be healthy or feeling hopeful and confident.

For the purposes of this study, we defined *motivation* using Bandura's theory of the self-regulatory system (Bandura, 1997; Gage & Polatajko, 1994; Takahashi, 2007). This theory states that actions and self-regulation processes are best predicted by the interaction of one's belief in the ability to perform a task, called *self-efficacy*, and the results one anticipates from having performed these tasks, called *outcome expectancy*. Four categories of motivation are derived from the combination of different levels of self-efficacy and outcome expectancy (Bandura, 1997): apathy, hopelessness, protest, and hopefulness. In populations without expressive disorders, *apathy* is the expression of both low self-efficacy and negative outcome expectancy. *Hopelessness* is the expression of low self-efficacy but positive outcome expectancy. *Protest* is the expression of high self-efficacy but negative outcome expectancy. *Hopefulness* is the expression of both high self-efficacy and positive outcome expectancy. We applied this framework to the measurement of verbal and nonverbal behavior.

Influence of Interview Context

Interview Topic

Studies have shown that different topics or events elicit different nonverbal behavior. For example, Wada (1988) found that 24 male Japanese students had less movement in the face and body (e.g., eye contact and gesture) when discussing a nonintimate topic of conversation than an intimate topic. The little research that has been done on Parkinson's disease has suggested that interpersonal and other contextual factors may influence people with Parkinson's disease as well. Griffin and Greene (1994) conducted a case study of a 74-yr-old man with Parkinson's disease during a videotaped conversation with his wife. Bradykinesia in the face increased after a series of negative comments by the wife. This finding suggests that a negative topic of conversation may exaggerate the signs of Parkinson's disease. Simons et al. (2004), in a study of 19 people with Parkinson's disease, found that participants' overall level of expressivity was related to self-reported emotional experience during an interview.

Typical health care interviews focus on negative aspects of Parkinson's disease. For example, therapists often ask about problems a client is experiencing. What effect this type of questioning has on clients is not known; however, the evidence from Griffin and Greene (1994) suggested that it may decrease facial expression and movement in the body. Moreover, most research has been directed toward problems of expression in Parkinson's disease and not toward the capacity to express happiness or hopeful feelings. Studies are needed that compare both positive and negative contextual factors, such as interview questions about enjoyable and frustrating activities, because they influence expressive behavior in Parkinson's disease.

Gender of Interviewer

Another contextual factor to consider besides interview topic is the gender of the interviewer. Although little relevant research in Parkinson's disease exists, in the general population interviewer gender is known to influence respondent behavior (Hall, Irish, Roter, Ehrlich, & Miller, 1994; Roter, Hall, & Aoki, 2002). Meta-analytic findings (Roter et al., 2002) have shown that female physicians elicit significantly more active partnership behaviors, positive talk, psychosocial counseling, psychosocial questions, and emotionally focused talk in their patients than do male physicians. Other studies have shown that people prefer to have a female counselor and report more satisfaction with a woman because they are given more encouragement and insight than with male counselors (Fuller, 1964; Jones, Krupnick, & Kerig, 1987; Orlinskey & Howard, 1980; Pikus & Heavey, 1996).

Gender Composition of Client–Therapist Dyad

In general, gender has been shown to affect how people behave: Women are more expressive and smile more than men (DePaulo, 1992; Hall, 2006). Explanations for this gender difference include cultural stereotypes that create expectations for women to be friendlier and more emotionally expressive than men and cultural pressure on women to seek social connectedness to a greater degree than men (Dodd, Russell, & Jenkins, 1999). Moreover, people's behavior is influenced by the gender composition of a dyad. Female patients make more positive statements and nod more with female physicians than with male physicians, and male patients smile more and are calmer (Hall et al., 1994). Likewise, women and men with Parkinson's disease may respond differently to male and female interviewers. The impact of client–therapist gender combination, however, has not been studied in Parkinson's disease.

The potential for desynchronization between internal feelings and external expression in people with Parkinson's disease can create communication problems during social occupations of any nature (DeGroat, Lyons, & Tickle-Degnen, 2006; Pentland, 1991; Pentland, Gray, Riddle, & Pitcairn, 1988; Pentland, Pitcairn, Gray, & Riddle, 1987; Pitcairn, Clemie, Gray, & Pentland, 1990a, 1990b; Tickle-Degnen & Lyons, 2004). The person with the disease can have trouble making personal needs, thoughts, and motives understood by family and friends, the community, and health care practitioners. In interactions with occupational therapy practitioners, this difficulty can create frustration, stigmatization, inaccurate assessments of mood and motivation, and a barrier to the development of effective therapeutic relationships and interventions. For example, a practitioner may incorrectly assume that the client has little interest in engaging in an activity when in fact the client feels motivated to participate. Or the practitioner may incorrectly assume that the client is depressed because of little facial expressiveness or that the client is not depressed by attributing the lack of facial expression to a movement disorder rather than to an emotional disorder.

In this study, we explore a set of contextual factors that may influence the client's occupational performance during health care interviews and, consequently, the therapist's ability to correctly interpret the client's motivations, interests, and emotional lives. We clarify whether the validity of motivational and emotional assessments of people with Parkinson's disease might be improved by therapist sensitization to or modification of the context of the assessment procedure. For example, the study findings are relevant to whether assessment validity might be improved by introducing variation in the emotional nature of interview questions or introducing variation in the social context, such as a changing mix of genders. Contextual qualities that support the expression of a broader repertoire of behavior would help clients feel that their needs were communicated and practitioners understand what type of interventions would be most meaningful and motivational to the client.

Method

Research Design

We studied the following research questions: How does the expressive behavior of people with Parkinson's disease change across different contexts, and how would their behavior appear to observers from a motivational perspective? We used a descriptive and relational research design in which men and women with Parkinson's disease ($N = 106$) discussed two topics (enjoyable activity vs. frustrating activity) during an assessment with a female or male interviewer. From videotaped clips, displays of four categories of motivation (apathy, hopelessness, protest, and hopefulness) and 12 verbal and 18 nonverbal behavioral patterns were rated by means of multiple rating procedures. We hypothesized that a question about frustrating activity would reduce nonverbal expressivity relative to a question about enjoyable activity. Moreover, we hypothesized that differences in gender composition during an interview would result in different expressive behavior. Findings were interpreted in comparison with what would be expected in populations without expressive disorders.

Participants

We used interview videotapes from the database of the Rehabilitation for the Self-Management of Parkinson's Disease research project (Tickle-Degnen, Ellis, Saint-Hilaire, Thomas, & Wagenaar, 2010). Participants had a diagnosis of idiopathic, typical Parkinson's disease; were ≥40 yr old; scored >26 on the Mini-Mental State Exam (Folstein, Folstein, & McHugh, 1975); scored ≤20 on the Geriatric Depression Scale; were on a stable dose of anti-Parkinson medication; walked without supervision; were able to communicate with

recruitment personnel; lived in the community; and had no other severe medical disorders that would interfere with movement.

Of the original 116 participants, 106 were included in the current study. They provided informed consent as approved by the Boston Medical Center and the Boston University institutional review boards to allow their videotaped interviews to be used in other studies. Their average age was 67.0 yr (standard deviation [*SD*] = 9.1 years); 32 participants were women and 74 were men. Participants were at Hoehn and Yahr Stage 2.0–3.0 (generalized dysfunction that is moderately severe). The average number of years since diagnosis was 6.8 yr (*SD* = 5.8).

Videotape Procedure

We used baseline videotapes of interviews of participants before they entered an intervention phase of the original study. Participants were assigned to a male or female interviewer by virtue of the time at which they entered the original study over a 2-yr period. During approximately the first half of the study, the interviewer for the project was a woman who left the position to pursue other professional activities and was replaced by a male interviewer. The first 47 participants were interviewed by the female interviewer, and the last 59 participants were interviewed by the male interviewer. Both interviewers were trained health care practitioners, young adults, and doctoral students in rehabilitation sciences. The video-camera image captured the upper body of the participant, who sat in an armchair. The interview lasted about 30 min. In the last part of the interview, the interviewer asked open-ended questions about the most frustrating and most enjoyable events during the past 7 days.

This study applied a validated thin-slice method (Ambady, Bernieri, & Richeson, 2000; Murphy, 2005), in which two different 20-s clips from the same interview were extracted. One of the clips was extracted from the last 20 s of participants' answer to the interviewer's question about the most frustrating occurrence during the past 7 days, and the other clip was from the last 20 s of participants' answer to the question about the most enjoyable event. After the editing procedure was completed, each clip was placed on one DVD in random order. The clips included both verbal and nonverbal behavior (combined).

Rating and Measurement Procedures

A comprehensive understanding of expressive behavior involves analysis at both a molar and a molecular level (Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979). A *molar level of analysis* treats behavior as a psychological unit. It incorporates psychological and social meaning and contextual factors into an observer's gestalt judgment. This gestalt judgment is similar to what occurs in conditional reasoning in a clinical setting. A *molecular level of analysis* treats behavior as a physical unit. It involves counting or measuring discrete actions or movements (e.g., specific words, degree of cheek raising, and vocal inflection).

Measures of Expressive Behavior at the Molar Level

A series of rating procedures was conducted for each of the verbal, nonverbal, and combined (both verbal and nonverbal) channels of expression (Hall, Bernieri, & Carney, 2005; Rosenthal et al., 1979). Before measuring verbal expression, a trained research assistant transcribed the participants' speech content in the selected clips following specific instructions. Before measuring nonverbal expression, the audio–video clips were edited to filter content out of the audio channel. This filter retained facial, body, and vocal (e.g., tone) nonverbal behavior. *Content filtering* is an editing procedure that removes sound wave frequency of 400 Hz and above from recorded speech. When listening to the clips, people cannot understand the speech content but can still hear the pitch and inflection of the voice,

as if listening through a wall (Scherer, Feldstein, Bond, & Rosenthal, 1985; van Bezooijen & Boves, 1986). Measuring the combined channel of expression did not involve any editing of audio–video clips.

The degree of the display of four categories of motivation in each channel of expression was rated by 11 raters per clip. The raters were blind to the research questions. The ratings achieved acceptable interrater reliability (average intraclass correlation [ICC] = .76, range = .59–.94). The 11 raters who measured the combined channel of expression were different from the raters who measured the channels of verbal and nonverbal expression.[1]

Using 5-point Likert scales (0 = *disagree strongly*, 5 = *agree strongly*), raters separately identified the degree to which they agreed that the participant in each clip was showing apathy, hopelessness, protest, and hopefulness. Definitions were quotes from Bandura (1997, p. 21) that were printed on the rating scale forms. *Apathy* was defined as a state when people "become apathetic and resigned to a dreary life. If no one can succeed, people become convinced of their powerlessness to improve the human condition. As a result, they do not put much effort into effecting changes." *Hopelessness* was defined as a state when people are "apt to give rise to self-disparagement and depression. The evident success of others makes it hard to avoid self-criticism" and "is most conducive to depressive mood and cognitive debilitation of performance." *Protest* was defined as a state that "generates resentment, protest, and collective efforts to change existing institutional practices. Should reforms be hard to achieve, given better options, people will desert environments that are unresponsive to their efforts and pursue their activities elsewhere." *Hopefulness* was defined as a state that "fosters aspirations, productive engagement in activities, and a sense of fulfillment." This state "enables people to exercise substantial control over their lives through self-development." The average score of the 11 raters was calculated and used as the motivation score of each clip for each channel of expression (verbal, nonverbal, and combined).

Measures of Expressive Behavior at the Molecular Level

Discrete verbal and nonverbal behaviors in each clip were counted and measured by computer software and raters as described in the sections that follow.

Verbal molecular behavior—The transcript of each of the 212 clips was processed by Linguistic Inquiry and Word Count software (LIWC; Pennebaker, Francis, & Booth, 2001) to count the number of motivation-related words in each clip (Table 1). LIWC counts the number of terms in a text on the basis of created or preprogrammed dictionaries. For this project, Kayoko Takahashi created four new dictionaries for words reflective of the four categories of motivation: apathy, hopelessness, protest, and hopefulness. The reliability and validity of these measures has not yet been established. In addition, we used preprogrammed LIWC dictionaries for positive emotion, negative emotion, anxiety or fear, anger, sadness or depression, and achievement. Pennebaker and Francis (1996) demonstrated the external validity of these dictionaries by correlating the LIWC output with the composite of four raters' judgments: positive emotion (r = .63), negative emotion (r = .75), anxiety or fear (r = .57), anger (r = .57), and sadness or depression (r = .66).

In addition to the LIWC, we used two items from the Interpersonal Communication Rating Protocol (ICRP; Table 2; Takahashi & Tickle-Degnen, 2005) to measure the degree to

[1]For the verbal and nonverbal channels, 4 of 11 raters overlapped. However, the raters could not determine which clips were matched across verbal and nonverbal channels because the verbal channel involved a written transcript without participants' video images and the nonverbal channel involved video images of the participants but no words could be heard. In addition, clip order was different for each rating procedure.

which four raters perceived the participants to use positive speech content and negative speech content in unedited audio clips (no video). Effective ICCs for rated positive speech and rated negative speech were .82 and .80, respectively. The clips included both speech and vocal tone.

Nonverbal molecular behavior—The ICRP was used on the 212 nonedited audio–video clips by four raters. As shown in Table 2, the protocol had 20 items, each rated on a 5-point Likert scale (ranging from 1 = *low* to 5 = *high*) to rate the perceived frequency, duration, and intensity of the expressive behavior. Some items were modified and incorporated from the Facial Action Coding System (Ekman, Friesen, & Hager, 2002): eyebrow raising, eyebrows pulling together, cheek raising, and lip corner puller. Two of the items measured speech content and were described earlier. Audio was muted to rate 11 nonverbal items, the video was turned off to rate 8 vocal nonverbal items, and both audio and video frames were shown to rate 1 item, "topic control." The average score of the four raters was calculated and used. The ratings achieved acceptable effective interrater reliability (average ICC = .76, range = .35–.93). Lyons and Tickle-Degnen (2005) found an earlier version of the ICRP to demonstrate construct validity when compared with client-reported and practitioner-observed Parkinsonian symptoms.

Data analysis—We calculated descriptive statistics to analyze the direction of change across different contexts. A 2 × 2 × 2 mixed between-subjects and repeated-measures analysis of variance (ANOVA) was used to determine the statistical significance of the differences across interview context factors: interview topic (enjoyable vs. frustrating), gender of interviewer (male vs. female), and gender of participant (male vs. female). Gender composition results were determined by the interaction effect of gender of interviewer and gender of participant.

Results were considered statistically significant at $p < .05$. We used the F ratios from the ANOVA analyses to determine the magnitude of the context effects. An F ratio of 1, with a sample size of 106, converts to an effect size of .10, which Cohen (1988) interpreted as a small magnitude of effect. An F ratio of 10 converts to an effect size of .30, which Cohen interpreted as a moderate magnitude of effect. An F ratio of 33 converts to an effect size of .50, which Cohen interpreted as a large magnitude of effect.

Results

Interview Topic

Table 3 shows the descriptive data separately for the enjoyable activity topic, the frustrating activity topic, and the tests of significance. We found a significant main effect of topic on all four categories of motivation as rated at the molar level of verbal and combined expression. Specifically, participants' transcripts showed more hopefulness, less apathy, less hopelessness, and less protest while talking about enjoyable activities than while talking about frustrating activities. We found no significant effect of topic on motivation as rated at the molar level of nonverbal expression.

Six of 12 (50%) discrete verbal behaviors showed significant effects when measured at the molecular level. When participants talked about enjoyable activities compared with frustrating activities, they used more positive speech content (ICRP positive speech content and LIWC positive emotion), especially more words of hopefulness (LIWC hopefulness). Participants also used less negative speech content (ICRP negative speech content), especially fewer words of hopelessness (LIWC hopelessness) and protest (LIWC protest). In addition, 4 of 12 (33%) discrete nonverbal behaviors showed significant effects when measured at the molecular level. When participants talked about enjoyable activities

compared with frustrating activities, they showed more positive facial expressivity (ICRP active expressivity in face, ICRP cheek raising, ICRP lip corner puller, and ICRP laughing).

Gender of Interviewer and Its Interaction With Interview Topic

We found a main effect of gender of interviewer on apathy as rated at the molar level of nonverbal expression (Table 4). The participants appeared to be more apathetic (F[1, 101] = 4.55, p = .04) when interviewed by the male interviewer (mean [M] = 1.91, SD = 0.58) than when interviewed by the female interviewer (M = 1.66, SD = 0.44). We found no significant main effect of gender of interviewer on motivation as rated at the molar level of verbal and combined expression.

With respect to the molecular measurement, participants had their mouths open more while forming words (less ICRP active mouth closure during speech) with the male interviewer (M = 3.03, SD = 43) than with the female interviewer (M = 3.19, SD = 0.52) regardless of interview topic (F[1, 99] = 6.83, p = .01). Interview topic and gender of interviewer showed no other statistically significant main effects or interaction effects.

Gender of Participant and Its Interaction With Interview Topic

We found a main effect of gender of participant on protest as rated at the molar level of nonverbal and combined expression (Table 4). Men appeared to be more protesting, especially nonverbally, than women, regardless of the topic of interview (nonverbal: F[1, 101] = 6.39, p = .01; combined: F[1, 101] = 7.46, p = .01). We found no significant main effect of participant gender on motivation as rated at the molar level of verbal expression. However, we found a significant interaction at the molar level of verbal expression between interview topic and gender of participant. Participants' transcripts showed less apathy (F[1, 101] = 4.07, p = .05) while talking about enjoyable activities than while talking about frustrating activities, especially men (enjoyable activity: M = 1.46, SD = 0.35; frustrating activity: M = 2.26, SD = 0.64) compared with women (enjoyable activity: M = 1.55, SD = 0.54; frustrating activity: M = 2.01, SD = 0.50). We found no significant three-way interactions at the molar level.

With respect to the molecular measurement, only 5 of 18 (28%) nonverbal behaviors and 0 of 12 verbal behaviors showed a main effect of participant's gender: Women were more talkative and verbally expressive than men. Women had more active mouth closure (ICRP active mouth closure: F[1, 99] = 4.87, p = .03), were more talkative (ICRP client talkativeness: F[1, 99] = 5.38, p = .02), demonstrated more vocal inflection (ICRP vocal inflection: F[1, 99] = 10.26, p = .01), spoke more articulately (ICRP articulation; F[1, 99] = 10.56, p = .01), and spoke faster (ICRP vocal speed: F[1, 99] = 4.78, p = .03) than the men.

We found a significant two-way interaction for discrete nonverbal behaviors and no two-way interactions for discrete verbal behaviors. Participants showed more smiling (ICRP cheek raising: F[1, 99] = 7.19, p = .01) while talking about enjoyable activities than while talking about frustrating activities; this finding was more the case for women (enjoyable activity: M = 2.48, SD = 0.95; frustrating activity, M = 1.73, SD = 0.64) than for men (enjoyable activity: M = 1.98, SD = 1.00; frustrating activity, M = 1.81, SD = 0.71). We found the same interaction for the upturning of lips, which is related to smiling. Participants showed more upturned lips (ICRP lip corner puller: F[1, 99] = 5.98, p = .02) while talking about enjoyable activities compared with frustrating activities. This finding was especially true for women (enjoyable activity: M = 2.31, SD = 0.79; frustrating activity: M = 1.78, SD = 0.52) compared with men (enjoyable activity: M = 1.97, SD = 0.72; frustrating activity: M = 1.79, SD = 0.59). We found no statistically significant two-way interaction effects of gender of interviewer and participant.

One of 12 (8%) discrete verbal behaviors showed a three-way interaction effect of interview topic, interviewer gender, and participant gender (LIWC apathy: $F[1, 101] = 6.53$, $p = .01$). Participants used more apathetic words while talking with an interviewer of the same gender about frustrating activities ($M = 0.81$, $SD = 1.58$) than while talking about enjoyable activities ($M = 0.07$, $SD = 0.47$). However, when they were interviewed by an interviewer of the opposite gender, participants showed a similar amount of apathetic words while talking about frustrating activities ($M = 0.33$, $SD = 0.89$) and enjoyable activities ($M = 0.34$, $SD = 0.98$). We found no further three-way interactions at the molecular level.

Discussion

This study's findings indicate that the expressive behavior of people with Parkinson's disease changes across different contexts, and their motivation appears different to observers across these contexts. The interview topic appeared to have more effect on behavior than the other context factors. From an observer's molar perspective of the participants' transcripts and the unedited audio–video clips, the participants seemed to have a more positive motivation while discussing an enjoyable activity than a frustrating activity. In fact, the molecular analyses showed that participants used more positive and hopeful words and had more positive facial expressivity while discussing an enjoyable activity. By contrast, participants used more negative, hopeless, and protesting words while discussing a frustrating activity. They also had less positive expressivity but not more negative expressivity such as frowning (eyebrows pulling together) while talking about a frustrating activity. Therefore, the following hypothesis was supported: In people with Parkinson's disease, an interview question about a frustrating activity reduces nonverbal expressivity relative to a question about an enjoyable activity.

If we consider how people without expressive disorders might react to talking about an enjoyable versus a frustrating activity, we would expect differences in facial expressions for the two different topics. In this respect, people with Parkinson's disease are similar to others without expressive disorders in showing positive expressions while discussing an enjoyable topic. Where they may differ is by showing fewer negative expressions (i.e., more facial masking) while discussing a frustrating topic. This study suggests that just talking about a frustrating activity can affect facial masking. It extends Griffin and Greene's (1994) finding that facial masking can be exacerbated in a negatively emotional interpersonal interaction to a situation in which a person is simply talking about a frustrating event.

We also found some support for the hypothesis that gender composition during an interview would result in different expressive behavior. Interview topic appeared to affect the degree to which participants' transcripts showed apathy at the molar level. Specifically, men used more apathy words than did women at the molecular level when speaking with a male interviewer about a frustrating activity. Interview topic influenced female participants' positive facial expressivity at the molecular level. Across the interview topics, women were more talkative and more facially expressive, whereas men were observed to be more protesting at the molar level and less talkative with less facial expression regardless of the topic of conversation. This gender difference is similar to what would be expected of the two genders in a population without an expressive disorder (DePaulo, 1992; Hall, 2006).

Limitations

To achieve low Type I error (incorrectly rejecting the null hypothesis of zero correlation) and support that the results were not expected by chance, the percentage of significant main effects out of total effects calculated for each factor should be >5%. For the interview topic analyses, 18 of 42 (42.9%) effects achieved significance of at least $p < .05$, and for

participant gender 7 of 42 (16.7%) effects achieved significance. These percentages suggest a low probability of Type I error.

For interviewer gender effects, however, only 2 of 42 (4.8%) effects achieved the criterion significance level, which suggests that Type I error could have played a role in these findings. Moreover, the generalizability of gender effects may be limited for two reasons. First, participants were not randomized to gender of interviewer. Effects that were found may be the result of unknown differences between the first year of the original study, during which the interviewer was woman, and the second year, during which the interviewer was a man. It is impossible to determine whether gender of interviewer was or was not confounded with any number of other variables, such as unmeasured attributes of the participants who entered earlier rather than later into the study, subtle changes in the study procedures, historical events that intervened between the two periods, and so on. Second, only one female interviewer and one male interviewer were used. Although both interviewers were skilled, findings may have been the result of other qualities unrelated to gender, such as personality traits or unmeasured behavioral styles. Regardless, the findings are consistent with the research literature on gender effects in interviews, suggesting that cautious generalization is warranted pending further investigation in the future.

Future Research

Because research of this nature is new in the area of Parkinson's disease, it will be important to replicate these findings while refining, varying, and extending the variables associated with context. Exploration of the effect of the intensity of the valence of questions is one direction. For example, would asking questions about more or less intensely positive or negative life situations elicit different degrees of positive or negative expressive behavior? The purpose of these studies would be to discover how to facilitate client production of the full set of motivational behaviors in their actual repertoire. By facilitating this production, the practitioner should have more behavioral evidence from which to draw conclusions about the client's motivation. Future research could test whether practitioner accuracy about client needs and motivations varies according to the degree to which a partial or full repertoire of client behavior is produced. Such research would provide validity to assessment procedures that systematically vary context to elicit a full range of behavior.

Future research should test interviewer gender and participant effects with randomization of participants to multiple interviewers representing each of the genders. Randomization that is blocked on both participant and interviewer gender will allow the internally valid examination of the effect of all combinations of gender during an interview.

Cultural and ethnicity factors related to client expressiveness and practitioner understanding of motivational states is another direction for this research. Recent findings have shown that both gender and ethnicity in people with Parkinson's disease are factors that can interact to influence practitioners' accuracy across cultures when forming impressions of client emotion, personality, activity preferences, and competence (Tickle-Degnen, Ma, & Huang, 2008). Finally, this research should be extended beyond an assessment interview to intervention contexts (Takahashi & Tickle-Degnen, 2005), for example, to determine the effects of gender or cultural mix on motivational behavior during group tasks and occupations.

Clinical Implications

A primary implication of this study is that occupational therapists can easily misinterpret the motivational and affective behavior of people with Parkinson's disease if they are unaware of the effect of contextual factors on this behavior. People, including occupational therapy

practitioners, tend to rely on nonverbal behavior when making judgments about others' states and traits because this reliance is generally accurate (Ambady et al., 2000). This study's findings, however, are consistent with previous findings suggesting that verbal behavior may be more reliable than many types of nonverbal behavior for understanding the states and traits of people with Parkinson's disease (DeGroat et al., 2006; Tickle-Degnen & Lyons, 2004). Practitioners can attempt to consciously separate out the verbal from the nonverbal channel of communication when observing the client, as if reading words in a book as opposed to hearing and "seeing" speech as a gestalt inseparable from other channels. By doing so, they may be able to focus their attention on the speech content to glean information from it independent of the information gathered from the manner in which speech is delivered.

This study's results suggest, however, that some types of nonverbal behavior, such as smiling, are effective indicators in this population of feeling better or worse about something (e.g., a favorite vs. frustrating activity). Although practitioners may have to focus more on verbal than nonverbal behavior, they should not exclude from their reasoning the information they gather from the nonverbal behavior. One approach is to vary the type and valence of questions that are asked. This approach should elicit a broader range of behavior within the client's communication repertoire than asking questions of one type or valence. Because this study suggested that facial masking was exacerbated during the discussion of a frustrating activity, a purely problem-based interview may fall short of eliciting the range necessary for valid clinical judgments and should be avoided. Questions about enjoyable activities may elicit a more active response from clients.

Although the study's findings about gender effects are more tenuous than those about interview topic, they suggest that practitioners should be sensitive to all elements of the interview context. With sensitivity comes more attempts to make appropriate tests and adjustments to clinical reasoning, thus supporting a good therapeutic relationship and valid decision making with this population. ▲

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References

Ambady N, Bernieri FJ, Richeson JA. Toward a histology of social behavior: Judgmental accuracy from thin slices of the behavioral stream. Advances in Experimental Social Psychology 2000;32:201–271. doi:10.1016/S0065-2601(00)80006-4.

Bandura, A. Self-efficacy: The exercise of control. W. H. Freeman; New York: 1997.

Cohen, J. Statistical power analysis for the behavioral sciences. 2nd ed.. Erlbaum; Hillsdale, NJ: 1988.

DeGroat EJ, Lyons KD, Tickle-Degnen L. Favorite activity interview as a window into the identity of people with Parkinson's disease. OTJR: Occupation, Participation and Health 2006;26:56–68.

DePaulo BM. Nonverbal behavior and self-presentation. Psychological Bulletin 1992;111:203–243. doi: 10.1037/0033-2909.111.2.203. [PubMed: 1557474]

Dodd DK, Russell BL, Jenkins C. Smiling in school yearbook photos: Gender differences from kindergarten to adulthood. Psychological Record 1999;49:543–551.

Ekman, P.; Friesen, WV.; Hager, JC. Facial Action Coding System. Network Information Research Corporation; Salt Lake City, UT: 2002.

Fleming, MH. Conditional reasoning: Creating meaningful experiences.. In: Mattingly, C.; Fleming, MH., editors. Clinical reasoning: Forms of inquiry in a therapeutic practice. F. A. Davis; Philadelphia: 1994. p. 197-235.

Folstein MF, Folstein SE, McHugh PR. “Mini-mental state”: A practical method for grading the cognitive state of patients for the clinician. Journal of Psychiatric Research 1975;12:189–198. [PubMed: 1202204]

Fox, MJ. Lucky man. Hyperion; New York: 2002.

Fuller FF. Preference for male and female counselors. Personnel and Guidance Journal 1964;42:463–467.

Gage M, Polatajko H. Enhancing occupational performance through an understanding of perceived self-efficacy. American Journal of Occupational Therapy 1994;48:452–461. [PubMed: 8042689]

Golden, J. *The Rush Limbaugh Show* [Radio broadcast].. Premiere Radio Networks; New York: Oct 23. 2006 Producer

Griffin WA, Greene SM. Social interaction and symptom sequences: A case study of orofacial bradykinesia exacerbation in Parkinson's disease during negative marital interaction. Psychiatry 1994;57:269–274. [PubMed: 7800774]

Hall, JA. Women's and men's nonverbal communication: Similarities, differences, stereotypes, and origins.. In: Manusov, V.; Patterson, ML., editors. Sage handbook of nonverbal communication. Sage; Thousand Oaks, CA: 2006. p. 201-218.

Hall, JA.; Bernieri, FJ.; Carney, DR. Nonverbal behavior and interpersonal sensitivity.. In: Harrigan, JA.; Rosenthal, R.; Scherer, KR., editors. The new handbook of methods in nonverbal behavior research. Oxford; New York: 2005. p. 237-282.

Hall JA, Irish JT, Roter DL, Ehrlich CM, Miller LH. Gender in medical encounters: An analysis of physician and patient communication in a primary care setting. Health Psychology 1994;13:384–392. doi:10.1037/02786133.13.5.384. [PubMed: 7805632]

Jones EE, Krupnick JL, Kerig PK. Some gender effects in a brief psychotherapy. Psychotherapy: Theory, Research, Practice, Training 1987;24:336–352.

Lyons KD, Tickle-Degnen L. Dramaturgical challenges of Parkinson's disease. OTJR: Occupation, Participation and Health 2003;23:27–34.

Lyons KD, Tickle-Degnen L. Reliability and validity of a videotape method to describe expressive behavior in persons with Parkinson's disease. American Journal of Occupational Therapy 2005;59:41–49. [PubMed: 15707122]

Michael, J.; Fox Foundation for Parkinson's Research. Michael J. Fox testifies on Parkinson's research. 2002 [April 14, 2008]. from www.michaeljfox.org/newsEvents_ mjffInTheNews_article.cfm?ID5148

Murphy NA. Using thin slices for behavioral coding. Journal of Nonverbal Behavior 2005;29:235–246. doi:10.1007/s10919-005-7722-x.

National Institute of Neurological Disorders and Stroke. Parkinson's disease: Hope through research. 2010 [January 12, 2010]. from www.ninds.nih.gov/disorders/parkinsons_disease/detail_parkinsons_disease.htm

Orlinsky, DE.; Howard, KI. Gender and psychotherapeutic outcome.. In: Brodsky, AM.; Hare-Mustin, RT., editors. Women and psychotherapy: An assessment of research and practice. Guilford; New York: 1980. p. 3-34.

Pennebaker JW, Francis ME. Cognitive, emotional, and language processes in disclosure. Cognition and Emotion 1996;10:601–626. doi:10.1080/026999396380079.

Pennebaker, JW.; Francis, ME.; Booth, RJ. Linguistic inquiry and word count (LICW). Erlbaum; Mahwah, NJ: 2001.

Pentland B. Body language in Parkinson's disease. Behavioural Neurology 1991;4:181–187.

Pentland B, Gray JM, Riddle WJ, Pitcairn TK. The effects of reduced nonverbal communication in Parkinson's disease. British Journal of Disorders of Communication 1988;23:31–34. doi: 10.3109/13682828809019874. [PubMed: 3245931]

Pentland B, Pitcairn TK, Gray JM, Riddle WJR. The effects of reduced expression in Parkinson's disease on impression formation by health professionals. Clinical Rehabilitation 1987;1:307–313. doi:10.1177/026921558700100410.

Pikus CF, Heavey CL. Client preferences for therapist gender. Journal of College Student Psychotherapy 1996;10:35–43. doi:10.1300/J035v10n04_05.

Pitcairn TK, Clemie S, Gray JM, Pentland B. Impressions of Parkinsonian patients from their recorded voices. British Journal of Disorders of Communication 1990a;25:85–92. doi: 10.3109/13682829009011965. [PubMed: 2375906]

Pitcairn TK, Clemie S, Gray JM, Pentland B. Nonverbal cues in the self-presentation of Parkinsonian patients. British Journal of Clinical Psychology 1990b;29:177–184. [PubMed: 2364195]

Rosenthal, R.; Hall, JA.; DiMatteo, MR.; Rogers, PL.; Archer, D. Sensitivity to nonverbal communication: The PONS test. Johns Hopkins University Press; Baltimore: 1979.

Roter DL, Hall JA, Aoki Y. Physician gender effects in medical communication: A meta-analytic review. JAMA 2002;288:756–764. doi:10.1001/jama.288.6.756. [PubMed: 12169083]

Scherer KR, Feldstein S, Bond RN, Rosenthal R. Vocal cues to deception: A comparative channel approach. Journal of Psycholinguistic Research 1985;14:409–425. doi:10.1007/BF01067884. [PubMed: 4032322]

Simons G, Pasqualini MCS, Reddy V, Wood J. Emotional and nonemotional facial expressions in people with Parkinson's disease. Journal of the International Neuropsychological Society 2004;10:521–535. doi:10.1017/S135561770410413X. [PubMed: 15327731]

Takahashi K. Self-efficacy and outcome expectancy: Analysis of theory and measurement in occupational therapy. Asian Journal of Occupational Therapy 2007;6:23–34.

Takahashi, K.; Tickle-Degnen, L. The facial expressiveness of people with Parkinson's disease during positive and negative topics of conversation.. Poster session presented at the annual conference of Massachusetts Association for Occupational Therapy; Westford. Oct. 2005

Tickle-Degnen L, Ellis T, Saint-Hilaire MH, Thomas CA, Wagenaar RC. Self-management rehabilitation and health-related quality of life in Parkinson's disease: A randomized controlled trial. Movement Disorders 2010;25:194–204. [PubMed: 20077478]

Tickle-Degnen L, Hall J, Rosenthal R. Nonverbal behavior. Encyclopedia of Human Behavior 1994;3:293–302.

Tickle-Degnen L, Lyons KD. Practitioners' impressions of patients with Parkinson's disease: The social ecology of the expressive mask. Social Science and Medicine 2004;58:603–614. doi: 10.1016/S0277-9536(03)00213-2. [PubMed: 14652056]

Tickle-Degnen, L.; Ma, H-I.; Huang, P-C. Culture, gender and health care stigma in Parkinsonism.. Scientific poster and abstract presented at the Society for Personality and Social Psychology Annual Conference; Albuquerque, NM. Feb. 2008

van Bezooijen R, Boves L. The effects of low-pass filtering and random splicing on the perception of speech. Journal of Psycholinguistic Research 1986;15:403–417. doi: 10.1007/BF01067722. [PubMed: 3772832]

Wada M. Effects of liking, interpersonal distance, and topics on nonverbal behaviors. Japanese Journal of Phycology 1988;59:45–52.

Table 1

Words Programmed Under Each Dictionary

Dictionary	Words to Be Counted
Apathy[a]	boring, drop*, empty, bored, stay* <home>, avoid*
Hopelessness[a]	Important, nervous, tense, anxious, pressure*, value, useful, beneficial, drop*, empty, bother*, afraid, bad, helpless, restless, fidgety, stay* <home>, worry
Protest[a]	boring, competent, skill*, tense, pressure*, angry, hostile, shout*, irritate*, bother*, upset, avoid*
Hopefulness[a]	enjoy*, fun, interesting, enjoyable, good, competent, satisfied, skill*, effort, try, tried, important, well, energy, relax*, value, useful, again, help*, beneficial
Positive Emotions[b]	ador*, calm, love, pleasant
Negative Emotions[b]	abandon*, ache, bore, upset
Anxiety & Fear[b]	afraid, anxi*, insecur, worr*
Anger[b]	argu*, destroy, hate, temper
Sadness & Depression[b]	abandon*, alone, cry, fail, miss
Achievement[b]	achiev, closure, fail, lose, try

Note. The words listed are illustrative and not a complete list of the words in a given dictionary. An asterisk (*) is put at the end of the word to program Linguistic Inquiry and Word Count (LIWC) to ignore all subsequent letters. An angle bracket <> is to program a conditional category of idiom (e.g., stay*<home> indicates that if *home* follows the word *stay* in the text, *stay* is to be counted under the dictionary of apathy and hopelessness.)

[a] Dictionary constructed for this study.

[b] Dictionary constructed by LIWC developers.

Table 2

Nonverbal Behavior Rated on Interpersonal Communication Rating Protocol (ICRP)

Item	Low				High
1. Active expressivity in face	1	2	3	4	5
2. Eyebrows raising	1	2	3	4	5
3. Eyebrows pulling together	1	2	3	4	5
4. Blinking	1	2	3	4	5
5. Cheek raising	1	2	3	4	5
6. Lip corner puller	1	2	3	4	5
7. Active mouth closure	1	2	3	4	5
8. Movement in trunk and head	1	2	3	4	5
9. Forward slouching	1	2	3	4	5
10. Tremors	1	2	3	4	5
11. Gesturing with arms	1	2	3	4	5
12. Client talkativeness	1	2	3	4	5
13. Vocal inflection	1	2	3	4	5
14. Articulation	1	2	3	4	5
15. Loudness	1	2	3	4	5
16. Vocal speed	1	2	3	4	5
17. Laughing	1	2	3	4	5
18. Positive content	1	2	3	4	5
19. Negative content	1	2	3	4	5
20. Topic control	1	2	3	4	5

Note. Adapted from “The Facial Expressiveness of People With Parkinson's Disease During Positive and Negative Topics of Conversation,” by K. Takahashi & L. Tickle-Degnen, October 2005. Poster session presented at the annual conference of the Massachusetts Association for Occupational Therapy, Westford.

Table 3

Descriptive Data for Main Effect of Interview Topic

	Interview Topic				
	Enjoyable		Frustrating		
Expressive Behavior in Parkinson's Disease	**Mean**	***SD***	**Mean**	***SD***	**Significance**
Motivation at molar level					*F*(1,101)
Apathy					
Verbal	1.48	0.41	2.18	0.61	10.05**
Nonverbal	1.74	0.54	1.85	0.53	0.05
Combined	1.91	0.53	2.32	0.57	6.35*
Hopelessness					
Verbal	1.53	0.42	3.18	0.84	32.33**
Nonverbal	2.28	0.67	2.50	0.61	0.01
Combined	1.80	0.45	2.78	0.68	14.68**
Protest					
Verbal	1.35	0.25	2.02	0.60	36.96**
Nonverbal	1.61	0.36	1.78	0.37	1.13
Combined	1.58	0.27	1.99	0.41	10.18**
Hopefulness					
Verbal	3.94	0.63	2.18	0.67	33.73**
Nonverbal	3.02	0.92	2.60	0.68	1.10
Combined	3.41	0.69	2.22	0.69	21.63**
Verbal behavior at molecular level					
LIWC					*F*(1,101)
Apathy	0.22	0.81	0.54	1.25	2.77
Hopelessness	0.23	0.81	1.20	1.84	3.97*
Protest	0.08	0.44	1.02	1.66	8.70**
Hopefulness	2.34	2.82	0.89	1.60	4.49*
Positive emotions	4.61	4.59	1.76	2.27	5.32*

	Interview Topic				
	Enjoyable		Frustrating		
Expressive Behavior in Parkinson's Disease	**Mean**	***SD***	**Mean**	***SD***	**Significance**
Negative emotions	0.62	1.74	2.66	2.74	3.32
Anxiety or fear	0.10	0.48	0.33	1.01	0.30
Anger	0.08	0.59	0.97	1.77	3.50
Sadness or depression	0.08	0.42	0.30	0.91	0.38
Achievement	1.08	2.49	1.38	1.91	0.08
ICRP					*F*(1,99)
Positive speech content[b]	2.85	0.91	1.11	0.26	264.24**
Negative speech content**	1.13	0.32	2.74	0.85	273.39**
Nonverbal behavior at molecular level (ICRP)					*F*(1,99)
Active expressivity in face[a]	2.69	0.95	2.53	0.75	8.28**
Eyebrows raising[a]	2.37	1.14	2.35	1.12	0.01
Eyebrows pulling together[a]	1.66	0.79	1.81	0.91	2.02
Blinking[a]	2.89	0.81	2.90	0.78	0.01
Cheek raising[a]	2.12	1.01	1.80	0.70	17.61**
Lip corner puller[a]	2.07	0.75	1.80	0.58	20.12**
Movement in trunk and head[a]	2.13	0.98	2.13	0.96	0.75
Forward slouching[a]	1.61	0.65	1.58	0.61	0.17
Tremor[a]	1.60	0.89	1.60	0.95	0.90
Gesturing with arms[a]	2.03	1.02	2.19	0.90	1.69
Active mouth closure[a]	3.09	0.48	3.11	0.48	0.15
Client talkativeness[b]	3.76	0.60	3.68	0.70	0.41
Vocal inflection[b]	2.80	0.73	2.68	0.65	3.10
Articulation[b]	3.18	0.68	3.16	0.74	0.10
Loudness[b]	2.87	0.58	2.91	0.56	1.67
Vocal speed[b]	2.92	0.50	2.97	0.52	0.12
Laughing[b]	1.33	0.65	1.06	0.17	16.56**

	Interview Topic				
	Enjoyable		Frustrating		
Expressive Behavior in Parkinson's Disease	Mean	*SD*	Mean	*SD*	Significance
Topic control[c]	2.85	0.91	1.11	0.26	1.65

Note. $N = 106$. For motivation at molar level, verbal = rated on transcripts, nonverbal = rated on content-filtered audio and video, combined = rated on nonedited audio and video; *SD* = standard deviation; LIWC = Linguistic Inquiry and Word Count (used on transcripts); ICRP = Interpersonal Communication Rating Protocol. Because of missing data, $N = 105$ for motivation rated at molar level and LIWC, and $N = 103$ for ICRP.

[a] Rated with audio turned off except footnoted items.

[b] Rated on unfiltered audio only, no video.

[c] Rated on unfiltered audio plus video.

* $p < .05$.

** $p < .01$.

Table 4

Descriptive Data for Main Effect of Gender of Interviewer and Participant

	Female Interviewer				Male Interviewer			
	Female Participant		Male Participant		Female Participant		Male Participant	
Expressive Behavior in Parkinson's Disease	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***
Motivation at molar level								
Apathy								
Verbal	1.70	0.51	1.83	0.74	1.81	0.59	1.89	0.55
Nonverbal[a]	1.69	0.33	1.66	0.47	1.74	0.60	2.02	0.55
Combined	2.01	0.46	2.02	0.51	2.05	0.69	2.28	0.59
Hopelessness								
Verbal	2.45	1.26	2.28	1.08	2.37	0.93	2.40	1.08
Nonverbal	2.44	0.66	2.26	0.60	2.41	0.75	2.50	0.61
Combined	2.27	0.84	2.22	0.76	2.24	0.81	2.40	0.69
Protest								
Verbal	1.73	0.53	1.73	0.65	1.68	0.54	1.64	0.51
Nonverbal[b]	1.59	0.36	1.80	0.40	1.59	0.35	1.68	0.33
Combined[b]	1.63	0.27	1.86	0.46	1.71	0.44	1.80	0.31
Hopefulness								
Verbal	3.13	1.01	3.08	1.13	3.01	1.12	3.05	1.10
Nonverbal	2.92	0.83	2.89	0.79	2.99	1.00	2.60	0.75
Combined	3.00	0.93	2.87	0.86	2.94	1.02	2.64	0.87
Verbal behaviors at molecular level								
LIWC								
Apathy	0.47	1.05	0.25	0.72	0.50	1.22	0.42	1.25
Hopelessness	0.87	1.48	0.44	1.05	0.72	1.47	0.96	1.87
Protest	0.38	1.00	0.39	1.04	0.43	1.05	0.85	1.67
Hopefulness	1.31	1.85	1.54	2.47	1.72	2.49	1.73	2.44
Positive emotions	2.29	2.82	3.49	4.56	3.17	2.92	3.12	3.90
Negative emotions	1.75	2.02	1.55	2.19	1.58	2.63	1.74	2.89
Anxiety or fear	0.47	1.09	0.24	0.97	0.30	0.77	0.07	0.44

	Female Interviewer				Male Interviewer			
	Female Participant		Male Participant		Female Participant		Male Participant	
Expressive Behavior in Parkinson's Disease	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***	**Mean**	***SD***
Anger	0.28	0.68	0.53	1.28	0.37	1.45	0.67	1.59
Sadness or depression	0.19	0.84	0.27	0.79	0.19	0.79	0.11	0.54
Achievement	1.50	1.59	1.35	1.98	1.06	3.11	1.13	1.98
ICRP								
Positive speech content	2.01	1.24	1.93	1.07	2.11	1.24	1.94	1.01
Negative speech content	2.09	1.21	1.97	1.08	1.98	0.93	1.85	0.99
Nonverbal behaviors at molecular level (ICRP)								
Active expressivity in face	2.54	0.75	2.56	0.92	2.91	0.93	2.51	0.75
Eyebrows raising	1.78	0.88	2.39	1.16	2.43	1.07	2.46	1.14
Eyebrows pulling together	1.69	1.03	1.87	0.92	1.48	0.63	1.75	0.82
Blinking	2.99	0.73	3.04	0.81	2.96	0.79	2.67	0.77
Cheek raising	1.89	0.71	1.89	0.89	2.23	0.95	1.90	0.85
Lip corner puller	1.98	0.78	1.90	0.71	2.10	0.70	1.86	0.60
Movement in trunk and head	1.95	0.47	2.48	1.10	2.05	0.79	1.86	0.91
Forward slouching	1.31	0.35	1.60	0.69	1.70	0.59	1.61	0.63
Tremor	1.45	0.97	1.78	1.02	1.32	0.62	1.63	0.91
Gesturing with arms	2.44	0.91	2.21	1.02	1.99	0.93	1.98	0.91
Active mouth closure[a,b]	3.40	0.38	3.13	0.54	3.09	0.55	2.99	0.34
Client talkativeness[b]	4.09	0.45	3.67	0.69	3.77	0.59	3.63	0.67
Vocal inflection[b]	3.01	0.52	2.68	0.72	3.07	0.75	2.53	0.58
Articulation[b]	3.56	0.54	3.01	0.75	3.45	0.70	3.06	0.63
Loudness	2.96	0.55	2.89	0.59	2.96	0.55	2.83	0.57
Vocal speed[b]	3.28	0.49	2.92	0.56	2.97	0.45	2.86	0.46
Laughing	1.18	0.43	1.14	0.41	1.37	0.67	1.16	0.46
Topic control	3.78	0.76	3.54	0.67	3.72	0.69	3.51	0.74

Note. N = 106. *SD* = standard deviation; LIWC = Linguistic Inquiry and Word Count; ICRP = Interpersonal Communication Rating Protocol.

[a] Significant main effect of interviewer gender.

[b] Significant main effect of participant gender.