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# Linguistic bases of social perception

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Abstract:

Target persons were videotaped while engaged in an interview. A text analysis program was used to ascertain the frequency with which they employed negative emotion words, positive emotion words, words reflecting cognitive operations, self-referents, present-tense verbs, negations, and unique words in their verbalizations. Judges viewed the videotapes and evaluated the target persons on a number of social perception dimensions. The language dimensions accounted for significant and substantial proportions of the variance in impressions of the target persons beyond that explained by traditionally studied person perception variables such as physical attractiveness, nonverbal expressiveness, and facial maturity. The results indicate the critical role that language plays in social perception and interaction.

Full Text:

The speed with which we develop initial impressions of other people is impressive. Moreover, there is a great deal of consensus among first impressions formed about particular individuals (e.g., Berry, 1991 a; Berry & Finch Wero, 1993; Kenny, Horner, Kashy, & Chu, 19921 Watson, 1989), and these judgments exert a powerful impact on one's subsequent evaluations of and behaviors toward them (e.g., Snyder, Tanke, & Berscheid, 1977). Until recently, much of the focus of research on impressions has been on how pieces of information about other people are processed, integrated, and retrieved (cf. Fiske & Taylor, 1991). However, a number of researchers have further developed an interest in identifying the various stimulus qualities that underlie these compelling initial intuitions about what other people are like (e.g., Berry, 1991b; Cunningham, 1986; Zebrowitz, 1990).

Research on the determinants of person perception has largely focused on identifying the nonverbal qualities that provide rich sources of social knowledge. For example, people's physical appearance strongly Colors one's impressions of them. In particular, it is well documented that people who are deemed attractive tend to be attributed with more desirable personal attributes than are less physically attractive individuals (e.g., Cunningham, 1986; Cunningham, Barbee, & Pike, 1990). Other work on physical appearance reveals that people who are high in facial maturity impress others as relatively competent, dominant, and shrewd, whereas people with less mature features are perceived to be more submissive, warm, and naive (cf. Berry, 1991b).

In addition to variations in appearance, individual differences in nonverbal behaviors exert a considerable impact on person perception. For example, nonverbally expressive people tend to impress others as friendly, confident, and popular (DePaulo, 1992; Riggio & Friedman, 1986), whereas less favorable impressions accrue toward people who exhibit a more reserved nonverbal demeanor. In addition to general expressiveness, there are more specific links between particular nonverbal behaviors and the expression and perception of personality. For example, people tend to exhibit high levels of visual dominance (defined as ratio of looking while speaking time to looking while listening time) when in a high-status or power role, and high visual dominance is further

associated with perceptions of status and power (e.g., Dovidio, & Ellyson, 1985). Thus nonverbal qualities are important determinants of first impressions. In the present study, we turn our focus to the role of language in social perception. That is, to what extent do aspects of people's verbal behaviors influence how they are viewed by others?

## VERBAL BEHAVIOR AND SOCIAL PERCEPTION

Like nonverbal behavior, verbal behavior can be analyzed along an almost infinite number of dimensions. In relatively unstructured interactions, verbalizations will vary depending on the topic of conversation, the context of the interaction, and the participants themselves (personality, gender, status, etc.; e.g., DePaulo, & Coleman, 1987). Moreover, dimensions of linguistic behavior can be studied from the molecular to the molar level, from morphemes to the deep structure of language. Previous work on speech and person perception has tended to focus on rather global aspects of speaking style. For example, speech acts are defined as sentences or utterances that perform some social action, such as making a request, asking a question, or making an assertion (e.g., Holtgraves, 1986; Searle, 1970). Variations in the prevalence of these verbal behaviors have been found to influence person perception. Wish, D'Andrade, and Goodnow (1980), for example, showed judges videotapes of dyads engaged in conversation and asked them to provide their impressions of each individual along the dimensions of ascendancy, evaluation, task orientation, and arousal. The prevalence of 36 different speech acts (e.g., requesting attention, making a judgmental assertion) was also assessed. These acts were then reduced to five underlying speech style dimensions (e.g., asking vs. informing; initiating vs. reacting). Some substantial relations between impressions and speech style were revealed. For example, people whose speech style was initiatory in nature received higher ascendancy ratings than did people with a speech style that was better described as reactive.

Related studies have shed additional light on the impact of verbal behaviors on person perception. For example, Leary, Rogers, Canfield, and Coe (1986) used Stiles' (1978) verbal response mode taxonomy to analyze the communications of people participating in same-sex dyadic interactions. Grammatical form and communicative intent were jointly used to identify the prevalence of eight verbal response modes, such as disclosure and advisement. These were then used to predict the extent to which independent judges rated the individuals on a scale of boring/interesting. Leary et al. found that the verbalizations of people who impressed the judges as boring tended to feature fewer disclosures and edifications but more questions and acknowledgments than those of targets who were thought to be more interesting. More recently, Gifford and Hine (1994) measured 10 different speech behaviors (e.g., asking questions) that people exhibited during a videotaped interaction. The authors reported that individuals who vary along personality dimensions such as extroversion, agreeableness, and warmth display different patterns of verbal behavior. Moreover, judgments of the participants' personalities were influenced by these behaviors.

Another line of research has focused on differences in the conversational styles of men and women and has related such differences to stereotypical impressions of the sexes. Lakoff (1975) proposed that women use more tag questions, hedges, qualifiers, and compound requests than do men. The use of such a "powerless" or feminine speech style (e.g., "That's sort of a crazy reason for quitting school, isn't it") results in different impressions than the use of a "powerful" or masculine speech style (e.g., "That's a crazy reason for quitting school"). For example, Newcombe and Arnkoff

(1975) asked judges to rate male and female speakers who used either a feminine or masculine speech style on dimensions of assertiveness, politeness, and warmth. Although speaker sex had relatively minor effects on impressions, use of the female register decreased impressions of assertiveness and, to some extent, increased ratings of politeness and warmth (see also, Mulac, Incontro, & James, 1985).

As this overview of the literature suggests, much of the work on language and person perception has focused on rather global dimensions of speech. However, in addition to individual differences in verbally communicated behaviors--such as asking questions or disclosing information--there are individual differences in the specific repertoire of words that people may use to accomplish such acts. Do these characteristic tendencies to use certain words or categories of words more than others influence first impressions? Little work has addressed this important question. In the present study, therefore, we shift the level of focus from the molar to the molecular and examine whether people's linguistic styles and choice of words within a conversation reflect basic dimensions of the social impressions they create. To this end, we used a computer program, LIWC (Linguistic Inquiry and Word Count), to examine the relations between individual differences in word selection and first impressions.

## THE LIWC APPROACH

Our interest in this question and selection of this level of analysis evolved from recent research linking disclosure to long-term measures of health and well-being (Berry & Pennebaker, 1993; Pennebaker, 1989). This work has revealed that the process of translating traumatic or emotionally laden thoughts, feelings, and memories into language--either verbally or through writing--has striking physical and psychological benefits. For example, study participants assigned to write about past traumatic events evidence improved physical health--as measured by both self-reports and physician visits--whereas control participants assigned to write about trivial topics did not (e.g., Pennebaker & Beall, 1986). Moreover, individual differences in the manner in which one uses language to describe such events are a major determinant of the extent of the benefits reaped from disclosure. For example, people whose verbal disclosures of a traumatic event are rated by judges as increasing in organization over time benefit more from such revelations than do people whose disclosures are judged to decrease in organization over the course of a study (Pennebaker, 1993). We became interested in identifying exactly what characteristics of linguistic expression were associated with these differences, and we have since demonstrated that the use of specific linguistic categories during written disclosure can reliably predict behaviors such as physician visits, school performance, and even incidence of depression (Pennebaker, 1993; Pennebaker & Francis, 1996; Pennebaker, Mayne, & Francis, in press). Our interest in examining verbal behaviors on this molecular level led us to develop the LIWC paradigm and computer program (Pennebaker & Francis, in press).

The development of LIWC was influenced by several classic content analysis perspectives. Perhaps the most studied was the method developed by Gottschalk and Gleser (1969) that required judges to evaluate all clauses and phrases within speech samples and code each along several psychoanalytically based categories. The first computerized content analytical method, called the General Inquirer (Oxman, Rosenberg, Schnurr, & Tucker, 1988; Stone, Dunphy, Smith, & Ogilvie, 1966), analyzed verbal samples on a word-by-word basis. Like the Gottschalk method, the General

Inquirer is intended to tap clinical syndromes and psychodynamic themes (for examples of other approaches to linguistic analysis, see McTavish & Pirro, 1990; Rajecki et al., 1994).

Guided by these earlier attempts, Pennebaker and Francis (in press) developed LIWC, a computer-based technique that computes the percentage of words within various categories that writers or speakers use in normal (i.e., nonclinical) speech samples. The program analyzes written or spoken samples on a word-by-word basis. Each word is then compared against a file of words that is divided into 49 dimensions, or dictionary scales. On the broadest level, these dictionary scales tap into five general text dimensions: positive emotions, negative emotions, cognitive mechanisms, content domains, and language composition.

The creation and selection of these primary LIWC categories was guided by recent research within social, health, and clinical psychology. The categories of negative and positive emotion words were based on the burgeoning literature on affect (e.g., Costa & McCrae, 1985; Watson & Pennebaker, 1989), mood, and emotion (e.g., Gross & Levinson, 1993), and tap dimensions such as anger, depression, guilt, optimism, and serenity. Cognitive mechanisms involve words that reveal different modes of thought. This dimension incorporates words that depict causal thinking, although not specific styles of attribution. These include categories such as self-reflection (e.g., understand, think; cf. Rogers, 1965; Pennebaker, 1989); discrepancy, or undoing (e.g., should, would, could, cf. Davis, Lehman, Wortman, & Silver, 1995; Higgins, Vookles, & Tykocinski, 1992); causation (e.g., because, effect, cf. Peterson, Seligman, & Vaillant, 1988); and achievement, or striving (e.g., at tempt, solve, achieve, cf. McClelland, 1976).

For the three primary dimensions just discussed, LIWC further measures a number of subordinate categories. That is, in addition to counting all negative emotion words, LIWC is programmed to additionally calculate the number of words related to five subscales of negative emotion words that specifically reflect anger, depression, paranoia, anxiety, and guilt. For example, words reflecting anger contribute to both the word count that LIWC calculates for the global negative emotion scale and the count made for the subordinate scale of anger. Similarly, five subordinate LIWC categories are measured for the global category of positive emotion words, and eight are calculated for the primary dimensions of cognitive mechanisms.

Because of our original interest in the relation of disclosure and language to health, LIWC was also programmed to measure 12 specific content categories related to physical, psychological, and emotional well-being, such as referents to physical symptoms, illness, religion, and death. Finally, the LIWC program calculates a number of traditional language composition elements, such as use of verb tense, article-and preposition use, and use of negations.

The words comprising these various scales or directories were generated from a range of sources, including dictionaries, a thesaurus, analyses of words used by participants writing about emotional topics, and groups of judges. Once generated, the scales were validated by having independent judges rate each word's appropriateness for that specific scale. A word (e.g., angry) was retained in a scale (e.g., negative emotion words) only if there was very high agreement regarding its appropriateness for inclusion (for details, see Francis & Pennebaker, 1993; Pennebaker & Francis, 1996).

Theoretically, a word count strategy such as that employed by LIWC is premised on a series of assumptions. First, it assumes that the percentage of words used within a given category reflects a speaker's general psychological state. For example, the more an individual uses negative emotion words in a speech sample is presumed to reflect his or her feeling higher degrees of negative emotion. Data from a series of validation studies suggest that this is a reasonable assumption (Pennebaker & Francis, 1996). In one study, for example, judges read essays written by 105 undergraduates about the experience of coming to college. They scored the degree to which each communicator expressed negative emotions, positive emotions, and causal and insightful thinking. The same transcripts were scored by LIWC. Correlations between LIWC word counts for specific categories (e.g., use of negative emotions) and judges' global ratings of the essays on thematically related dimensions (e.g., the extent to which the author expressed negative emotion) were all statistically significant, with correlations ranging from.35 to.76, mean r=.56 (see Pennebaker & Francis, 1996, for details of validation studies of LIWC).

Language, of course, is highly contextual, and a word count program can fail to properly appreciate instances of irony, sarcasm, or metaphors. A word that is negative in one context (e.g., "What he did made me mad") can be positive in another (e.g., "I'm mad about the cute person in my class"). Similarly, LIWC would score the sentence "I'm not happy about the angry teacher" and the sentence "I'm not angry about the happy teacher" in exactly the same way. Thus some words will be misclassified in terms of intent, due to this limitation of a word counting approach. Our previous work with LIWC and the validation data described above suggest that the number of misclassifications is small compared with the number of correct classifications.(1)

In short, the LIWC program provides a simple, efficient, and valid approach to language analysis. Moreover, the linguistic scales developed for LIWC have been successfully used in recent studies to predict a wide variety of outcome variables, ranging from deception in verbal communications (Berry & Pennebaker, 1997; Richards & Pennebaker, 1997) to personality (Berry, Pennebaker, & Mueller, 1997) to psychological adjustment (e.g., Pennebaker et al., 1996) to health (e.g., Pennebaker & Francis, 1996).

## THE PRESENT STUDY

Although previous work has established that a variety of global verbal behaviors are related to impressions, the present study represents a primary attempt to examine whether people's propensities to employ specific word categories--their idiosyncratic lexicons--predict, how they are perceived, and, if so, to identify the dimensions of impressions most strongly related to word choice. To this end, we used LIWC to analyze transcripts of the videotaped interactions of 141 target persons on a word-by-word basis to determine the percentage of their total words that reflected various linguistic categories. In addition, we obtained measures of the stimulus persons along several nonverbal qualities that have been previously established to exert a strong impact on person perception. We then used these linguistic and nonverbal dimensions to predict first impressions of the stimulus persons' warmth, competence, and dominance.

LIWC was used to quantify seven linguistic dimensions. These included use of negative emotion words, positive emotion words, words suggesting cognitive mechanisms, self-references, negations, verb tense, and unique words. Whereas LIWC has the technical capacity to score 49(2) individual

word-count categories, at the outset we decided to restrict our investigation to a more limited number of LIWC dimensions. First, we elected to not include the 12 specific content categories measured by LIWC (e.g., sex, illness, physical symptoms) in our analysis. We further eliminated the 18 subordinate categories that were also included in the primary LIWC dimensions of either positive emotion, negative emotion, or cognitive mechanisms (e.g., anger, guilt, depression). From the remaining LIWC dimensions, we selected the 7 categories noted above because, based on previous psychological research, we felt that they would be likely to influence first impressions.

Positive emotion, negative emotion, and cognitive mechanisms are primary LIWC dimensions and were selected because of their presumed importance in social perception. In addition to the three primary LIWC scales, we elected to include use of self-referents, negations, verb tense, and use of unique words in our analysis. We felt it was important to include these verbal behaviors due to previous research linking them with various dimensions of personality. For example, analyses of self-referents (e.g., I, me, my) were included because people who exhibit a high frequency of self-references have been found to be higher in the traits of Type A and negative affect/neuroticism, and to be more self-conscious and self-absorbed than individuals who characteristically, use fewer of these words (Berry et al., 1997; Graham, Scherwitz, & Brand, 1989; Ickes, 1982; Ickes, Reidhead, & Patterson, 1986; Mehrabian & Wiener, 1967). The use of negations has been further considered to be a central determinant of inhibition or rigidity (McClelland, 1979). Verb tense was included to see whether people who focus more on the present are viewed more favorably than those who dwell on the past (less than 1% of verbs are future oriented). Finally, the number of different or unique words that appear in a communication was examined. (This dimension is also sometimes referred to as type-token ratio; e.g., Carpenter, 1990.)(3) Greater numbers of unique words (i.e., high type-token ratios) tend to emerge when people are experiencing low levels of arousal, whereas lower frequency of unique words is characteristic of speech that occurs when people are highly aroused (Carpenter, 1990; Sherblom & Van Rheenen, 1984).

To compare the predictive strengths of the LIWC categories with those of well-established nonverbal determinants of person perception, we further selected three nonverbal characteristics for study. The stimulus persons were evaluated on two physical appearance measures that have been found to influence impressions. These were attractiveness and facial maturity. Numerous studies have documented that people who are rated as physically attractive are perceived to be more competent, warm, and extroverted than are less attractive people (e.g., Berry, 1991b; Cunningham, 1986). People whose faces are judged to look babyish are perceived to be more submissive, shy, warm, naive, and less assertive than people with faces judged to look mature (e.g., Berry, 1991b). The target persons' nonverbal expressiveness was also assessed through the use of the Affective Communications Test (ACT; cf. Friedman, Prince, Riggio, & DiMatteo, 1980). Expressiveness has been revealed to be an important determinant of first impressions (DePaulo, 1992). For example, people's ACT scores are positively related to judgments of how self-confident, popular, and likable they are (e.g., Riggio & Friedman, 1986).

If people's individual word choices were indeed demonstrated to predict social judgments, we expected that the relative strength of the linguistic versus nonverbal predictors would vary as a function of the particular dimension of first impressions studied. In particular, we expected that nonverbal qualities would be more strongly related to judgments of interpersonal warmth and dominance than would linguistic categories. This prediction is based, in part, on earlier research that

compared personality impressions formed on the basis of restricted channels (i.e., a transcript vs. the videotaped face or body) with impressions based on full-channel video displays. For example, O'Sullivan, Ekman, Friesen, and Scherer (1985) reported that for traits such as likability, sincerity, sociability, outgoingness, and dominance, impressions based on channels in which nonverbal cues were available (videotapes of the face or body) bore stronger relations to judgments based on full-channel displays than did those based on transcripts alone. Moreover, the available data suggest some actual links between variables such as attractiveness, maturity, and expressiveness and socially defined dimensions such as warmth, dominance, and extroversion (Berry, 1991 a; Berry & Finch Wero, 1993; DePaulo, 1992; Feingold, 1992).

On the other hand, although some nonverbal qualities play a role in the communication of competence (e.g., Dovidio, Ellyson, Keating, Heltman, & Brown, 1988), verbal style seems likely to play an especially critical role in both the expression and the perception of such qualities. For example, Borkenau and Liebler (1993) asked naive judges to view either soundless or standard videotapes of people with whom they were unacquainted and evaluate their intellectual competence. Verbal information exerted a greater impact on these ratings than did nonverbal information. Moreover, judges' ratings correlated significantly with measures of intellectual competence only when the audio track of the tapes was available. Therefore, variations in the LIWC dimensions were expected to be more strongly related to judged competence than were individual differences in nonverbal factors.

Thus our primary research questions were twofold. First, can the LIWC categories account for significant proportions of the variance in first impressions? If so, our second question involved the relative utility of linguistic and nonverbal cues as predictors of different dimensions of person perception. That is, which dimensions of impressions are most strongly influenced by linguistic variables and which are most influenced by nonverbal qualities?

## Method

Participants. A total of 571 college students participated in the study. Of these participants, 141 served as stimulus persons. Evaluations of the stimulus persons on social perception scales were provided by 309 of the participants.

The remaining 121 individuals provided ratings of the stimulus persons' physical appearance. All participants were naive in the sense that none had received any particular training prior to taking part in the study, and none were familiar with the research questions being addressed. All participants received extra credit points in an introductory psychology course in return for their assistance.

Videotaping session. Stimulus persons (73 males and 68 females) were brought individually to the lab and seated approximately 5 ft in front of a video camera. One female undergraduate research assistant (RA) was present during the session. She told the participants that she would like to videotape them as part of an ongoing study of social perception. They were instructed to "tell us about yourself and what is going on in your life; just tell us about yourself, your classes, or your activities." No additional information regarding the nature of the study was given, although participants were told that other undergraduates would see the videotapes. All agreed to participate,

and each signed a general consent form, as well as a form releasing the videotape for use in future research. None of the stimulus persons were acquainted with the R.A.

While the research assistant prepared the camera, participants were given a couple of minutes to think of what they would like to say. The RA then started the tape, announced the participants' code number, and told them to begin. During the videotaping, the RA sat on a chair just below and to the left of the camera lens. Eye contact was maintained throughout the conversation. Although the RA remained engaged with the participants throughout the interaction, her actual verbalizations were limited to content-free comments (e.g., "Uh huh," "Yes, I see") that would not direct the content of what they decided to talk about. The stimulus persons' verbalizations ranged from 22 to 914 words in length, with a mean word count of 216 (SD = 145). (The RA's words are not included in this count.) The interviews lasted an average of 1 min and 26 s.

Social perceptions judges who were unacquainted with the stimulus persons provided first impressions of them after viewing the full-channel display of the interaction described above. Groups of 2 to 10 judges viewed the videotaped interactions in sessions that ranged from approximately 1 hr to 1 hr and 30 min in length. The judges were told that they were going to see individuals who had been videotaped while engaging in a conversation with a research assistant. They were instructed to watch the entire clip before rating the stimulus persons.

Judges rated the extent to which the stimulus persons impressed them as industrious, competent, submissive, dominant, extroverted, self-confident, warm, likable, and honest. All judgments were made on 9-point scales with endpoints of a little/a lot and not at all/very. A given judge rated the stimulus persons on one of three subsets of the social perception measures. The content of these subsets was randomly determined. Judges further evaluated 1 of 11 subsets of the stimulus persons that were roughly equivalent in size. A given judged rated either male or female targets. Interjudge reliabilities for each of the first impression measures were acceptably high (M alpha = .81).(4) Therefore, the mean rating that each stimulus person received from judges on each dimension was calculated for use in later analyses.

A varimax rotation revealed that the nine social perception ratings could be more succinctly described in terms of three underlying dimensions. Therefore, the mean ratings that each stimulus person had received on the individual scales that comprised a given dimension were averaged to yield a composite score. More specifically, the scales of competent and industrious were combined to form a competence dimension (alpha = .80); the scales of submissive, dominant, self-confident, and extroverted were combined to form a dimension that was labeled dominance (alpha =.95); and judgments of warm, likable, and honest were combined to produce a warmth dimension (alpha = .74). When necessary, items were reverse scored so that higher values reflected greater levels of competence, dominance, and warmth.(5)

Physical appearance measures. Judges viewed silent videotapes of the stimulus persons, in which they remained immobile, gazed directly into the camera for 15 s, and maintained a neutral facial expression. Physical appearance was evaluated on two 9-point bipolar scales with endpoints of not at all attractive/very attractive and baby-faced/mature faced. A given judge rated either one of four subsets of the male stimulus persons or one of three subsets of the female stimulus persons. Half of the judges provided ratings of attractiveness first, and half made ratings of facial maturity first.

Acceptably high reliabilities were obtained for ratings of the attractiveness and facial maturity of each subset of stimulus persons (M alphas =.87 and .81, respectively). The mean attractiveness and maturity rating obtained for each stimulus person was computed for use in later analyses.

Nonverbal expressiveness. An assessment of the stimulus persons' nonverbal expressiveness was obtained by having each subject complete the ACT (Friedman et al., 1980). This is a 13-item self-report measure on which people indicate the extent to which they endorse statements such as "I can easily express emotion over the telephone" and "I usually have a neutral facial expression" (reverse scored). High scorers on this measure are described by others to be nonverbally expressive and are better encoders of facial expressions of emotion than are people who obtain low scores on the ACT (e.g., DePaulo, Blank, Swaim, & Hairfield, 1992; Friedman et al., 1980).

Text analysis. Transcripts of the subjects' verbalizations were analyzed using the LIWC text analysis program (Francis & Pennebaker, 1993; Pennebaker & Francis, 1996). As described previously, the LIWC program consists of a main text processing program and external support dictionary. The dictionary is composed of more than 2,000 words and/or word stems that are assigned to one or more dictionaries or scales.

For each transcript, LIWC calculated the proportion of total words that belonged to each of the seven categories of interest in the present study: positive emotion words, negative emotion words, negations, self-referents, common present-tense verbs, cognitive mechanisms, and unique words. Definitions of each of these seven categories appear in Table 1. The appendix provides an example of how LIWC would score a sample of text. First, the total number of words in the text, in this case 100, is calculated. Next, the total number of words that match each of the word dictionaries is counted. As can be seen in the appendix, for example, a total of six self-referents are identified in this sample text. Thus LIWC assigns a percentage score of .06 (6 self-referent matches divided by 100 total words) to that category. A similar procedure is followed for the remaining categories of negative emotion words, positive emotion words, cognitive mechanisms, negations, and present tense verbs. Finally, the number of unique words--words that appear only once in the text--is counted. As 69 different individual words appear in this passage, it is assigned a unique word value of .69 (69 unique words divided by 100 total words). When the entire LIWC catalogue of 49 linguistic categories is used, LIWC categorizes, on average, about 70% of the total words in naturalistic conversation. Because we limited ourselves to a consideration of seven LIWC categories in the present study, a somewhat lower proportion of total words is, of course, categorized in the present text.

TABLE 1: LIWC (Linguistic Inquiry and Word Count)
Text Analysis Scales

| LIWC Category | Definition |
|---|---|
| Negative emotion | General expression of negative feelings |
| Positive emotion | General expression of positive feelings or attributes |
| Cognitive mechanisms | General expression of cognitive processes or level thinking |
| Self-referents | First-person singular or plural |
| Negations | Use of negations |
| Present tense | Common present-tense verb |

| | |
|---|---|
| Unique words | Number of different words that appear in a communication, divided by total word count |

| LIWC Category | Examples | Number of Words in Scale |
|---|---|---|
| Negative emotion | angry, sad, wrong | 541 |
| Positive emotion | happy, glad, joy | 328 |
| Cognitive mechanisms | higher believe, know | 363 |
| Self-referents | I, me, our | 19 |
| Negations | no, can't, never | 41 |
| Present tense | are, can | 125 |
| Unique words | -- | -- |

Results

Our analyses addressed two primary questions. First, did variations in people's use of the LIWC categories account for substantial proportions of the variance in judges' impressions of them? Second, if these language categories did predict social judgments, how did they compare with the nonlinguistic predictors of attractiveness, nonverbal expressivity, and facial maturity? In particular, which dimensions of impressions were most clearly related to nonverbal qualities and which were more strongly related to linguistic factors? We addressed these questions through multiple regression analyses.

We first computed a set of equations in which the length of the interview and sex of target were entered on Step 1 as control variables; the nonlinguistic dimensions of physical attractiveness, expressiveness, and facial maturity were entered as predictors on Step 2; and the language categories of positive emotion words, negative emotion words, cognitive mechanisms, self-referents, negations, unique words, and present tense verbs were entered on Step 3 (see Table 2). (Recall that the values for each linguistic scale reflect the proportion of a target person's total words that fell into that particular LIWC category.) The resulting overall equations were significant for all social perception judgments, Fs (12, 128) = 4.03,4.00, and 4.47 for judged competence, dominance, and warmth, respectively, all ps [is less than] .0001.

TABLE 2: Zero-Order Correlations, Standardized Beta Weights, and [R.sup.2]s From Multiple Regression Equations Predicting Social Perceptions From Linguistic and Nonlinguistic Dimensions

| | Competence | |
|---|---|---|
| | r | [Beta] |
| Step 1 (control variables) | | |
| Length of interview | .21(*) | -.04 |
| Sex | .05 | .04 |
| Step 2 (nonlinguistic predictors) | | |
| Facial maturity | .18(*) | .19(*) |
| Facial attractiveness | .14 | .12 |

| | | |
|---|---|---|
| Expressiveness | .09 | .10 |
| Step 3 (linguistic predictors) | | |
| Negative emotion words | -.12 | -.20(*) |
| Positive emotion words | -.06 | -.02 |
| Present tense | .22(*) | .22(*) |
| Cognitive mechanisms | .02 | .01 |
| Self-referents | -.24(*) | -.24(*) |
| Negations | -.21(*) | -.18(*) |
| Unique words | -.29(*) | -.31(*) |
| [R.sup.2] change (Step 1) | | .05(*) |
| [R.sup.2] change (Step 2) | | .06(*) |
| [R.sup.2] change (Step 3) | | .17(***) |
| Total [R.sup.2] change | | .28(***) |

Dominance

| | r | [Beta] |
|---|---|---|
| Step 1 (control variables) | | |
| Length of interview | .19(*) | -.18(*) |
| Sex | -.03 | -.10 |
| Step 2 (nonlinguistic predictors) | | |
| Facial maturity | .12 | .13 |
| Facial attractiveness | .20(*) | .19(*) |
| Expressiveness | .23(*) | .23(*) |
| Step 3 (linguistic predictors) | | |
| Negative emotion words | .02 | -.02 |
| Positive emotion words | -.19(*) | -.20(*) |
| Present tense | -.01 | .10 |
| Cognitive mechanisms | .01 | -.05 |
| Self-referents | -.17(*) | -.15 |
| Negations | -.10 | -.06 |
| Unique words | -.31* | -.41(*) |
| [R.sup.2] change (Step 1) | | .04 |
| [R.sup.2] change (Step 2) | | .10(**) |
| [R.sup.2] change (Step 3) | | .13(**) |
| Total [R.sup.2] change | | .27(***) |

Warmth

| | r | [Beta] |
|---|---|---|
| Step 1 (control variables) | | |
| Length of interview | .12 | -.06 |
| Sex | -.05 | -.09 |
| Step 2 (nonlinguistic predictors) | | |
| Facial maturity | .02 | .05 |
| Facial attractiveness | .34(*) | .30(*) |
| Expressiveness | .27(*) | .26(*) |
| Step 3 (linguistic predictors) | | |
| Negative emotion words | -.12 | -.18(*) |
| Positive emotion words | -.06 | -.05 |
| Present tense | .15 | .26(*) |
| Cognitive mechanisms | .02 | -.01 |
| Self-referents | -.02 | -.01 |

| | | |
|---|---|---|
| Negations | -.11 | -.11 |
| Unique words | -.18(*) | -.26(*) |
| [R.sup.2] change (Step 1) | | .02 |
| [R.sup.2] change (Step 2) | | .17(***) |
| [R.sup.2] change (Step 3) | | .11(**) |
| Total [R.sup.2] change | | .30(***) |

NOTE: df = 12,128. Values in table represent standardized beta weights from final equations.

(*) p < .05.

(**) p < .01.

(***) p < .0001.

As can be seen in Table 2, the nonlinguistic dimensions accounted for significant proportions of the variance in judged competence, [R.sup.2] change (Step 2) = .06, p [is less than] .05; perceived dominance, [R.sup.2] change = .10, p [is less than] .01; and rated warmth, [R.sup.2] change = .17, p [is less than] .0001. However, the linguistic categories further accounted for significant and sizable increases in explained variance beyond that accounted for by the nonlinguistic predictors, [R.sup.2] changes (Step 3) = .17, .13, and .11 for impressions of competence, dominance, and warmth, respectively, all ps [is less than] .01. Fischer r to z tests revealed that the linguistic dimensions accounted for significantly greater proportions of the variance in perceptions of perceived competence than did nonlinguistic cues, [R.sup.2] = .17 and .06, respectively, z = 2.23, p [is less than] .05. Although there was a clear trend for nonlinguistic cues to predict more of the variance in warmth than the linguistic predictors ([R.sup.2]s =. 17 and .11, respectively), this difference was not significantly different, z = 1.14, ns. The linguistic and nonlinguistic predictors explained similar proportions of the variance in judged dominance ([R.sup.2]s =.13 and .10, respectively), z =.61, ns. Finally, we should note that we carried out a parallel set of regression equations in which we reversed the order in which the linguistic and nonlinguistic predictors were entered. Specifically, the linguistic predictors were entered on Step 2, and the nonlinguistic predictors were entered on Step 3. The [R.sup.2]s associated with each set of predictors were virtually identical to those observed in the equations described here, reflecting the fact that there was very little shared variance between the LIWC predictors and the nonverbal predictors.

An examination of the beta weights from the final equations provides insight into the contributions of specific predictor variables to the explained variance for each social perception measure (the betas and associated zero-order correlations appear in Table 2). Consistent with previous work (e.g., Berry, 1991b; Cunningham et al., 1990) physical attractiveness was positively related to perceptions of warmth and dominance. Previous research has also found that expressive individuals impress others as being extroverted, confident, popular, and likable (e.g., Riggio & Friedman, 1986), and expressiveness, as measured by the ACT, did indeed predict judged warmth and dominance. Finally, consistent with previous research (e.g., Berry, 1991b), analyses revealed that facial maturity was positively related to perceived competence. Thus the relations of the nonverbal predictors to first impressions were consistent with those revealed in previous studies. As can be seen in Table 2, impressions of competence further accrued toward individuals whose verbalizations were characterized by relatively few negative emotion words, a tendency to speak in the present tense,

few self-referents, few negations, and a relatively low number of unique words, all ps [is less than] .05. Use of positive emotion words, self-referents, and unique words were negatively related to perceived dominance, ps [is less than] .05. Finally, people who impressed others as warm tended to use fewer negative emotion words and fewer unique words and to make greater use of the present tense than did other individuals.

We carried out an additional set of analyses to ascertain the stability of the relations of the language categories to social perceptions. First, the entire subject sample was randomly split into two groups. This was accomplished by selecting those subjects identified by an even code number to comprise Sample 1 and placing those subjects identified by an odd code number into Sample 2. The seven language categories were then simultaneously entered into equations in which the social perception judgments served as the criterion variables. Subjects comprising Sample 1 only were included in these analyses. For each equation, the unstandardized beta weights for each predictor variable and the overall constant were recorded. These parameters were then used to predict social judgments in Sample 2. Specifically, the values of each language category observed for subjects in Sample 2 were weighted by the appropriate unstandardized beta obtained from Sample 1, and then summed with the equation constant. This was done separately for each social perception judgment. These weighted linear composites were then correlated with the corresponding social perception rating obtained from Sample 2. This provides a highly conservative test of the stability of the relations of the linguistic predictors and criterion variables revealed for the entire sample. The zero-order correlations between these variables were indeed significant for the dimensions of competence (.30, p [is less than] .006) and dominance (.23, p [is less than] .04), although this relation did not attain significance for judgments of warmth (.10, ns).

In a final set of exploratory analyses, an interaction term involving sex of target was computed and entered as a potential predictor of social perceptions. More specifically, a unique interaction term was calculated for each dependent measure. To this end, all 12 predictor variables (control variables, nonverbal qualities, and LIWC dimensions) were simultaneously entered as predictors of a given criterion measure. The beta corresponding to each predictor in the resulting equation was then recorded. Each of the 12 predictors was then weighted by its own beta and summed. For each criterion variable, an interaction term was then created by computing the product of target sex and the appropriate weighted composite.

Three regression equations were then computed in which the 12 original predictor variables were entered into the equation on Step 1, and the appropriate interaction term was entered on Step 2. The interaction terms did not account for significant increases in explained variance in perceptions of competence, [R.sup.2] change [is less than] .01, [R.sup.2] change [is less than] 1, ns; dominance, [R.sup.2] change [is less than] .01, F change = 2.03, ns; or warmth, [R.sup.2] change [is less than] .01, F change = 1.64, ns.(6)

## Discussion

The present study reveals that differences in the specific categories of words that individuals elect to include in their verbal communications predict the nature of the first impressions that people form about them. In particular, the frequency with which our target persons employed the seven LIWC categories studied accounted for significant and substantial proportions of the variance in judges'

impressions of their competence, dominance, and warmth. Moreover, the linguistic dimensions held their own as predictors of impressions even when pitted against the target persons' attractiveness, expressiveness, and facial maturity, each of which has been documented to be an important determinant of social judgment.

Consistent with the results of previous work on person perception (e.g., Borkenau & Liebler, 1992; Feingold, 1992), the linguistic categories were the strongest predictors of perceived competence. In particular, Fischer r to z tests revealed that the percentage variance accounted for by the LIWC dimensions was significantly greater than that explained by the nonverbal characteristics. We had further predicted that impressions of warmth would be more strongly related to nonverbal than to verbal characteristics. Although the conservative r to z tests did not reveal a significant difference between the proportions of variance explained by the LIWC and the nonverbal predictors, a clear trend was revealed in the direction predicted. Finally, we had expected ratings of warmth to be more strongly related to the nonverbal qualities than to word choice. However, the data revealed that the linguistic and the nonverbal dimensions were both strong and independent predictors of judged warmth.

We should note that the general strength of the linguistic categories as predictors of impressions is especially striking in light of the relative availability of these variables in the videotaped interactions. In particular, information about physical appearance and nonverbal expressiveness was available to the judges during the entire duration of the videotapes. On the other hand, the temporal availability of the combinations of word categories that predicted judgments was much more limited. For example, positive and negative emotion words made up an average of only about 5% and 1% of individuals' total words, respectively, but bore strong relations to impressions.

In a sense, this initial work on language categories and person perception is descriptive, in the same manner that the early work on nonverbal behavior was primarily descriptive: Our main goals in the present study were to evaluate whether individual differences in word choice were indeed related to first impressions and to compare the strength of those relations with those observed for the nonverbal qualities across different dimensions of social judgment. Thus we did not make specific a priori predictions about what individual linguistic categories might bear relations to particular dimensions of impressions. However, some of these relations are intriguing, and it is worth noting that the specific language category/impression relations that we did observe are unlikely to be spurious. In particular, the stability of the relations of individual language categories to impressions along two of the dimensions studied--judged competence and dominance--was noteworthy, as evidenced by the split half regression analyses.

The proportion of unique words that people used bore a negative relation to ratings of their dominance and competence. In other words, people whose verbalizations feature greater proportions of unique words impress others as being less dominant and competent than do people who use relatively fewer unique words. (As the stability of the relations between specific language categories and impressions of warmth was less clear, we will focus our discussion of specific predictors to impressions of competence and dominance.) This may reflect the association between arousal level and the use of unique words. In particular, it has been suggested that the extensive use of unique words is more common at low than high levels of arousal (cf. Carpenter, 1990). In turn, the perception of a low level of arousal may lead to impressions of a shy, retiring, and passive

nature. Consistent with our findings, low levels of arousal would seem less likely to lead to attributions of industriousness and competence. In addition, people who used a high proportion of self-referents in their communications tended to impress others as relatively shy and incompetent, perhaps reflecting the higher levels of self-consciousness associated with the use of this linguistic category (Ickes, 1982).

Participants' use of negations and of negative emotion words was negatively related to, and use of the present tense was positively related to perceived competence, a clearly positive attribution. Moreover, neither of these three categories was related to impressions of dominance or extroversion versus submissiveness or shyness, neither pole of which is clearly more desirable than the other. This may suggest that these three language categories are related to the overall valence of impressions; generally more positive impressions accrue to those who use few negations and negative emotion words and whose verbalizations tend to be grounded in the present rather than in the past. (Consistent with this, people who used few referents to negative emotions and more present-tense verbs were incidentally seen as more warm than other people, as well.) Despite the finding that generally negative impressions are associated with the use of negative emotion words, the reverse pattern was not observed for use of positive emotion words: Although the prevalence of positive emotion words was correlated with dominance, it was unrelated to perceived competence or warmth. Why would referents to negative but not positive emotion influence the overall valence of first impressions? One possibility is that discussing positive feelings is deemed expected and appropriate social behavior in an initial interaction, whereas talking about guilt, depression, or anger is not. Thus social perceivers may be more likely to make dispositional attributions for the latter type of behavior than for the former (e.g., Jones, Davis, & Gergen, 1961).

A couple of caveats need to be considered when evaluating the findings reported in this article. First, the present study is correlational in nature--as is typically the case in studies of social behavior--making it difficult to directly address the issue of causality. Therefore, it would be desirable to complement the work described here with studies in which specific aspects of linguistic content are systematically manipulated. A second point to keep in mind is that the relations between verbal and nonverbal qualities and the impressions generated by our participants may be context dependent. In different situations, the relative strengths of these variables in predicting person perception may change. For example, linguistic qualities may be quite influential in the social context studied here, which involved the disclosure and exchange of personal information among college students. However, it may also be the case that nonverbal qualities would be better predictors of the impressions that accrue toward individuals observed in social interactions characterized by different intents and goals (e.g., providing emotional support). The role of context has received less attention than it should in most work on person perception, and the consideration of this factor in research generated by the data that we report here seems critical.

Finally, the data further speak to the usefulness of a word count strategy such as LIWC in the analysis of social perception and social interaction. Such an approach is a relatively simple and objective way by which to gauge the intent and dimensions of language within speech. Ironically, examining the components of language is analogous to earlier studies that have measured the components of nonverbal behaviors such as facial movement, gaze, gesture, and so forth. Any word category by itself--much like a specific nonverbal dimension--has meaning only within the context of the setting and the interaction. For example, the percentage of self-referent words is inversely

related to perceptions of competence. We doubt that observers mentally calculate self-references as the interviewee speaks any more than eye gaze or smiles are mentally tallied. Nevertheless, the use of self-references within this interview context may reflect insecurity or self-absorption in the same way that adverted gazes might. Linguistic markers, then, are useful in revealing meaningful social and psychological processes.

In sum, the data presented here indicate that individual differences in the words or categories of words that people tend to favor--their idiosyncratic lexicons--are powerful determinants of first impressions. Moreover, these variations in word use account for substantial proportions of the variance in impressions beyond that explained by nonverbal cues such as attractiveness or expressiveness. We hope that our findings will encourage others to continue to work toward a better understanding of the specific verbal and nonverbal stimulus qualities that determine social perception.

## APPENDIX

### Example of LIWC (Linguistic Inquiry and Word Count) Scoring Protocol

I'm(4,6) a freshman so college is(6) something(3) else. It's(6) not(5) what I(4) expected because(3) no(5) one really cares(2) now. We(4) don't(5,6) have(6) a dress code here. We(4) can(6) wear whatever you want(3) and do(6) whatever we(4) want(3). We(4) don't(5,6) even have(6) to go(6) to classes. And that's(6) good(2) in a sense and also a big difference ... and it's(6) not(5) as easy(2) as it was before. There's(6) a lot of responsibility involved. And the professors don't(5,6) come(6) to you and ask you are(6) you having any troubles(1) because(3) they have(6) certain times where you have(6) to come(6) to talk(6) to them.

NOTE: Words followed by numbers are scored as belonging to one of the seven LIWC categories measured in the present study. Note in this case that (1) = negative emotion; (2) = positive emotion; (3) = cognitive mechanism; (4) = self-referent; (5) = negation; (6) = common present-tense verbs.

## NOTES

(1.) We have some direct empirical evidence that such occasional misclassifications do not invalidate the LIWC category counts to any great extent. For one set of transcripts, we coded the number of instances in which either a positive emotion word was preceded by a negation (e.g., "I am not happy") or a negative emotion word was preceded by a negation (e.g., "She's not angry"). For each individual transcript, we then calculated the total instances of negative emotion' words counted by LIWC and subtracted from it the number of instances of negated emotion words. A similar procedure was followed for positive emotion words. These corrected totals correlated almost perfectly with the uncorrected LIWC counts for both negative emotion words, $r(148) = .98$, and positive emotion words, $r(148) = .97$.

(2.) In addition to these 49 word count categories, LIWC scores text for an additional 12 elements for a total of 61. These 12 items include variables such as average number of letters in words comprising the text, number of sentences, number of questions, and so on.

(3.) The category of unique words should not be confused with the concept of how frequently a given word is used within the general population. Rather, unique words are defined at the level of a particular communication. The number of different words in a given communication divided by total word count is considered unique to that communication. Thus communications with low proportions of unique words are more repetitive in nature than are communications with high proportions of unique words.

(4.) Details regarding the reliabilities observed for individual scales and subsets of stimulus persons are available from the authors.

(5.) Details of the distributions of the predictor and criterion variables employed in this study are available from the authors.

(6.) Examination of the beta weights for individual nonverbal predictors from analyses conducted separately for men and women did reveal some interesting trends. To briefly summarize, nonverbal cues tended to be better predictors of impressions of men than of women. As such differences are beyond the scope of this article and did not qualify the relations of the linguistic variables to social perceptions, they will not be discussed further.

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