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DULANEY, EARL FRANKLIN, JR.

THE LANGUAGE OF DECEPTION: AN EXPERIMENTAL STUDY

The University of Oklahoma PH.D. 1981

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THE UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

THE LANGUAGE OF DECEPTION: AN EXPERIMENTAL STUDY

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF PHILOSOPHY

BY

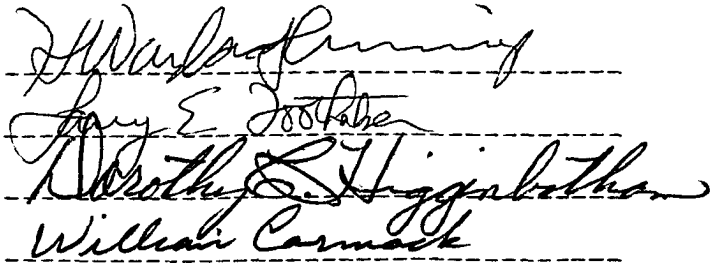
EARL FRANKLIN DULANEY, JR.

Norman, Oklahoma

1981

THE LANGUAGE OF DECEPTION: AN EXPERIMENTAL STUDY

APPROVED BY



DISSERTATION COMMITTEE

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DEDICATION

This dissertation is dedicated to Jennye, Jessica, and Leah who saw very little of me during the preparation of this manuscript. I love you dearly.

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The Language of Deception: An Experimental Study

Earl F. Dulaney, Jr.

University of Oklahoma

In this study 20 subjects were placed in a situation designed to elicit a number of truthful and dishonest statements. Differences in these statements were examined by the SLCA III and LEXIC programs to uncover language variables which discriminate between individuals' truthful and deceptive statements. The results indicate that when lying, individuals (a) use fewer words, and as a consequence, fewer unique words with a larger type-token ratio and smaller perceived-cognitive activity, (b) use fewer past tense verb forms, and (c) that males use the indicative mood more often when lying and the subjunctive mood less often when lying. In addition, when used in a discriminant function equation, 14 of the SLCA III and LEXIC variables were able to correctly identify 100.00% of the subjects' statements as truthful or deceptive.

The Language of Deception: An Experimental Study

Over the past few years there has been an increasing interest in the fields of psychology and communication concerning deceptive communication. (For a detailed review see Knapp & Comadena, 1979). The primary focus of most of this research has been in the area of nonverbal indicants of deception. Researchers have investigated eye behavior, pitch changes, facial affect, foot and leg movement, hand gestures, head nodding, smiling and laughing, and numerous other nonverbal mannerisms. There has been, however, a paucity of research into the linguistic indicants of deception.

Regardless of the unit of analysis in deception research, whether verbal or nonverbal, the underlying assumption seems to be that the act of deception produces an increase in anxiety which ultimately manifests itself in changes in the internal states of the body. These changes in turn affect both verbal and nonverbal behavior. One of the current areas of interest in deception concerns whether untrained observers may accurately classify an individual as deceptive/nondeceptive and what conditions provide for

optimal classification. While the majority of this research focuses on subjects' use of nonverbal mannerisms when making attributions, it would be equally relevant to focus on language behavior in making veracity attributions. It is to this objective that the current investigation was addressed.

In 1974 Knapp, Hart, and Dennis conducted an exploratory study in which 11 linguistic and 3 nonverbal indices were identified which discriminated between liars and truth-tellers. Thirty-eight male undergraduate veterans were given a 100 word passage which listed typical responses to both sides of a controversial issue and were asked to speak both for and against the issue (about which all subjects agreed). Trained coders then viewed the videotapes and transcripts and coded the nonverbal behaviors; trained content analysts viewed the videotapes and transcripts and coded the verbal content; and the remarks were subjected to an automated language analysis program, TEXAN. On the basis of these procedures five clusters of indices were identified:

1. Two indices--the confidence ratio (total number of words spoken divided by the total interaction time) and the different words index (a count of the number of unique words)--comprised the certainty dimension.

2. A vagueness dimension was comprised of the following four indices: The factual statements index was a count of the number of statements which "remark about an

existing person(s), object(s), or set(s) of conditions objectively verifiable by the senses" (p. 19). The self-experiences index was a count of the number of "statements made by the subject which expound upon actual experiences he has had (or is having) or upon activities he has engaged in (or is engaging in)" (p. 19). The past references index was a count of the number of past tense verbs, and the leveling terms index was a count of the number of overgeneralizations such as "all", "every", "none", etc.

3. Three indices--the total words index (number of words spoken), the message duration index (measure of time spent speaking), and probes index (number of interviewer probes)--comprised the reticence dimension.

4. A dependence dimension was comprised of the following three indices: The self references index (number of "self" words), the self-interest index (number of statements "of either factual or evaluative character which state the costs or benefits which have (or have not accrued), are (or are not accruing), should (or should not accrue) to self" (p. 20)), and the other references index (the number of third person plural pronouns).

5. Two indices--the group references index (number of first person plural pronouns) and the disparaging statements index (number of statements "depicting unfavorable actions or statements of another person, group, or institution" (p. 20))--comprised the negative affect dimension.

Knapp, Hart, and Dennis found that deceivers' messages did not differ from truth-tellers' in qualification (subjunctive mood words), in hypotheticals (remarks based on the premise "what if"), and in absolute verbs (all of the forms of the verb form "to be"). They did, however, differ in confidence ratio indicating that deceivers tended to not "fill-in" the interaction time with verbage. Subjects also differed in the different words index indicating a form of restricted code for deceivers. In sum, based on these two indices, Knapp, Hart, and Dennis found that deceivers' messages seem more uncertain.

They also found that deceivers made fewer factual statements, mentioned their own experiences less often, referred to past events less often, and made more sweeping generalizations. Future references (number of future tense verbs) and other experiences references (remarks about others' real or imagined experiences) failed to discriminate between truth-tellers and liars. In general, Knapp, Hart, and Dennis suggest that deceivers seem more vague than nondeceivers.

Thirdly, they found that deceivers seemed more reticent than nondeceivers. Deceivers used fewer words, had shorter message duration ($p < .08$), and had a greater number of interviewer probes (short remarks from the interviewer to encourage them to continue talking) than nondeceivers.

It also appears that deceivers seem to dissociate

themselves from the situation more than nondeceivers. They referred to themselves less frequently ($p < .10$) and to others more frequently.

Finally, Knapp, Hart, and Dennis found that though affirmative nods, smiles, and other interest statements did not discriminate truthful from dishonest statements, deceivers did use fewer group references and made more disparaging remarks. Deceivers, it seems, are more defensive and unpleasant than nondeceivers.

Knapp, Hart, and Dennis concluded:

> At face value it appears that the six behavioral styles we are associating with deception are really very natural, common traits of us all. Apparently, however, deceivers exhibit such traits excessively, thus throwing themselves out of the bounds of normality. . . .We know that there are at least 14 communication differences between deceivers and nondeceivers. . .we also know that only continued research in the area can indicate we know what we think we know. (pp. 26-27)

Based on the assumption that women's language differs in numerous ways from men's language, Todd (1977) examined the 14 Knapp, Hart, and Dennis irdices in women's lies and truthful statments, since the previous experimenters used all male subjects. Surprisingly, only one index significantly discriminated between truthful and dishonest

statements--the disparaging statements index. Certainly, more research to distinguish sex differences in deceptive language is warranted.

Todd-Mancillas and Kibler (1979) attempted to empirically assess the validity of the Knapp, Hart, and Dennis indices by correlating them with four new indices previously shown to measure similar aspects of uncertainty, vagueness, negative affect, and reticence (the dependence cluster was omitted since no known measure of dependence was available). The Silence Quotient (SQ), operationalized as the ratio of amount of time spoken to amount of available speaking time; the Modified Flesch Reading Ease Score (MFRES), operationalized as the number of syllables spoken per 100 words; the Modified Flesch Human Interest Score (MFHIS), operationalized as the average number of personal words (personal pronouns, words with masculine or feminine gender, and proper nouns); and the Discomfort Relief Quotient (DRQ), operationalized as the ratio of negative affect words to positive affect words, were correlated with the eleven previously defined indices (omitting the three dependence indices).

The SQ has been previously demonstrated to be a valid measure of interviewee output. Based on the assumption that persons talk more when they are certain, positive correlations were expected between the SQ and the indices of the Certainty dimension. Partial support was found.

The MFRES and the MFHIS, both measures of reading

ease, should be inverse measures of vagueness. Hence, it was expected that the indices of the Vagueness dimension should correlate negatively with the MFRES and MFHIS. No support was offered for this hypothesis.

The DRQ has been shown to be a valid measure of negative affect. Hence, it was expected to correlate positively with the Negative Affect dimension. No support was found for this hypothesis.

Finally, the SQ was expected to correlate positively with the Reticence dimension under the assumption that a low SQ is indicative of reticence to interact with others. Full support was found for this hypothesis.

Todd-Mancillas and Kibler concluded: "Since it has not been possible to identify artifacts that are largely responsible for these nonsignificant results, it is concluded that these indices are not valid measures of uncertainty, vagueness, and negative affect as originally argued" (p. 122).

Chapman (Note 1) examined passages from Nixon's Watergate speeches which were objectively verified (by later evidence in the chronology of the Watergate affair) as true or false. Using an earlier version of the SLCA III program (Cummings & Renshaw, 1979) he was able to identify categories similar to those offered by Knapp, Hart, and Dennis (1974) and Todd-Mancillas and Kibler (1976) which were useful in discriminating between Nixon's truthful and deceptive

statements. He found that Nixon (a) had a heightened use of self references, (b) used more concept modification through adjectives and adverbs, (c) was more abstract and vague by using more nonsensory-based words such as peace, honesty, integrity, etc., and (d) was more emphatic and assertive when lying. None of Chapman's data, however, were subjected to the rigors of statistical inference. Two years earlier, in a more qualitative content analyis of Nixon's Checkers speech and the two Watergate speeches, Gibbons and Felkins (1974) found similar characteristics in Nixon's language behavior. They noted (a) a pronounced "I" orientation, (b) abstractness and vagueness, and (c) a "simple, basic, and emotional form of language" as indicated in a low type-token ratio.

In sum, the scant research to date has demonstrated that deceivers (a) will be more reticent (use fewer words, have a shorter message duration, and a higher silence quotient), (b) may be less certain (have a smaller confidence ratio, a larger silence quotient, and use fewer adjectives and adverbs), and (c) may be more vague (use more nonsensory-based words, fewer past tense verbs, and more overgeneralizations). Before these assumptions are elevated to the status of covering laws, however, the following criticisms should be noted.

First, all of these studies have been conducted using a rather restricted sample of subjects. Knapp, Hart,

and Dennis (1974) used all males, Todd-Mancillas and Kibler (1979) used all females, and Chapman used a sampling of statements from one individual. In 1977 Todd attempted to replicate Knapp, Hart, and Dennis' (1974) study using 38 female subjects. He found support for only one index, the disparaging statements index. Clearly, women and men differ in changes in language behavior from a truthful to a deceptive context. In addressing this discrepancy Todd-Mancillas and Kibler (1979) stated: "Since Knapp, Hart, and Dennis made no case for presuming that their indices are more valid measures of men's than women's deceptive speech, then it may be presumed that these indices are valid measures regardless of source gender" (pp. 121-122). Todd's (1977) earlier finding renders this presumption somewhat tenuous. A better method would be to include subject sex as a blocking variable in future deception designs. This would provide adequate control for any differences which may be due to source gender.

A second criticism of earlier language-based deception research concerns operationalizations of lying. The lie act has been defined as the presentation of an altered view of one's perception of reality (Knapp & Comadena, 1979). The method employed by Knapp, Hart, and Dennis (1974), Todd (1977), and Todd-Mancillas and Kibler (1979), however, may have generated statements which may not be prima facie valid lies. In such a structured role playing

situation subjects may not be presenting an altered view of their reality, rather they may be presenting their perceptions of another's view of reality. To help them succeed in their role playing experience Knapp, Hart, and Dennis (and presumably Todd and Todd-Mancillas and Kibler) gave the subjects lists of counter arguments. The subjects, then, may not have presented an altered view of their perceptions of reality, rather, they may have presented their perceptions of the reality indicated in the lists of arguments. A better method would be one in which the subjects are given an opportunity to make their own decision to lie and to choose their own strategies and methods in doing so.

A third criticism of previous language-based deception research concerns the subjects' motivation for lying. The methods employed may not have provided the subjects with a personally relevant motivation for lying, and may have failed to create any anxiety or fear of being found deceptive. The subjects were simply playing a zero sum game in which the rewards of lying plus the costs of lying in terms of increased anxiety equal zero. A better method would be to provide the subject with a situation in which the costs for lying clearly outweigh the rewards gained. Such situations would be more typical of that which occurs in the natural setting and would give the subject a heightened motivation to succeed in their deception once they determine to deceive. This heightened motivation would have an

unconscious effect on subjects' physiological behavior (Gustafson and Orne, 1963) and, presumably, on their verbal and nonverbal behaviors.

Finally, Knapp, Hart, and Dennis gave the subjects brief lists of arguments prior to the deception to "minimize the bias resulting from familiarity with the topic" and noted that the resultant statements were "somewhat" spontaneous. Since the raison d'etre for most inferential studies is to generalize to the natural setting, such prior intervention in giving the subjects things to say would interfere with spontaneity and perhaps affect the subject's linguistic performance in the deceptive condition, thereby biasing the results.

This study was advanced in an effort to account for these criticisms and to shed some light on a relatively new area where the shadows of methodological weakness seem to be growing.

Method

The Deception Inducing Procedure. The procedures used in the present study to generate truthful and deceptive statements from the subjects were designed to meet the following criteria: They must generate (a) spontaneous and unrehearsed truthful and dishonest statements which (b) meet the standards of a lie as defined by previous research, (c)

are lengthy, and (d) are elicted from a situation which provided the subject a heightened motivation for lying and an interest in the success cf the lie. The procedures are similar to those employed by Exline, Thibaut, Hickey, and Gumpert (1970), Shulman (1973), Bauchner, Brandt, and Miller (1977), and Bauchner, Kaplan, and Miller (1980). (See Note 2).

Ten male and ten female undergraduate speech students enrclled in the basic speech course at the University of Oklahoma were asked to participate in an experimental study to "assess the effects cf group size on problem solving ability." Each subject was paired with a male Confederate and told that other groups of various sizes (five-, four-, three-, and two-members) were sclving the same problems--first estimating the number of squares cn a series of three cards, then estimating the number of dots on a similar series of three cards. The sex of the experimenter was varied to maintain an equal number of male-male, male-female, female-male, and female-female dyads in the interview portion which followed the task portion.

The experimenter then described the first task to the pair, explaining that he or she would flash a card for about five seconds and then give them time to confer until they reached a consensus on the number of squares. The Experimenter continued with the task being careful to record the pair's responses cn a score sheet placed in front of

him. After the first task (squares) was completed and before the second task (dots) was begun a second Experimenter, who had been listening unobserved from an adjoining room, entered the room and informed the first Experimenter that he or she had an important phone call in an office on the same floor. Both Experimenters then left the room leaving the score sheet in a manila folder on the table with the Confederate and the subject.

After pausing for about one minute the Confederate wondered aloud whether the answers were in the manila folder, suggested looking, and regardless of the subject's response, opened the folder to find the answers. He then stated them out loud and returned the folder to its previous position.

At this point the first Experimenter entered the room, apologized for the interruption, and continued with the task with the Confederate and the subject using the dishonestly obtained answers to make accurate judgements. At the conclusion of the second task, the Experimenter suggested that the Confederate leave the room while the subject answered a few questions "concerning the strategies and methods employed to arrive at an answer." In each case the Experimenter was careful to state that the Confederate would be called in next to answer the same questions. This interview was audiotaped with the subject's awareness of the taping.

The Experimenter then asked a series of questions about the processes, methods, and strategies used by the pair to solve the problems. Each subject was previously randomly assigned to a truthful-deceptive ordering or a deceptive-truthful ordering of questions and the questions for the second task were essentially the same as for the initial task. Unless the subject reported the cheating which took place any answers to questions about the strategies and methods the pair used to come to consensus about the number of dots in the second task were considered deceptive. Of the 22 subjects who participated in this study, 20 failed to report the cheating and their responses to the two sets of questions were compared for differences. At this point subjects were carefully debriefed and questioned to determine if any had suspicions during the study. No subject reported that s/he suspected the Experimenter or the Confederate which minimally suggests the success of the manipulations.

Transcripts of the interviews were carefully made with two extralinguistic factors coded in--the average response time latency, operationalized as the amount of time in seconds from the end of an experimenter's question to the beginning of the subject's answer, and dysfluencies, operationalized as (a) stutters or stammers, (b) word repetitions, (c) vocalized pauses such as "ah", "uh", etc., and (d) pauses of five seconds or more. The data were coded and

analyzed by the SLCA III (Cummings & Renshaw, 1979) and LEXIC (Dulaney, Note 3) programs to generate a number of scores for each subject.

Data analysis. The SLCA III and LEXIC programs generate for each subject's truthful and deceptive remarks a number of scores which are measures of language behavior and lexical diversity. This section presents the variables used in the analysis.

Coded input for the SLCA III analysis is processed in the following manner. (See Cummings and Renshaw, 1979, for a more thorough discussion of the processes employed by SLCA III). First, each word is checked against a number of dictionaries and assigned a value if it appears in a particular dictionary. Each word is then tagged according to its various attributes. Nouns and pronouns, termed information units (IU) may be classified by the following four attributes:

1. Social perception content. An IU will be tagged (a) GO if it is found in the generalized-other dictionary which contains words like they, them, their, etc., (b) AO if it refers to a specific person, place, or thing, (c) SELF if it is found in the self references dictionary which contains words like me, mine, my, I, etc., (d) AUD if it is found in the audience references dictionary which contains words like you and yours, and (e)

INAN if it refers to an inanimate object.

2. Existential content. An IU will be tagged negative if it is preceded by a word which indicates negation or is itself a word which indicates negation, and will be tagged positive otherwise. For example, in the sentence, "No one cares.", the IU one would be tagged negative. However, in the sentence, "One does care.", the IU one would be tagged positive. A negative IU indicates nonexistence; a positive IU indicates existence.

3. Sensory content. An IU will be tagged sensory-based if it symbolizes some object or entity which is objectively verifiable by the senses, and will be tagged nonsensory-based otherwise. For example, arm, leg, green, loud, and salt are all sensory-based words while peace, hate, envy, honesty, and integrity are all nonsensory-based words.

4. Degree of qualification in the sentence. An IU will be tagged as defined, if it has one or more adjectives associated with it, or undefined if it has no adjectives associated with it.

Words such as adjectives and adverbs, termed qualifiers/quantifiers (QQ) may be classified by the following three attributes:

1. Existential content. QQ words will be tagged negative if they are preceded by a word or prefix which indicates negation, and will be tagged positive otherwise. Unlikely, illegal, and impractical are all examples of negative QQ words while likely, legal, and practical are examples of positive QQ words. Negative QQ words indicate nonexistence while positive QQ words indicate existence.
2. Referents. QQ words are also tagged according to whether they modify an IU or an RI.
3. Sensory content. QQ words will be tagged sensory-based if they symbolize something objectively verifiable by the senses, and will be tagged nonsensory-based otherwise. For example, loudly, green, hot, and salty are examples of sensory-based QQ words while inadvertently, boring, and temperamental are examples of nonsensory-based QQ words.

Finally, words which are parts of a verb phrase, termed relational units (RL) may be classified by the following six characteristics:

1. Tense. RL words may be tagged past tense if they indicate something which should have or has already taken place, future tense if they indicate something which should or will occur, and

present tense if they indicate something which is occurring.

2. Existential content. RL words will be tagged negative if they indicate negation, and will be tagged positive otherwise. For example, in the sentence, "You should not do that.", the RL do would be tagged negative. However, in the sentence, "You should do that.", the RL do would be tagged positive.

3. Degree of qualification in the sentence. RL words will be tagged as defined, if they have one or more adverbs associated with them, undefined otherwise.

4. Symmetry or transitivity. An RL will be tagged transitive if it has an object and will be tagged intransitive otherwise. For example, in the sentence "He dropped the book.", the RL dropped would be tagged transitive. Conversely, in the sentence, "The book dropped.", the RL dropped would be tagged intransitive. Intransitive sentences are asymmetric while transitive sentences are symmetric.

5. Mood. An RL will be tagged subjunctive if it indicates something which should be done or should have been done, and will be tagged indicative if it indicates something which was done

or will be done. For example, in the sentence, "You should eat your carrots." the RL eat would be tagged subjunctive. In the sentence, "You will eat your carrots.", the same RL would be tagged indicative. RL words which are subjunctive in mood are sometimes referred to as conditional while RL words which are indicative in mood are referred to as assertive.

6. Voice. RL words which are taken from the verb form "to be" (e.g., am, is, are, was, were, be, being, been) are considered passive in voice, while any other RL words are considered active in voice. Passive voice verbs indicate nonmotion while active voice verbs indicate motion.

The computer routine accumulates frequencies of the various types of words and computes proportions or densities by dividing each frequency by the PCA, which is the total number of IU, RL, and QQ type words. All other words which are not IU, RL, or QQ type words (e.g., a, and, the, if, well, etc.) are simply disregarded.

This analysis allows for a number of logical clusterings of variables into language dimensions. The SENSORY dimension includes the sensed- and nonsensory-based IU and RL densities. The PERCEPTION dimension includes the self, generalized-other, authority-other, audience, and inanimate densities. The NEGATION dimension includes the negative IU,

RL, and QQ densities. The MOTION dimension includes the active and passive voice densities. The TIME dimension includes past, present, and future RL densities. The SYMMETRY dimension includes the transitive and intransitive densities. The DEFINITION dimension includes the defined and undefined IU and RL densities. The EXISTENTIAL dimension includes positive and negative existential densities. Finally, the CONDITIONALITY dimension is comprised of the assertion density (indicative mood) and conditional density (subjunctive mood).

The LEXIC program accepts input coded for a SLCA III analysis and returns for each subject a number of scores representing various aspects of lexical diversity. It generates the total number of words, the number of unique words, the type-token ratio which is the ratio of unique to total words, frequencies and percentages for each unique word used, frequencies and percentages for various word lengths (for words up to 25 characters), the average word length, the frequency of dysfluencies defined earlier, and the dysfluency ratio which is the frequency of dysfluencies divided by the total number of words.

The 36 SLCA III variables and 6 variables from the LEXIC program were analyzed by a number of multivariate t tests (Hotelling's T^2 statistic) in a 2x2 repeated measures design incorporating the subject's sex as a blocking variable. Further, the variables from both programs were used as

discriminating variables in a discriminant function analysis.

Results

Data from the multivariate T^2 analyses as presented in Table 1 indicate a significant simultaneous difference in the variables which comprise the lexical diversity measure when an individual attempts deception ($F(7,12)=5.096, p<.007$) and the univariate analyses reveal that the difference may be related to differences in response time latency (RTL) ($F(1,18)=14.06, p<.001$), total number of words used ($F(1,18)=10.82, p<.004$), number of unique words used ($F(1,18)=16.50, p<.001$), type-token ratic ($F(1,18)=4.91, p<.04$), and perceptual-cognitive activity (PCA) ($F(1,18)=8.35, p<.01$).

Insert Table 1 atcut here

The data reveal that when attempting deception an individual will have a shorter RTL ($\overline{Y}=2.65$ vs $\overline{X}=1.62$), will use fewer unique words ($\overline{Y}=109.40$ vs $\overline{X}=80.55$), will have a larger type-token ratio ($\overline{Y}=.59$ vs $\overline{X}=.65$), and will have a smaller

PCA ($\bar{X}$=65.35 vs $\bar{X}$=49.85). Neither the multivariate nor univariate main effect tests for sex nor the multivariate nor univariate interaction effect tests for sex by lie/truth condition proved significant for variables in the lexical diversity measure.

As Table 1 reveals, a similar multivariate main effects test indicates a significant simultaneous difference in tense when lying ($F(3,16)=3.50, p<.04$) and an inspection of the univariate tests reveal that the difference may be related to differences in the number of past tense words ($F(1,18)=7.05, p<.02$) such that when lying individuals use fewer past tense verbs ($\bar{X}$=.106) than when telling the truth ($\bar{X}$=.134). Neither the multivariate main effect test for sex nor the multivariate interaction effect proved significant. Similarly, no univariate main effect test for sex nor univariate interaction reached the level of significance for tense variables.

As indicated in Table 1, one final multivariate analysis proved significant, that being a sex by lie/truth condition interaction in language conditionality ($F(2,17)=3.79, p<.04$). The univariate tests for the conditionality (subjunctive mood) densities reveal a correspondingly significant interaction ($F(1,18)=4.51, p<.05$). Post hoc individual comparisons of cell means using Dunn's t (where the alpha level for any one comparison is divided by the number of comparisons, in this case six, resulting in an

overall alpha level for all the comparisons of .05) indicate that when lying, males use less conditionality ($\bar{X}$=.05) than they do when telling the truth ($\bar{X}$=.01) ($t(36)=2.85, p<.0083$). The univariate tests for assertion (indicative mood) densities reveal a significant condition main effect ($F(1,18)=6.42, p<.021$), yet there was also a significant sex by lie/truth condition interaction ($F(1,18)=6.58, p<.02$), such that when lying, males use more assertion ($\bar{X}$=.26) than when being honest ($\bar{X}$=.21) ($t(36)=3.87, p<.0083$), and use significantly less assertion than truthful females ($\bar{X}$=.25) ($t(36)=3.41, p<.0083$) or deceptive females ($\bar{X}$=.25) ($t(36)=3.38, p<.0083$).

For the purpose of the discriminant function analysis the twenty subjects were randomly assigned to a truthful condition (in which only their truthful remarks were examined) or a deceptive condition (in which only their deceptive remarks were examined). From the pool of 42 variables, 14 were included in the final stepwise equation which incorporated Rao's V as the selection criterion. Table 2 presents the standardized canonical discriminant function coefficients.

Insert Table 2 about here

The resultant cannonical correlation was .998 and the final equation correctly classified 100.00% of the cases.

Discussion

The data clearly reveal that when individuals shift from truthfulness to deception there are corresponding shifts in their lexical diversity. The most noticeable shift occurs in output level--when deceiving, an individual uses fewer words. This finding is consistent with Knapp, Hart, and Dennis' (1974) earlier finding and suggests that deceivers are more reticent than nondeceivers. Perhaps the deceptive individual feels an aversion to the lying process which would cause a decrease in verbal output, or it may be that the individual is afraid of the possibility of giving himself away by saying too much. When questioned after the interview about their internal states during the deceptive portion of the interview, most of the subjects indicated that they felt uncomfortable and wished the questioning would have moved at a faster rate.

Secondly, there was a decrease in the number of unique words used, a decrease in the perceptual-cognitive activity (PCA), and an increase in the type-token ratio. These changes, however, may have proved significant due to the overall decrease in the number of words from the truthful context to the deceptive context. To determine if these

differences would occur if the number of total words were held constant, a multivariate analysis of covariance for the lexical diversity dimension was conducted using the total number of words variable as a covariate. Table 3 presents the results of this analysis.

Insert Table 3 about here

As before, the multivariate interaction effect and the multivariate main effect test for sex proved nonsignificant. Also, none of the univariate interaction effects or sex effects proved significant. Surprisingly, the multivariate condition main effect test proved significant ($F(6,12)=2.96, p<.05$) and the only corresponding univariate test which reached the level of significance was response time latency ($F(1,17)=14.83, p<.001$). From this analysis, then it appears that the differences in PCA, type-token ratio, and number of unique words from the truthful to the deceptive context was related to differences in the total number of words used. When the total number of words used was held constant, these differences failed to appear.

A second factor relative to lexical diversity which is influenced by the attempt of deception is response time

latency. Prior research has indicated that deceivers have either an extremely long RTL (Baskett & Freedle, 1974; DePaulo, Zuckerman, & Rosenthal, 1980) or an extremely short RTL (Hemsley, 1970; Matarazzo, Wiens, Jackson, & Manaugh, 1970; O'Hair, 1979). The subjects in this study had shorter RTL when being deceptive than when being truthful. Kraut (1978) argued that judges are more likely to view a subject as truthful if s/he responds quickly to questions. Perhaps the subjects in this study were using this principle to appear truthful.

The data also indicate that when being deceptive, individuals use fewer past tense verbs, a finding consistent with prior research (Knapp, Hart, & Dennis, 1974). One logical explanation for this finding would be that past events are more easily verified than present and future events. To avoid detection the deceiver must keep attention focused away from the past. This will ultimately manifest itself in verb phrase tense.

The data also reveal that when being deceptive, males' language behavior tends to be more assertive and less conditional. Males tend to use a greater number of indicative sentences and fewer subjunctive sentences; the same is not true for women. Certainly the person who uses indicative sentences would be perceived as more assertive than one who uses subjunctive sentences. Prior research suggests tentatively that males escape detection more often than

females (Parker, 1979), and perhaps one of the factors which allow them this advantage is the difference in indicative and subjunctive mood.

Finally, the data from the discriminant function analysis indicate that with 14 of the SLCA III and LEXIC variables, individuals' statements may be accurately classified as truthful or deceptive. Inspection of the standardized coefficients (see Table 2) reveals that the more important variables are degree of defined IU, subjunctive mood, number of unique words, positive QQ, and intransitive verb forms. These 14 variables produced a very high degree of separation as indicated in the final Wilks Lambda (.0041, $F(14,5)=85.95$, $p<.0001$) and cannonical correlation (.998) for the discriminant function.

When comparing the results of this study with those obtained by earlier deception researchers, one must consider the issue of the degree of apprehension or anxiety caused by the stimulus situation. In previous language-based deception studies the role playing game played by the subjects could not allow for a great degree of apprehension or anxiety about the lie being told. In this study the subjects were facing personal embarrassment and academic punishment for lying. In either situation certain factors proved significant (tense, conditionality, and lexical diversity) which argues for the validity of these factors as measures of deception across situations which vary in potential for

apprehension and anxiety. Other factors which were significant in earlier research but nonsignificant here did not prove equally valid as discriminators. It appears, then, that an important and previously overlooked factor which may account for some of the variance in language behavior in deceptive contexts is the potential for apprehension or anxiety associated with lying. This finding certainly deserves further research.

It is apparent from the results of this investigation that when individuals shift from being truthful to being deceptive there are some clearly discernable changes in their language behavior. The question remains, however, why?

It seems reasonable to assume on the one hand that most, if not all of the changes which occur in language behavior when shifting from one context to the next are under our conscious control. One does, after all, have the ability to decide how much to say when asked a question and also how quickly to respond. On the other hand, it seems reasonable to assume that one would not consciously decide to make such subtle changes as using fewer past tense verbs or fewer subjunctive verb forms. Given this premise, then, it is difficult to say whether when shifting from truthfulness to deception individuals consciously manipulate word choice and lexical diversity or whether the locus for such manipulations is the unconscious. Perhaps an even more

tenable assumption would be that some language behaviors are consciously manipulated and others are unconsciously manipulated. Certainly this issue also demands future attention.

Summary

In this study 20 subjects were placed in a situation designed to elicit a number of truthful and untruthful statements. Differences in these statements were examined by the SLCA III and LEXIC programs to find variables which discriminate between truth tellers and liars. The results indicate that when lying, individuals use fewer words, and as a consequence, fewer unique words and also have a larger type-token ratio and a smaller PCA, use fewer past tense verb forms, and that males tend to use a greater number of indicative mood sentences and fewer subjunctive mood sentences. When used in a linear combination combination, 14 of the SLCA III and LEXIC variables were able to provide 100.00% correct classification for the veracity of the subjects' statements.

This study was conducted to correct some of the methodological weaknesses in previous language-based deception studies, namely, the use of stimulus situations which would not occur with any regularity in the natural setting. The results seem encouraging, yet may only be proven valid by more research. The mere fact that there have been only a

handful cf studies into the linguistic indicants of deception while the number of studies into the nonverbal indicants is enormous calls fcr more research.

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2. The procedures employed in this study violate the standards set forth by the APA for use of human subjects in experimentation. The author obtained permission and approval to conduct this investigation from the Institutional Review Board of the University of Oklahoma and was careful to minimize any potential physical, mental, or psychological risks to the subjects. The author took extreme care to thoroughly debrief each subject following participation. More information concerning the methods used in conducting this study may be obtained from the author.
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TABLE 1

Multivariate and Univariate Analyses of Variance

	SEX		CONDITION		INTERACTION	
SOURCE	F	R	F	R	F	R
LEXICAL DIVERSITY	1.415	.672	5.906**	.865	.970	.601
RTL	.041		14.601**		.002	
Total words	2.170		10.822**		.358	
Unique words	.415		16.501**		1.961	
TTR	2.931		4.907*		.000	
Word length	.382		.775		3.182	
Dysfluency ratio	4.435		1.481		.322	
PCA	2.313		8.345**		1.089	
TENSE	.967	.392	3.501*	.630	1.825	.505
Past tense	.250		7.047*		.743	
Present tense	.391		.160		.865	
Future tense	3.124		3.782		3.535	
CONDITIONALITY	.978	.321	3.459	.538	3.790*	.555
Assertion	.702		6.420*		6.579*	
Conditional	2.501		3.540		4.512*	

*$p < .05$
**$p < .01$

TABLE 2

Standardized Discriminant Function Coefficients

Variable	Coefficient
Response time latency	1.636
Unique words	15.291
Average word length	2.933
Frequency of dysfluencies	-2.089
Unsensed-based QQ density	5.298
Positive SELF density	-4.922
Inanimate density	-9.943
Defined IU density	27.778
Intransitive RL density	13.719
Nonmction (passive voice) density	-6.885
Past tense density	-9.082
Future tense density	13.422
Conditionality	-26.189

Function Evaluated at Group Centroids

Group	Centroid
1	14.717
2	-14.717

TABLE 3

Multivariate and Univariate Analyses of Covariance

Covariate: Total words

	SEX		CONDITION		INTERACTION	
SOURCE	F	R	F	R	F	R
LEXICAL DIVERSITY	1.258	.621	2.962*	.773	1.071	.591
RTL	.004		14.877**		.019	
Unique words	.004		3.350		2.217	
TTR	.662		.385		.616	
Word length	.601		.115		3.278	
Dysfluency ratio	4.244		.007		.717	
PCA	.135		.287		2.026	

*p < .05
**p < .01

Appendix A

A Review of the Selected Literature in

Deceptive Communication

PROSPECTUS

A Review of the Selected Literature in

Deceptive Communication

Over the past few years a considerable body of research has developed in the field of communication regarding deception. There must be a great number of forces motivating this sudden interest in deception, but a few seem obvious. The release of the Pentagon Papers and several post-presidential biographies have confirmed the public's suspicion of countless deceptions spanning four presidential terms and almost twenty years concerning decision-making, e.g., the Vietnam war. Other incidents such as Russia's downing of Gary Power's U-2 spy plane during the Eisenhower administration, Kennedy's Bay of Pigs fiasco, Johnson's insistence that there would be no ground war in Laos, and Nixon's involvement in Watergate made the public even more cognizant of public officials' dependence on deception.

As early as 1967, Hans Morgenthau was writing that

the act of deception was not being practiced occasionally as a necessity, but "consistently as a kind of light-hearted sport through which the deceiver enjoys his power" (p. 19). Bok (1978) reported a survey conducted in 1976 by Cambridge Survey Research in which sixty nine percent of the respondents felt that over the past ten years, this country's leaders had consistently lied to the public. Write Wolk and Henley:

> The sheer prevalence of lying does mean that a climate of deceit is the psychological weather of our age and that the person who can tolerate the climate with a minimum of stressful guilt will reap psychological benefits from the acceptance of the realities. . . .We believe that this civilization's climate of deceit makes lies not only unavoidable, but indespensible. They help people to preserve their emotional equillibrium. (p.7)

In 1973 the American Psychological Association presented the informed consent code in which experimenters are expected to tell subjects various aspects of their research which might influence their decision to participate. This attempt to legislate honesty in social science research has stimulated much experimentation to determine the effects of deception on experimental subjects and to determine if other non-deceptive research methods may more ethically and effectively be employed (see Freedman, 1969; Holmes & Bennet,

1974; Miller, 1972).

The APA's attempt to legislate honesty is not without its counterpart in business, industry, and government. Consider, for instance, the numerous truth-in-lending laws, advertising policies, ethics committees, and conflict of interest stipulations.

With the public's concern for deception came a corresponding increase in interest in deception as a communication construct. In reviewing the research it becomes apparent that the act of deception has been operationalized typically as the conscious attempt to alter information about one's perceptions in order to change another's perceptions. Bok (1978) defined the lie act as "an intentionally deceptive message that is stated. Such statements are most often made verbally or in writing" (p. 13). Some researchers (Ekman & Friesen, 1969; Feldman, 1976; Feldman, Devin-Sheehan, & Allen, 1978) have made subjects lie to interviewers about their emotional states which is a form of deception termed dissembling. Others (Hocking, Bauchner, Kaminski, & Miller, 1979; Kraut, 1978) have made subjects lie about factual information such as their name, GPA, or occupation. Some (Knapp, Hart, & Dennis, 1974; Todd-Mancillas & Kibler, 1979) have made subjects argue against a position that they favor, or for one they disfavor, in a counter-attitudinal advocacy (CAA) paradigm. In a few studies (Bauchner, Brandt, & Miller, 1977; Exline, Thibaut, Hickey,

& Gumpert, 1970; Shulman, 1973) experimenters have placed the subjects in a situation which would elicit spontaneous, unsanctioned, and unrehearsed lies. Some have argued (Bauchner, Kaplan, & Miller, 1980; O'Hair, 1979) that experimenters who have analyzed lies which are unspontaneous, sanctioned, and rehearsed are not analyzing "lies" since the subjects are not presenting an altered view of their perceptions; rather, merely "role-playing" or acting out behaviors requested by the experimenter. They argue that the use of such behaviors may produce findings inconsistent with the everyday behaviors associated with lying and deception, since the laboratory liar lacks the same motivation for lying, interest in success of the lie, and anxiety about being "found out".

Having thus set the stage for a discussion of deception, it is appropriate at this time to begin by answering the question: "What is the nature of the lie act?" The answer to this question is found by addressing the following two questions: What are the verbal, nonverbal, and paralinguistic factors which distinguish spoken lies from spoken truths, and what are the cues which observers use to discriminate truthful from dishonest speakers.

Attributions made by observers

Before reviewing the literature concerning the vari-

ous verbal, nonverbal, and extralinguistic variables that are associated with lying, it would be useful to examine a line of research designed to answer the question: "What is the most important information used by observers to classify liars and truth-tellers?" The majority of these studies have examined channel differences in the detection of deception (e.g., sight vs sound vs sight and sound, or head vs body vs head and body) while a few have examined the sex, age, field independence, and ability to self-monitor expressions of observers in an effort to determine characteristics of effective observers.

Bauchner, Kaplan, and Miller (1980) posited that the relationship between amount of total information available to a judge and accuracy in judgements of truthfulness is negative. That is, as individuals are given more information about an individual's behavior in an interview (live viewing vs transcript) the success of their judgements should be poorer than if given a restricted amount of information. Their results, however, failed to find such differences. Predictive equations based on the amount of available total (verbal and nonverbal) information and on amount of used information were unable to predict judges' accuracy scores. They state: "The amount of information, both total and nonverbal, does not predict accuracy in detecting deception. Furthermore. . .an interaction between the use of nonverbal and verbal information occurs when

observers make varacity judgements" (p. 262). The results of this study casts serious doubts on the findings of earlier channel effects research.

The earliest proposal relative to channel differences came from Ekman & Friesen. In 1969 they argued that differences in sending capacity of the face, hands, and feet provide predictions about the types of nonverbal behaviors which produce leakage of deception. They argue:

> For both neuroanatomical and sociological reasons individuals in Western Cultures grow subject to more commentary, instruction, and reinforcement on their facial activity than their body movement during conversation. This. . .results in a greater ongoing awareness of ongoing facial expressions and better retrieval for the purpose of simulation. (1974, pp. 288-289)

They proposed that when one is lying, the body, more than the face, is a source of leakage and deception clues. (Leakage occurs whenever the nonverbal act reveals a message that is otherwise being concealed while deception clues are nonverbal behaviors that indicate deception but do not reveal the hidden message.) This effect is due to the fact that becuase there is greater focus on the face than the body, one will attempt to inhibit, interrupt, or mask the facial expressions to the exclusion of conscious control over body movements.

A 1974 study involving nurses who either lied or told the truth about their feelings after watching an unpleasant film tested this hypothesis (Ekman and Friesen). They found that the face was mentioned more often that the body when the nurses were asked afterward which behaviors should be controlled during deception. They also found that when observers viewed the nurses, there was no difference in accuracy between those who viewed only nurses' heads and those who observed only their bodies when the observers had no prior information about nurses' nonverbal behaviors. However, when given segments of the nurses' honest nonverbal behaviors to use as a standard, more accurate judgements were made from the body than from the face.

Hocking (1977) examined the difference between head and body observations when subjects were verbally dissembling and when they were lying about factual material. He found that when subjects were masking emotions, observers made better judgements from the body than the head, but no differences emerged when subjects made untrue statements about factual information. This finding was later confirmed by Hocking, Bauchner, Kaminski, and Miller (1979). Finally, Wilson's (1975) results failed to detect any significant head-body differences.

Concerning vocal-visual distinctions, DePaulo (1978) conducted two studies which indicated that observers tend to be more influenced by visual cues than auditory cues unless

a liar's nonverbal and verbal behaviors are highly discrepant, in which case auditory cues become more salient for observers. Hocking (1977) found that subjects who receive audio and video were more accurate in judgements than subjects who received only video portions. However, he failed to include an audio-only condition in his design. Hocking, Bauchner, Kaminski, and Miller (1979) found that for both factual and emotional accuracy, observers who were in the audio-only condition were no more effective than those who reviewed only transcripts. They also found that when observers viewed lies about factual material, those who received video and audio information were more accurate than those who received visual information only. No such differences emerged for lies of emotional matter. Maier and Thurber (1968) found that judges in audio only and transcript only conditions were more accurate than judges in an audio and video condition. They posit that the visual areas of the interview serve primarily as distractors which lower the proportion of accurate judgements. Finally, Wilson (1975) found that observers make better judgements from nonverbal than from verbal information.

The results of this line of research suggest, tentatively, (a) that for lies of emotional nature, the body is a better place to look for deception cues and leakage than the head, and (b) observers may do better by limiting the amount of information to audio or written modalities than by

increasing the amount of incoming interpretable stimuli. Yet, what kinds of persons make better judges of deception? Research has investigated sex, age, and ability to self-monitor expressive behaviors as factors which may influence the observer's predictive accuracy.

Maier and Lavarakas (1976) reveal that females tend to make more accurate judgements than males, yet Lavarakas (1977) and Parker (1979) failed to find the sex difference. Interestingly, Parker reports that child viewers, contrary to what might be expected, are no less capable of detecting deception than are adults. Male deceivers were found to escape detection more often than females, and older persons were able to escape detection more frequently than younger persons. Feldman and White (1980) report a similar sex effect in that "girls are better at presenting themselves when saying they dislike something that they actually do like, while boys are better at pretending to like something they actually dislike" (p. 126). In a related study, Feldman, Jenkins, and Popcola (1979) report that adults seem better able to detect deception in children than in other adults. Finally, in a study which examined observers' ability to self-monitor their own nonverbal behaviors, Snyder (1974) found that subjects with higher self-monitoring capabilities (Gerger, Rarick, and Soldow, 1977) were better able to detect deception than those with low-monitoring ability.

These studies suggest that sex, age, and

self-monitoring ability may impact upon observers' abilities to detect deception, as perhaps do channel differences. It is hoped that future research might make the exact influence of such factors on observers' veracity judgements clearer.

Nonverbal characteristics

Research into eye behavior of truthful and nontruthful individuals is, at present, conflicting. Hocking and Leathers (1980) recently found that liars have a longer eye contact duration than truth-tellers while Horvath (1973) and O'Hair (1979) found that liars have shorter eye contact durations. Burns and Kintz (1976) found that males gaze longer into females' eyes while lying and that females gaze longer into males' eyes while lying. Knapp, Hart, and Dennis (1974) failed to find any significant differences. Hemsley (1977) found that liars have more eye movements and flutters while Hocking and Leathers (1980) uncovered no such differences. Hemsley also found that individuals blink more while lying. Concerning the frequency of eye contact units, both Knapp, Hart, and Dennis and Hocking and Leathers found no significant differences between truth-tellers and liars. In related research, Clark (1975) and Heilveil (1976) found that when individuals lie, their pupils dilate more than when telling the truth.

The majority of studies investigating the frequency

of self manipulative or grooming behaviors in deception tends to support the contention that liars engage in more than an ample share of self manipulative behaviors (Hemsley, 1977; O'Hair, 1979; McClintock & Hunt, 1975; Morris, 1977). Kraut (1978) found that observers are more likely to judge as truthful individuals who engage in less grooming. Hocking and Leathers (1980), however, found no such distinctions between individuals' truth-telling and lying behaviors.

Hocking and Leathers (1980) and Knapp, Hart, and Dennis (1974) detected no differences between those telling lies and those telling the truth in smiles and overall pleasant facial expressions, while Feldman, Devin-Sheehan, and Allen (1978) and McClintock and Hunt (1975) found that liars smiled less than truth-tellers. Conversely, O'Hair (1979) found that during segments of an interview in which the lying subjects were prepared to lie they smiled more, but no differences were found when subjects were telling unrehearsed lies. Finally, Kraut's (1978) observers were more likely to judge as truthful an individual who smiled less during and interview.

Research also seems to suggest that liars engage in more postural shifts than honest individuals (Kraut, 1978; O'Hair, 1979; McClintock & Hunt, 1975), though Hocking and Leathers (1980) failed to find any significant differences for postural shifts between liars and truth-tellers. Further, research has consistently failed to find differences

between liars and honest individuals in the frequency of shrugs (Ekman, Friesen, and Scherer, 1976; O'Hair, 1979).

Concerning hand gestures, Ekman, Friesen, and Scherer (1976) found liars to exhibit fewer adaptors while Hocking and Leathers (1980) were unable to document such differences, and O'Hair (1979) found liars to exhibit more adaptors than truth-tellers. Similarly, McClintock and Hunt (1975) document an increase in illustrators (which are hand gestures used to emphasize or expand one's verbal messages) during deception while Hocking and Leathers (1980), Knapp, Hart, and Dennis (1974), and O'Hair (1979) found no such differences.

Finally, O'Hair (1980) reported that liars tend to engage in more leg and foot movements and affirmative head nodding than truth-tellers. Other researchers (Knapp, Hart, & Dennis, 1974; Hocking & Leathers, 1980), have found no consistent differences for either type of behavior.

Research to date has failed to pinpoint specific nonverbal mannerisms which characterize the lying individual. Research has focused on eye behavior, pupillary dilation, self-grooming and manipulation, postural shifting, smiling, shrugging, hand gestures, leg and foot movements, and affirmative head nods. Perhaps the divergence in research findings could be attributable to the various situations and methods which have been employed to generate samples of lying behavior. It may be, using two popular

experimental procedures as an example, that a role-playing experience creates less anxiety, guilt, and interest in lying than counter-attitudinal advocacy. Such differences in experimental methodology might be the cause of the discordant findings. A few studies have examined such "situational" variables and have uncovered some rather interesting findings. First, Mehrabian (1971) did find differences in certain nonverbal behaviors when individuals were role-playing and when they were counter-attitudinally advocating, a finding which lends credence to the previous example.

Secondly, Feldman (1976) found that "publicness in which an individual interacts with another affects his nonverbal behavior" in deceptive interaction (p. 44). Feldman argues that increases in the publicness of the interaction will cause increases in the liar's fear of detection which in turn will affect the individual's nonverbal behavior.

Thirdly, a few studies have investigated the saliency of topic content (Manaugh, Wiens, & Matarazzo, 1970; Matarazzo, Wiens, Jackson, & Manaugh, 1970) and have found that certain topics seem more personally salient for subjects than others, and when discussing such relevant topic areas, subjects tend to speak longer with shorter response-time latencies. Results indicate that discussion of these content areas "tapped an already present, differentially viable (salient) motivational state which revealed itself in the speech behavior of both experimental and control

subjects" (p. 23). They conclude that momentary motivational states such as that of a deception set, as well as more enduring motivational states may be mirrored in a speaker's speech behaviors. Perhaps differences between studies in terms of topic content could account for much of the discrepancy in findings.

Fourthly, O'Hair (see also O'Hair, McGlaughlin, & Cody, 1980) hypothesized in 1979 that an individual's behavior while telling a lie that is sanctioned by the experimenter and rehearsed prior to the interview might differ from his behavior while telling an unsanctioned and unprepared lie. His results support the hypothesis in that certain behaviors were useful in discriminating between truth-tellers and liars when the liars were telling rehearsed and sanctioned lies, but were not useful in discriminating between the two when liars were telling spontaneous and unrehearsed "cover-up" type lies.

Fifthly, McClintock and Hunt (1975) found that when subjects were verbally dissembling (lying to mask emotions) they smiled more, shifted posture more, and increased their self manipulations. However, when lying about factual information, subjects tended to smile less while increasing their posture shifts and self manipulations. Perhaps differences in the nature of the context of the deception affect the findings and account for some of the variance.

Sixthly, Thackery and Orne (1968) had subjects lie

about neutral factual evidence and personally relevant information. They conclude that "personally relevant material is significantly more detectable than neutral material, although consequences for detection were the same for both types" (p. 234). In short, it seems harder for one to lie about something in which he is personally involved. This might account for some of the variance in research findings as well.

Finally, Gustafson and Orne note in 1963 that the higher one's motivation to deceive, the more intense is his physiological response as measured by mechanical lie detectors. If this physiolcgical response has its nonverbal and verbal counterparts, then differences in nonverbal and verbal behaviors between highly motivated liars and unmotivated liars are to be expected. Perhaps such is the case when one considers the differences between various methods used to generate lies in the laboratory experiments previously referenced.

All of these findings may be useful in explaining the various discrepancies that have been noted in nonverbal and verbal research into deception. As indicated previously, a variety of procedures have been employed to generate samples of lies. Some researchers have used factual information while others have preferred material of emotional content. Some have used role-playing; others have employed counter-attitudinal advocacy. Some have allowed

their subjects to rehearse their lies while others have elicited unrehearsed samples of lies. Some have employed salient topic areas; others have employed nonsalient ones. Some have attempted to increase the subject's motivation for lying while others have not. The situational differences in experimental methodology in deception research abound.

Some might argue, as this researcher does, that situational variance in experimentation into deception and lying is an asset rather than a liability since lies are employed in a variety of situations and settings. The research may be illustrating the present inability to define cross-situational nonverbal correlates of lying, and that one's nonverbal patterns change from one situation to the next. If this proves true, then a more stable indicant of deception must be sought. Perhaps one might do better by looking to an individual's extralinguistic behavior to infer veracity.

Extralinguistic characteristics

Though research into the extralinguistic domain often borrows from linguistic terminology (i.e., the semantic or pragmatic aspect of paralanguage), extralinguistic concerns are distinct from linguistic concerns. Extralinguistic factors impact upon one's verbal output, yet fall within the nonverbal domain. For example, pitch is the pri-

mary vehicle through which one's statements are perceived as declarations or questions. Such vocal distinctions as pitch, however, are not verbal, yet are an integral part of one's meaning. For the purpose of this review, extralinguistic factors are those elements of one's spoken or written communication which include pitch, rhythm and rate, nonfluencies, amount of verbal output, mean duration of utterance, and response-time latency. Numerous studies have focused on differences in such factors between liars and truth-tellers.

Two studies report that when an individual lies he chooses a higher pitch than when telling the truth. Ekman, Friesen, and Scherer (1976) found that observers' judgements appear to be based on hand movements and pitch which are correlated (during deception illustrators decrease while pitch increases) and which change between deceptive and honest communication. Streeter, et al (1977) found similar results for pitch when observers listened to a tape in which honest and deceptive speakers' semantic content had been filtered out. However, when observers listened to the tape with semantic content unaltered, observers' judgements were uncorrelated with frequency, suggesting a somewhat tenable conclusion that truthfulness is negatively correlated with pitch.

A number of studies have tested the hypothesis that individuals will have more dysfluencies (i.e., stutters,

repetitions, vocalized pauses, etc.) when lying than when telling the truth. Mehrabian (1971) and Hemsley (1977) both found that communicators have more dysfluencies while lying, yet Knapp, Hart, and Dennis (1974), and Hocking and Leathers (1980) found no such differences between liars and truth-tellers. Mehrabian also found that deceivers talk slower than nondeceivers while Hocking and Leathers found no such difference, and Knapp, Hart, and Dennis (1974) found a marginally nonsignificant trend in that direction.

Concerning the use of pauses, Feldman, Devin-Sheehan, and Allen (1978) found that liars paused more frequently, while Hocking and Leathers (1980) and Knapp, Hart, and Dennis (1974) found no such differences. Numerous studies have examined liars' and truth-tellers' response-time latency (RTL) which is the length of hesitation prior to an answer or comment. Previous research has concluded that longer RTL is negatively correlated with social desirability--that if one hesitates before answering an interviewer's question he is attempting to hide something. Write Lay and Burron:

> Judges tend to rate the nonhesitant speaker more favorably than the hesitant speaker over a large number of heterogeneous trait adjectives. This "halo effect" suggests that hesitant speech, at least at certain levels, is viewed as an undesirable characteristic of the speaker, or, in addition, that

hesitant speech may be aversive to the listener. (1968, p. 955)

Baskett and Freedle (1974) had judges listen to two tapes of a person saying "true" or "false" to a question. The tapes were prepared so as to systematically vary the time between the adjective and the response. They found that if a person responded either too quickly or too slowly, the judges attributed the response as being a lie more often than if the delay were more moderate in duration. Similar results were achieved by DePaulo, Zuckerman, and Rosenthal (1980) who state: "Perhaps. . .any deviation from a humdrum response, whether in the direction of an underplay or an overplay, can signal fraudulence to a vigilant observer" (p. 136). The results of Manaugh, Wiens, and Matarazzo (1970), Matarazzo, Wiens, Jackson, and Manaugh (1970), Hemsley (1977), and O'Hair (1979) indicate that when lying, subjects have shorter response-time latencies, particularly, as the first two studies discovered, when the topic of conversation is a salient one. Hocking and Leathers (1980), however, found no such differences, and Kraut (1978) reported that judges were more likely to judge an interviewee as truthful if he had a shorter RTL. In a second experiment Kraut found that judges used a longer pause to infer deception only if it preceded a self-serving answer. A long pause prior to a self-serving statement may cause it to be believed less and a long pause prior to a self-incriminating

statement may cause it to be believed more.

Numerous studies have examined the length of liars' and truth-tellers' responses to determine significant systematic differences. Some have analyzed the total number of words while others have examined the length in seconds. Knapp, Hart, and Dennis (1974) found that nondeceivers use significantly more words than deceivers, yet found that there was only a marginally significant trend in that direction when comparing message duration in seconds. Support for this finding was offered by Hemsley (1977) and O'Hair (1979). Conversely, Mehrabian (1971) found that deceivers spoke less and slower than nondeceivers, a finding similarly reported by Kraut (1978). Finally, DePaulc, Zuckerman, and Rosenthal (1980) found that extremely long and extremely short answers characterized deceptive messages.

In sum, the research to date in extralinguistic factors associated with lying, like that of research into the nonverbal area, is inconsistent and inconclusive. Pitch differences (as indicated by only two studies) seem to be the most stable indicant yet studied. Inconsistency in findings regarding nonfluencies, rate, pauses, RTI, length, and mean duration of utterance casts doubt upon the utility of using these variables tc make accurate veracity judgements. Perhaps, then, the best place to look for stable

indices of deception would be the linguistic domain.

Linguistic characteristics

Given the increasing interest in deception as a communication construct (Knapp and Comadena, 1979), it is surprising to note the lack of concern for linguistic factors associated with lying. While this author found over sixty experimental studies which detail nonverbal and extralinguistic correlates of deception, only eight studies were uncovered which even touched upon the linguistic aspects of deception. Since these studies are more relevant to the line of research examined in this research project, they will be examined in more detail that those presented in the foregoing portion of the review. An appropriate division of the task at hand should prove to be the three-part sequence of (a) semantic, (b) pragmatic, and (c) syntactic properties of lies (see Morris, 1938, and Miller, 1964). According to Morris, syntactics is concerned primarily with the linguistic structure, sematics with problems of comprehension, while pragmatics is concerned with the uses to which language is put after one has performed a semantic/syntactic analysis. Baskett and Freedle (1974) note that "the pragmatic aspect of language study [is concerned with]. . .what is done with information after its content has been apprehended" (p. 118).

The pragmatic evidence. Only two studies have addressed the pragmatic implications of their findings. Baskett and Freedle (1974), building on Miller's (1964) conception of pragmatics as the degree of belief or disbelief of linguistic information, argued that "the pragmatic aspect of degrees of belief concerning verbal utterances which leads to acceptance or rejection of this information is in some cases intimately related to certain social perceptions such as the arousal of suspicion that a lie has been told" (p. 118). They examined the extent to which subjects believed lies to have occurred as a function of the delay of time between a question and an answer (RTL). Their results (noted previously in this appendix) indicated a curvilinear "U" shaped function in RTL and attributions of lies such that particularly long and particularly short RTL are used by observers to infer veracity. They conclude: "Linguistic content, believability, and the proportions of lie attributions together indicate that a fruitful approach to the analysis of some perceptions may be made from the point of view of language pragmatics" (p. 130).

The second study which examined pragmatic issues in deception is that of Bowers, Elliot, and Desmond (1977) which investigated pragmatic rules one might employ to construct "devious messages". Limiting themselves to situations in which the explicit fulfilment of the communicative demand would be a "yes" or "no" response, they argue that

there are certain pragmatic rules which one might employ to communicate falsehood without having tc lie overtly. For instance, when a persen asks, "Are you going out tonight?" and is met with the response, "Is the Pope Catholic?", while the response does not fill the demand syntactically (i.e., is not a yes/no response), the inquirer will habitually process this response pragmatically because he assumes good faith in the respondent. They state: "Assuming that devious messages are inimical to the good life (and we do not claim that they are, always), society would be well advised to seek means of detecting them" (p. 239). What are some fundamental propositions one might make about deviously structured messages?

First, there appears to be an abundance of metapropositions (i.e., propositions about propositions). For example: (Q) "Do you like my dress?" (A) "You would be wrong if you thought I disliked it!". Secondly, there is an abundance of negation. Finally, there tends to be a large number of propositions offered in the absence of a demand for numerous propositions. For instance: (Q) "Do you want to come to my party?" (A) "Well, my mother-in-law is coming, my father is sick, my car is not running, I dont't have a baby-sitter. . . ." Using these propositions, one might be able to devise messages by which pragmatic rules convey deception yet allow the deceiver to avoid overt lying.

The semantic/syntactic evidence. Certainly one of

the most interesting and detailed examinations of the deception construct is that of Knapp, Hart, and Dennis (1974). Their study (portions of which have been discussed in prior sections of this review) investigated a large number of nonverbal, extralinguistic, and linguistic variables which are associated with deception. Eleven linguistic and three nonverbal indices emerged as significant discriminators between truth-telling and deceptive interactions. Based on an a priori "commonsensical" clustering, five dimensions were presented:

1. Two indices--the confidence ratio (total number of words spoken divided by the total interaction time) and the different words index (a count of the number of unique words)--comprised the certainty dimension.

2. A vagueness dimension was comprised of the following four indices: The factual statements index was a count of the number of statements which "remark about an existing person(s), object(s), or set(s) of conditions objectively verifiable by the senses" (p. 19). The self-experiences index was a count of the number of "statements made by the subject which expound upon actual experiences he has had (or is having) or upon activities he has engaged in (or is engaging in)" (p. 19). The past references index was a count of the number of past tense verbs, and the leveling terms index was a count of the number of overgeneralizations such as "all", "every", "none", etc.

3. Three indices--the total words index (number of words spoken), the message duration index (measure of time spent speaking), and probes index (number of interviewer probes)--comprised the reticence dimension.

4. A dependence dimension was comprised of the following three indices: The self references index (number of "self" words), the self-interest index (number of statements "of either factual or evaluative character which state the costs or benefits which have (or have not accrued), are (or are not accruing), should (or should not accrue) to self" (p. 20)), and the other references index (the number of third person plural pronouns).

5. Two indices--the group references index (number of first person plural pronouns) and the disparaging statements index (number of statements "depicting unfavorable actions or statements of another person, group, or institution" (p. 20))--comprised the negative affect dimension.

They found firstly that deceivers' messages, while not differing from truth-tellers in qualification (subjunctive mood words), in hypotheticals (remarks based on the premise "what if"), and in absolute verbs (all of the forms of the verb form "to be"), did differ in confidence ratio, indicating that deceivers were less able to "fill-in" the interaction time with verbage, and in different words indicating a form of restricted code for deceivers. In sum, based on these two indices, deceivers' messages seem more

uncertain.

Secondly, they found that deceivers made fewer factual statements, mentioned their own experiences less often, referred to past events less often, and made more sweeping generalizations. Future references (number of future tense verbs) and other experiences references (remarks about others' real or imagined experiences) failed to discriminate between truth-tellers and liars. In general, deceivers seem more vague than nondeceivers.

Thirdly, they found that deceivers seemed more reticent than nondeceivers. Deceivers used fewer words, had shorter message duration ($p < .08$) and had more probes than nondeceivers.

Fourthly, it appears that deceivers seem to dissociate themselves from the situation more than nondeceivers. They referred to themselves less frequently ($p < .10$) and to others more frequently.

Finally, they found that though affirmative nods, smiles, and other interest statements did not discriminate truthful from dishonest statements, deceivers did use fewer group references and made more disparaging remarks. Deceivers, it seems, are more defensive and unpleasant than nondeceivers. They conclude:

> At face value it appears that the six behavioral styles we are associating with deception are really very natural, common traits of us all.

> Apparently, however, deceivers exhibit such traits excessively, thus throwing themselves out of the bounds of normality. . . .We know that there are at least 14 communication differences between deceivers and nondeceivers. . .we also know that only continued research in the area can indicate we know what we think we know. (pp. 26-27)

Based on the assumption that women's language differs in numerous ways from men's language, Todd (1977) examined the 14 Knapp, Hart, and Dennis indices in women's lies and truthful statments, since the previous experimenters used all male subjects. Surprisingly, only one index significantly discriminated between truthful and dishonest statements--the disparaging statements index. Certainly, more research to distinguish sex differences in deceptive language is warranted.

Todd-Mancillas and Kibler (1979) attempted to empirically assess the validity of the Knapp, Hart, and Dennis indices by correlating them with four new indices previously shown to measure similar aspects of uncertainty, vagueness, negative affect, and reticence (the dependence cluster was omitted since no known measure of dependence was available). The Silence Quotient (SQ), operationalized as the ratio of amount of time spoken to amount of available speaking time (p. 114); the Modified Flesch Reading Ease Score (MFRES), operationalized as the number of syllables spoken per 100

words; the Modified Flesch Human Interest Score (MFHIS), operationalized as the average number of personal words (personal pronouns, words with masculine or feminine gender, and proper nouns); and the Discomfort Relief Quotient (DRQ), operationalized as the ratio of negative affect words to positive affect words, were correlated with the eleven previously defined indices (omitting the three dependence indices).

The SQ has been previously demonstrated to be a valid measure of interviewee output. Based on the assumption that persons talk more when they are certain, positive correlations were expected between the SQ and the indices of the Certainty dimension. Partial support was found.

The MFRES and the MFHIS, both measures of reading ease, should be inverse measures of vagueness. Hence, it was expected that the indices of the Vagueness dimension should correlate negatively with the MFRES and MFHIS. No support was offered for this hypothesis.

The DRQ has been shown to be a valid measure of negative affect. Hence, it was expected to correlate positively with the Negative Affect dimension. No support was found for this hypothesis.

Finally, the SQ was expected to correlate positively with the Reticence dimension under the assumption that a low SQ is indicative of reticence to interact with others. Full support was found for this hypothesis.

State Todd-Mancillas and Kibler: "Since it has not been possible to identify artifacts that are largely responsible for these nonsignificant results, it is concluded that these indices are not valid measures of uncertainty, vagueness, and negative affect as originally argued" (p. 122). It should be noted, however, in light of Todd's (1977) earlier finding relative to women's deceptive language, that Todd-Mancillas and Kibler used only female subjects, while Knapp, Hart, and Dennis' subjects were all males. Perhaps sex could be the biasing artifact which intervened in the present study causing contradictory results.

Further research investigating semantic/syntactic facets of deceptive communication has isolated other categories useful in discriminating between truthful and deceptive statments. Chapman (Note 1), for example, examined passages from the Nixon Watergate speeches which were objectively verified (by later evidence in the chronology of the Watergate affair) as true or false. He found four clusters of deceptive behaviors: Nixon was (a) more self-oriented when lying as indicated by a heightened use of self references, (b) more emphatic when lying as indicated in a larger ratio of subject words to connector words, (c) more uncertain when lying as indicated in a heightened use of concept modification through adjectives and adverbs, and (d) more abstract and vague when lying as indicated in a heightened usage of non-sensed based words (i.e., peace, integrity,

loyalty, etc.). None of the data were subjected to the rigors of statistical inference, however. Note the similarities between Chapman's self-orientation, uncertainty, and abstractness dimensions and Knapp, Hart, and Dennis' dependence, uncertainty, and vagueness dimensions. Gibson and Felkins (1974), in a similar content analytical rhetorical criticism of Nixon's "Checkers" speech and the two Watergate speeches noted that Nixon (a) had a definite "I-orientation" (e.g., dependence/self-orientation), (b) was more abstract in the Watergate speeches (e.g., abstractness/vagueness), (c) used a "more simple, basic, and potentially emotional form of language" in the Watergate speeches as indicated in a lower type-token ratio (e.g., uncertainty).

Kraut found that observers use the plausibility, vagueness, and consistency of an answer to infer its degree of veracity with some success. All three are based on semantic/syntactic analyses of the verbal content and seem to fit with the vagueness and certainty dimensions offered previously.

Heugli (1971) found that a trustworthy group representative's communication is judged to be greater in empathy, sensitivity, emotional control, and objectivity than that of an untrustworthy representative's communication. Perhaps these dimensions might add to those previously mentioned and aid observers in discriminating between truth-tellers' and liars' statements.

Finally, Horvath (1973) presented three types of verbal statements that are made by persons undergoing polygraphic investigations. These are complaints (e.g., negative affect), questions (e.g., uncertainty), and requests to hurry the examination (e.g., negative affect, reticence).

Certain semantic/syntactic dimensions of deceptive language emerge from these studies and seem to recur with some degree of regularity. A few of these include negative affect, self perception, uncertainty, vagueness, other perception, empathy, emotional control, objectivity, consistency, empahsis, dependence, and reticence. Certainly, these and other dimensions of syntactic patterns and semantic classifications need further analysis.

Summary

In sum, the research in deception to date is, at best, confusing. Certain nonverbal characteristics of deception have been offered, yet none have emerged, with the possible exception of RTL, as stable characteristics. Similarly, research into extralinguistic factors has failed to present stable extralinguistic factors associated with deception, perhaps with the exception of pitch changes. Finally, a relatively new line of research has emerged which may offer more promise for detecting deception through analysis of syntactic/semantic patterning.

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Appendix B

Consent Form for Voluntary Participation

TITLE OF PROJECT: COMMUNICATION STUDY

INVESTIGATOR: EARL F. DULANEY, JR., DEPARTMENT OF COMMUNICATION, UNIVERSITY OF OKLAHOMA, NORMAN

THIS IS TO CERTIFY THAT I, , HEREBY AGREE TO PARTICIPATE AS A VOLUNTEER IN A SCIENTIFIC INVESTIGATION AS A PART OF AN AUTHORIZED RESEARCH PROGRAM OF THE UNIVERSITY OF OKLAHOMA UNDER THE SUPERVISION OF EARL FRANKLIN DULANEY.

I UNDERSTAND THAT EARL FRANKLIN DULANEY HAS AN OBLIGATION AND A RESPONSIBILITY TO INFORM ME PRIOR TO MY DECISION TO PARTICIPATE OF THE PURPOSE OF THE RESEARCH, THE PROCEDURES TO BE EMPLOYED, THE PHYSICAL AND/OR MENTAL DISCOMFORTS I MIGHT EXPERIENCE AS A PARTICIPANT, THE PHYSICAL, MENTAL, AND/OR SOCIAL RISKS TO ME FROM PARTICIPATION IN THIS STUDY, AND THE BENEFITS THAT I MIGHT EXPECT FROM PARTICIPATION IN THIS STUDY. I REALIZE, HOWEVER, THAT FULL DISCLOSURE OF THIS INFORMATION MIGHT AFFECT THE OUTCOME OF THE STUDY. MY SIGNATURE BELOW INDICATES THAT I AGREE TO PARTICIPATE IN THIS STUDY WITHOUT PRIOR DISCLOSURE OF THE ABOVE MENTIONED INFORMATION. MY SIGNATURE BELOW ALSO INDICATES THAT I AM WILLING OF MY OWN ACCORD TO TAKE WHATEVER RISKS MIGHT BE INVOLVED IN PARTICIPATION.

I UNDERSTAND THAT I AM FREE TO REFUSE TO PARTICIPATE IN ANY PROCEDURE OR REFUSE TO ANSWER ANY QUESTION AT ANY TIME WITHOUT PREJUDICE TO ME. I UNDERSTAND THAT I AM FREE TO WITHDRAW MY CONSENT AND TO WITHDRAW FROM THE RESEARCH AT ANY TIME WITHOUT PREJUDICE TO ME.

I UNDERSTAND THAT BY AGREEING TO PARTICIPATE IN THIS RESEARCH AND SIGNING THIS FORM I DO NOT WAIVE ANY OF MY LEGAL RIGHTS.

I UNDERSTAND THAT THE RESEARCH INVESTIGATOR NAMED ABOVE WILL ANSWER ANY OF MY QUESTIONS RELATING TO THE RESEARCH PROCEDURES AT ANY TIME.

I UNDERSTAND THAT DURING THE COURSE OF THE STUDY MY VERBAL COMMENTS MAY BE AUDIO-TAPED AND THAT TRANSCRIPTS OF MY VERBAL COMMENTS WILL BE MADE FOR THE PURPOSE OF ANALYSIS. MY SIGNATURE BELOW INDICATES APPROVAL FOR AUDIO-TAPING AND FOR TRANSCRIPTS TO BE USED ONLY FOR THE PURPOSES OF THIS STUDY. NO BROADCASTS OR PUBLICATIONS OF THIS MATERIAL MAY BE MADE WITHOUT MY PRIOR WRITTEN CONSENT.

DATE: SIGNED:

Appendix C

Interview Questions

The following questions were answered by each subject for both the squares task (truthful) and the dots task (deceptive). Each subject was randomly assigned to a deceptive-truthful ordering or a truthful-deceptive ordering to control for order effects.

1. Exactly how did you and (name of Confederate) arrive at an answer? could you explain that in more detail?

2. How much different were your initial estimates for the number of dots/squares from (name of Confederate).

3. Did you use the same procedures for estimating the number of squares/dots for the first card as you did for the last card? In other words, did your methods for estimating the number change as you progressed in the task?

4. How confident are you in your's and your partner's answers?

Appendix D

Summary Tables

This appendix presents a detailed supplemental summary in tabular form of the multivariate and univariate analyses of variance for the dimensions and densities which failed to meet the level of significance. It also presents means and standard deviations for all the variables used in the study.

TABLE A

Means and Standard Deviations

	Truth		Lie	
	$\bar{X}$	SD	$\bar{X}$	SD
Lexical Diversity				
Response time latency	2.649	1.544	1.621	.857
Total Words	109.400	41.787	80.550	33.210
Unique words	62.000	16.441	47.350	16.378
Type-token ratio	.594	.080	.650	.099
Average word length	3.763	.220	3.813	.198
Dysfluency ratio	.064	.033	.078	.044
Perceptual-cognitive activity (PCA)	65.350	24.888	49.850	18.619
Linguistic Activity				
IU density	.283	.048	.293	.056
RL density	.270	.045	.276	.047
QC density	.447	.047	.431	.082
Sensory Content				
Sensed-based IU density	.283	.048	.293	.056
Unsensed-based IU density	.000	.000	.000	.000
Sensed-based RL density	.360	.082	.344	.076
Unsensed-based RL density	.087	.041	.087	.055
Social Perception Content				
Positive AO density	.000	.000	.000	.000
Negative AC density	.003	.010	.000	.000
Positive GC density	.007	.012	.010	.017
Negative GO density	.052	.026	.047	.032
Positive SELF density	.014	.013	.013	.020
Negative SELF density	.129	.040	.124	.058
Positive AUD density	.003	.005	.003	.008
Negative AUD density	.011	.019	.010	.016
Inanimate density	.062	.033	.084	.060
Symmetry				
Transitive density	.114	.036	.122	.036
Intransitive density	.157	.048	.154	.038

Means and Standard Deviations

	Truth		Lie	
	$\bar{X}$	SD	$\bar{X}$	SD
Definition				
Defined IU density	.283	.048	.292	.056
Undefined IU density	.000	.000	.001	.004
Defined RL density	.095	.030	.090	.035
Undefined RL density	.176	.054	.187	.034
Motion				
Passive density	.201	.054	.192	.061
Active density	.070	.033	.084	.034
Tense				
Past tense density	.134	.045	.106	.039
Present tense density	.134	.055	.129	.050
Future tense density	.030	.037	.013	.029
Conditionality				
Assertion density	.233	.056	.256	.049
Conditional density	.037	.039	.019	.030
Negation				
Negative existential density	.227	.055	.245	.060
Negative QQ density	.004	.008	.003	.009
Negative RL density	.017	.016	.014	.016
Negative AO density	.003	.010	.000	.000
Negative GC density	.052	.026	.047	.032
Negative SELF density	.129	.043	.124	.056
Negative AUD density	.019	.019	.011	.016
Existence				
Positive existential density	.056	.027	.047	.025
Negative existential density	.227	.055	.246	.060

TABLE B

Multivariate and Univariate Analyses for

Existence, Symmetry, and Motion

	SEX		CONDITION		INTERACTION	
SOURCE	F	R	F	R	F	R
EXISTENCE	.253	.170	.575	.378	.250	.388
Positive existence	.236		.818		2.922	
Negative existence	.161		.970		1.588	
SYMMETRY	.683	.273	.422	.218	.127	.121
Transitive density	1.177		.850		.238	
Intransitive density	.641		.043		.001	
MOTION	.192	.149	1.540	.392	.214	.157
Nonmotion density	.176		.419		.005	
Motion density	.403		2.911		.308	

TABLE C

Multivariate and Univariate Analyses for

Negation and Social Perception

	SEX		CONDITION		INTERACTION	
SOURCE	F	R	F	R	F	R
NEGATION	.919	.591	2.586	.775	.922	.591
Negative existence	.161		.970		1.588	
Negative QQ	1.417		.192		.019	
Negative RL	1.949		1.952		1.952	
Negative AC	.004		.333		.005	
Negative GO	.006		.122		.153	
Negative SELF	1.310		.067		.345	
Negative AUD	2.524		.074		.477	
SOCIAL PERCEPTION	.460	.541	.598	.591	1.164	.715
Positive AC	.000		.000		.000	
Negative AO	1.949		1.952		1.952	
Positive GC	.109		.567		2.408	
Negative GC	.004		.333		.005	
Positive SELF	.001		.011		4.918*	
Negative SELF	.006		.122		.153	
Positive AUD	.004		.022		.045	
Negative AUD	1.310		.067		.345	
Inanimate	1.583		2.822		2.156	

*$p < .05$

TABLE D

Multivariate and Univariate Analyses for

Language Activity, Sensory Content, and Definition

	SEX		CONDITION		INTERACTION	
SOURCE	F	R	F	R	F	R
LANGUAGE ACTIVITY	1.201	.429	.177	.179	.130	.154
IU density	.375		.388		.243	
RL density	.006		.317		.136	
QC density	.103		.546		.301	
SENSORY CONTENT	.440	.342	.160	.202	.655	.386
Sensed-based IU	.375		.388		.243	
Unsensed-based IU	.000		.000		.000	
Sensed-based RL	.291		.735		.150	
Unsensed-based RL	2.099		.000		2.861	
DEFINITION	.463	.332	.599	.371	.260	.255
Defined IU	.440		.328		.291	
Undefined IU	1.000		1.000		.260	
Defined RL	.000		.268		.025	
Undefined RL	.010		1.229		.295	