

Deceptive Language by Innocent and Guilty Criminal Suspects: The Influence of Dominance, Question, and Guilt on Interview Responses

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Abstract

This study proposed that criminal guilt interacts with dominance and interview question to affect linguistic properties during criminal interviews. A field experiment tested effects of criminal guilt, dominance, and question on linguistic properties of suspects' responses using a 2 (criminal guilt: guilty/innocent) × 4 (question: Q1/Q2/Q3/Q4) mixed-model design with dominance as a covariate and question as a repeated factor. Analysis of linguistic properties from 37 criminal interviews indicated a hypothesized two-way interaction among dominance and guilt on immediacy and a three-way interaction among dominance, question, and guilt on complexity explored as part of the research question. Several other direct effects for dominance and question were noted. Implications, limitations, and future research directions are discussed.

Keywords

criminal interview, deception, dominance, question, linguistic analysis, Linguistic Inquiry and Word Count

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Crime investigators use different techniques to distinguish between guilty and innocent suspects in a criminal interview. A few of these techniques such as reality monitoring (RM) and criteria-based content analysis (CBCA) focus specifically on suspects' language (Vrij, 2008). RM and CBCA are both founded on Undeutsch's (1989) hypothesis that statements describing actual experiences differ in content and quality from imagined statements. To ascertain whether the interviewee is reporting actual events, interview transcripts are carefully examined. The above techniques have been used successfully to identify guilty suspects who had previously denied their involvement in a crime (Vrij, 2008).

Recent research attempted to automate language analysis of interactions involving deception. Building on the success of labor-intensive manual techniques (e.g., RM and CBCA), automated approaches have been shown to successfully identify differences in statements based on actual versus fabricated events or opinions. These differences were evident across both mediated (Hancock, Curry, Goorha, & Woodworth, 2008; Zhou, Burgoon, Twitchell, & Nunamaker, 2004; Zhou, Burgoon, Zhang, & Nunamaker, 2004) and face-to-face interactions (Bond & Lee, 2005; Burgoon & Qin, 2006), as well as across statements from individuals facing trivial consequences (e.g., a potential loss of a small monetary reward) and statements taken in criminal investigations with much more at stake (Bond & Lee, 2005; Fuller, Biros, & Wilson, 2009). However, the specific linguistic properties reported as diagnostic differed across contexts and samples (for a discussion, see Ali & Levine, 2008), and some empirical studies did not uncover any differences (e.g., Vrij, Mann, Kristen, & Fisher, 2007). These inconsistent findings suggest that other factors (e.g., moderating variables) may be affecting the diagnostic ability of statements' linguistic properties.

Specifically, research on automated linguistic analysis has yet to consider elements of the interaction such as the question being asked and the degree of dominance or submissiveness displayed that may affect the linguistic properties of real versus imagined reports. (The rationale for focusing on these variables is discussed below.) If these variables have a moderating effect on accounts of guilty versus innocent criminal suspects, the results of linguistic analyses without these moderators may be unstable across samples and lack discriminatory validity.

This study aimed to determine if interaction features such as questions being asked and interviewee's dominance moderate how guilty versus innocent criminal suspects use language. To examine these factors, a field experiment was conducted in which criminal suspects were interviewed. The interviews were transcribed and subjected to automated linguistic analysis (see Newman, Pennebaker, Berry, & Richards, 2003; Pennebaker, Francis, & Booth, 2001) that extracted the properties of quantity, complexity, certainty, immediacy, specificity, affect, and diversity. The analysis examined the interaction effects of three factors: (a) interviewee innocence or guilt, (b) questions being asked during the interview, and (c) interviewee dominance on these linguistic properties.

Theoretical Background

A criminal interview is a dynamic, goal-oriented exchange where the interviewer attempts to determine the interviewee's involvement in a crime and the interviewee attempts to demonstrate innocence. During such exchanges, misrepresentation is likely as guilty interviewees attempt to avoid detection by using deception and denial. The interviewer's task is to identify deception and ultimately distinguish between guilty and innocent interviewees. The types of questions posed during an interview may affect judgments of interviewee's guilt or innocence (Levine, Shaw, & Shulman, 2010; Vrij et al., 2009). However, as yet, the effects of specific questions or patterns of questions in an interaction have largely been ignored (Vrij, Mann, & Fisher, 2006).

In traditional studies (typically dealing with deception detection) investigating how linguistic properties can be used to distinguish guilty from innocent interviewees, the unit of analysis is typically the entire length or a large portion of an interview. As a result, linguistic properties are quantitatively summarized for the entire interview as opposed to being broken down by responses to individual questions. Using the former approach may obscure the effects of particular questions in conjunction with other variables (e.g., dominance and criminal guilt) on interviewee language. However, during interviews, these within-interview factors are critical for the accuracy of the interviewer's assessment (Buller & Burgoon, 1996).

Some researchers examining automatically extracted linguistic properties noted the variability in responses across questions and thus limited their analyses to a single question or block of questions in an interview (e.g., Jensen, Meservy, Burgoon, & Nunamaker, 2010). However, examining only one question, similar to using aggregate summaries of linguistic properties from several questions, does not reflect the reality of criminal interviewing. Either of these approaches fails to take the differences based on questions into account. Since in criminal interviews the differences in the responses of guilty versus innocent suspects may emerge across several questions, accounting for fluctuations in linguistic properties across several questions becomes important if the results are to have ecological validity.

The utility of approaches that focus on multiple interview questions is pertinent for criminal interviews also because interviewing techniques that focus on several specific questions are commonly taught to law enforcement personnel. This study examined responses to four questions obtained from a structured interview protocol, the Behavioral Analysis Interview (BAI; Inbau, Reid, Buckley, & Jayne, 2001). Although some have criticized the BAI's effectiveness (e.g., Vrij et al., 2006), the BAI is frequently applied to situations where interviewers must distinguish between guilty and innocent suspects, and its proponents report having taught the techniques to hundreds of thousands of law enforcement professionals.¹ According to BAI developers, the structure and semantic content of responses are expected to vary based on whether the interviewee is attempting to conceal his or her guilt or is being truthful (Inbau et al., 2001). Therefore, different questions should have different effects on linguistic properties of interviewees' statements depending on whether an interviewee is being

forthcoming or is trying to conceal his or her involvement. Thus, the following hypothesis is offered:

Hypothesis 1: Question interacts with guilt to influence linguistic properties of (a) verbal quantity, (b) complexity, (c) certainty, (d) immediacy, (e) diversity, (f) specificity, and (g) affect.

Among the key interpersonal factors affecting language choice and style is interactional dominance (Burgoon & Hale, 1984; Burgoon, Johnson, & Koch, 1998), defined here as a relationally based pattern of communication in which one individual attempts to assert influence over his or her interactional partner (Burgoon & Dunbar, 2000). In face-to-face interactions, communicators enact dominance through behavioral displays related to physical potency (e.g., expansive postures and gestures, vocal intensity and amplitude), interaction control (e.g., interruptions, longer turns), emotion control (e.g., facial expressions that are animated but poised) and resource control (Burgoon et al., 1998; Dunbar & Abra, 2010). These dominance displays may differ as a function of context, relationship, and interaction goals. (From now on and throughout the article, interactional dominance is referred to as dominance).

One such consideration comes from the context where a communicator has something to hide. Relevant research primarily involving deception detection indicates that not only may more dominant individuals adopt different deception strategies than submissive ones, but the degree of dominance or submissiveness may be a deception strategy in and of itself and may influence how deception is enacted (Dunbar et al., 2010; Zhou, Burgoon, Zhang, et al., 2004).

Communicators might adopt a subdued, passive, and guileless style (submissiveness) as a means of evading detection, or a forceful style (dominance) when attempting to persuade the interlocutor of their veracity (Cody & O'Hair, 1983; Dunbar et al., 2010; Zhou, Burgoon, Zhang, et al., 2004).² Cody and O'Hair (1983) uncovered systematic differences between low-dominance truth tellers and low-dominance deceivers in their language use. Zhou, Burgoon, Zhang, et al. (2004), who investigated online communication, found that deceivers' dominance language followed a different trend line over time as compared to truth tellers. Deceivers began interactions with a non-dominant style, then increased dominance over time, and they displayed higher linguistic dominance than truth tellers on some measures. These investigations demonstrate that dominance can affect truthful or deceptive language.

Furthermore, focusing on dominance is particularly salient for criminal interviewing as there is a high incidence of antisocial tendencies among criminal populations (Dolan & Blackburn, 2006; Kosson, Lorenz, & Newman, 2006), which often result in attempts to dominate others for personal gain (American Psychological Association, 2000). There is also evidence that dominance is strategic and may be manipulated by felons (e.g., Seibel, Wallbrown, Reuter, & Barnett, 1990). Where the purpose of the interview is clear and the consequences are substantial, a suspect likely considers how dominant he or she wishes to be during the interview and this dominant or submissive strategy will be evident during the interview. Thus, dominance is likely to play a role

in the responses of criminal suspects attempting to conceal their guilt. In light of this argument, the following hypothesis is proposed.

Hypothesis 2: Dominance interacts with guilt to influence linguistic properties of (a) verbal quantity, (b) complexity, (c) certainty, (d) immediacy, (e) diversity, (f) specificity, and (g) affect.

A final research question considered the possibility of a three-way interaction among the independent variables of criminal guilt, question, and dominance, which would override the previously hypothesized relationships. We reasoned that differences in dominance exhibited by guilty versus innocent suspects may affect the linguistic properties of an interaction, depending on what question is asked. For example, if a question inquires about some potentially verifiable information, innocent interviewees exhibiting more dominance may be likely to use more rhetoric and influence tactics trying to convince the interviewer of their innocence and, as a result, may be more likely to produce longer utterances that are more complex, linguistically diverse, specific, certain, and verbally immediate (i.e., expressing greater psychological closeness). Since dominance is commonly characterized by greater expressivity and certitude (Burgoon et al., 1998), the language of interviewees exhibiting more dominance should also be more affect laden. Conversely, innocent interviewees exhibiting less dominance may show the opposite pattern, avoiding overt persuasion and instead relying on approaches such as simple denials that are linguistically shorter, less complex, certain, immediate, specific, affective, and diverse.

Individuals attempting to conceal their guilt, by contrast, may be less likely to demonstrate their usual dominance. When asked about verifiable information, guilty interviewees may engage in information control, trying to ascertain what information the interviewer knows, and attempt to appear as forthcoming as possible without providing too much information about the events in question. As a result, they may demonstrate less quantity, complexity, certainty, immediacy, specificity, affect, and diversity than an innocent individual, because offering too much information could reveal unwanted details or inconsistencies. However, these individuals may also be careful not to say too little since they may perceive that saying too little makes them seem not forthcoming enough. In light of the conjectural nature of these predictions, we explored these relationships as a research question:

Research Question 1: Is there a three-way interaction among guilt, question, and dominance?

Method

Participants

Transcripts of 37 interviews that met several strict criteria (see below) were selected from a larger corpus of 101 interviews conducted as part of actual criminal investigations. The

interviews were conducted by a single professional male interviewer who had performed more than 20,000 interviews in criminal, civil, and employment contexts over 43 years. To control for possible gender effects, only transcripts from male suspects were included. The majority of suspects were accused of sex-related crimes ($n = 24$, of whom 14 were found guilty), including sexual assault ($n = 14$), rape ($n = 7$), incest ($n = 2$), and sexual harassment ($n = 1$). Other suspects ($n = 13$, of whom 6 were found guilty) were accused of theft ($n = 2$), attempted homicide ($n = 2$), and assault ($n = 2$). The remaining crimes included single cases of homicide, road rage, immigration violations, restraining order violation, menacing, battery, and fraud.

Design

The hypotheses were tested in a field experiment using a 2 (criminal guilt: guilty/innocent) \times 4 (question: Q1/Q2/Q3/Q4) mixed-model repeated measures design with question as the repeated measure and dominance as a covariate. The dependent variables were derived from automated linguistic analyses of interview transcripts using seven linguistic properties of quantity, complexity, certainty, immediacy, specificity, affect, and diversity.

Instrumentation

Determination of guilt and innocence. In criminal interviews, the truth can be extremely difficult to ascertain. Statements from guilty suspects are not uniformly deceptive; in fact, they may be truthful in response to some questions. Thus, rather than deception, *guilt* was examined and determined on the basis of three strict criteria. The first criterion was the result of the investigation (e.g., a suspect pled guilty or was exonerated) or successful prosecution. Out of 20 interviewees in the guilty condition, 18 suspects ultimately confessed, and 2 were found guilty by a court of law. The 17 innocent interviewees were exonerated during the investigation and either had all charges dropped or no charges filed. The second criterion was the result of a polygraph test administered following the interview. The third criterion was the opinion of the interviewer who administered the structured interview after examining available evidence and interview statements. Only when the interviewer judged the interviewee guilty, the interviewee failed a polygraph test, and the interviewee later pled guilty or was convicted was the interview included in the guilty condition. Similarly, only when the interviewer judged the interviewee innocent, the interviewee passed a polygraph test, and later was exonerated was the interview selected to be in the innocent condition. Cases failing to meet all three criteria were excluded.

Interactional dominance. Dominance was measured using two trained coders experienced in coding dominance in interactions (intercoder reliability: Cronbach's $\alpha = .93$). To avoid conflating linguistic properties with the measurement of dominance, coders rated only nonverbal dominance and viewed videos with content-filtered audio.³ Coders were instructed to view and rate the relevant questions and answers. During initial coding, it was noted that interviewees' dominance did not fluctuate across questions;

therefore, a single dominance rating was provided across the four interview questions examined in this study. Dominance was coded on a scale of 1 (*submissive*) to 7 (*dominant*). The ratings from both coders were averaged to produce a dominance score ($M = 3.91$, $SD = 1.76$).

Question. With the variety of crimes included in this sample, many different questions were asked during interviews. Two criteria were used to select questions for analyses. First, because of our interest in questions typically asked during criminal interviews, only questions commonly asked in BAI interviews (Inbau et al., 2001) were examined. Second, to avoid any confounding because of question order effects, only questions asked in the same order across all interviews were selected (i.e., in each interview Question 1 occurred before Question 2, Question 2 before Question 3, and Question 3 before Question 4). For interviews where a specific question was not asked (one case for Questions 1 and 3 and four cases for Question 4), a mean substitution procedure was used for the given linguistic property to avoid listwise deletion (a default for repeated measures analyses) because of missing data. The questions included in the analyses are presented in Table 1 along with the number of responses and mean length in seconds.⁴

Table 1. Sample Size, Mean Response Lengths (and Standard Deviations) for Behavior Analysis Interview Questions Included in the Analysis

Question	$N_{\text{per question}}$	$M_{\text{response length}}$ (SD) in seconds
1. Why might someone want to do something like this?	36	44.9 (36.6)
2. How do you feel about this accusation?	37	46.0 (74.8)
3. What do you think should happen to the person who did this?	36	36.5 (26.7)
4. Did you ever do anything like this before?	33	27.9 (38.8)

Linguistic Properties

Subcomponents of linguistic properties (e.g., word count, number of affective words) were extracted from interview transcripts using the Linguistic Inquiry and Word Count (LIWC; Pennebaker et al., 2001) approach. The subcomponents were combined into indices to form linguistic properties based on Zhou et al. (2004).⁵ The subcomponents used here differ slightly from Zhou et al.'s subcomponents because of our use of LIWC for language extraction (see Table 2 for linguistic properties and their subcomponents). The following linguistic property indices were formed: quantity, complexity, certainty, immediacy, specificity, affect, and diversity. Separate indices were formed for each property by saving the first unrotated principal component,

Table 2. Categories of Linguistic Properties, Their subcomponents, and Transformations

Linguistic Property	Subcomponents of Linguistic Properties	Transformations ^a
Quantity	Word count, verb count, function word count	ln(recoded original variable + 25)
Complexity	Words per sentence, six-letter words	Recoded original variable
Certainty	Modal verbs (e.g., would, should), certainty words (e.g., always, never), and tentative words (e.g., maybe, perhaps)	ln(recoded original variable + 1)
Immediacy	First-person references	Recoded original variable
Diversity	Percentage of unique words	None
Specificity	Spatiotemporal words (e.g., down, in, end), perception words (e.g., saw, heard, felt)	ln(recoded original variable + 1)
Affect	Positive and negative affect words (e.g., love, hurt, hate)	Recoded original variable

^a All variables were recoded to a lower value to control for outliers; ln indicates natural logarithm.

which involved using an unrotated one-component solution and then calculating standardized regression component scores for each participant (Afifi, Clark, & May, 2004).

Results

Descriptive statistics for each linguistic property for each question are listed in Table 3. To test the hypotheses that question and dominance interact with guilt to influence linguistic properties of (a) quantity, (b) complexity, (c) certainty, (d) immediacy, (e) specificity, (f) affect, and (g) diversity, a repeated measures mixed-model multivariate analysis of variance was performed with guilt and question used as independent variables, dominance as a covariate, and linguistic properties as the dependent variables. The repeated factor of question was decomposed into linear, quadratic, and cubic polynomials for focused testing of the individual hypotheses. Additionally, given the low power resulting from the small sample size, effects with p values of less than .10, although failing to reach conventional significance levels, are also reported as suggestive of findings warranting future research.

Main Effects

Among the between-subjects effects, dominance exerted a significant influence on *quantity*, $F(1, 33) = 5.92$, $p = .02$, $\eta^2 = .14$; and *diversity*, $F(1, 33) = 12.31$, $p < .01$, $\eta^2 = .25$. However, the main effect of dominance on quantity was superseded by a

Table 3. Means (Standard Deviations) for Each Linguistic Property, by Question

Condition	Dominance Score (SD)	Property	M (SD)			
			Question 1	Question 2	Question 3	Question 4
Innocent	4.15 (1.64)	Quantity	0.08 (1.06)	0.39 (.85)	0.06 (1.03)	0.16 (1.11)
		Complexity	0.04 (1.11)	-0.17 (1.12)	-0.15 (.93)	0.18 (1.08)
		Uncertainty	0.20 (1.13)	0.23 (.96)	-0.25 (1.03)	0.08 (1.06)
		Immediacy	8.60 (7.33)	10.40 (5.37)	5.61 (4.85)	4.50 (5.43)
		Diversity	78.52 (19.81)	69.59 (22.15)	78.81 (17.79)	81.70 (18.70)
		Specificity	0.09 (1.10)	-0.04 (.98)	-0.06 (1.00)	0.20 (1.22)
		Affect	3.86 (4.11)	7.81 (6.22)	4.34 (3.85)	1.58 (1.72)
Guilty	3.73 (1.88)	Quantity	-0.15 (1.05)	-0.34 (1.05)	0.08 (1.00)	-0.21 (.90)
		Complexity	-0.04 (.85)	-0.09 (.93)	-0.04 (1.09)	-0.21 (.85)
		Uncertainty	-0.13 (.89)	-0.38 (.97)	0.17 (.97)	-0.17 (.84)
		Immediacy	12.65 (8.87)	10.32 (7.49)	5.63 (3.52)	2.31 (3.54)
		Diversity	76.76 (17.64)	74.63 (16.54)	79.79 (15.47)	71.39 (21.88)
		Specificity	-0.15 (.90)	-0.09 (1.11)	0.04 (1.09)	-0.14 (.84)
		Affect	3.88 (4.02)	9.19 (5.55)	3.61 (4.12)	1.07 (1.54)

Note: All linguistic properties containing multiple subcomponents were formed by saving the first unrotated principal component.

significant two-way interaction. Those who were more dominant during interviews displayed less *diversity* in their responses to the interview questions. The effect of dominance on *certainty*, $F(1, 33) = 3.45, p = .07$; and *specificity*, $F(1, 33) = 3.19, p = .08$; approached significance, with individuals exhibiting high dominance tending to use more *certainty* and sensory-rich language.

Before examining within-subjects effects, the data were first checked for violations of the sphericity assumption, indicating inequality of group variance. Sphericity violations were found for *complexity*, Mauchly's $W = .70, \chi^2(5, N = 37) = 11.45, p < .05$; and *affect*, Mauchly's $W = .56, \chi^2(5, N = 37) = 18.27, p < .05$. Thus, the degrees of freedom for within-subjects tests were adjusted using the Huynh-Feldt method (Meyers, Gamst, & Guarino, 2006); note that this adjustment yields fractional degrees of freedom. The results indicated that the within-subject effect of question was significant for the linguistic properties of *quantity*, $F(3, 99) = 2.71, p = .05, \eta^2 = .07$; *immediacy*, $F(2.96, 97.67) = 13.84, p = .04, \eta^2 = .07$; and *affect*, $F(2.60, 85.91) = 10.74, p < .01, \eta^2 = .22$. The effect of question on *immediacy* was negative linear, decreasing gradually across the four questions. However, the effects on *quantity* and *affect* were superseded by a significant two-way interaction described below. There were no main effects of guilt on the linguistic properties.⁶

Interaction Effects

First, there was a significant dominance by question interaction effect on *quantity*, $F(3, 99) = 2.97, p = .04, \eta^2 = .08$, and *affect*, $F(2.60, 85.91) = 3.15, p = .04, \eta^2 = .06$.

Dominance and question had a significant linear effect on *quantity*; interviewees exhibiting more dominance produced longer utterances than interviewees exhibiting low dominance except on Question 3. Dominance and question had a significant quadratic effect on *affect*, with interviewees exhibiting low dominance using more affective language for Question 2. The effect of dominance by question on *diversity*, $F(3, 99) = 2.11, p = .10$, approached significance.

Second, consistent with Hypothesis 2d, there was a significant guilt by dominance interaction effect on *immediacy*, $F(1, 33) = 4.09, p = .05, \eta^2 = .10$. To illustrate (see Figure 1) and probe the nature of this interaction, *immediacy* was averaged across the four questions and dominance was dichotomized using a median-split procedure. Among innocent interviewees, there was no difference in *immediacy* because of dominance, $t(15) < 0.01, p > .99$. However, among guilty interviewees, interviewees exhibiting high dominance ($M = 9.42, SD = 2.96$) demonstrated more *immediacy* than interviewees exhibiting low dominance ($M = 6.34, SD = 2.74$), $t(18) = 2.41, p = .03$. None of the other hypothesized interactions (Hypotheses 1a-1g and Hypotheses 2a-2c, 2e-2g) were significant.

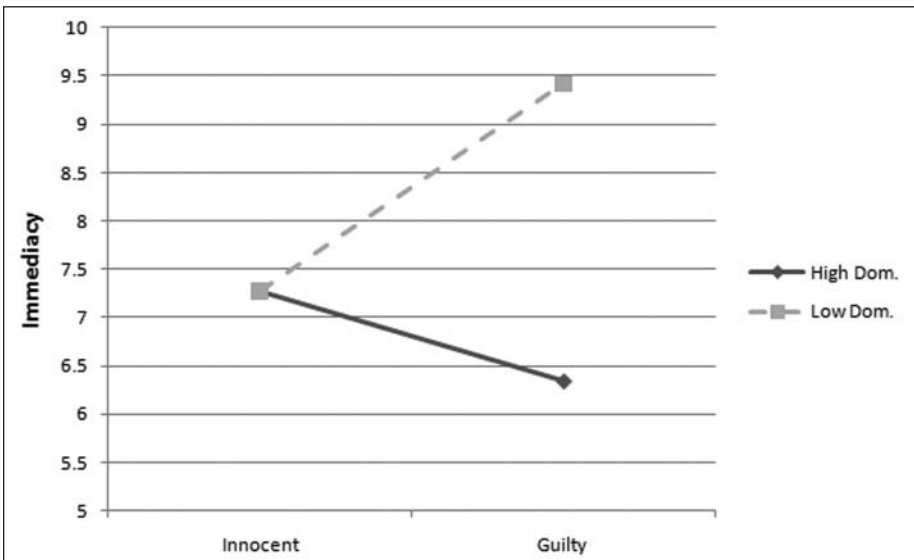


Figure 1. A two-way interaction of guilt by dominance on immediacy

Finally, in answer to Research Question 1, the omnibus test for the three-way (question by dominance by guilt) interaction for *complexity* approached significance, $F(2.82, 92.98) = 2.45, p = .07$, and the trend analysis produced a significant interaction effect with a quadratic pattern for question, $F(1, 40) = 4.68, p = .04, \eta^2 = .12$ (see Figure 2).

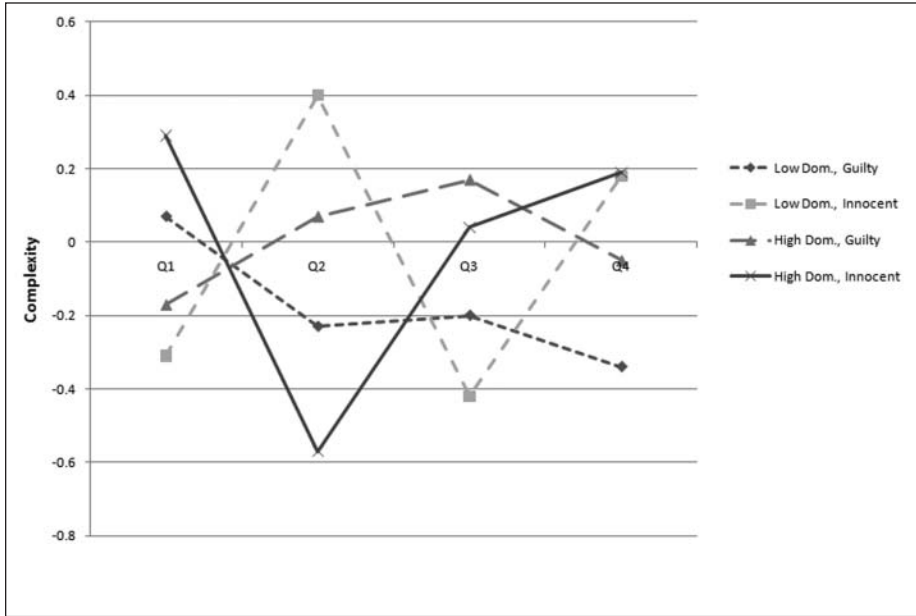


Figure 2. A three-way interaction of guilt by dominance by question on complexity

For the first and second questions, the main difference was between innocent respondents exhibiting high versus low dominance: People exhibiting high dominance used much more complex language than those exhibiting low dominance on Question 1, but this reversed for Question 2; guilty respondents used intermediate *complexity*, regardless of their dominance. Only on Question 4 do guilty respondents exhibiting low dominance differ from their innocent counterparts. Thus, *complexity* was more responsive to dominance than guilt, and neither high nor low levels of complexity were indicative of guilt, save for one question.

Discussion

This study examined the extent to which criminal interviews are marked by systematic variability in language when taking into account interviewee guilt, dominance, and interviewer questions. All the linguistic measures were influenced by one or more of the independent variables, but the effects varied from measure to measure. *Specificity* was influenced only by dominance, and *quantity*, *diversity*, and *affect* were responsive to dominance and question. *Immediacy* and *complexity* were affected by all three variables.

These results highlight the complexity of using linguistic properties of interview responses to determine guilt in “real-world” circumstances (see Table 4). There were

Table 4. Summary of *p* Values From *F* Tests for Main and Interaction Effects

Linguistic Property	Question	Dominance	Guilt × Dominance	Question × Dominance	Guilt × Dominance × Question
Quantity	.05 ^a	.02 ^a		.04	
Complexity					.04 ^c
Certainty		.07 ^b			
Immediacy	.04 ^a		.05		
Diversity		<.01 ^a		.10 ^b	
Specificity		.08 ^b			
Affect	<.01 ^a			.04	

^aIndicates main effect is superseded by an interaction effect.

^bIndicates an effect that does not meet traditional significance levels but is reported as suggestive of findings warranting future research.

^cWith a quadratic pattern for question.

no main effects for guilt, and guilt was involved in only two interactions. The three-way interaction among guilt, dominance, and question on linguistic complexity indicated that guilty individuals differed from innocent ones on only one question, and that difference was only evident for the interviewees exhibiting low dominance. Innocent individuals used more complex language. For other questions, guilty interviewees showed intermediate levels of complexity and the main differences pertained to interviewees exhibiting high versus low dominance.

Guilt was also implicated in a guilt by dominance interaction on immediacy. Among innocent interviewees, immediacy did not differ between high and low dominance. However, among guilty interviewees, those exhibiting high dominance used more immediacy language than those exhibiting low dominance. This finding is intriguing given the mixed results of research investigating the impact of deception on immediacy (e.g., Hancock et al., 2008; Newman et al., 2003; Vrij et al., 2007). More immediate language coming from the more dominant guilty interviewees makes sense, since if dominance is indeed a strategy, attempting to win the interviewer over with more immediate language may also be part of the interviewee's strategy. Based on these results, dominance influenced how immediacy is displayed by guilty suspects and may be a possible explanation for past contradictory findings.

As compared to guilt, the effects of question and dominance on linguistic properties were much more influential. Changes in linguistic properties that are attributable to variations in question and/or dominance are critical to understand so that they are not mistakenly interpreted as markers of guilt. Therefore, the effects of dominance and question are detailed below so they can be clearly identified and considered separately from the effects of guilt.

The results indicated that interviewee dominance affected language diversity: The interviewees who were more dominant during interviews were less lexically diverse in

their responses to the interview questions. When considered in conjunction with the dominance by question effect on quantity (i.e., how much was said in response to a particular question) described below, this result is not surprising. While offering more in response to certain questions, those interviewees who exhibited more dominance had a tendency to repeat themselves.

Further examination of the dominance by question interaction on quantity revealed that more dominant interviewees produced more words in response to all questions except for Question 3, which asked about the potential punishment for the individual guilty of the crime. Recall that Questions 1, 2, and 4 asked the interviewees to elaborate on the reasons someone might have to perpetrate the crime (Question 1), feelings about the accusation (Question 2), and previous instances of doing something like this (Question 4). Overall, dominance was largely associated with saying more.

In addition to producing more verbiage, the interviewees who appeared more dominant also used more affect-laden words than those who appeared less dominant, except on Question 2 (i.e., feelings about accusations question), where this was reversed. Overall, the results indicated that the fewest number of affective terms was produced for Question 4, which makes sense, since asking participants whether they have done something like this before requires a more factual statement. The most affective words were produced in response to Question 2, where respondents exhibiting low dominance produced more affective words than did interviewees exhibiting high dominance levels. The finding that the most affect was produced in response to Question 2 is not surprising inasmuch as the question elicited feelings about the accusation. Why the suspects exhibiting more (vs. less) dominance used less affect is unclear.

Taken together, these results suggest that the types of questions asked and the dominance demonstrated by the interviewee should be considered when judging question responses in both criminal and other types of interviews. In this study, the types of questions and dominance were much more influential on linguistic properties than was guilt. Since questions and dominance are observable, they can be incorporated into linguistic analyses by human observers or automated analyses. Furthermore, it may be prudent, as recommended by interviewing guides (e.g., Inbau et al., 2001), to develop individual models of linguistic responses for specific questions.

Although there is some evidence that the types of questions posed during an interview affect judgments of an interviewee's guilt or innocence (Levine et al., 2010; Vrij et al., 2009), and a similar view regarding the diagnostic power of different questions is also maintained by the BAI developers (e.g., Inbau et al., 2001), the fluctuations in linguistic properties of interviewee responses to specific questions were not significantly connected with their innocence or guilt (at least for the questions examined in this study). In this respect, the results of this study caution against using the linguistic variations in interviewee responses as being indicative of a suspect's guilt.

Finally, in this study we did not distinguish between potential sources of dominance, and this point deserves further discussion. During an interview, dominance may be displayed for a variety of reasons, including the interviewee's natural tendencies, ambiguous power distribution between the interviewer and interviewee (Dunbar,

2004), and as a tactic when deception is used for persuasion (Dunbar et al., 2010). Although there are many reasons why dominance may be manifested during an interview, dominance remains observable; thus, the interviewer can note when influence tactics involving dominance are being employed and to what degree. Therefore, regardless of the source, dominance should be used as part of the interviewee evaluation.

There are a few limitations that merit discussion. First, we acknowledge that the effect of specific questions and the ordering of the questions are confounded. A counterbalanced design was not possible with the sample; experimental control was sacrificed for ecological validity. Future investigations with control over interview content should examine whether the current results replicate across alternate question orders.

Second, the theoretical basis for this study is grounded in research on deception, which is conceptually distinct from criminal guilt/innocence. The variable referred to here as guilt is not deception, as all interviewees (including the guilty) could mix truth and deception in response to the interview questions. However, all guilty interviewees initially denied their involvement in a crime, which means they were all engaging in deception at some point in their responses.

This study examined interaction processes in an ecologically valid setting. In such settings, people are likely to mix truth and deception; thus, separating the two may not always be possible. In circumstances like these, some type of proxy for truth and deception is needed. Here, guilt was used as such a proxy, with several conservative criteria established to determine guilt. As compared with altering a message or part of a message, criminal guilt is likely to indicate a mind-set, which is a broader notion than deception. Future research should systematically study whether the results of deception research also apply to mind-sets induced by criminal guilt.

Third, our sample size was relatively small for a design with two fully crossed between-subjects variables. Our decision to attain some homogeneity by including only male subjects further reduced the sample size. Even though a mixed design with a repeated measure was used to increase statistical power and to control for individual differences, replications with a larger sample are necessary. This is especially salient given the main and interaction effects that approach significance. Therefore, we caution against overinterpretation of nonsignificant findings.

Finally, the types of crimes discussed during the interviews varied considerably across the sample. Small sample size prevented investigation of whether the type of crime affected interviewee dominance and/or linguistic properties in the interviewee responses. The extent of these effects is unknown. Effects exhibited above may be stronger for some types of criminal offenses (e.g., those with more severe consequences) than others. Future research should systematically investigate the effects of the types of crime on linguistic properties.

Conclusion

This research was a first step toward using automated tools to understand language use of guilty and innocent interviewees based on differences in questions and

dominance. The findings contribute to research on criminal interviewing in several important ways. First, because our data were gathered from actual criminal interviews, our results offer a level of ecological validity that is rare in studies concerning concealment of guilt. Second, the findings confirm that linguistic properties are sensitive to variability in communication features: Both the type of question asked by the interviewer and the degree of dominance in the interviewee's demeanor systematically influenced language use. Interviewee guilt, however, was a lesser contributing factor, indicating that systematic variation in interviewee language should not be indiscriminately attributed to guilt. Third, the emergence of significant interactions highlights the nuanced patterns of language that emerge in human exchanges. Language is responsive not just to the main effects of contextual factors but also to the moderating effect of combinations of factors, such as the combined influence of interviewer question and interviewee dominance. Future investigations of linguistic patterns not only must carefully chronicle the conditions under which the language is observed but also design experiments that allow for the examination of linguistic variability across contextual, interviewer, and interviewee factors.

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Notes

1. John E. Reid and Associates (n.d.), the firm that offers the BAI interview training, states more than 300,000 individuals have received training that includes the BAI since 1974.
2. We acknowledge that casting dominance as a deception strategy, especially when measurement of dominance is traditionally derived from the interaction, may result in tautological causal order. (We thank an anonymous reviewer for suggesting that this may be a potential problem.) For this reason, we focused specifically on the nonverbal component of

dominance to determine interviewee dominance. This approach mitigated methodological concerns from coders being influenced by linguistic properties in their coding of dominance (see the method section and footnote 3 for further details).

We further acknowledge that many contributors to dominance (e.g., trait dominance) may exist aside from strategic interactional control. Unfortunately, we were unable to measure interviewees' trait dominance as our study was conducted many years after the interviews occurred and the interviews were also anonymized.

3. Both coders recruited to code the data had previous experience with coding behavioral data. To work on this project, they were initially trained for 2 hours to observe nonverbal indicators of dominance. Training was followed by several practice sessions to ensure consistency. Dominance was scaled on a continuum of dominance–submission where dominance was characterized as the extent to which one conversational partner attempted to assert control over the other. Typical behaviors indicating dominance included talking more frequently and for longer periods of time, interrupting, unwavering eye contact, forward lean, direct body orientation, expansive gesturing, and expressive turn-requesting and turn-denying behaviors. Additionally, dominance displays also included, using a deeper and louder voice.

The audio was content filtered to eliminate the verbal component of speech so that dominance coding could not be conflated with linguistic features. The audio was rendered unintelligible by removing a segment from the audio seven times a second, but this approach still allowed coders to identify key indicators of dominance from the vocal channel (e.g., interruptions, longer talk time, louder voice).

4. Note that question effects are conflated with time, which is a limitation further discussed in the limitations section of the discussion. Also, the wording of Question 4 is slightly different in our study than the version prescribed by Inbau et al. (2001). Inbau et al. proposed wording similar to “Have you ever thought about doing something like what you are accused of doing?” The question posed by the interviewer in this study focused on past action rather than thoughts.
5. To meet the assumptions of the statistical analyses employed (Bauer & Fink, 1983; Fink, 2009), the distribution of each subcomponent of linguistic properties was examined for its approximate normality, and if variables appeared relatively nonnormal, they were transformed. Prior to transformations, if outliers were present, the dependent variables were first recoded to smaller values. All transformations required a constant be added to the recoded variables because these transformations cannot be performed on zero values. If transformations were necessary, all analyses were performed on the transformed variables.
6. For the interest of readers and benefit of future meta-analyses, the complete results of the guilt's main effect on linguistic properties were as follows: *quantity*, $F(1, 33) = 1.65, p = .21$; *complexity*, $F(1, 33) = 0.03, p = .86$; *certainty*, $F(1, 33) = 0.15, p = .70$; *immediacy*, $F(1, 33) = 2.49, p = .12$; *diversity*, $F(1, 33) = 1.98, p = .17$; *specificity*, $F(1, 33) = 0.76, p = .39$; and *affect*, $F(1, 33) = 0.86, p = .36$.

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