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Language dominance in interpersonal deception in computer-mediated communication☆

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Abstract

Dominance is not only a complicated social phenomenon that involves interpersonal dynamics, but also an effective strategy used in various applications such as deception detection, negotiation, and online community. The extensive literature on dominance has primarily focused on the personality traits and socio-biological influence, as well as various nonverbal and paralinguistic behaviors associated with dominance. Nonetheless, language dominance manifested through dynamically acquired linguistic capability and strategies has not been fully investigated. The exploration of language dominance in the context of deception is even rarer. With the increasing use of computer-mediated communication (CMC) in all aspects of modern life, language dominance in CMC has emerged as an important issue. This study examines language dominance in the context of deception via CMC. The experimental results show that deceivers: (1) demonstrate a different trend of language dominance from truthtellers over time; (2) manipulate the level of language dominance by initiating communication with low dominance and gradually increasing the level over the course of interaction, and (3) display higher levels of dominance in terms of some linguistic behaviors than truthtellers. They suggest that in CMC, deceivers not only adjust the level of language dominance more frequently, but also change it more remarkably than truthtellers.

Keywords: Dominance; Interpersonal deception; Linguistic behavior; Computer-mediated communication

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1. Introduction

Dominance is a function of particular relationships (Bernstein, 1981). It is more of a social phenomenon involving inter-individual dynamics than a simple phenomenon descriptive of an individual quality (Omark, 1980). Dominance–submission is positioned as one of two superordinate dimensions by which people come to define and understand their interpersonal relationships (Burgoon & Hale, 1984). Adapted from the view of interpersonal dominance (Burgoon & Dillman, 1995; Burgoon & Dunbar, 2000), dominance in the present study is defined as a behavioral state that reflects the actual attempts of influence or control of one person over another via communicative actions.

1.1. The nature of deception

Deception generally entails messages and information knowingly transmitted to other people to create a false conclusion (Buller, Burgoon, Buslig, & Roiger, 1994). Deception research has drawn on the theories and findings from diverse disciplines such as communication, criminology, forensic science, police study, psychology, and psychophysiology (Burgoon, Buller, Guerrero, Afifi, & Feldman, 1996; Driscoll, 1994; Kraut, 1978; Porter & Yuille, 1996; Sapir, 1987; Vrij, 2000). The research results can potentially be applied to enhancing law enforcement, military intelligence, and homeland security agencies, as well as to improving the public awareness of deception detection.

In order to increase the accuracy of deception detection, factors that may exert influence on deception have been examined from different perspectives, such as general cues to deception (DePaulo, Lindsay, Malone, Muhlenbruck, Charlton, & Cooper, 2003), personal traits, situational factors, and relationship factors (Burgoon, Buller, Ebesu, & Rockwell, 1994). It is important to study deception from an interpersonal perspective (Buller & Burgoon, 1996). As a fundamental part of human communication, dominance has been related to deception in the prior work. To name but a few, it was suggested that the most effective manipulative strategies for humans include the ability to disguise the truth about intentions or feelings (Buss, Gomes, Higgins, & Lauterbach, 1987; Ekman, 2001). Among the areas selected for investigating the patterns of nonverbal involvement in the service of the social control function, Edinger and Patterson (Edinger & Patterson, 1983) included dominance and deception. Mager (1931) used a dominance test as one of the two types of deception tests, which revealed the presence of deception by detecting every increase in the receiver's effort to withhold the truth.

1.2. The relationship of dominance to deception

Substantial research has reported that deception is often characterized by less nonverbal dominance than truthful communication (Buller et al., 1994; DePaulo, 1978; Zuckerman, Amidon, Bishop, & Pomerantz, 1982). Recent work by Burgoon and colleagues specifically on dominance during deceptive interpersonal interactions

has repeatedly shown that deceivers exhibit less verbal and nonverbal dominance than truthtellers (Burgoon et al., 1994; Burgoon, Buller, & Floyd, 2001; Burgoon, Buller, Floyd, & Grandpre, 1996; Burgoon & Dunbar, 2000).

However, various factors such as types of deception, receiver suspicion levels, and interpersonal familiarity have been shown to moderate that relationship (Burgoon et al., 1994; Burgoon & Dunbar, 2000). In one investigation, deceivers who engaged in flat-out lies (falsifications) were more dominant when faced with suspicion than when not, whereas those engaged in equivocation with a friend and those engaged in concealment with a stranger were less dominant under suspicion. These patterns suggest that deceivers may increase their level of dominance when the occasion calls for it, such as a need of presenting a convincing narrative or argument to a skeptical receiver.

Other research has demonstrated that individual communication skills moderate these relationships and deception success (Cody & O'Hair, 1983; Keating & Heltman, 1994b). Deceptive skill, general communication skills, and dominance are all positively correlated such that people who score high on dominance-related measures are highly successful deceivers (Braginsky, 1970; Geis & Moon, 1981). However, highly skilled deceivers also better adapt their dominance and submissiveness than their less skilled counterparts by exhibiting more dominance under truth than deception conditions (Burgoon & Dunbar, 2000). Strategically and normatively, then, deceptive messages are likely to be characterized as less dominant than truthful ones unless the circumstance lends itself to taking a more assertive approach.

Dominance may also be manifested in language use (Bernstein, 1981; Caldie, 1981; Liska, 1992). The existing studies of language dominance primarily focus on socio-biological perspectives (Hymes, 1964; Thorne & Henley, 1975), which frequently link language dominance with sex, social status, education background, ethnics, and so on. However, the issue of how dominance is manifested through dynamically acquired linguistic capability and strategies has not been fully investigated. Even though the linguistic behavior of deception has been identified in face-to-face settings (Sporer, 1997; Steller & Köhnken, 1989), and recently in computer-mediated communication (Zhou, Burgoon, Nunamaker, & Twitchell, in press), the examination of linguistic forms of dominance in the deception context is still sparse. We believe that several linguistic features should be indicative of dominance. These include higher quantity, more expressive language, and assertive statements. Non-dominant individuals are more subdued and passive. Conversely, we should expect more affective terms and intense language from dominant individuals.

1.3. Language dominance in computer-mediated communication

Computer-mediated communication (CMC) is the electronic exchange of information using computer terminals joined together via communication links (Sproull & Kiesler, 1986). CMC can break down communication barriers by making people less sensitive to contextual restrictions (McGuire, Kiesler, & Siegel, 1987) on behavior and encouraging them to convey information that is not otherwise conveyed through face-to-face communication (Sproull & Kiesler, 1986). With the wide

adoption of CMC technology in interpersonal communication, deception in CMC emerges as an important issue. It offers a new context for investigating language dominance, because first, prior dominance studies have largely been restricted to face-to-face settings. The relationship between linguistic behaviors of dominance and deception in CMC remains unidentified. Second, text is the major or even the sole medium for conveying information in CMC. Dominance, if there were any in CMC, would become more evident from a linguistic textual perspective. Consequently, textual messages produced in CMC can be considered as an ideal resource for studying linguistic behaviors of dominance. Third, during deceptive message exchanges in CMC, deceivers must be sensitive to language form in order to gain credibility and eliminate suspicion from their communication partners. Thus, we expect deceptive intention to be reflected in language behaviors, which are associated with dominance.

1.4. Objectives of this investigation

The main objective of this study is to investigate language dominance in deception in CMC. Motivated by the linguistic cues to deception in CMC (Zhou et al., in press), the current study aims to offer an interpretation of language behavioral patterns from a dominance standpoint. Despite the extensive research on dominance in face-to-face settings, Bernstein (1980) argued that dominance relationships can never be assumed but must be demonstrated in each application. Therefore, the exploration of language dominance in interpersonal deception in CMC will not only test the prior research findings in a new setting, but also broaden the scope of dominance research.

Dominance needs to be understood within a temporal context, in particular, the recurring messages in relation to preceding events (Harper, 1985). As interaction continues, the focus and language of messages may change, causing the alteration of language dominance accordingly. Successful deception often requires deceivers to encode a series of messages. Deceivers' linguistic behaviors should be investigated in multiple messages exchanged in continuous interaction. As the number of messages generated in a deceptive interaction increases, the probability of verbal and nonverbal inconsistency also grows. Verbal inconsistency is considered as an important indicator to distinguish truthful and deceptive behaviors (Kraut, 1978; Stiff & Miller, 1986). Nonetheless, seldom have prior studies taken into account the possible influence of subsequent messages on the consistency of language dominance. In view of the mixed communication goals and the strategic information management by deceivers, the temporal profile of language dominance for deceivers should be distinct from that for truthtellers. Therefore, we are interested in addressing the following two questions:

RQ1: How do temporal changes in language dominance differ between deceivers and truthtellers engaged in ongoing communication?
RQ2: How do deceivers change the pattern of language dominance over the course of the interaction?

On the one hand, it might seem plausible that deceivers would instinctively or strategically adopt dominant language to influence their partners' attitude towards what they say and prevent them from believing otherwise. On the other hand, concerned with being detected, deceivers may choose to protect themselves by keeping a low profile, appearing in a low status, and letting their partners take the lead during certain phases of communication. The latter is the pattern found consistently in the prior studies of dominance through nonverbal behaviors. It is still unclear whether deceivers in the context of CMC display higher language dominance than truth-tellers or the reverse. Therefore, we pose the following question:

RQ3: How does the language dominance of deceivers differ from that of truth-tellers?

2. Theoretical development

2.1. Interpersonal deception theory (IDT)

IDT (Buller & Burgoon, 1996) presents a framework to address the issue of deception in the interpersonal context from a dialogic instead of monologic perspective. In light of dialogic and dynamic features involved in interpersonal communication in CMC, IDT may be extended to explain the deception behaviors in CMC. Some of the propositions in IDT can be potentially helpful for examining language dominance in CMC. Information management (Buller & Burgoon, 1996) subsumes the modification or manipulation of the central message content and its language style. Among the strategies that deceivers may use (Burgoon, Buller, Guerrero et al., 1996) are withholding truthful information, then opting for vagueness and uncertainty if withholding does not work, and finally resorting to nonimmediacy if the first two fail. The above three strategies may be accomplished through a collection of linguistic choices. Among them, many are identified as part of verbal nonimmediacy (Wiener & Mehrabian, 1968), which refers to linguistic patterns that create a psychological sense of distance rather than closeness among interactants and has an effect in reducing the clear linkage between an individual and an action. Deceivers may use qualifiers, indirect forms of expression that qualify a response, such as "kind of" or "it seems to me." In addition, the idea of the influence of interaction on participants' subsequent behaviors implies a possible change in linguistic behaviors as communication evolves. Therefore, it is plausible to use linguistic indicators to examine deception in continuous communication.

2.2. Dominance, gender, and language

Communication success and failure often depend not merely on the content of a message, but as much as or more on how one expresses and delivers it (Sanders, 1984). Dominance has received a lot of attention in language and gender research,

which attempts to explain how male dominance in society also manifests itself linguistically.

In general, females are considered as less dominant and tend to exhibit patterns of uncertainty, qualification, hyperpoliteness, and expressions of personal emotional reactions (Lakoff, 1973). The female style of speech is characterized by less obtrusiveness and is often equated with powerless speech. Many early findings and speculations have reported that females tend to use significantly more words to express feelings, emotions, or motivations (Barron, 1971; Gleser, Gottschalk, & Watkins, 1959; Lakoff, 1973; Wood, 1966). It is implied from those findings that, in contrast with female's speech style, dominance language should involve less uncertainty and qualification. The higher emotional display in female speech mainly pertains to the occasion of recalling past experience in daily conversation, rather than discussing issues in a decision making context, where females' emotional voice representing preferred choices may be less likely to be heard. Thus, the affective language associated with dominance or submission will depend on the context and differ qualitatively across contexts. In a decision-making context, we might expect dominant females to express more affect in the form of strong opinions favoring or rejecting certain options, whereas those in positions of less power and dominance may opt for greater linguistic neutrality. The research results characterizing male's speech are quite consistent. For example, men have a tendency of using more words in responding to a given stimulus (Henley & Thorne, 1975; Wood, 1966), and the linguistic mode characteristic of many men is authoritative and declarative (Workshop, 1973). Other linguistic analyses of dominance and power have shown that dominant and powerful individuals use more declarative statements and a variety of linguistic forms that are nonimmediate, definitive, and concrete, as compared with the hyperpolite, hyperformal, indirect, immediate, indecisive, and overly qualified forms used by less powerful individuals (Bradac & Mulac, 1984; Burgoon, Johnson, & Koch, 1998; O'Barr, 1982; Rogers & Farace, 1975; Rogers & Jones, 1975).

The evolving gender-based dominance in society is beyond the scope of our work. Nonetheless, the relationship existing between language and gender dominance identified in the past work may shed light on language dominance in CMC regardless of gender.

2.3. Attributes of dominance

There are two common approaches to studying the attributes and dimensions of dominance (Burgoon et al., 1998). The first one is to consider general attributes or impressions that dominant individuals create during their communication and actions (Liska, 1992; Norton, 1983; Weisfeld & Linkey, 1985). For example, dominance displays connote social success, self-confidence, sociability, and competitiveness (Weisfeld & Linkey, 1985). Dominance is pictured as being active, energetic, and dynamic, taking the lead in conversations, being expressive and impression-leaving, and being assertive and influential (Burgoon et al., 1998). The second approach is

to look more specifically at behaviors and dimensions underlying different classes of dominant displays (Argyle, 1972; Burgoon, Buller, Hale, & deTurck, 1984; Dovidio & Ellyson, 1985; Lamb, 1981). By this way, dominance is mainly evaluated on the basis of specific nonverbal or verbal traits (Schwartz, Tesser, & Powell, 1982). For example, the patterns of hesitation may be related to subordination (Brend, 1972). However, nonverbal displays may be misleading. Keating and Heltman (1994b) found that deception could not be accurately decoded from the nonverbal dominance behavior. Several studies also indicate that success in deception detection is improved when decoders have fewer or no nonverbal channels on which to rely (Hocking, Bauchner, Kaminski, & Miller, 1979; Maier & Thurber, 1968). These findings point to the value of considering verbal behaviors when examining dominance in deception. This is especially true in text-based CMC media, such as e-mail, where verbal rather than nonverbal behaviors are evident and accessible.

Communicator dominance is generally associated with the control of interactions and with verbal differences (including language) during interactions (Mehrabian, 1971). Dominant communicators employ longer messages in normal truth-telling interactions than less dominant communicators. The research findings about nonverbal behaviors of dominance, however, provide insight into potential linguistic behaviors of dominance. For example, potency (dominance) of nonverbal behavior corresponds to dominant communicators' being freer to use intense language, especially opinionated rejection language. Attributes of dominant individuals such as monopolizing, authoritativeness, involvement, and persuasiveness (Burgoon et al., 1998; Liska, 1992; Norton, 1983) may be associated with more verbosity and certainty during the communication. Being expressive, influential (Burgoon et al., 1998), and self-confident (Weisfeld & Linkey, 1985) implies the use of a more definitive speech style with less uncertainty and subjunctive language and more intensity language and positive affect.

2.4. Conversational dominance

Interpersonal communication in CMC is a kind of virtual conversation. Contrary to the common belief that daily conversation between peers is a form of interaction characterized by symmetry and equality of participation, some analysts argue that daily conversation is also characterized by asymmetry (Itakura, 2001). Dominance is one dimension of asymmetry. Nonverbal gestures of dominance and submission often follow the asymmetric pattern.

Dominance in conversation is analyzed along three dimensions: sequential, participatory, and quantitative (Itakura, 2001). The sequential and participatory dominance is not as evident in distributed asynchronous CMC as in traditional face-to-face conversation. The quantitative dimension, however, can be generalized to CMC settings. Quantitative dominance is based on the assumption that each speaker's contribution to a conversation is quantifiable in terms of the sum of turns or the size of text produced during the conversation. The result (Itakura, 2001) shows that dominant people use more words.

2.5. Interaction Adaptation Theory (IAT)

Deception is likely to be a continuous event that occurs over time (White & Burgoon, 2001). IAT describes the interaction patterns of reciprocity and compensation in dyadic interaction (Burgoon, Stern, & Dillman, 1995). Even with deception goals in mind, deceivers may manage to make their intention embedded in other messages that seem truthful to their partners. One underlying motivation is to prevent their communication partners from suspecting them, which may in turn lead to cognitive arousal in themselves. In addition, the adaptation in dyadic interaction may have some effect on deceivers' occasionally displaying similar behavior to truthtellers. Therefore, we expect to see dynamics of language dominance in deception over time.

2.6. Hypotheses

According to the literature reviewed in the preceding sections, dominance exerts influence on linguistic behaviors. In particular, it is suggested that dominance is featured with higher quantity, expressivity, and intensity of language (Burgoon et al., 1998), yet it is also associated with less uncertainties and subjunctive language (Lakoff, 1973; Workshop, 1973), and with more affect displays (Burgoon et al., 1998; Weisfeld & Linkey, 1985). In text-based CMC, the influence and persuasiveness of dominant communicators on their partners are more likely to be exercised through clearly stated subjective orientation and polarity of words. Submissive partners, on the other hand, may only feel comfortable to present objective facts instead of their personal opinions. Therefore, we predict that language dominance in CMC involves more affect display. Deception is most frequently associated with a communicator's negative affect (Wiener & Mehrabian, 1968). Thus, we further classify affect into two classes: positive and negative affect. To sum up, language behavior indicative of dominance should include higher quantity, expressivity, intensity, positive and negative affect language, and lower uncertainty and subjunctive language.

In order to manage negative arousal and cognitive load as a consequence of attempts to simultaneously deceive and maintain communication, deceivers must juggle multiple, perhaps conflicting, goals that would not be as salient in "normal" interaction. They tend to both deliberately employ strategic communication behaviors and inadvertently display "nonstrategic" leakage behaviors typical of deceivers (Buller & Burgoon, 1996). The adjustment of deceivers' behavior during communication may cause the language dominance to change with unusual patterns over time. As a result, deceivers are expected to exhibit a different moving trend of language dominance from truthtellers, as described in hypotheses H1:

H1. Deceivers show different trends in quantity (H1a), expressivity (H1b), intensity (H1c), positive affect (H1d), negative affect (H1e), uncertainty (H1f), and subjunctive language (H1g) from truthtellers over the course of interaction.

When engaging in deception, a communicator must manage his/her own internal state and be sensitive to signs of detection on the part of an interaction partner.

Consequently, when people are deceiving, they are motivated to reduce suspicion. It is argued that when deceivers try to avoid detection, they strive to avoid looking like deceivers by suppressing those behaviors that can be controlled and that are judged as stereotypical of deceivers (Hocking & Leathers, 1980). This suggests that if deceivers attempt to project a more believable impression, they should adjust their own language behaviors accordingly by becoming more submissive and keeping lower status. Since adjusting dominance behavior on the deceivers' side may protect them from being suspected, changing patterns of dominance behaviors is as important as the overall level of dominance itself. The adaptation in dyadic interaction may cause deceivers to behave in a similar way to truthtellers occasionally (Burgoon, Miczo, & Miczo, 2001). In line with the view that deceptive displays are dynamic and responsive to partners behavior, deceivers have also been found to exhibit varying patterns over time in relation to themselves and in relation to truthtellers (Zhou, Burgoon, & Twitchell, 2003). However, little is known about the typical patterns of language dominance in deceiving. Starting from the premise that deception has a dampening effect on affect and verbal behavioral expression (Buller & Burgoon, 1996; DePaulo, Stone & Lassiter, 1985; Ekman, 2001), we anticipate that deceivers will begin the interaction with lower levels of dominance, but will attempt to increase the level of dominance and gain control over the communication over time:

H2. Deceivers start with low levels of quantity (H2a), expressivity (H2b), intensity (H2c), positive affect (H2d), and negative affect (H2e), and then increase the levels over time. Deceivers also start with higher levels of uncertainty (H2f) and subjunctive language (H2g), and then decrease them over time.

In this study, deceptive senders were specifically instructed to mislead or misinform their partners to arrive at a wrong decision. In order to accomplish the task, deceivers need to exert influence over their partners in order to manipulate their decisions, which should bear certain relations to their expectations of dominance during interaction. Whereas the nonverbal communication literature has routinely found that deceivers adopt a meek, nonassertive demeanor unless the situation lends itself to being more assertive and dominant, two features of the current investigation make the latter pattern of greater dominance more likely on some features. One feature is that the task requires participants to persuade their partners to adopt their recommendations, thus qualifying as a persuasive context. When deceivers are forced to encode a message, if they do not want to be detected, it should be of sufficient length and plausibility to make the message believable. Another is that participants communicated via CMC, which affords deceivers more time to plan, review, and edit their messages and to adapt to receivers' responses.

The first investigation into many of these linguistic features (Zhou et al., in press) found that deceivers differed from truthtellers in quantity, diversity, certitude, affective tone, and formality of their messages. Deceivers had longer messages with more words, verbs, noun phrases and sentences; their messages were more affectively positive, less diverse, more uncertain and tentative, and more informal (Zhou et al., in press). Viewed from a dominance standpoint, deceivers were more dominant in terms of message

quantity, expressivity, and affective content, but equivocal in terms of how definitive their statements were. This pattern would qualify as tempered dominance. In the case of deception, the particular combination of cues would serve as a means of preserving the appearance of dominance while tempering it with other uncertain language to reduce deceivers' accountability for what they said. That is, deceivers would likely couple dominance—expressed through greater verbosity, expressivity, affect, and intensity—to create an impression of authoritativeness, with other strategies of uncertainty and ambiguity, evasiveness and equivocation, and nonimmediacy. These strategies will be manifested as more uncertain and subjunctive language. To test this proposition, we coded two additional linguistic features and hypothesized that:

H3. Deceivers show higher intensity (H3a) and lower subjunctive language (H3b) than truthtellers.

3. Research method

We have conducted an experiment (Zhou et al., in press) to test the above hypotheses. Subjects were randomly formed as sender–receiver pairs, and the dyadic pairs were randomly assigned to one of the two experimental conditions and performed a task for three consecutive days. Only the senders under two conditions are included in the current investigation. Therefore, this study used a 2×3 repeated measure design varying experimental condition (truth vs. deception) and time (day 1, 2, and 3).

A series of profile analyses and post-hoc tests were conducted to test hypotheses H1–H3. In all analyses, time was treated as a within-subjects factor, and repeated contrasts were performed on the time variable to identify potential trends. Three comparisons were of primary interest in these analyses. First, deceivers' trends of language dominance over time were analyzed and compared with those of truthful senders. Second, language dominance of deceptive senders was further examined by contrasting two consecutive days. Finally, language dominance of senders under the deception condition was compared with that under truth condition.

3.1. Participants

Sixty participants (undergraduate students) were recruited from a management information systems course in a large southwestern university. They were offered extra credits for experimental participation. Subjects participated in the experiment by logging onto a Web-based e-mail messaging system. They were randomly formed into two-person groups (dyads), which were then randomly assigned to one of the treatments depending on the order they logged in.

3.2. The procedure

Subjects paired up as dyads of sender and receiver to complete the assigned task. The task was a modification of the standard Desert Survival Problem (Lafferty &

Eady, 1974), in which subjects were hypothetically stranded in the Kuwaiti desert. After reading a newly developed "encyclopedic entry" on "Surviving in the Desert," participants were asked to discuss the importance of the salvageable items to survival and reach consensus on the ranking via message exchange. The availability of one item may influence the importance of the others. Senders wrote to their partners in the first half-days and partners replied in the second half-days over three consecutive days. Deceptive senders were specially induced in the instruction to deceive their partners when they first logged in. A dynamic situation was introduced into the experiment on the second and the third days, where one of the salvageable items became unusable. The pairs had to adjust their rankings on the remaining items and justify their choices with messages. None of the participants was informed of others' condition throughout the entire experiment.

3.3. Independent variables

3.3.1. Condition

There were two types of experimental conditions: deception and truth. Approximately half of the dyads were assigned to each condition. In the deception condition, randomly selected senders were instructed to mislead their receiver to a decision that is contrary to what was recommended by experts in the encyclopedic description and contrary to what the sender knew to be the best course of action. In the truth condition, senders presented their true recommendations and opinions.

3.3.2. Time

The entire experiment lasted for three consecutive days. On each day, the sender in a dyad wrote messages to the receiver between noon and midnight, while the receiver responded between midnight and noon on the next day.

3.4. Dependent variables

It is imperative to operationalize the notion of dominance in such a way that enables us to compare linguistic behaviors of partners during a communication. Based on the survey of past studies on dominance and language as well as the automation potential, we selected seven dependent variables. These variables and their descriptions are summarized in Table 1. All variables except quantity and expressivity were measured on per-word basis. Among them, quantity, expressivity, uncertainty, and positive and negative affect have been investigated from the perspective of linguistic cues to deception in a prior study (Zhou et al., in press), but they are incorporated into this study as indication of dominance. In addition, the variables of intensity and subjunctive language are newly introduced in this study.

To avoid subjective interpretation and inefficient hand coding of individual linguistic measures, natural language processing (NLP) tools (Voutilainen, 2000) were employed to automate the process. NLP allows people to communicate with machines using natural communication language by enabling computers to automatically analyze and understand human language. NLP applications, along with

Table 1
Summaries of dependent variables and descriptions

Quantity:	the total number of words in a message.
Subjunctive language:	the percentage of verbs expressing a condition that is doubtful or not factual, such as "should have".
Uncertainty:	the percentage of phrases indicating the lack of sureness about someone or something, such as "possible".
Expressivity:	$\frac{\text{total \# of adjectives} + \text{total \# of adverbs}}{\text{total \# of nouns} + \text{total \# of verbs}}$
Positive affect:	the percentage of phrases showing conscious subjective aspect of a positive emotion, such as "beautiful".
Negative affect:	the percentage of phrases showing conscious subjective aspect of a negative emotion, such as "uncomfortable".
Intensity:	the percentage of phrases modifying the intensity, extensity, or frequency of a subject–object relationship, such as "very" (Wiener & Mehrabian, 1968).

heuristic rules supported by special-purposed lexicons, can automatically calculate the values for all the measures in Table 1.

4. Data analysis and results

Among the 30 dyads that successfully completed the whole experiment, 14 were collected from truth condition and 16 from deception condition. For all analyses, Greenhouse corrected degrees of freedom were used when the sphericity assumption was violated.

4.1. Profile analyses

A series of profile analyses and a series of post-hoc analyses (Johnson & Wichern, 2002) were conducted on seven dependent variables to test the hypotheses. Since people anticipate and prefer truthful message exchange, subjects engaging in truthful communication constitute a baseline condition.

For senders, a series of condition × time profile analyses were performed on each dependent variable separately. The analysis results (See Appendix) revealed that the condition by time interaction had significant influence on quantity, $F(1.603, 44.871) = 2.771$, $P < 0.1$, and intensity, $F(2, 56) = 2.426$, $P < 0.1$. Thus, hypotheses H1a and H1c were supported. Other sub-propositions in H1 were not supported. The contrast analyses between day 2 and day 3 showed that quantity decreased significantly and intensity increased significantly in the deception condition, but little change occurred in the truth condition. Furthermore, the moving directions of both measures for deceivers were opposite to those for truthtellers over the course of the experiment. It suggested that deceivers adjust their language dominance to a larger degree than truthtellers, and even completely switch the normal moving directions.

In order to test hypothesis H2 that deceivers initiate communication with low dominance and increase it over time, we used the data from truthful senders as a baseline and compared the changing trends of deceivers' language with those of truthtellers. If a change is simultaneously significant (or insignificant) in both conditions, it is likely to be a temporal effect unrelated to deception. However, if a significant change only happens in the deception condition, it supports the hypothesis that deceivers change their levels of language dominance. If the change only appears in the truth condition, it may be because deceivers strategically suppress the naturally occurred changes, or they were too taxed by deception to adjust their behaviors. Trend analysis on the time variable for the deception condition uncovered a linear increasing trend for expressivity, $F(1, 13) = 4.399$, $P < 0.1$, a linear decreasing trend for quantity, $F(1, 13) = 50.898$, $P < 0.001$, subjunctive language, $F(1, 13) = 4.366$, $P < 0.1$, and negative affect, $F(1, 13) = 3.308$, $P < 0.1$, a quadratic trend for uncertainty, $F(1, 13) = 6.626$, $P < 0.05$, and intensity, $F(1, 13) = 5.046$, $P < 0.05$, which initially decreased and then increased. A similar trend analysis for the truth condition revealed a linear decreasing trend for quantity, $F(1, 13) = 9.72$, $P < 0.01$, uncertainty, $F(1, 13) = 3.432$, $P < 0.1$, and positive affect, $F(1, 13) = 3.432$, $P < 0.1$. The parallel comparison of the results for deceivers and truthtellers showed that deceivers increased expressivity, decreased subjunctive language and negative affect, and suppressed the decrease on positive affect. Therefore, hypotheses H2b, H2d, and H2g were supported, and hypothesis H2c was partially supported. However, hypotheses H2a, H2e, and H2f were not supported. In particular, the test results showed or partially revealed the opposite of the predictions in hypotheses H2e and H2f.

The analyses also demonstrated that the time had a significant impact on quantity, $F(1.603, 44.871) = 23.095$, $P < 0.001$, and uncertainty, $F(2, 56) = 2.544$, $P = 0.01$. The repeated contrast analyses on time revealed that quantity decreased significantly from day 1 to day 3, and uncertainty decreased from day 1 to day 2. The simple contrast analysis for the deception condition uncovered several significant changes: quantity decreased from day 1 to day 2, $P < 0.01$, and from day 2 to day 3, $P < 0.05$; uncertainty decreased from day 1 to day 2, $P < 0.01$; and intensity increased from day 2 to day 3, $P < 0.1$. The simple contrast analysis on the truth condition showed that only quantity decreased significantly from day 1 to day 2, $P < 0.01$. The comparison of the above two simple contrast results suggested that uncertainty and intensity of language significantly change solely in the deception condition. Moreover, the decreasing trend of quantity was more consistent in the deception condition than in the truth condition. In contrast, deceivers maintained similar levels of positive and negative affect and subjunctive language over the course of communication.

The analysis of main effect of condition in H3 showed that neither of propositions on the two additional linguistic features was supported.

5. Discussion

This study investigated the pattern of language dominance of deceivers in CMC, in which the language from truthtellers was used as a baseline. IDT proposes that

deceivers may strategically manage information through a collection of linguistic choices. Many previous studies on dominance have suggested that dominance is closely related to language usage. This study provides new appealing evidence, indicating that deceivers in CMC manipulate language dominance to achieve their communication goals.

Two of hypotheses were at least partially supported in their sub-propositions in the study. First, the time trends of dominance language were considerably different on quantity and intensity between deceivers and truthtellers. Second, the trend that deceivers started communication with a low level of language dominance and gradually increased the level was reflected on expressivity, positive affect, and subjunctive language, and partially on intensity. In addition, deceivers changed the level of language dominance on expressivity, uncertainty, intensity, and quantity over the course of interaction. The above findings imply that deceivers tend to manipulate their language dominance more extensively and frequently. The ability to control behavior and suppress behavior when deceiving is indicative of dominance (Cody & O'Hair, 1983; Keating & Heltman, 1994a). The fact that deceivers adjust language dominance in more linguistic behaviors over time and change the language dominance between subsequent messages more markedly than truthtellers signals that there is more verbal inconsistency in deceptive behaviors. It confirms the findings from a few prior studies on identifying deceptive behaviors from multiple message exchange (Kraut, 1978; Stiff & Miller, 1986). Deceivers' increase of dominance over time implies that they tend to keep a low status to protect themselves from being suspected at the beginning. Once deceivers built relationship with their partners, which reduced the immediate threat to the image of the deceivers, they started to work towards their deceptive goal in a more noticeable way.

Unlike what we predicted, deceivers did not show higher dominance in terms of intense and subjunctive language. One possible explanation is that, in addition to negative opinionated rejection language such as "never", we include qualifiers such as "really" as part of the intense language. The latter characterizes powerless speech. An alternative explanation is that given a persuasive and potentially conflicting situation, communicators may converge on their use of intense language. Furthermore, dominant individuals may feel it is more difficult to exert influence on others via leaner CMC channel than in face-to-face communication, while less dominant individuals may feel it relatively easy to express themselves in CMC. It echoes the positive effect of electronic meeting system on participation ratio in group work (Valacich & Dennis, 1994). The lack of support for subjective language may be due to the nature of task and the dyadic setting. In the experiment, subjects were asked to collaborate with each other in determining the importance of items for the task at hand with concrete details. Thus, there is little chance for them to use subjunctive language, which was reflected in lower values ($M = 0.0041$) than other dominance measures. A prior study (Zhou et al., in press) revealed that deceivers produced higher quantity and positive affect than truthtellers. From the dominance standpoint, deceivers showed more dominance in terms of quantity and positive affect language. Dominant individuals are characteristics of persuasiveness (Burgoon et al., 1998; Liska, 1992). At least under persuasive conditions and CMC conditions, as

shown in our experiment design, deceivers may try to bluff their way through creating a lot of verbosity. This contradicts with the findings of less non-verbal dominance by deceivers in face-to-face communication. Therefore, the current results make a unique contribution by signaling that deceivers' dominance behavior may vary according to the context.

Opposite to our prediction in the hypotheses, negative affect showed a linear decreasing trend, indicating that deceivers lowered the level of language dominance over time. Deception is generally considered as a negative experience due to the potential arousal, nervousness, and even apprehension caused by deception (Ekman, 2001). Deceivers have to manage to conceal the truth and present false information as if it were true. Therefore, they inadvertently displayed more negative affect at the beginning. As they continued the interaction towards their goals, deceivers learned to better control themselves and disclose less negative affect to their partners. Even though the decrease in negative affect may indicate the decrease of language dominance, it also suggests an increase in deception dominance considering negative affect as a natural "weak point" of deception. The trend of uncertainty in the deception condition implied that dominance initially increase and then decrease. Uncertainty reduction and relationship development are two of the main functions of interpersonal communication (Berger, 1987). Therefore, the level of uncertainty is expected to reduce through the communication process. In addition, the assigned task in the experiment was of the decision type, so the uncertainty was supposed to be alleviated over time, as shown in the truth condition. Driven by deception, which was disparate from the communication goals of truthtellers, deceivers increased rather than decreased the level of uncertainty at the latter phrase of the communication. The alternative explanations suggest that some linguistic choices could play contradictory roles in terms of dominance and deception. In the context of deception, the influence of deceptive communication goals may take the lead.

Some patterns observed under the truth condition were absent under the deception condition. For example, in contrast with the truth condition, positive affect did not show a significant moving trend in the deception condition. It revealed that deceivers maintained a consistent level of positive demeanor over the entire communication. As communication between partners unfolded in the experiment, decisions should have become clearer and exchanged messages become more objective. As a result, the level of positive affect was expected to show a decreasing trend. Deceivers' lack of change was a removal from the normal pattern shown by truthtellers, which implicitly conformed to our proposition that positive affect was increased over time in the deception condition. It indicated that in the decision making context deceivers were likely to adopt positive affect to direct the decisions towards their own favors. Given enough time and a physically distributed setting in CMC, deceivers may feel it much easier to put on the desired affect while composing their messages.

Questions remain as to the external validation of these results to other tasks or settings. In view of CMC, however, the experimental condition was a close approximation to a real-life situation, for a real deceiver would have sufficient time to compose his/her messages and s/he does not have to worry about disclosing deceptive clues other than messages themselves. If patterns of dominance language emerge

between deceivers and truthtellers in the experiment studies, we are expected to see even more pronounced patterns in the real world. Nonetheless, the lack of common standards and structure of the language in CMC was clearly demonstrated in this study (e.g. punctuations were used very sparsely).

Whether or not nonverbal indicators of dominance occur may depend upon a variety of factors, including variables such as sex, race, age, and social context (i.e. number of participants and nature of the relationship) (Harper, 1985). Such factors may also play a role in verbal behaviors. In view of random selection from the same population across different groups, however, many of the factors can be neglected. It can be assumed that there are no systematic variations across experimental groups.

6. Future research

Language helps enact and transmit every type of inequality, including the one between the genders (Thorne & Henley, 1975). The relationship between dominance and gender has been frequently discussed in face-to-face and/or spontaneous communication (Caldie, 1981; Thorne & Henley, 1975). However, little is known about the effect of gender on language dominance in CMC. It is worthwhile to investigate whether the effect of gender on dominance in face-to-face communication can be extended to CMC.

The relationship between a message and its follow-ups is potentially useful for discovering dominance-submission relationship, such as question intonation in declarative contexts. For example, in response to the question "*When will the documents be ready?*", an answer "*Tomorrow morning?*" sounds as if the respondent is seeking approval and asking whether that time will be okay. A comparison of reciprocation and compensation patterns between partners under deception and truth conditions will be the next objective of the future study.

Group size and the nature of partners' relationships are two potential moderating factors. While there are more than two parties involved in ongoing interactions, there are higher possibilities of dominance–submission interplay, and groups may take on their own characters. The nature of the relationship, often determined by the purpose and/or formality of the context (e.g. work vs. social encounter) and the time the group has been together, is also important (Harper, 1985). We can change dyadic design to a triadic one, and find out whether more dominance will emerge. The subjects were not aware of their partners' information in the experimental design. We may pair subjects based on friend or stranger relationship and examine the effect of relationship on language dominance. When examining dominance relations in ongoing groups, we should consider those interactions that are occurring now and those interactions that have occurred in the past.

This study provided evidence for a positive relationship between deception and dominance, which is a reversal of the past findings. Contextual factors such as communication channel and task type may have contributed to the difference.

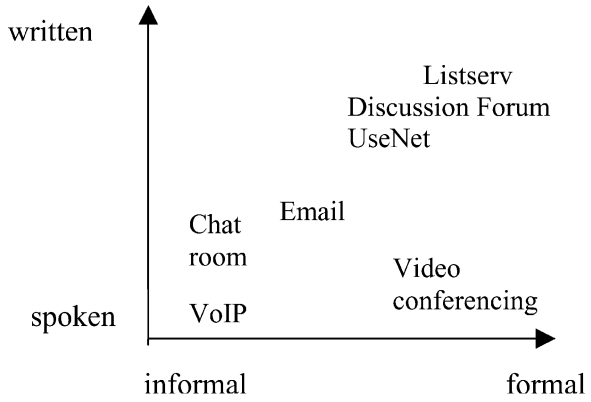

Fig. 1. The relationship between CMC media types and language styles.

Therefore, it is worthwhile to revisit the relationship between deception and dominance in other types of contexts. In terms of interpersonal communication, there are many types of supporting media other than e-mail, as shown in Fig. 1. Changes in communication media may be accompanied with the change in language behaviors. Compared with e-mails, for example, chat rooms are more spontaneous and featured with more speech style of language. It will be interesting to extend and validate the findings on linguistic behaviors of dominance from email to other types of media.

In addition to language dominance, some nonverbal behaviors of dominance in CMC are worth exploring. The order and the number of turns of interaction were pre-determined and fixed in this experiment. As a result, the participatory dominance and sequential dominance (Itakura, 2001) were not issues of concern. The structure of the design may be altered by allowing more dynamics in the number of turns and the order of communication in future studies.

A number of other factors, including task, profession, culture, and social status, can account for language dominance. CMC provides a new environment for dominance and deception research, of which the results can not only help better understand a complicated social, psychological, and interpersonal phenomenon, but also have many practical applications. Among them, deception detection, negotiation, and the development of online community are three promising areas.

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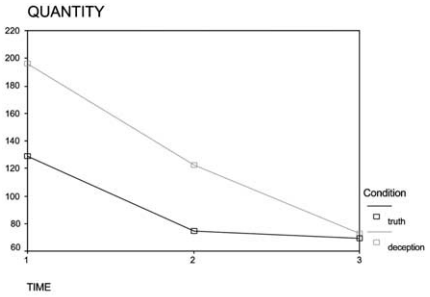
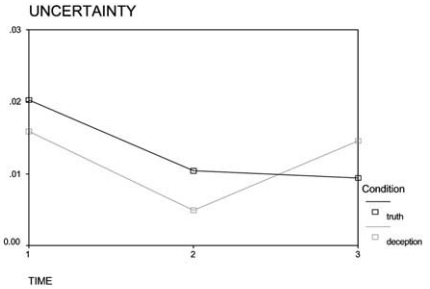
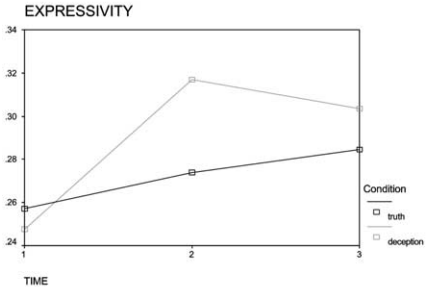
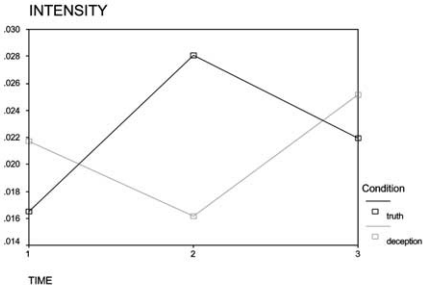
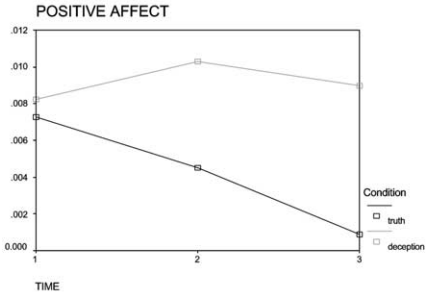
Appendix A. Mean comparisons by condition and time for individual language dominance variables

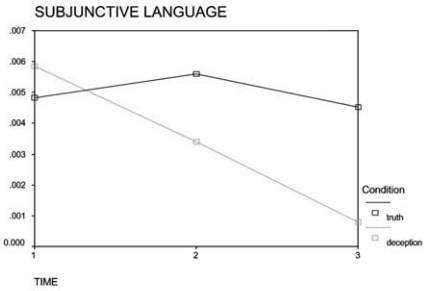


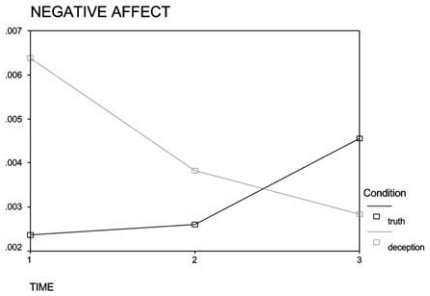












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