# THE IMPACT OF DECEPTION AND SUSPICION ON DIFFERENT HAND MOVEMENTS

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ABSTRACT: The present experiment examined the relationship between different types of discourse linked hand movements and deception. Hand gestures were experimentally studied during truth telling and deception, and in situations with either weak or strong suspicion. Participants (128 Italian psychology students) were interviewed twice about the possession of an object. In one interview they were asked to lie and in the other asked to tell the truth (veracity factor). In both conditions, suspicion was raised after the interview: Participants were accused of lying by the interviewer and asked to repeat their account a second time (suspicion factor). Results indicate that lying was associated with a decrease in deictic gestures, and an increase in metaphoric gestures (main effect of veracity). Also a decrease in self-adaptor gestures was found. Strong suspicion was associated with an increase in metaphoric, rhythmic, and deictic gestures and a decrease in self-adaptor, emblematic, and cohesive gestures (main effect of suspicion). No interaction effect was found.

KEY WORDS: deception; hand gestures; suspicion.

The most comprehensive meta-analysis of cues to deception to date revealed only a few, and mostly weak, relationships between nonverbal behavior and deception (DePaulo, et al., 2003). Vrij (in press) provides

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several explanations for this. He argues that, amongst other factors, cues to deception are dependent on the situational context and on the individual. He also states that the research may have been overlooked some cues. The latter explanation is the focus of this article, which presents a fine-grained analysis of the relation of various types of hand gestures and deception.

## Hand Gestures in Typical Deception Research

Researchers examining the relationship between hand gestures and deception typically focus on two types of hand gestures: Illustrators (i.e., hand gestures that modify and/or supplement what is being said verbally) and self-adaptors (i.e., gestures of self contact assumed to have the purpose of satisfying self or bodily needs, Ekman & Friesen, 1969b). DePaulo et al.'s (2003) meta-analysis of deception research revealed that self-adaptors are not related to deception. This is perhaps surprising because one could logically predict that self-adaptors would be related to arousal. However, the stakes (negative consequences of getting caught or positive consequences of getting away with the lie) are probably not high enough in deception studies to reveal clear signs of arousal (Miller & Stiff, 1993). Low-stakes deception studies thus reflect everyday life because in most daily life situations the stakes are typically low (DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996).

DePaulo et al.'s (2003) meta-analysis revealed that illustrators tend to decrease when people lie. This may be the result of cognitive load the liar is experiencing when s/he tries to come up with a plausible or convincing answer (Zuckerman, DePaulo, & Rosenthal, 1981; Vrij & Mann, 2005). Cognitive load results in a neglect of body language, reducing overall animation (Ekman & Friesen, 1972). The decrease in illustrators may also be the result of an attempt to control behavior. Liars may deliberately attempt to make a credible impression and will therefore try to avoid displaying any behaviors, including certain movements, which they believe will appear suspicious (Vrij & Mann, 2005; Zuckerman et al., 1981). This may result in an unusual degree of rigidity and inhibition (DePaulo & Kirkendol, 1989). Obviously, truth tellers may also attempt to appear convincing, as they too may be keen to be believed. However, truth tellers typically take their credibility more for granted than liars, and liars will therefore try harder than truth tellers to make a convincing impression (DePaulo et al., 2003). Although the relationship between illustrators and deception was significant in DePaulo et al.'s meta-analysis, the effect size was weak ($d = -0.14$). (Cohen (1977) suggests that effect

sizes of .20, .50, and .80 should be interpreted as small, medium, and large effects respectively.) In alignment with this, Vrij's (2000) review of deception studies showed that in most studies where illustrators were examined, no significant relationship between such illustrators and deception emerged.

*More detailed Analyses of Hand Movements*

A possible reason for the absence of strong effects regarding the relationship between hand gestures and deception is that the hand gestures are somewhat poorly defined in deception research. Vrij and his colleagues examined specific subtle movements liars and truth tellers make with their hands and fingers without moving their arms, and repeatedly found a decrease in such movements during deception (Vrij, 2000; Vrij & Mann, 2005). DePaulo et al.'s (2003) meta-analysis found a stronger effect size ($d = -0.36$) for such movements.

Studies on hand communication (i.e., Butterworth & Hadar, 1989; Ekman & Friesen, 1969b, 1972; Krauss, Chen, & Chawla, 1996; McClave, 1994; McNeill, 1985, 1992) highlight the presence of more detailed and systematic hand gesture classifications, and, theoretically, different types of hand gestures could be related to deception in different ways. The present experiment examines the relationship of deception and levels of suspicion with different types of hand movements.

There is no universal category system of hand gestures. Rather, different researchers use different taxonomic criteria. For example, in their popular taxonomy, Ekman and Friesen (1969b) distinguished five categories of gestures: 'illustrators' (conveying discourse content), 'emblems' (conventional and cultural signs), 'regulator signals' (controlling conversational flow), 'emotional displays' (emotional state expression), and 'adaptor gestures' (movements of contact and manipulation). In consideration of hand gestures during speech, Kendon (1995) divides gestures into two general categories: pragmatic gesture and substantive gestures. Pragmatic gestures help to give structure to the specific segment of discourse, indicating type of speech act or aspects of discourse structure. Substantive gestures express aspects of the utterance's content, whether literally or metaphorically (e.g., illustrators and emblems). McNeill (1985, 1992) distinguishes between 'iconics' (using the hands to 'draw', in the air, pictures of objects cited in discourse content), 'metaphorics' (using the hands to 'draw', in the air, shapes representing a metaphor of abstract ideas of the discourse), 'deictic' (or 'pointing', to indicate objects or places), 'beats' (rhythmical pulsing movements that are

in time with the stress peak of speech), and 'cohesive gestures' (which are repetitive similar movements and refer to utterance structure, creating linkages across narrative texts, conveying continuity and coherence).

In order to synthesize these different classifications and achieve a categorical system which is as exhaustive as possible, we considered hand movements as basically organized into two macro-categories: 'discourse linked gestures' and 'discourse non-linked gestures' (Maricchiolo, Bonaiuto, & Gnisci, 2005). The latter category includes *self-adaptor gestures* (Ekman & Friesen, 1969a), which are gestures of self-contact (self-touching, Kendon, 1997) assumed to have the purpose of satisfying self or bodily needs. Many deception researchers also separate adaptor gestures from other types of hand movements (DePaulo et al., 2003; Vrij, 2000); it is the discourse linked category of hand movements that lacks precision in most deception research.

The 'discourse linked gestures' category includes 'rhythmic', 'cohesive', 'emblem' and 'illustrator' gestures. *Rhythmic* gestures (termed 'beats' by McNeill, 1992, and 'batons' by Efron, 1941, and Ekman and Friesen, 1969a) are related to speech but do not refer to the actual speech content. These are hand/finger movements which are repeated along with the rhythmical pulsation of the speech, tending to have the same form regardless of the speech content (typically, up-down hand movements, which co-occur with vocal peak (McClave, 1994)). Rhythmic gestures provide the discourse with emphasis and rhythm by punctuating speech and accentuating or emphasizing part of the utterance. *Cohesive* gestures (McNeill & Levy, 1993) are repetitive hand movements performed by the speaker in the same place and with the hand forming the same shape in the air (each single type having its own idiosyncratic shape, e.g., circular or forward-backward or right-left hand movements). These gestures do not refer to the discourse content (the shape produced by the cohesive gesture is not representative of the content referent) but to the narrative structure. They accompany discourse narrative development, giving it continuity and coherence by maintaining their location in space (''Gestural cohesion depends on repeating the same gesture form, movement, or locus in the gesture space,'' McNeill, 1992, p. 16). Whilst rhythmic gestures refer to 'prosodic' aspects of verbal utterance, cohesive gestures are linked with the 'syntactic' aspects that determine its structure.

The *emblems* category (Ekman & Friesen, 1969b) includes all symbolic gestures that have a direct verbal translation which would usually consist of one or two words (i.e., thumbs up as an OK sign). This verbal definition of the emblem is well known by members of the same culture. The category of illustrator gestures includes 'iconic', 'metaphoric', and

'deictic' gestures (McNeill, 1992). *Iconic* gestures are demonstrative gestures reproducing the form of the object or event being discussed (i.e., a grabbing gesture when the speaker mentions ''and then he took the knife''). *Metaphoric* gestures are also pictorial but refer to an abstract idea rather than a concrete object or event: Therefore the hand, as it moves, ''draws'' a shape representing a metaphor of the abstract concept (e.g., forming a fist shape when referring to strength). Finally, *deictic* gestures are pointing gestures. Pointing has the obvious function of indicating objects and events in the concrete world, but, more often, it can occur when indicating something which is present at the level of discourse content**.** These gestures (emblems, iconic, metaphoric, and deictic), refer in different ways, to the 'semantic' aspects of the concurrent verbal content.

Studies on the relationship between specific types of hand gestures and speech have addressed different interactive contexts, such as spontaneous conversations (Beattie & Shovelton, 2000, 2002; Carli, LaFleur, & Loeber, 1995), dialogues in dyads (Bavelas, Chovil, Coates, & Roe, 1995; Burgoon, Birk, & Pfau, 1990; Contento & Stame, 1997), interviews about personal subjects (Feyereisen & Havard, 1999), group discussions (Bonaiuto, Gnisci, Maricchiolo, & Livi, 2004), and political discourses and public speeches (Argentin, Ghiglione, & Dorna, 1990; Atkinson, 1984; Bull, 1986). These studies have found that gestures have intradiscursive functions (prosodic, syntactic, and semantic functions) as well as interactive and metadiscursive functions. Taking metaphoric gestures as an example, some researchers (Argentin, 1985; Hadar, Wenkert-Olenik, Kruass, & Soroker, 1998) have found that they are used more in situations involving very complex cognitive tasks (i.e., problem-solving or lexical retrieval), particularly to compensate for imperfect speech (i.e., intradiscursive function). Moreover (Argentin et al., 1990), metaphoric gestures seem to have a persuasive function in discourse and interaction, and are used to give credibility to the discourse (i.e., an interactive function). Meanwhile, other hand gestures, such as adaptors, create the opposite effect (Argentin et al., 1990); self-adaptors are also typically seen as suspicion arousing (Stromwall, Granhag, & Hartwig, 2004).

In the present experiment, we consider seven specific categories of hand gestures according to the aforementioned taxonomy: self-adaptor, emblem, iconic, metaphoric, deictic, rhythmic, and cohesive gestures. Participants lied or told the truth about the possession of an object. Although they were given an incentive to perform well (see Method) this study constitutes a low-stake situation and therefore reflects the majority of real life situations where deception occurs. The following hypotheses for each category of gesture were tested:

Hypothesis 1: *Self-adaptor* gestures will occur less often when lying, because participants will tend to refrain from making such movements when they attempt to appear convincing.

Hypothesis 2: *Deictic* and *iconic* gestures will occur less often when lying, due to the absence of real objects in the physical space in this condition.

Hypothesis 3: *Metaphoric* gestures will occur more often when lying because they are more frequently used in situations involving cognitively complex tasks in order to compensate for imperfect speech and are used more when trying to make a convincing impression.

No difference is expected for *emblematic* gestures. These are almost always intentional, deliberate movements and people are typically aware of their use of emblems (Ekman & Friesen, 1969b). We don't expect deception to 'leak' via the use of such intentional movements as they are well rehearsed actions, which are easy for the displayer to control. Moreover, no differences are expected for *cohesive* or *rhythmic* gestures because they are related more to the structure than the content of discourse (McNeill & Levy, 1993).

In daily life, a communicator may be confronted with a suspicious conversation partner. When being confronted with suspicion, Buller and Burgoon's (1996) Interpersonal Deception Theory predicts that liars will attempt to make behavioral adjustments in order to diminish suspicion. Whether or not they actually achieve this is open to debate (see Buller, Stiff, & Burgoon, 1996, and Levine & McCornack, 1996a, 1996b for a lively discussion), but to our knowledge, hand adaptators have never been measured in the detailed way outlined above. In the present experiment, after they had provided several answers, the participants were accused of lying by the interviewer and were asked to repeat what they had just said. Due to the fact that not only liars, but also truth tellers, will be keen to make a convincing impression (DePaulo et al., 2003), we therefore expect that this suspicion will affect the behavior of both liars and truth tellers. More specifically, we predicted that:

Hypothesis 4: A decrease in *self-adaptor* gestures will occur in the strong suspicion phase compared to the first part of the interview (weak suspicion). Such gestures are typically

associated with suspicion (Stromwall et al., 2004) and interviewees might attempt to avoid making them.

Hypothesis 5: A decrease in *emblematic* and *iconic* gestures will occur in the raised suspicion phase (strong suspicion) compared to the first part of the interview (weak suspicion). Such gestures are perhaps more typical for free and unchallenged speech settings, than for situations where credibility is challenged.

Hypothesis 6: An larger increase in *metaphoric* gestures will occur in the strong suspicion phase compared to the weak suspicion phase, as these gestures are used more during lexical retrieval in linguistic production (Hadar et al., 1998), and are used more to convince the recipient (Argentin et al., 1990).

Hypothesis 7: An increase in *deictic* gestures will occur in the strong suspicion compared to the weak suspicion, as a result of participants trying to shift the object from themselves to other referents or trying to contextualize and concretize their utterances.

Hypothesis 8: An increase in both *cohesive* and *rhythmic* gestures will occur during the strong suspicion compared to the weak suspicion: Cohesive gestures are typically found when telling stories (Contento, 1999; McNeill, 1985; McNeill & Levy, 1993) and they can positively affect perceived social influence in social interaction (at least partly, Bonaiuto et al., 2004). Rhythmic gestures are found more in persuasive contexts (political communication, sales transactions; Argentin et al., 1990; Atkinson, 1984; Bull, 1986; Leigh & Summers, 2002) and it is expected that interviewees will use them more when suspicion is raised, where the interviewees' aim to convince is greater than when in the interview.

We will explore the interaction effects between deception and raised suspicion. It could be the case that after suspicion is raised, both liars and truth tellers will attempt to become more persuasive. In that case, an interaction effect will not occur. Alternatively, it could be the case that liars will become more persuasive than truth tellers once suspicion is

raised. In that case, interaction effects between deception and raised suspicion may appear.

## Method

*Participants*

The sample consisted of 128 Italian psychology students (9 male, 119 female, aged 21–37 years; $M = 23.6$; $SD = 2.6$) at the University of Rome 'La Sapienza.'

*Experimental Setting*

The experiment was carried out in the Social Psychology Laboratory of the Department of Developmental and Socialization Processes Psychology at Rome's 'La Sapienza' University. Three rooms were used in order to conduct the experiment: A reception room, a video-recording room, and an adjacent room where the experiment itself took place. This latter room had a unidirectional mirror behind which a video camera was aimed at the participant. Two chairs were placed in the middle of the room, one for the participant and the other for the interviewer, so as not to hinder the view for the video camera. A backpack containing an object (either a book, pencil case, or video cassette) that the participant was to pick up, examine closely, and memorize, was placed next to the chair. Objects were chosen according to their familiarity, simplicity, and ease to remember. The objects were shown to the participants randomly and in varied order, the latter to avoid a situation where the interviewer would know immediately that the person was lying or telling the truth just on the basis of the object the participants described.

*Procedure*

After the students were recruited, they had to undergo two experimental sessions, one for the truth condition and one for the deception condition. (Truth telling and lying was counterbalanced.) Thus, out of a sample of 128 participants, 256 accounts were obtained.

   The participants met the experimenter in the reception area and were then led to the lab where they were asked to sit down and make themselves comfortable. The experimenter would then ask each participant to pick up the object in the backpack and examine it closely. The experimenter too, would take a close look at it before giving instructions

on how the experiment would take place: ''*We're carrying out an experiment to try to understand how good people are at deceiving. You will be interviewed twice by an interviewer about the object you found in the backpack and the person who gave it to you. In one condition you'll be asked to state what you actually saw in the backpack and that I gave you the object, in the other interview you'll be told to lie, making up another object and saying that someone else gave it to you. The interviewer is not aware of the content of the backpack and does not therefore know whether you are lying or telling the truth.*''

In the truth condition, participants were simply told to describe the object and the person who gave it to them. In the deception condition, they were asked to lie about both object and person by describing a different object than that which they had seen and a different person than they had seen. Since the data were analyzed for the statement as a whole, we cannot differentiate between the gestures made while talking about the person or about the object. The order of presentation of truth/lie conditions was balanced.

The 128 subjects underwent a structured interview (Vrij, Semin, & Bull, 1996), which was the same for both truth and deception conditions. This interview was constructed to obtain a verbal and nonverbal account that would be long enough to allow analysis. The interview was divided into two phases (weak or strong suspicion): in the first part (questions 1 to 10) the interviewer raised a weak suspicion on the interviewee's sincerity; in the second part, by a direct accusation, the suspicion became stronger. During the whole interview, the interviewer avoided giving nonverbal (i.e., smiles, nods, vocalism, etc.) or verbal (i.e., yes, ok, etc.) feedback, so as not to influence the participants' answers or behavior. The following twelve questions were asked:

Phase 1: Interview with weak suspicion

1. What's in the backpack?
2. Can you give me an accurate description of the object?
3. Are you telling the truth?
4. Are you sure about what you're telling me about the object?
5. Haven't you forgotten to tell me something about the object?
6. Who gave you this object?
7. Can you give me a detailed description of this person?
8. Can you give me a detailed description of all the interactions you had with this person?
9. Are you sure about the information you're giving me about this person?

10. Haven't you forgotten to tell me something about this person?

   Phase 2: Interview with strong suspicion

11. I don't believe you! You're lying! Are you absolutely sure you told me the truth?
12. Could you now repeat what you said?

   During phase two, the interviewer adopted an inquiring attitude so as to instill increased emotional anxiety in the interviewee, typical of those who feel threatened of being found out.
   In order to motivate the participants, they were promised a higher score in a legal psychology examination, if they lied convincingly. In the Italian University where the study was conducted, paying participants is not allowed, but rewarding them with a higher score is allowed. Scores range from 18/30 to 30/30 in Italy and one extra point was promised as an incentive. Giving students an extra point in such a way is a common procedure in this Italian University.
   The independent variables in the study were:

1. Veracity (within) on 2 levels (truth/lie).
2. Raised suspicion (within) on 2 levels (weak/strong).

*Coding of Dependent Variables*

The experiment was video-recorded on VHS tapes for a total of 34 hours. In the preliminary phase, the coder, who was blind to the hypotheses, watched all the available material recorded on video, gathering ethnographic notes with the aim of familiarizing herself with the contents, the events, and the context of the proceedings. The recorded material was then systematically observed for hand gestures. Each hand gesture observed was noted down and coded according to the classification system of hand gestures described in the introduction: cohesive, rhythmic, emblematic, iconic, metaphoric, deictic, and self-adaptor gestures. The experimental setting did not allow the participant to have any contact with objects or other people, so object-adaptor and person-adaptor gestures were excluded from the coding. Having finished the coding, the observer checked her own codings by observing all the video recorded material again. Any remaining ambiguous cases were resolved in a discussion with her supervisor.

The frequency with which the interviewee's gestures occurred was calculated. With regard to interrater reliability, the concordance between two independent observers on 20% of the sample under investigation (24 subjects for a total of 48 interviews) was calculated. The percentage of concordance regarding the frequency of occurrence of each gesture was calculated using the formula $P^a = N^a/N \times 100$, where $P^a$ is the percentage of concordance among observers, $N^a$ is the number of concordances among the same, and $N$ represents the total number of observations (concordance + non-concordance). Cohen's $K$ (Cohen, 1960) was used for agreement on occurrence of specific hand gesture categories (Bakeman & Gottman, 1997) with ComKappa software (Robinson & Bakeman, 1998). According to Fleiss (1981) coding is reliable if Cohen's $K$ is >.70. The mean scores presented in the Tables are the frequency of occurrence of the different types of gestures per minute of interview.

The percentage agreement in identifying the occurrence of coding units was 78%, while Cohen's $K$ for each of the seven gestures were: self-adaptor: $K = .81$; emblematic: $K = .75$; metaphoric: $K = .73$; deictic: $K = .78$; cohesive: $K = .71$; iconic: $K = .77$; rhythmic: $K = .70$).

*Data Analysis*

The frequency of occurrence of the gestures was corrected for the interview length (frequency per minute of interview). After checking that a preliminary MANOVA was carried out in order to test whether Presentation Order (truth-lie/lie/truth) has an impact on the dependent variables. In this MANOVA, Veracity, Raised Suspicion, and Order of Presentation were the factors, and the seven types of gestures the dependent variables. Mean scores and SDs for the various gestures by veracity condition are presented in Table 1. The Presentation Order main effect and all interaction effects related to Presentation Order were non-significant (all $F's < 1.60$, all $p's > .14$). This factor is therefore disregarded when testing the hypotheses.

**Results**

*Length of Interview*

A 2 (Veracity) $\times$ 2 (Raised Suspicion) $\times$ 2 (Order of Presentation) ANOVA was conducted with length of interview as dependent variable. The analysis revealed a significant main effect for Veracity, $F(1, 126) = 5.23$, $p < .05$, $\eta^2 = .04$ and Raised Suspicion, $F(1,126) = 618.90$, $p < .01$,

**TABLE 1**

**Frequency of Occurrence of Gestures as a Function of Veracity**

| Gestures | Truth | | Lie | | |
| --- | --- | --- | --- | --- | --- |
| | *M* | *SD* | *M* | *SD* | *N* |
| Self- adaptor | 8.44 | 4.54 | 7.43 | 4.27 | 128 |
| Deictic | 6.29 | 3.87 | 5.31 | 3.48 | 128 |
| Iconic | 0.98 | 1.81 | 0.99 | 1.56 | 128 |
| Metaphoric | 10.71 | 7.50 | 12.53 | 8.46 | 128 |
| Emblematic | 3.73 | 2.56 | 3.75 | 2.84 | 128 |
| Cohesive | 2.93 | 2.53 | 2.81 | 2.84 | 128 |
| Rhythmic | 2.05 | 3.19 | 2.24 | 3.76 | 128 |

$\eta^2 = .83$, and a significant Veracity $\times$ Raised Suspicion interaction effect, $F(1, 126) = 27.03$, $p < .01$, $\eta^2 = .18$. Mean scores concerning the interaction effect revealed that the first part of the interview lasted slightly longer for liars ($M = 118.09$, $SD = 60.3$) than for truth tellers ($M = 101.78$, $SD = 46.5$) whereas the raised suspicion part of the interview lasted slightly longer for truth tellers ($M = 46.21$, $SD = 34.1$) than for liars ($M = 42.50$, $SD = 29.1$). These differences in interview length between conditions have not affected our results because all the frequency scores on which our analyses were based have been corrected for the length of interview (see Method). Mean scores and SDs for the various gestures by the Raised Suspicion factor are presented in Table 2. Neither the Order of Presentation main effect nor any interaction effects related to this factor were significant (all $F's < 3.85$, all $p's > .052$).

*Hypothesis Testing*

A total of seven 2 (Veracity) $\times$ 2 (Raised Suspicion) ANOVAs were carried out, one for each of the seven different gestures. Results revealed significant main effects regarding the Veracity factor for self-adaptor gestures, $F(1, 126) = 6.16$, $p < .05$, $\eta^2 = .05$, metaphoric gestures, $F(1, 126) = 3.02$, $p < .01$, $\eta^2 = .09$, and deictic gestures, $F(1, 126) = 6.28$, $p < .01$, $\eta^2 = .05$.

The mean scores and standard deviations for the various gestures are presented in Table 1. In support of Hypothesis 1, self-adaptor gestures were used more often when telling the truth than when lying. Deictic gestures occurred more often when telling the truth than when lying,

partially supporting Hypothesis 2. Metaphoric gestures occurred more often in the lie condition than in the truth condition, supporting Hypothesis 3. As expected, no significant differences between truth telling and lying were found for cohesive $F(1, 126) = 0.29$, *ns*, rhythmic, $F(1, 126) = 0.38$, *ns.*, emblematic $F(1, 126) = 0.004$, *ns.*, or iconic gestures $F(1, 126) = 0.01$, *ns.*

The ANOVAs further revealed significant main effects for the Raised Suspicion factor regarding self-adaptor gestures, $F(1, 126) = 22.50, p < .01$, $\eta^2 = .15$, emblematic gestures, $F(1, 126) = 35.41$, $p < .01$, $\eta^2 = .22$, metaphoric gestures, $F(1, 126) = 42.05$, $p < .01$, $\eta^2 = .25$, deictic gestures, $F(1, 126) = 101.79$, $p < .01$, $\eta^2 = .45$, cohesive gestures, $F(1, 126) = 5.02$, $p < .05$, $\eta^2 = .04$, and rhythmic gestures, $F(1, 126) = 30.37$, $p < .01$, $\eta^2 = .19$.

The mean scores and standard deviations for the various gestures are presented in Table 2. In support of Hypothesis 4, fewer self-adaptor gestures were made in the strong suspicion phase than in the weak suspicion phase. In partial support of Hypothesis 5, emblematic gestures also decreased during the strong suspicion phase compared to the first part of the interview (weak suspicion). During the strong suspicion phase, participants made more metaphoric, deictic, and rhythmic gestures than during the first, weak suspicion part of the interview, supporting Hypotheses 6 and 7, and partially Hypothesis 8. However, cohesive gestures decreased during the strong suspicion phase compared to the part of the interview with weak suspicion, partly contradicting Hypothesis 8.

**TABLE 2**

**Frequency of Occurrence of Gestures as a Function of Raised Suspicion**

| Gestures | Weak | | Strong | | |
| --- | --- | --- | --- | --- | --- |
| | *M* | *SD* | *M* | *SD* | *N* |
| Self-adaptor | 8.72 | 4.13 | 7.14 | 4.27 | 128 |
| Deictic | 4.06 | 2.20 | 7.54 | 4.61 | 128 |
| Iconic | 0.94 | 1.26 | 1.03 | 1.93 | 128 |
| Metaphoric | 9.73 | 6.21 | 13.52 | 9.71 | 128 |
| Emblematic | 4.51 | 2.80 | 2.97 | 2.66 | 128 |
| Cohesive | 3.15 | 3.31 | 2.60 | 2.13 | 128 |
| Rhythmic | 1.19 | 1.65 | 3.10 | 4.78 | 128 |

No main Raised Suspicion effects occurred for the number of iconic gestures, $F(1, 126) = .43$, *ns*, partly contradicting Hypothesis 5 where a decrease of such movements in the strong suspicion phase was predicted.

None of the Veracity × Raised Suspicion interaction effects were significant (all $F's < 3.5$, all $p's > .064$).

Finally, we combined the six different types of discourse-linked gestures (all dependent variables without self-adaptors) and used this measure as a dependent variable in a 2 (Veracity) × 2 (Raised Suspicion) design. A significant main effect emerged for Raised Suspicion, $F(1, 126) = 73.93$, $p < .01$, $\eta^2 = .37$. Mean scores indicate that more discourse-linked gestures were made during the strong suspicion part of the interview ($M = 5.13$, $SD = 2.5$) than during the weak suspicion part of the interview ($M = 3.93$, $SD = 1.8$). More importantly, neither the Veracity main effect, $F(1, 126) = 1.24$, *ns*, nor the Veracity × Raised Suspicion interaction effect, $F(1, 126) = .04$, *ns*) was significant.

## Discussion

In the present experiment, we examined the effects of deception and raised suspicion on different types of hand movements. Although the usual approach in deception research of merging different sorts of discourse linked hand movements together did not reveal significant differences between liars and truth tellers, distinguishing between different sorts of hand movements did. As predicted, lying was associated with more metaphoric gestures and with fewer deictic gestures, and was not associated with emblematic, cohesive, or rhythmic gestures. Differentiating between different types of discourse linked gestures therefore seems worthwhile. The only unexpected result was the non-significant finding regarding iconic gestures. Perhaps this was due to the experimental setting. Iconic movements are used to describe real objects and events. In this experiment, both liars and truth tellers were describing (the same) objects and persons. The only difference was that liars had not actually seen these objects and persons. However, despite this, they were probably likely to be able to create for themselves clear pictures of the objects and persons they described, thus negating the difference between them and truth tellers.

We further found that deception was related to a decrease in self-adaptors. Although this effect could be easily explained, as liars attempt to avoid behaviors that in their view appear suspicious, it does not occur in many other lower-stakes deception studies (DePaulo et al., 2003; Vrij,

2000). In such studies, sometimes an increase in self-adaptors is found as a result of deception, sometimes a decrease, and sometimes no differences emerged (Vrij, 2000). The present finding and previous findings underline the idiosyncratic nature of deception studies and cues to deception. This is unsurprising given the fact that no cue is linked to deception per se (the equivalent of Pinocchio's growing nose). Rather, cues may appear because liars are aroused, experience cognitive load, or attempt to control themselves (Vrij & Mann, 2005; Zuckerman et al., 1981). These factors have an opposite effect on self-adaptors. For example, arousal may increase self-adaptors, whereas attempted behavioral control may result in a decrease. The relationship between self-adaptors and deception thus depends on how aroused the liar is and how hard s/he tries to appear convincing.

Being under strong suspicion resulted in participants in the present experiment adapting several behaviors. As expected, a decrease in self-adaptors and emblems took place in the strong suspicion condition, whilst the predicted increases in metaphoric, deictic, and rhythmic gestures also occurred. The predicted decrease in iconic gestures and increase in cohesive gestures did not occur. In fact, iconic gestures were not related to strong suspicion, and the same explanation as provided above for the absence for a deception effect can perhaps account for this. In both phases, the same objects and persons were described, meaning that the two settings did not really differ for the use of iconic gestures. The results further revealed a decrease in cohesive gestures in the raised suspicion phase. This can probably be explained by the nature of the two interview phases, as the discourse structures differed for the first part of the interview and the strong suspicion phase. In the first part of the interview, participants answered some questions about an object and a person, while in the strong suspicion phase participants were asked to repeat what they had said in the interview. Cohesive gestures were used more during the weak suspicion than during the strong suspicion part, probably because it is a more conversational and descriptive situation and, in the literature, these gestures are particularly found in this type of speech in order to give coherence and continuity to discourse (telling stories and discussion; McNeill & Levy, 1993).

The interaction effect between veracity and interview phase was not significant. Being under suspicion will not only influence liars, it will also influence truth tellers (DePaulo et al., 2003), apparently to the same extent. Bond and Fahey (1987) obtained similar findings, and Ekman's (1985) Othello error is also in alignment with this. Judging behavioral adaptations as signs of deceit (or truth telling) after suspicions are raised,

a technique commonly used by the police (Inbau, Reid, Buckley, & Jayne, 2001; Moston & Engelberg, 1993; Vrij, 2004), is therefore an unreliable method to detect deceit.

In this experiment the participants were involved in a cognitively complex task: This induced them to use more metaphoric than other gestures, as found by Hadar et al. (1998) in other contexts. The participants used metaphoric gestures in describing abstract concepts, such as in the following examples (excerpts 1 and 2), which are translated from the originally Italian transcripts into English (a description of the gesture given is in italics and is concurrent with the verbal utterances enclosed in brackets):

EXCERPT 1. Interview n. 2

she is a smart and [physically well-groomed person] *both hands in front of the body move once simultaneously from the top to the bottom*

EXCERPT 2 Interview n. 10

she came in during the lesson asking who would [participate] in the experiment *left hand palm up, right hand moves to left hand fingering the palm*

Regarding the total amount of gestures, Kendon (1995) found that gesturing of Southern Italian inhabitants is rich and varied, arguing that this partly depends on an adaptation to the historical communication ecology of their cities (a combination of climatic conditions, the built environment, social structure, and economy). Via such a process, gestures would acquire the force of a cultural tradition. Future studies should ascertain whether such high relative frequency of metaphoric gestures is culturally specific or not, given the fact that gesturing, like speech, can be influenced by cultural values and historical tradition, and therefore its usage can adjust to settings and social circumstances.

To conclude, previous research on deception and hand movements has examined a limited group of different hand movements, and grouped them together rather than separately examine the different categories of movements. The result is a lack of clear trends when lying or truth telling. In this study, if all discourse-linked gestures are collapsed together, the same unclear pattern results. However, when different gestures are tested separately, clearer trends appear with respect to deception and truth

telling. Moreover, it has been shown that level of suspicion and deception have independent principal effects.

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