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**How Culture Influences the Telling and
Detection of Lies: Differences between Low-
and High-context Individuals**

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ABSTRACT

Since police forces increasingly operate in an international context it may be argued that cultural differences influence the interaction between a police interviewer and a suspect, especially when it comes to the detection of deception. In this study, interactions within dyads of a low-context culture were compared to dyads of high-context cultures and to mixed cultural dyads. Comparison was done on two possible cues to detection of lies; depletion and behavioral mimicry. Furthermore, it was established to what extent interviewers in mixed cultural dyads were able to detect for lies. The experiment, involving 78 pairs of participants, consisted of an interview between a 'suspect' and an 'interviewer'. The suspect participants completed two pre-interview tasks; the first involving an online computer game called 'Never End' and the second involving a mock theft. They were instructed to either lie or tell the truth on both tasks. After that, they were interviewed by another participant who was instructed to detect for lies and truths. Results showed that i) low-context suspects are more depleted after the interview than high-context suspects, but that depletion does not vary across veracity conditions; ii) high-context dyads do not show more orientation or position mimicry during the interview than low-context dyads; iii) high-context dyads do not show more orientation or position mimicry when the suspect is lying; and iv) interviewer detection rates were not affected by cultural composition of the dyad. Additional analyses also indicate that mimicry did not negatively interfere with deception detection.

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INTRODUCTION

Police forces operate in an international context more often than they used to; a suspect's cultural background can differ significantly from the cultural background of the police officer in charge. Therefore, it may be argued that cultural differences will influence the interaction between a police interviewer and a suspect, especially when it comes to one of the most important aspects of suspect interviewing: deception detection. Since one goal of a police interview is to find out the truth about a certain crime or situation, especially when the suspect is accused of lying, it is important to understand if and how cultural differences influence deception detection amongst police personnel.

Because of the importance of deception detection across cultures, similar points of interest have been brought up before. As Zhou and Lutterbie (2005, p.465) point out: "With the increasing trend of globalization and internationalization, interaction across national borders has become a common thing of work and daily life. As a result, the issue of deception across cultures arises and starts to attract attention." Similarly, Broadhurst & Cheng (2005) argue that sensitivity to cultural and language variation has become increasingly relevant as law enforcement personnel operate in a transnational context more often.

Even though attention has been given to the subject of deception detection across cultures (Bond & Atoum, 2000; Bond, Omar, Mahmoud & Bonser, 1990; Sitton & Griffin, 1981; Vrij & Winkel, 1991), there are still some questions to be answered. For example, it is relatively unknown how cultural differences influence the telling of a lie, both verbally and non-verbally. To specify, cues to deceit influenced by culture have not yet been found (Vrij, 2008). To address these questions this study will try to find new insights to improve deception detection across cultures from a non-verbal perspective. Its focus will be on the non-verbal behaviour suspects of high- and low-context cultures exhibit during the telling of a lie. Moreover, this study will also look at the consequences of cultural differences for deception detection rates.

The remainder of this introduction starts off with outlining the general differences between low- and high context cultures. These general differences will then be linked to possible non-verbal cues to deception, followed by formulation of the hypotheses.

Low-context versus high-context cultures. According to Hall (1976), cultures differ in the way information is processed during interaction. He proposed that all cultures prefer a certain type of information processing, with 'high-context processing' and 'low-context processing' as the two ends of this dimension. Although all cultures have both low- and high-context features, cultures can be characterized as being high- or low-context according to the degree to which the human interaction depends on the consideration of the context (Abriam-Yago, Yoder & Kataoka-Yahiro, 1999). High-context cultures rely on the *implicit context* of a message to convey meaning (Beune, Giebels, Adair,

Fennis & van der Zee, 2011), while low-context cultures rely on the *explicit information* in the message itself, vested in words or precise and unambiguous meaning (Kakabadse, Kouzmin, Kakabadse, & Savery, 2001). Generally, low-context communication is predominantly found in Western, individualistic cultures like the USA, Germany, The Netherlands and Switzerland, whereas high-context communication is found to be predominant in non-Western, more collectivistic cultures like China, Korea and Japan (Beune et al., 2011, Kim, Pan & Park, 1997).

Furthermore, Hall (1976) suggests that an individual's behaviour is an extension of the system in which he or she lives; individuals from different cultures have different understandings regarding the interaction process, including different styles of communication. This is considered an explanation for the difficulties encountered in cross-cultural communication (Kakabadse et al., 2001; Kim et al., 1997), including police interviewing settings.

Cues to deception. Before relating any cultural characteristics or differences to deception, it is first of all important to assess cues to deception in general. Deception is a "successful or unsuccessful deliberate attempt, without forewarning, to create in another a belief which the communicator considers to be untrue" (Vrij, 2008, p. 15). The concept of deception is associated with many types of feelings and behaviors, all of which might provide cues toward deception detection. These cues can be both verbal and non-verbal, although this study will only focus on non-verbal cues to deception.

Non-verbal cues to deception can be explained through three different approaches; the emotional approach, the controlling behavior approach and the cognitive approach (Gozna, Vrij & Bull, 2001; Vrij, 2008; Vrij & Semin, 1996). The emotional approach states that deception is paired with feelings of guilt, fear and excitement, which causes arousal in the human body. This arousal in turn elicits physiological reactions that can serve as cues to deception detection (Ekman, 1985; Köhnken, 1989; Knapp, Hart, & Dennis, 1974; Riggio & Friedman, 1983). In other words, the emotions experienced when lying could influence behaviour in subtle ways that the liar may not be aware of (Gozna et al., 2001).

According to the controlling behavior approach, liars may realize that observers pay attention to their behavioral reactions to judge whether they are lying (Vrij, 2008). Therefore, they might attempt to control their behavior in order to avoid cues to deception (Buller & Burgoon, 1996; Burgoon & Buller, 1994). This however results in an unusual degree of rigidity and inhibition of movement, which in itself can provide a cue to deception (Burgoon & Buller, 1994; DePaulo & Kirkendol, 1989).

Lastly, the cognitive approach states that deception is a cognitively complex task that requires extra mental effort (Vrij, 2008). Therefore, liars will automatically experience a higher cognitive load which, as research shows, leads to a neglect of body language and a decrease of overall animation (Davis & Hadiks, 1995; Ekman, 1997; Ekman & Friesen, 1972; Vrij, Semin & Bull, 1996). Furthermore, it appears that increasing cognitive load by instructing interviewees to recall their stories

in reverse order leads to many more cues to deceit. Moreover, the instruction to convey stories in reverse order improved police observers' ability to detect deception (Vrij, Mann, Fisher, Leal, Milne & Bull, 2008).

All processes described by the three approaches may occur simultaneously (Vrij, Akehurst, Soukara & Bull, 2004). For example, a liar can feel nervous, while having difficulty to think of a good response and trying to control his or her behavior, all at the same time. This study does not specifically expect otherwise, however a larger contribution of the cognitive approach is expected in uncovering cultural differences when lying. To specify, it is expected that the consequences caused by an increase in cognitive load (i.e., decrease of overall animation and more leakage cues) might actually differ for low- and high-context cultures, more so than the consequences of the emotional and controlling behavior approach. To assess this, focus will be put on two main aspects of the cognitive approach: 1) the increase in cognitive load itself, which can be linked to an increase in felt depletion and 2) the decrease of overall animation, which this study will link to measurements of mimicry. Both aspects could not only reveal possible cues to deceit, but also provide more insight in deception across cultures. An overview of how the cognitive approach links to depletion and mimicry for different cultures shall be given in the next sections.

Depletion. As the cognitive approach states, lying is usually considered to be more cognitively demanding than truth telling for a number of reasons (Vrij et al., 2008). First, formulating the lie may be cognitively demanding. Secondly, liars must remember what they have said to whom in order to maintain consistency. Third, liars are less likely to take their credibility for granted, so they will monitor their own behavior and the behavior of their target (i.e., a police officer) more carefully. All these elements of telling a lie take up cognitive resources (Vrij, Granhag & Porter, 2010), which is depleting for a liar. Depletion refers to a state in which the individual does not have all the resources it has normally. In other words, the 'executive function' of an individual depends on a limited resource that is consumed during activities such as self-regulation, making effortful choices and taking initiative (Baumeister & Vohs, 2007). Although depletion might occur in any situation, it may be argued that an individual will deplete more when lying rather than when telling the truth. Similar arguments are made by Burgoon, Stoner, Bonito and Dunbar (2003), who argue that lying requires more mental "heavy lifting," which is referred to as creating more cognitive "load" than truth telling. The demands of creating plausible and coherent verbal messages while also monitoring and managing accompanying nonverbal behavior requires a significant amount of effort (Burgoon et al., 2003), which in turn leads to more depletion.

With the above statements Vrij and colleagues (2008, 2010) and Burgoon and colleagues (2003) argue that lying in itself is depleting for anyone. Yet, considering findings on high- and low-context communication, one could argue that there is a difference in the amount of felt depletion

between low- and high-context individuals when it comes to deception. Two aspects of communication that are found in low-context cultures might be the cause of this: the quality maxim and the consistency principle. The quality maxim includes that one should state only that which is believed to be true on the basis of sufficient evidence (Beune, Giebels & Sanders, 2009). The quality maxim is important to low-context cultures because these cultures rely on logic and rationality when communicating (Adair & Brett, 2004). The same can be said about the consistency principle, which states that low-context individuals consider a lack of consistency to make a statement less plausible and hence, less truthful (Beune et al., 2009; Beune et al., 2011). To specify, Cialdini, Wosinska, Barrett, Butner, and Gornik-Durose (1999) found that consistency arguments were more effective in influencing people from low-context cultures than from high-context cultures when it came to responding to a request to participate in a market survey. Furthermore, Choi and Nisbett (2000) found that low-context Americans were more likely to change their behaviour when confronted with cognitive inconsistencies than high-context East Asians. Subsequently, they argue that low-context cultures have a lower tolerance for cognitive inconsistencies than do high-context cultures. This argumentation is supported by Leung and Tong (2004) who state that in collectivist cultures, which can be viewed as mostly high-context cultures, variations across actors, time, and contexts are more accepted because of the importance attached to group boundaries. In contrast, in individualist societies, mostly low-context cultures, variations across different groups of actors, time, or contexts are less accepted.

In sum, when low-context individuals communicate, they are culturally bound to monitor the consistency of content and the importance of the logic and reasoning behind it more carefully than a high-context individual does. According to Abriam-Yago, Yoder and Kataoka-Yahiro (1999) all this monitoring requires extensive cognitive resources. Hence, one could argue that low-context communication is more depleting than high-context communication. Following this, considering the possibility that lying is more depletion than telling the truth, low-context liars are probably more depleted than high-context liars. To test whether this argumentation can be verified, the following hypothesis can be formulated:

H1: Telling a lie is more depleting for individuals from low-context cultures than for individuals from high-context cultures.

Mimicry. The previous hypothesis focuses on the perspective of the liar. This is in line with other research on deception detection, which has mainly focused on the deceiver's behavior or alternatively on possible pitfalls in the detection of lies. However, when telling a lie to another person, social interaction takes place. It is therefore important to study the way people influence each other's behavior in a deceptive setting (van der Zee, in prep.). One way this influence occurs is through

mimicry: the automatic tendency to imitate the behaviors of other people (Chartrand & Bargh, 1999; Stel, Van Dijk & Olivier, 2009). To specify, mimicry is considered to be an automatic process during which the members of the mimicry dyad are influenced in various ways when interacting with each other. Different types of mimicry can occur, including facial mimicry, verbal mimicry and behavioral mimicry (Chartrand & Bargh, 1999). Since this study focuses on non-verbal cues to deception, only behavioral mimicry will be taken into account. Behavioral mimicry involves the automatic tendency of taking on the postures, mannerisms, gestures, and motor movements of other people (Chartrand & Bargh, 1999).

Research suggests that mimicry influences human interaction in an important way. First, mimicry leads to more rapport, empathy and liking between two interacting individuals (Chartrand, Maddux, & Lakin, 2005; Lakin, Jefferis, Cheng & Chartrand, 2003). Second, it makes individuals feel closer to others and causes more willingness to help them (van Baaren, Holland, Kawakami & van Knippenberg, 2004). Third, mimicking the expressions of others causes one to feel the emotions that are associated with these expressions, leading to more emotional understanding (Stel & Van den Bos, 2010). Specifically, results by Stel and Vonk (2010) showed that imitating emotional expressions leads to adopting a similar emotional experience and more ability to take the perspective of this person.

The reason why mimicry is so interesting for the area of deception detection is because of the possible cue that mimicry can provide for deception detection. As mentioned before, results on the cognitive approach towards deception detection show that a higher amount of cognitive load leads to a decrease of overall movement (Vrij, Semin & Bull, 1996), but whether this is true for mimicry (which is an interaction measure) is still relatively unknown. Furthermore, one might argue that mimicry patterns may not only differ significantly for liars and truth tellers, they might also differ for cultural background (e.g., low- or high-context cultures). Before establishing any cues to deceit, it is important to first describe differences in mimicry patterns for culture. Then, differences in mimicry patterns for veracity in relation to culture shall be discussed.

Mimicry patterns & culture. Mimicry is expected to be subject to cultural variations because of its automatic nature. According to Ekman (1992), we learn from childhood a set of ‘display rules’, which govern our emotional expressions without choice or conscious awareness. Once these display rules are deeply ingrained, they become habitual and difficult to mask or undo. It could be argued that this is the same for mimicry; an unconscious process which is partially ‘learned’ by culture and therefore, differs between high- and low-context cultures. The expectation in this research is that the main cultural difference in mimicry will stem from differences in context dependency. High-context cultures rely more on context than low-context cultures do; they draw on physical aspects of communication, as well as the time and situation in which the communication takes place, not to mention the relationship

between the two individuals interacting (Würtl, 2005). Furthermore, Würtl (2005) argues that communication in high-context cultures is characterized by an extensive use of non-verbal strategies, such as gestures, body language, silence, proximity and symbolic behavior for conveying meanings and messages. To add to this, Chartrand and Bargh (1999) found that individuals who are more perceptually attuned to the behavior of others, and who place more emphasis on interdependence, will mimic more during interaction than individuals who don't have this communal orientation. Considering these findings, one could argue that high-context individuals have a significant different mimicry pattern when interacting than low-context individuals. To test this, the following hypothesis can be formulated:

H2a: During overall interaction, high-context dyads mimic more than low-context dyads.

Mimicry patterns & veracity. Following the previous argument, the same can be said for high-context individuals when *lying*. Lying is a form of communication and therefore abides by the same set of 'rules'. Since high-context individuals are culturally predisposed to rely more on non-verbal behavior, they will probably try to deceive or persuade their interaction partner through non-verbal behavior as well. Dunbar, Jensen and Burgoon (2011) provide evidence for this assumption when they argued that the perceived credibility of a deceiver will improve when the deceiver mimics his or her interaction partner (i.e., when one wants to be seen as credible, they will mimic more). They assume that mimicry is a sign of competence and conversational skill, mainly because it shows focus or interest in the behavior of others. The more a liar mimics, the more she or he will be seen as competent and, by extension, credible. This is most likely explained by the fact that mimicry generally results in more liking towards the interaction partner and more willingness of cooperation with them (Chartrand & Bargh, 1999; Stel & van den Bos, 2010; Stel & Vonk, 2010).

However, Dunbar and colleagues (2011) did not compare dyads across cultures. In this study it is expected that the assumption of mimicry leading to more credibility is presumably more applicable to high-context individuals because of their context- and relationship-dependent culture and their preferences for non-verbal communication. High-context individuals already put more emphasis on nonverbal behavior for conveying their messages, but to be seen as more credible (relevant in a deception context) they might rely even more heavily on mimicry. Therefore, one could argue that high-context individuals display more mimicry during an interaction in which they have to lie than low-context individuals will.

H2b: When one of the dyad members is telling a lie, high-context dyads mimic more than low-context dyads.

Deception detection rates. Alongside the perspective of the liar (hypothesis 1) and the possible coordination of behaviour between a liar and his interaction partner (hypothesis 2), it is also important to look at whether cultural differences facilitate or hinder subjective detection of deception.

According to Bond, Omar, Mahmoud and Bonser (1990), cross-cultural lie detection is worse than within-culture lie detection because individuals lack a familiarity with the ‘cultural baseline’ of their interaction partner. To specify; a culture's distinctive communication pattern forms a baseline for the detection of deception. If so, persons who lack familiarity with the baseline should have difficulty detecting that culture's lies. Results by Bond and colleagues (1990) showed that lies hardly could be detected across cultures. They found that Americans had a hard time detecting lies communicated by Jordan individuals and vice versa. They argue that although the principles of human lie detection may be universal, cues to detection have a cultural base. Vrij and colleagues (2010) use similar arguments, although they attribute it to the availability heuristic. They state that because people encounter more deceptive messages from others in their own culture, people assume that most of that particular behavior is associated with lying in general. Of course, when interacting with someone from a different culture this might lead to a false accusation based on wrongly interpreted behaviour. Based on these findings, one could argue that individuals with the same cultural background would benefit from their shared cultural rules of communication when it comes to deception detection, verbally and non-verbally.

However, results appear to go either way when it comes to same-cultural dyad detection. Stel, van Dijk and Oliver (2009) argue that mimicry within same-cultural dyads actually hinders deception detection. They found that when manipulated for mimicry (i.e., people are told to mimic or not to mimic their interaction partner) non-mimickers were more accurate than mimickers in their estimations of targets’ truthfulness and of targets’ experienced emotions. These results contradict the view that mimicry facilitates the understanding of people’s felt emotions (Stel & van den Bos, 2010). Stel et al. (2009) explain this by saying that when a liar expresses a false emotion, the mimicker will only mimic the basics of the emotion and not the details that give away that in fact, the emotion is false. Therefore, the mimicker feels it as being an honest emotion and the liar succeeded in delivering a false message. Note here that results were based only on same-cultural dyads (all participants were Dutch college students from Leiden University) and that Stel et al. (2009) didn't specifically look at culture or cultural differences. Furthermore, they instructed their participants to mimic or not to mimic, therefore diminishing the automatic nature of mimicry.

In sum, results by Bond et al. (1990) show a positive relation between culture and deception detection (i.e., more similarity in culture results in more detection), while results by Stel et al. (2009) show a negative relation between mimicry and detection (i.e., more mimicry, even in same-cultural dyads, results in less detection). Therefore, point of interest in this study is to see the extent to which these conflicting accounts accord with direct data on cross-cultural differences in the detection of

deception. To test this, two contradicting hypotheses are formulated. Hypothesis 3a will involve verifying findings by Stel and colleagues (2009):

H3a: Deception detection rates will be worse for individuals in a dyad who mimic more, regardless of their cultural background.

Next, theory by Bond et al. (1990) will be verified, which means that mimicry that occurs between two individuals within the same culture will *increase* deception detection rates, because mimicry facilitates the understanding between these two individuals. Next to that, both participants are familiar with each other's 'cultural baseline'. Similarly, mimicry that occurs between two individuals from different cultures will *decrease* deception detection rates, simply because in this case mimicry patterns are not understood or interpreted correctly by one another. If this proves to be true, it would set another example of how cultural differences may lead to errors in deception detection. To test this, the following hypothesis is formulated:

H3b: Deception detection rates will be worse for individuals in a mixed culture-dyad, as opposed to individuals in a same culture-dyad.

METHOD

Study Overview

To investigate the hypotheses, an experiment was conducted in which participants could perform two possible roles; the role of the 'suspect' or the role of the 'interviewer'. During the interview, the interviewer was instructed to find out whether the suspect was lying or telling the truth about having played a game called 'Never End' before the interview started. Next to that, the interviewer had to accuse the suspect of stealing 5 pounds out of a wallet which was placed in the interview room. Varying on the veracity condition, the suspect had to either lie or tell the truth about playing the game and taking the money.

Participants formed dyads based on cultural background. For the low-context culture condition it was chosen to use white British participants (i.e., participants of Caucasian heritage who were born in the UK or Ireland, as were one or both of their parents). Since the experiment was conducted in Lancaster (England), this was the most preferable group of low-context participants to use. For the high-context cultural condition it was chosen to use South-Asian and South-East Asian participants (i.e., students that were born in India, Pakistan, Sri Lanka, Bangladesh, Nepal, or Malaysia/Singapore, as were one or both their parents). This group was chosen because of the high number of available

participants at Lancaster University and because of the presumed better knowledge of the English language, which contributes to smoother interaction during the interview.

Behavioral coordination was measured during the interview setting (hypothesis 2). Afterwards, felt depletion (hypothesis 1) and correct or false detection of deception (hypothesis 3) were measured by a questionnaire given to the participants. A cultural check was also admitted in this questionnaire, to see whether a participant was correctly labeled low- or high-context.

Participants

Participants were 156 students (70 males and 86 females) of Lancaster University (mean age = 22.5 years, Range: 18 – 64 years). From these participants, 78 students were from high-context cultures and 78 students from a low-context culture. Participants were classified as low- or high-context based on country of birth, in line with previous research on low- and high-context individuals (Beune et al., 2011; Giebels & Taylor, 2009). Participants who were classified as low-context ($n = 78$) originated mostly from the UK ($n = 77$). The remaining participant was born in France ($n = 1$), but was raised in the UK. Participants who were classified as high-context originated from a variety of countries in South-Asia or South-East Asia ($n = 78$), including India ($n = 60$), Pakistan ($n = 12$), Malaysia ($n = 3$), Singapore ($n = 1$), Hong-Kong ($n = 1$) and Sri Lanka ($n = 1$).

Design

The design was a 3 x 2 x 2 factorial design and the dyad was the unit of analysis. Dyads' cultural background (high-context/low-context/mixed) and veracity (lie-telling/truth-telling) were used as between-dyad factors. Type of story (talking about a game and talking about missing money) was used as a within-dyad factor. There were 78 couples: 30 low-low context couples, 30 high-high context couples and 18 mixed couples. Furthermore, there were 24 female couples, 16 male couples and 38 mixed gender couples. Each individual within a high-context and low-context dyad was assigned to experimental conditions on a random basis. This included a randomization of roles within the dyad (i.e., being a 'suspect' or an 'interviewer') and a randomization of veracity conditions for the suspect (i.e., being in the truth condition or the lie condition). There was no randomization for the within-dyad factor 'type of story' since all dyads would talk about both subjects in the same order; firstly about the game, secondly about the money.

In the mixed culture condition it was decided that the low-context participant would always be assigned to the role of interviewer, whereas the high-context participant would always be assigned to the role of suspect. This was done because insight in the detection rates of low-context interviewers towards high-context suspects is more relevant for this particular study, which focuses on law enforcement practice in the West (i.e., dominantly low-context countries). The mixed condition did

have a randomization for the condition of the suspect (i.e., being in the truth condition or the lie condition).

This study included 3 dependent variables: depletion (measured for the suspect), the level of mimicry (body alignment between the participants as a dyad) and deception detection rates from the interviewer.

Procedure

Participants were recruited using Lancaster University's online sign-up system. In this system restrictions towards cultural background were admitted, so all participants who would sign up would meet the cultural requirements of the study. Based on this information, participants were classified either as high-context or low-context individuals, in line with previous research by Beune et al. (2011). After that, two participants could sign up per timeslot, so as to fill all cells of the experimental design.

Procedure for suspect: Truth condition (pre-interview). The suspect was invited to enter the interview room while the interviewer was sent to another room and instructed to wait for 5 minutes. This way, both participants could be instructed separately by the researcher for they were not to know each other's assignment.

The suspect was told that they would be interviewed by another student about a game called 'Never End'. The suspect was instructed to play 'Never End' (see Appendix A for an instruction) on a laptop for about 7 minutes, during which the researcher would go to a different room to instruct the interviewer. The suspect was told that they were to convince the interviewer that they played the game during the pre-interview time, which in their case meant telling the truth. Additionally, they were instructed to pay attention to all details of the game in order for them to answer all the questions truthfully, yet convincing. They were told that if they managed to convince the interviewer that they were telling the truth, they would be entered into a raffle of prizes worth £50 at the end of the experiment. This incentive was given to ensure that the suspect would try their best on the task.

Before leaving the room the researcher made the suspect aware of a timer that was set to 3 minutes and a piece of paper. The suspect was instructed to read their second assignment on the paper when the timer went off. This second assignment involved bringing a wallet with a £5 note sticking out to a different room where a lost property box filled with random items was located. On the paper the suspect was instructed to pay attention to the items in the box and the surroundings of the box, again to make sure they would be able to convince the interviewer that they actually did bring the wallet to the lost property box and were speaking the truth. Again, they were told that if they managed to convince the interviewer that they were speaking the truth, they would be entered into a raffle of prizes worth £50 at the end of the experiment.

Procedure for suspect: Lie condition (pre-interview). Similar to the truth condition, the suspect was separated from the interviewer when entering the interview room and was told that they would be interviewed by this student about a game called 'Never End'. They would not play this game, yet were instructed to convince the interviewer that they had. In other words, they would have to construct a lie. In order for them to prepare for the interview, the suspect was given a short description of the game. They were instructed to read the description and, with the help of their own imagination, construct a story. Consistent with Vrij et al. (2008, p.257) this procedure "reflects a situation where a liar is familiar with the event s/he describes but lacks the experience of true participation in that event". Similar to the truthful condition the suspect was told that if they managed to convince the interviewer that they were speaking the truth, they would be entered into a raffle of prizes worth £50 at the end of the experiment.

Before leaving the room the researcher made the suspect aware of a timer that was set to 3 minutes and a piece of paper. The suspect was instructed to read their second assignment on the paper when the timer went off. This second assignment involved taking a £5 note out of a wallet that was in the lab and hiding it somewhere on their body (i.e., in a pocket or shoe). This was done to enhance any feelings associated with stealing money and so that the interviewer could not see them carrying it. On the paper, the suspect was then instructed to convince the interviewer that they did not take the £5 note, but that they brought the wallet to the lost property box in another room and that they had no idea as to what happened to the £5. This meant that they would have to construct a second lie. Consistent with the truthful condition, the suspect was told that if they managed to convince the interviewer that they were speaking the truth, they would be entered into a raffle prize worth £50 at the end of the experiment.

Procedure for interviewer (pre-interview). Upon arrival the interviewer was sent to a different room. Then, the researcher explained that they were going to interview the other student about two topics: firstly about the game 'Never End' and secondly about a £5 note that had gone missing. For both topics they were instructed to find out if the suspect was lying or telling the truth, with the help of a list of pre-made questions. For a full list of these questions, see Appendix B.

Interviewers were told that they had to fill in their findings on a questionnaire after the interview. Furthermore, they were told that if they managed to correctly identify the lie, they would be entered into a raffle prize worth £50 at the end of the experiment. Again, this incentive was given to ensure that the participant would try their very best at detection. After assuring that the interviewer understood the task, the experimenter handed the paper with pre-made questions over for a short preparation.

Procedure during the interview and afterwards. The researcher explained that now she would have to put the Xsens sensors on both participants. The detailed purpose of these sensors was not mentioned, other than that they would measure body motion. When this was done, the researcher explained that the complete interview would be 5 minutes, 2.5 minutes per topic, which she would time for the participants. During the interview, the pre-made questions were asked by the interviewer and answered by the suspect according to his or her assignment (i.e., lying or telling the truth).

After the interview both participants were asked to fill in a questionnaire. When this was done, the researcher unstrapped the Xsens sensors while both participants were debriefed as to what was tested in the experiment.

Independent variables

Culture. To check whether or not participants were correctly assigned to low-context and high-context categories, a questionnaire assessing culture was administered to the participants after the interview. This culture check consisted of 22 items, including items like: "I am able to recognize others' subtle and indirect messages", "I try to adjust myself to others' feelings when we are communicating" and "I often bend the truth if the truth would hurt someone".

These items were derived from the original 71 item scale developed by Adair, Buchan and Chen (2009). It was not possible to use the full scale due to time constraints. Instead, 16 items on guessing meaning (3 items, $\alpha = 0.81$), humbleness in communication (8 items, $\alpha = 0.61$) and truth bending (5 items, $\alpha = 0.79$) scales, as previously used by Beune et al. (2011), were included. These were then completed with 6 additional items from the original scale. These additional items had a dual goal. First, they might provide a better insight in the placement of participants in either a low- or high-context culture. Second, the items could provide interesting data for the first hypothesis, concerning depletion, and for hypothesis 3a and 3b concerning deception detection. The factors that were added covered 'Assertive persuasion' ("I am generally firm in pursuing my side of the issue") and 'Multi-tasking' ("I do not like to engage in several activities at the same time"). The items within the factor of 'Assertive persuasion' (3 items, $\alpha = 0.78$) were added because they might show a relation to the detection of deception. When a suspect is very persuasive and assertive, this might influence the detection of deception, especially in mixed culture dyads. The items within the factor of 'Multi-tasking' (3 items, $\alpha = 0.71$) were added because they might provide insight in difference of felt depletion between cultures, since multi-tasking in itself is considered to be related to a higher level of cognitive load, especially in the field of deception (Vrij, 2008, Vrij et al., 2008, 2010).

When all 22 items were examined together, the culture check was found to be below the reliability level of $\alpha \geq 0.70$ (22 items; $\alpha = 0.64$). As a consequence, one item was excluded from the questionnaire ("I listen very carefully to people when they talk"), leaving the cultural check with 21 items and a Cronbach's alpha of exactly 0.70, making the scale sufficiently reliable. For a complete overview of the questions, see either Appendix C or D.

Deception instructions. When in the lie condition, there were two deception tasks the participant was instructed to do; to lie about playing a game and to lie about not taking money out of a wallet. The decision to add this second assignment concerning a mock theft was made to make the experiment more 'criminally based', or, in other words making it more relevant for police practitioners. Furthermore, it would be interesting to see if there is a difference in depletion, mimicry and detection rates when it comes to different types of lies. Lying about the details of a game can be felt as more difficult because it involves memory and a certain type of creativity, yet lying about something immoral like stealing money can be considered more difficult because of the strain it puts on the participants norms and values.

Pre-made list of interview questions. All interviewers were given a question sheet with two sets of questions, one for each topic (i.e., the game and the missing money). This was done in order to keep the content and order of the questions the same. The questions regarding the game were put in reversed order, to increase difficulty for the suspects who had to lie, as done before by Vrij et al. (2008). This way, lying about the game was expected to be cognitively harder, as opposed to lying about the money, which was expected to be harder in a moral sense. Questions regarding the game included "What was your total score?", "What happened when you went through an exit?", "Tell me about the lay-out of the game: any specific colors, effects or sounds?" and "Tell me about the keys you used to play this game". Questions regarding the money included "Did you take the 5 pounds while you were here playing 'Never End'?", "Why did you decide to bring the wallet to lost property?", "How many items were in the lost property box?" and "Could you describe these items?". For a complete overview of the questions asked, see Appendix B.

Dependent variables

Depletion. The State Ego Depletion Scale (see Appendix C) was used to measure the depletion experienced by the suspect, in line with previous research by Janssen, Fennis, Pruyn and Vohs (2008). This scale consists of 25 items, including 'Right now, it would take a lot of effort for me to concentrate on something', 'I can't absorb any more information', and 'I feel sharp and focused' (reversed item). The questionnaire was given twice, once before the interview (after the suspect performed their pre-interview task, i.e., playing the game or reading a description of the game) and once after the interview. This was done to check that depletion caused by the pre-interview task did not interfere with the depletion caused by lying or telling the truth during the interview. For example, a participant might find playing 'Never End' quite depleting, but does not feel depleted by the interview itself. If in this case only one measurement of depletion was given, this would most likely result in a false indication of depletion caused by the interview. After converting the reversed items, both depletion test 1 (25 items; $\alpha = .93$) and depletion test 2 (25 items; $\alpha = .94$) were found to be highly reliable.

Furthermore, depletion was measured by a self-report item on felt difficulty of the assignment. The question 'How difficult was it for you to do your assignment?' was therefore omitted in the suspect questionnaire. Reason behind adding this item is that assignments that are considered to be more difficult are usually also considered more depleting (Vrij et al., 2008). Hence, it could provide insight into felt depletion by the suspect.

Mimicry. In order to measure mimicry, participants wore 17 Xsens strap-on sensors on their bodies. The Xsens motion capture system is used for full body human motion capture, which is based on miniature inertial sensors and wireless communication solutions, combined with advanced sensor fusion algorithms using assumptions of biomechanical models. Examples of field of use are biomechanics, ergonomics, 3D animation and virtual reality training and simulation (Xsens user manual, 2010). The 17 sensors were placed on the pelvis, sternum and extremities including the head, shoulders, upper and lower arms, hands, upper and lower legs and feet. By means of a wireless receiver the data was registered on a computer.

In order to study the actual occurrence of mimicry, dynamic time warping (DTW) was used. DTW is a well-known technique to find an optimal alignment between two given (time-dependent) sequences under certain restrictions. These sequences may be discrete signals (time-series), or, more generally, feature sequences sampled at equidistant points in time. To compare two different features, one needs a *local cost measure*, sometimes also referred to as *local distance measure*. Typically, a local distance measure is small (low cost) if the two points (x and y) in time are similar to each other. If not, local distance measure is large (high cost). The goal is to find an alignment between x and y having minimal overall cost, in other words, to find the *optimal warping path* between x and y (Müller, 2007, p. 69). Eventually, DTW will give a 'mimicry score' for each pair of participants. Considering the optimal warping path theory, this means that the lower this mimicry score the more mimicry occurred during the interaction (i.e., a lower score indicates a lower overall cost of the warping path).

Next to using the Xsens sensors, video cameras were placed to film the interview. This was done to ensure recording of body movement, which could be coded from the videos if necessary.

Deception detection. Deception detection rates were measured by a questionnaire given to the interviewers after the interview had taken place. The questionnaire comprised two detection items, plus items on certainty of previous answers (e.g., 'Did the other student speak the truth about playing the game?', 'Did the other student speak the truth about the missing money?', 'How certain are you about your answer on the previous questions?' and 'How convincing did you think the other student was?'). See Appendix D for questionnaire containing these questions.

RESULTS

Manipulation check. To measure whether the participants who played the 'suspect' role thought they understood their veracity assignment (i.e., lying or telling the truth), the question 'How well did you understand your assignment?' was examined as a function of assigned condition. Results on a scale from 1 (I didn't understand it at all) to 7 (I absolutely understand it) indicate that on average, suspect participants felt that they understood the assignment well ($M = 6.38$, $SD = 0.81$). This finding helps increase the validity of the manipulation by showing that the participants did not feel confused or insecure about performing their assignments.

Sampling check. To test whether participants who were classified as high-context scored significantly higher on the culture scale than low-context participants, an independent-samples *t*-test was conducted. This revealed that the mean culture scale score for high-context participants ($M_{hc} = 5.07$, $SD_{hc} = 0.56$) was significantly higher than the score for low-context participants ($M_{lc} = 4.82$, $SD_{lc} = 0.51$), $t(154) = -2.83$, $p < .0025$, one-tailed. Thus, the classification of low-context versus high-context based on country of birth can be considered effective.

Test of hypotheses

Depletion. It was predicted that telling a lie would be more depleting for individuals from low-context cultures than for individuals from high-context cultures (hypothesis 1). In order to examine the role of depletion, two measures were assessed: a self-report item on depletion ("How difficult was it for you to do your assignment?") and the State Ego Depletion Scale containing 25 items on felt depletion. All answers were given on a Likert scale ranging from 1 to 7.

Each measure was submitted to a 2 (culture) x 2 (veracity) between-subjects ANOVA. Note here that although the experiment also contains mixed dyads, essentially these dyads are made up of either low- or high-context participants. Hence, for this analysis only two cultural conditions are used: low- and high-context. Additionally, since only the suspect participants were measured for depletion, this analysis will contain a total of $N = 78$ participants.

In relation to the self-report item on depletion two main effects and an interaction effect are found. First, there is a main effect of culture, $F(1, 76) = 15.16$, $p < .0005$. To specify, results indicate that low-context participants have more difficulty performing their assignment ($M_{lc} = 3.33$, $SD = 1.75$) than high-context participants ($M_{hc} = 2.19$, $SD = 1.27$), which indicates more felt depletion for low-context suspects. Second, there is a main effect of veracity, $F(1, 76) = 23.59$, $p < .0005$. Results indicate that liars have more difficulty performing their assignment than truth tellers ($M_{lie} = 3.23$, $SD = 1.64$ vs. $M_{truth} = 2.03$, $SD = 1.22$). This supports the general theory that lying is more difficult than

telling the truth, hence possibly more depleting. Lastly, there is an interaction effect of culture and veracity conditions, $F(1, 76) = 10.88, p < .005$. Figure 1 shows that low-context suspects have more difficulty performing their assignment than high-context suspects, yet that this depends on the veracity condition.

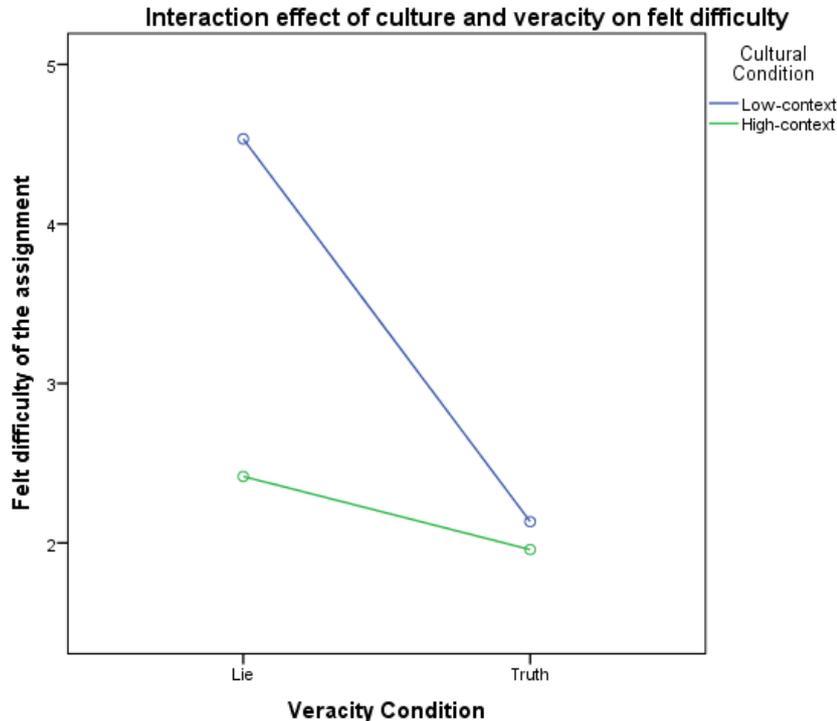


Figure 1. Interaction effect of culture and veracity on felt difficulty of the assignment

Next, analysis in relation to the State Ego Depletion Scale was conducted, for which several between-subjects ANOVA's were used. Note here that the State Ego Depletion Scale was given twice; once after the pre-interview tasks and once after the interview itself.

First, differential scores for the two depletion questionnaires were calculated in order to examine any significant differences between the first and second questionnaire. A 2 (culture) x 2 (veracity) between-subjects ANOVA on these differential scores did not show any significance regarding the influence of culture, $F(1, 76) = 0.001, ns$, or veracity, $F(1, 76) = 0.22, ns$. Moreover, there was no significant interaction effect, $F(1, 76) = 1.28, ns$. All taken together this indicates that there is no difference between cultures in felt depletion before and after the interview. In other words, for both cultures the interview itself does not seem to have an effect on felt depletion.

This finding seems to be reflected when comparing separate results on the first and second depletion questionnaire. Results of a 2 (culture) x 2 (veracity) between-subjects ANOVA conducted on the first depletion measure (given directly after the tasks) show there is a main effect of culture $F(1, 76) = 16.49, p < .0005$. To specify, after performing the tasks low-context participants felt more depleted ($M_{lc} = 84.43, SD = 27.24$) than high-context participants ($M_{hc} = 63.08, SD = 18.74$).

However, the same analysis did not find a significant main effect of veracity, $F(1, 76) = 0.46, ns$, nor a significant interaction effect, $F(1, 76) = 0.22, ns$.

Results of a 2 (culture) x 2 (veracity) between-subjects ANOVA conducted on the second depletion measure (given after the interview) also show a main effect of culture $F(1, 76) = 16.48, p < .0005$. Again, after the interview low-context participants felt more depleted ($M_{lc} = 80.33, SD = 25.73$) than high-context participants ($M_{hc} = 56.12, SD = 17.0$). Like with the first depletion test, there are no significant results for the main effect of veracity, $F(1, 76) = 1.25, ns$, nor for the interaction effect between culture and veracity, $F(1, 76) = 0.32, ns$.

All three ANOVA's taken together, results show significant main effects of culture, with low-context participants being more depleted both after the tasks and after the interview. However, there is no significant increase or decrease of felt depletion during the interview itself, since differential scores proved to be insignificant. Furthermore, none of the results show significance for veracity. This indicates that amongst all participants, there is no difference in felt depletion when telling a lie or when telling a truth. Considering these results, hypothesis 1 can only be supported on the cultural aspect, not on the veracity aspect. However, results on the self reported item of felt difficulty state that low-context liars feel more difficulty performing their assignment than any other type of participant, thereby supporting hypothesis 1. These conflicting accounts shall be further discussed later on.

Mimicry. It was predicted that high-context dyads would mimic more than low-context dyads (hypothesis 2a). Furthermore, it was predicted that when one of the dyad members is lying high-context dyads would mimic more than low-context dyads (hypothesis 2b). Before being able to look at the actual mimicry scores (i.e., the amount of behavioral coordination between the two participants), the raw data provided by the Xsens sensors was converted through dynamic time warping into DTW scores. A DTW score reflects how well the direction and position of movement between participant A and participant B aligns. The lower the DTW score, the more mimicry is displayed within the dyad because DTW looks for the lowest 'cost' of matching two sets of movements. In other words, high scores (i.e., expensive 'costs') indicate more misalignment. Yet, for the purpose of this section all DTW scores were manually converted to negative scores, which changes interpretation of misalignment. In this case a high score actually indicates less misalignment and hence, more mimicry. This will make the omitted figures easier to read.

The dynamic time warping process rendered two SPSS datasets, one for sensor *orientation*, which reflects the direction of the movement, and one for sensor *position*, which reflects the coordinates of the movement. For both levels three measurements were given per sensor: measurements on the x-axis, on the y-axis and on the z-axis. These measurements were made 120 times per second in raw sensor units, resulting in a stream of data that revealed the direction and intensity of the interviewers' and suspects' movement on each limb.

First, mimicry was analyzed using a within-subject variable (i.e., orientation or position) which consisted of 7 levels, representing 7 mean scores of different body parts. To specify, mean scores across multiple sensors were calculated for the following body parts: head (consisting of head and neck movements), spine (consisting of 3 movements recorded along the spine), pelvis, right and left arm (both consisting of shoulder, upper arm, fore arm and hand sensors), and right and left leg (both consisting of upper leg, lower leg and foot sensors). Each of these aggregated measures was recorded twice: once for talking about the game 'Never End' and once for talking about the lost money (i.e., type of lie: the within-subject factor). It was decided to combine the 7 body parts in to one within-subjects variable to construct a general measure for the entire body, without averaging all sensors together. In this way, results show the overall behavioral coordination within the dyad without losing too much of the actual scores, which would happen if one were to calculate one mean score for the entire body. Additionally, all 7 body parts were analyzed separately to see if findings were similar. Furthermore, the analyses were conducted separately on the orientation and position scores to determine the robustness of the findings to different measurement approaches.

Mimicry Orientation. First, the orientation scores were submitted to a 3 (culture) x 2 (veracity) x 2 (type of lie) x 7 (limb) repeated measures ANOVA, with type of lie and limb as a within-subject variables. Mauchly's Test of Sphericity indicated that the assumption of sphericity has not been violated, $\chi^2(20) = 297.417, p \leq .001$. There was a significant within-subjects effect of orientation of the limbs, $F(6, 71) = 121.234, p < .001$. This was to be expected, since it indicates that all the body parts omitted in this within-subject variable move significantly different from one another (i.e., the orientation of head movements are significantly different than the orientation of leg movements).

In order to test hypothesis 2a, the extent of mimicry orientation as a function of culture was examined. To start off, Figure 2 shows that high-context dyads (HC line) appear to mimic more than low-context dyads and mixed dyads. However, results of the repeated measures ANOVA did not find a significant between-subjects effect of culture $F(2, 75) = 0.177, ns$. Therefore it cannot be concluded that high-context dyads mimic more than low-context dyads do, which leads to rejection of hypothesis 2a with regard to orientation mimicry.

As for results on hypothesis 2b, Figure 3 shows that, when one of the participants is lying, mixed dyads (the MIXED line) seem to exhibit more orientation mimicry than both high- and low-context dyads. Furthermore, Figure 3 shows that differences between low- and high-context dyads are small. Therefore, a post hoc comparison using the Fisher LSD test was done. This revealed that there is no significant difference between mean scores of low- and high-context dyads, indicating that orientation mimicry does not differ between high- or low-context dyads when a lie is being told. Therefore, hypothesis 2b cannot be supported with regard to orientation mimicry.

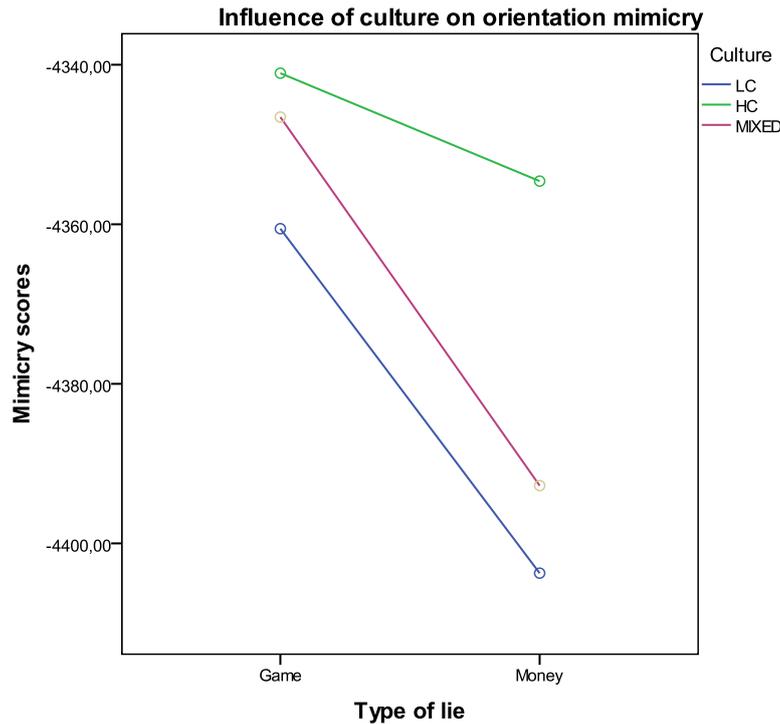


Figure 2. Overall influence of culture on orientation mimicry

However, other results are worth mentioning. Figure 2 shows that in all three cultural conditions there is a difference in orientation mimicry when speaking of the game and when speaking of the money. To specify, results on the repeated measures ANOVA show a significant effect of the within-subjects factor *type of lie* on orientation mimicry, $F(1, 76) = 9.858, p < .002$, indicating that orientation mimicry between two participants indeed does differ when they speak about the game or about the lost money. It appears that, especially for mixed and low-context dyads, mimicry orientation decreases when talking about the lost money. Additionally, the control question 'How difficult was it for you to lie about the game/the money?' on a 7 point Likert scale shows that liars have more difficulty in lying about the money than about the game ($M_{\text{money}} = 4.26, SD = 1.65$ vs. $M_{\text{game}} = 3.87, SD = 1.75$). Therefore, one could argue that lying about the money is considered more difficult and significantly leads to less mimicry within a dyad.

Furthermore, a post hoc comparison using the Fisher LSD test on cultural differences in mimicry when lying (see Figure 3) shows significant differences for mixed dyads. This indicates that mixed-cultural dyads mimic more when a lie is being told, than same-cultural dyads do.

Additionally, orientation scores of the 7 separate body parts were each submitted to a 3 (culture) x 2 (veracity) x 2 (type of lie) repeated measure ANOVA. Results show a significant main between-subjects effect of culture on orientation mimicry of the *spine*, $F(2, 75) = 3.49, p < .05$. From Figure 4 it appears that this effect is caused by the mixed cultural dyads, like discussed previously when all body parts were measured together.

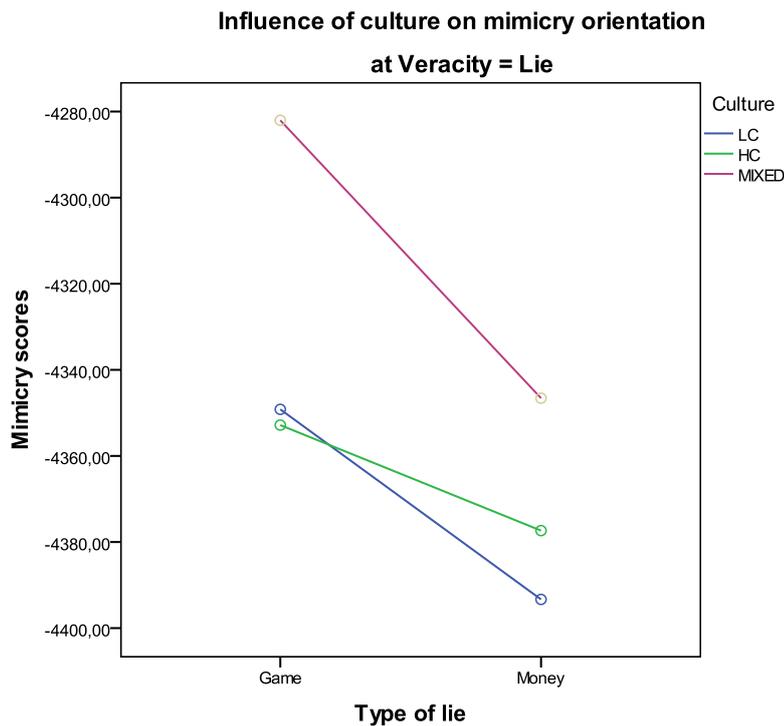


Figure 3. Influence of culture on mimicry orientation when lying

A post hoc comparison using the Fisher LSD test on cultural differences in orientation mimicry of the spine indeed confirms that the mixed cultural dyads differ significantly from the high-context cultural dyads, but not from the low-context cultural dyads.

Moreover, the high-context cultural dyads and the low-context cultural dyads do not significantly differ from one another. Since only one main between-subjects effect was found when analyzing the body parts separately and since this main effect proved to be caused by the mixed cultural dyads, hypothesis 2a cannot be supported. This is in line with previous findings on analysis of all 7 body parts together.

Next, both orientation mimicry on the *right arm* and the *left leg* show a within-subjects effect of type of lie, respectively $F(1, 76) = 5.37$, $p < .05$ and $F(1, 76) = 9.61$, $p < .005$. This indicates that direction of movement of the right arm and the left leg are influenced by type of lie. Figures 5 and 6 show that orientation mimicry seems to decrease when talking about the money. This is in line with findings on all 7 body parts measured together.

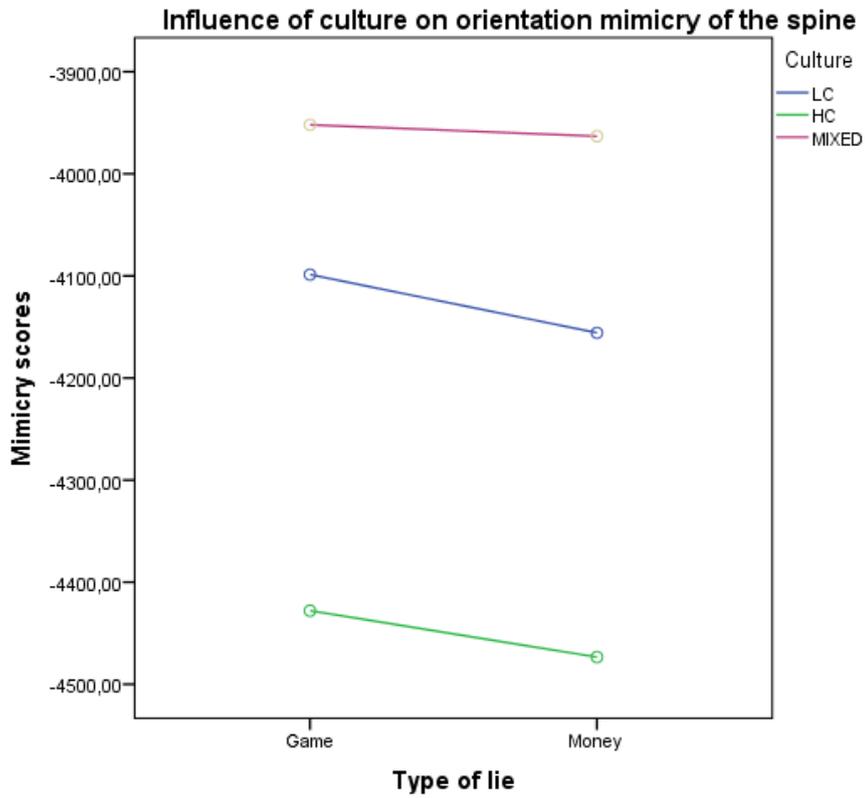


Figure 4. Influence of culture on orientation mimicry of the spine

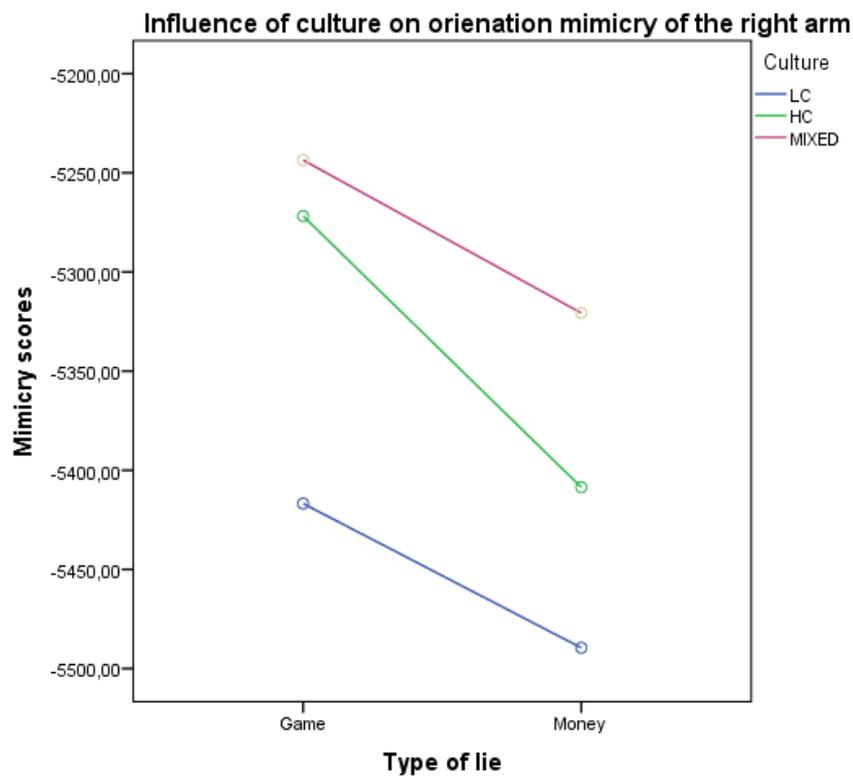


Figure 5. Influence of culture on orientation mimicry of the right arm

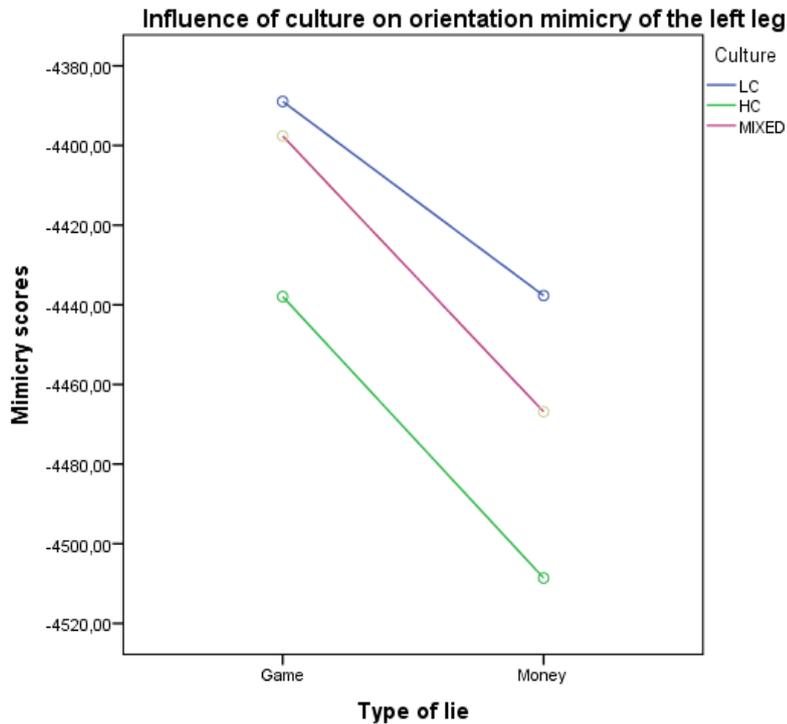


Figure 6. Influence on orientation mimicry of the left leg

Mimicry position. The position scores were submitted to a 3 (culture) x 2 (veracity) x 2 (type of lie) x 7 (limb) repeated measures ANOVA, with type of lie and limb as a within-subject variables. Mauchly's Test of Sphericity indicated that the assumption of sphericity had not been violated, $\chi^2(20) = 239.000, p = .000$. There was a significant within-subjects effect of limb position, $F(6, 71) = 1907.756, p < .000$, which indicates that all the body parts omitted in this within-subjects variable had a significantly different position, which influences position mimicry.

In order to test hypothesis 2a, the extent of mimicry position as a function of culture was examined. To start off, Figure 7 shows that low-context dyads (LC line) appear to have more position mimicry than high-context dyads and mixed dyads. Results show that there is a main between-subjects effect of *culture* on mimicry position, $F(2, 75) = 3.589, p < .05$. In other words, culture influences position mimicry, regardless of other variables. However, post hoc comparisons using the Fisher LSD test revealed that low- and high-context dyads did not have significantly different position mimicry scores. Differences between low-context dyads and mixed dyads and between high-context dyads and mixed dyads did prove to be significant. Hence, one could argue that the main between-subjects effect of culture is caused by the mixed-cultural dyads, not by the difference in same-cultural dyads. Therefore, hypothesis 2a cannot be supported with regard to position mimicry.

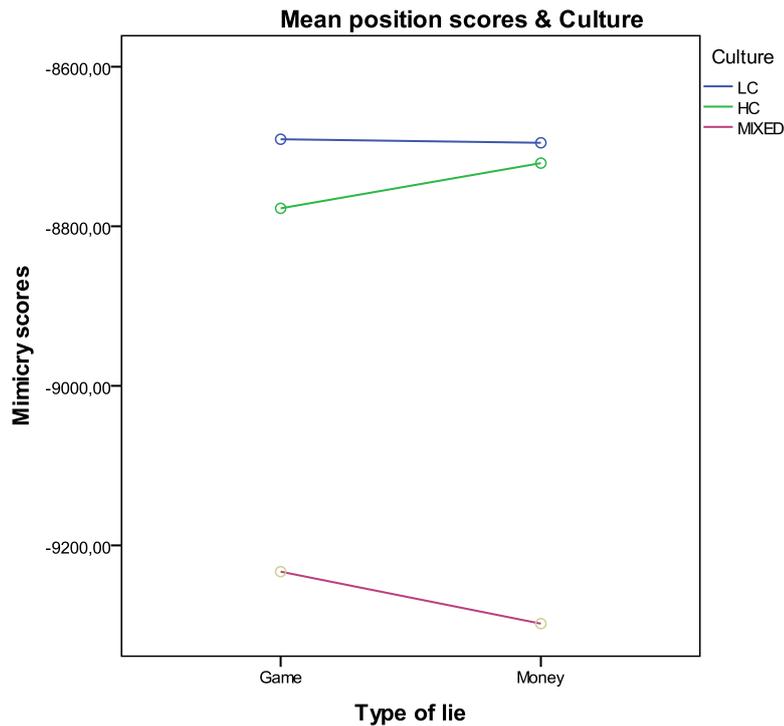


Figure 7. Overall influence of culture on position mimicry

As for results on hypothesis 2b, Figure 8 shows that, when one of the dyad members is lying, low-context dyads (LC line) seem to mimic more than high-context dyads or mixed dyads. However, again post hoc comparisons using the Fisher LSD test revealed that there is no significant difference between mean scores of low- and high-context dyads. This indicates that when lying, low- and high-context dyads do not differ in their alignment of position mimicry. Therefore, hypothesis 2b cannot be supported with regard to position mimicry.

The following other significant results were found. Pair wise comparisons on position mimicry when lying show significant differences for mixed dyads in comparison to same-cultural dyads. To specify, Figure 8 shows that mixed-cultural dyads show less position mimicry, indicating that the coordinates of their movements are significantly less aligned than those of same-cultural dyads.

Additionally, position scores of the 7 separate body parts were each submitted to a 3 (culture) x 2 (veracity) x 2 (type of lie) repeated measure ANOVA. Results show significant main between-subjects effects of culture on position mimicry of the *spine*, $F(2, 75) = 5.23, p < .05$, the *left arm*, $F(2, 75) = 3.59, p < .05$, and the *left leg*, $F(2, 75) = 4.60, p < .05$. This indicates that the left side of the body, together with spinal movements, is influenced by culture regardless of other variables. However, since no significant difference between same-cultural dyads was found when analyzing all 7 body parts together, a post hoc comparison using the Fisher LSD test needs to be conducted for these separate findings as well. Results show that for the spine, the left arm and the left leg results are caused by the mixed dyads, who prove to differ significantly from both low- and high-context dyads.

Low- and high-context dyads do not differ significantly from one another, which is in line with findings on all 7 body parts together. It appears that the mixed cultural dyads are responsible for any effects of culture. Therefore, hypothesis 2a cannot be supported.

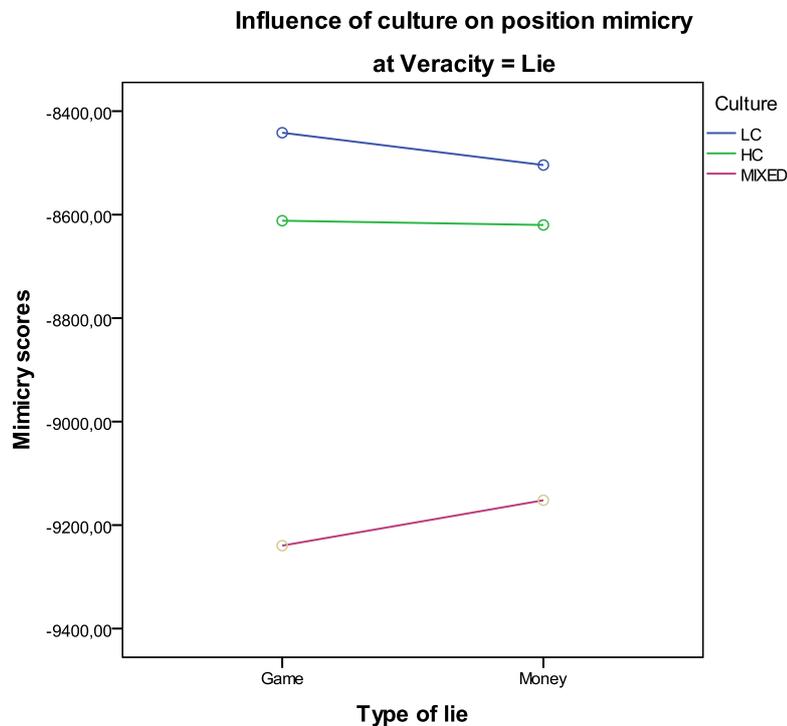


Figure 8. Influence of culture on position mimicry for liars

Lastly, results show a significant main between-subjects effect of veracity on position mimicry of the *right arm*, $F(1, 76) = 4.05, p < .05$, and the *right leg*, $F(1, 76) = 4.69, p < .05$. This indicates that the right side of the body is influenced by veracity, regardless of other variables. However, after performing a Fisher LSD test, it appears that both main between-subjects effects of veracity are caused by the mixed dyads, not by any difference between the low-context and high-context dyads. This is in line with results found on analysis of all 7 body parts together; it appears that the mixed cultural group is responsible for any significant effects of veracity. Therefore, hypothesis 2b cannot be supported.

Deception detection. It was expected that dyads that mimic more would show worse deception detection rates than dyads that mimic less, regardless of cultural background (hypothesis 3a). It is important to note that there is no official 'cut-off' score for mimicry, or in other words, there is no official way to divide between a 'lot of mimicry' and 'little mimicry'.

Before looking at the actual detection rates, the item that measured confidence rate of the suspect participant was calculated. A one-way ANOVA with veracity as between-subjects factor was conducted on the confidence rate item of the suspect participant, measured on a scale from 1 to 7. Results show a significant main effect of veracity, $F(1, 76) = 4.49, p < .05$, on the self-reported

confidence of suspect participants. To specify, truth tellers ($M = 5.46$, $SD = 1.16$) were more confident that they convinced the interviewer of their story than liars ($M = 4.85$, $SD = 1.38$). However, both of these scores are on the high side, indicating that both liars and truth tellers felt fairly confident in their ability to convince the interviewer of their innocence.

Next, a ROC curve analysis (Fawcett, 2006; Metz, 1978) was used on both orientation mimicry and position mimicry, for both types of lies. In order to conduct this analysis, one average mimicry score for orientation and for position, as well as per type of lie, was calculated, resulting in 4 scores. For orientation scores on the game-lie, results show $p = 0.83$. Hence, it can be concluded that the area under the ROC curve is not significantly different from 0.5 and that therefore there is no evidence that orientation mimicry has an ability to distinguish between correct and false detections on the game-lie. The same results were found for the money lie, with $p = 0.78$, indicating that orientation mimicry also has no ability to distinguish between correct and false detections on the money-lie. Next, position mimicry scores on both the game-lie ($p = 0.98$) and the money-lie ($p = 0.63$) were found to be insignificant as well. To specify, this means that position mimicry, like orientation mimicry, has no ability to distinguish between correct and false detections on both type of lies. Considering these results, it can be concluded greater or less mimicry does not lead to more or less detection. Therefore, hypothesis 3a cannot be supported.

Lastly, it was predicted that mixed cultural dyads (i.e., a high-context suspect and a low-context interviewer) would show worse detection rates compared to same cultural dyads (hypothesis 3b). After calculation of correct detection percentage regardless of the veracity and culture condition it appears that interviewers were more correct in their overall detection regarding the *missing money* (57.7% correctly detected whether the suspect was lying or telling the truth) than in their detection regarding the *game* (47.4% correctly detected for lies and truths). This difference however proved to be insignificant, $\chi^2(1, N = 78) = 0.53$, *ns*.

When cultural background is involved, correct detection for both the game and the missing money show the following percentages. For the game, 53.3% of the interviewers in the low-low context condition detected correctly, versus 50% in the high-high context condition and 33.3% in the mixed cultural condition. For the missing money, 56.6% of the interviewers in the low-low context condition detected the lie correctly, versus 60% of the high-high context condition and 55.5% in the mixed condition. However, after performing a Chi-square analysis on the observed counts, it turns out that for both the game-lie, $\chi^2(1, N = 78) = 1.86$, *ns* and the money-lie, $\chi^2(1, N = 78) = 0.44$, *ns*, no significant results can be found between same culture dyads and mixed culture dyads. Therefore, these results do not support hypothesis 3b.

DISCUSSION

Deception detection is one of the most important, if not *the* most important, part in the criminal justice system. Without the truth, justice cannot be served. Nowadays however, crime has become more global, with different nationalities and cultures committing and fighting crime on the same turf (Broadhurst & Cheng, 2005; Kakabadse et al., 2001; Zhou and Lutterbie, 2005). Police personnel may encounter suspects from different cultural backgrounds, with different means of communication, and a different set of 'interaction rules' (Hall, 1978; Würtz, 2005). It is therefore important to combine the fields of cross-cultural research and research on deception detection to find possible cues to detect lies, especially when cultural differences might stand in the way of correct detection.

In this study, low-context cultures were compared to high-context cultures on two possible cues to detection of lies; depletion and behavioral mimicry. Furthermore, it was established to what extent interviewers in mixed cultural dyads were able to detect for lies. The results of the experiment, involving an interview between a suspect (telling a lie or telling the truth based on a pre-interview task) and an interviewer (detecting for lies) showed various results.

First, it was expected that when telling a lie, low-context individuals would be more depleted than high-context individuals. Results show that indeed low-context participants were more depleted after the interview than high-context participants. This supports the theory expressed in this study that low-context communication in general is more depleting than high-context communication, caused by certain characteristics of low-context communication such as the quality maxim and the consistency principle. It is interesting to explore which of these characteristics has the strongest influence on felt depletion, as to tie all information about low-context communication together. Future research might delve deeper into these topics to see what the consequences are of a higher amount of felt depletion to the overall success of low-context communication (e.g., in crisis or business negotiations) and perhaps how felt depletion can be minimized if consequences turn out to be negative. Interesting to note however, is that it appears that low-context individuals also felt more depleted before the interview, and that the interaction which was displayed during the interview did not significantly increase or decrease their felt depletion. In other words, low-context individuals seem to feel more depleted at all times, regardless of their assignment or the interaction during the interview. Future research might try to assess this lack of difference again. When results are similar, this might indicate that low-context individuals do not necessarily feel more depleted just by communicating and interacting with others, but perhaps by other factors around them as well.

Second, while support is found on the cultural aspect of the first hypothesis, conflicting support is found on the veracity aspect. According to the results of the State Ego Depletion scale, it did not matter if low-context participants were lying or telling the truth, they felt more depleted all the

same. This is remarkable, since established research shows that lying causes more cognitive load, and hence, is more depleting than telling the truth (Buller & Burgoon, 1996; Vrij et al., 2010; Vrij et al., 2008; Vrij et al., 1996; Zuckerman, DePaulo & Rosenthal, 1981). Furthermore, the self report item for suspect participants on the felt difficulty of their assignment shows that liars had significantly more difficulty with their assignment than truth tellers. More specifically, low-context liars had the most difficulty of all to perform their assignment, indicating support for the expectation that low-context liars feel more depleted than high-context liars.

Two possible explanations can be suggested. First, there might be a possibility that felt depletion and cognitive load shouldn't be considered as part of the same construct when it comes to deception. For example, in this study liars were instructed to convince the interviewer that they went to a lost property box to drop off a wallet with money in it. The interviewer would ask them what items were there in the box. When answering this question, the liar knows (s)he's being untruthful, which according to previous research causes cognitive load. Yet, he or she might not feel depleted because obvious items that are most likely to be found in a lost property box can be named to convince the interviewer. In other words, answers (even though they are lies) are not hard to think of, hence cause no felt depletion. Since the scale used in this study only measured depletion, it can therefore be that liars actually did experience more cognitive load than truth tellers, just not more depletion. This idea is reflected in the contrasting accounts that were found between the depletion scale (liars are not significantly more depleted) and the self report item on felt difficulty (liars have more difficulty with their task). Second, according to DePaulo and colleagues, lies based on scripts or familiar stories are "unlikely to be marked by the signs of mental effort" (DePaulo, Lindsay, Malone, Muhlenbruck, Charlton & Cooper, 2003, p.79). They state that a liar who sticks to a script or familiar story may be less likely to get tangled in contradictions than a liar who makes up a completely new story, hence not feeling as much depletion. Additionally, McCornack (1997) states that lie telling is so routinely practiced, it may generally be only slightly more challenging than telling the truth, especially when it comes to easy or familiar lies. In this experiment, liars were not provided with a script. Furthermore, the online game that was played was unknown to the suspect participants. Questions about the lay-out and the scoring system of the game can therefore not be considered familiar. However, the lost money situation could be considered as a familiar event to some of the lying participants, making lying about them relatively easy and therefore not depleting. Truth tellers on the other hand had to actually make a mental effort to remember the situation as it occurred, for example remembering the items in the lost property box, possibly resulting in more felt depletion. This explanation would prove to be even stronger when indeed depletion and cognitive load both explain different things concerning deception (i.e., it might be that liars experience a higher cognitive load, but truth tellers feel more depleted). Further research might shed a light on the conceptual differences between cognitive load and depletion and implement this to the field of deception research.

Third, it was expected that high-context dyads mimic more than low-context dyads. Results cannot support this hypothesis. On both orientation and position mimicry it appears that high-context dyads do not significantly mimic more or less than low-context dyads. Following this, the expectation that high-context dyads with a lying dyad member would mimic more than low-context dyads with a lying dyad member also cannot be supported. Two technical explanations might have influenced these results. First, the participants had to wear extensive body motion equipment, perhaps causing them to become more rigid than usual. However, the tremendous accuracy provided by the Xsens sensors (i.e., 120 measurements per second were taken, therefore measuring every twitch the participants makes) should make up for most of this interference. Second, the participants sat down during the interview. Sitting down might cause less body movement, for the pelvis and upper legs are practically in rest. However, during the experiment there were no objects placed in between the participants, like tables or other objects, allowing them to see each other fully. Therefore, even though participants were sitting down, full body mimicry could still be possible.

Fourth, considering the lack of significant results as stated above, one might argue that culture has no influence whatsoever on mimicry. However, this study found that when looking at mixed-cultural dyads, significant differences did emerge. Results show that overall, mixed dyads have less position mimicry. In other words, the coordinates of the movements significantly align *less* as with same-cultural dyads. Next, mixed dyads show more orientation mimicry when a lie is being told. To specify, the direction of movement within these dyads is significantly *more* aligned than in same-cultural dyads when a lie is being told. Taken together, this indicates that mixed-cultural dyads move their body in the same direction (e.g., both move their right hand up when communicating) when a lie is being told, but the position of this movement is different (e.g., one moves their right hand on pelvis level, the other one on chest level). This effect can be explained by the basic theory behind the effect of mimicry. Like Chartrand and Bargh (1999) state, mimicry provides for bonding, liking and most of all, more understanding between people. It appears that this automatic tendency increases when two people from different cultures are put together. They have a hard time properly understanding each other's non-verbal signals and therefore 'work' harder to make the interaction understandable. That might also be the reason for an increase in orientation mimicry, but not in position mimicry. After all, communication partners try to gesture in the same way, but do not actually position their movements correctly because this way of interacting is unfamiliar to them. This being said, it is apparent that mimicry patterns are influenced by culture, although future research might give more attention to whether this actually helps communication partners understand each other better in a mixed cultural situation.

Fifth, this study found a significant influence of type of lie on orientation mimicry patterns. It appears that orientation mimicry decreases for all cultural groups when speaking about the money. In other words, regardless of culture, participants in a dyad start to move in significantly different

directions when they talk about the money (e.g., the suspect crosses one leg over the other while the interviewer remains with both legs straight and feet on the floor). An explanation for this can be found in the results of the self-reported difficulty item of the participants who had to lie, stating that they found it more difficult to lie about the money than about the game. An increase in difficulty might explain the decrease in alignment with the interviewer. Because the task became more difficult, participants might have had less cognitive resources left to use towards mimicking one another. This argument aligns with several other studies on increased cognitive load and decreased or change body motion (Davis & Hadiks, 1995; Ekman, 1997; Ekman & Friesen, 1972; Vrij, Semin & Bull, 1996). Moreover, lying about money can be considered a more high-stake lie than lying about the game, therefore increasing stress or nervousness, which in turn can change overall body motion (Vrij, 2008). Similarly, interviewers might find the money lie more difficult as well. Because of the moral consequences of accusing someone with stealing money, they might have a hard time detecting whether the suspect was lying or not. To specify this claim, one can look at the truth-bias. Truth-bias is the tendency of observers to judge messages as truthful rather than deceptive (Köhnken, 1989; Levine, Park & McCornack, 1999; Zuckerman, DePaulo & Rosenthal, 1981). According to Gilbert (1991) messages are initially taken to be true, and that disbelief requires extra effort. In line with this, the anchoring heuristic might also influence this process. The anchoring heuristic refers to observers judging suspects from an initial value (the anchor), which then can result in a final decision that is biased towards this value (Elaad, 2003). In the case of accusing someone of stealing money, many interviewers in this study might have felt that stealing is wrong and that the other student (like themselves) will not do such a thing. In that way decision-making becomes easier, because the initial message 'I'm innocent' is taken to be true (truth-bias) and is biased towards the moral value that stealing is wrong (anchoring heuristic).

Sixth, it was expected that dyads that would mimic more would show worse detection rates than dyads that would mimic less. This hypothesis cannot be supported. There was no significant difference from chance for the correct detection rates, indicating the mimicry is not negatively interfering with deception detection, as Stel and colleagues (2009) state. On the other hand, mimicry is also not positively interfering with deception detection. This means that apparently, mimicry doesn't affect deception detection at all, even though the theory behind the effect of mimicry states that mimicry leads to more (emotional) understanding (Chartrand and Bargh, 1999). However, one can also argue that this effect will be stronger, maybe only relevant, in purely social settings, not in an interviewing setting. Furthermore, considering the specific time-restraints of this experiment, the amount of mixed-cultural dyads that were tested on deception detection proved to be rather small. In the future, focus solely on mixed-dyad might prove resourceful.

Seventh, it was expected that mixed-cultural dyads would show worse detection rates than same-cultural dyads. Results however showed that this hypothesis can't be supported. For both the lie

about the game and the lie about the money no significant results can be found. This would indicate that cultural background is of no significant influence in the detection of lies, something that is contradicted by other study's, for example the study done by Bond, Omar, Mahmoud and Bonser (1990). The insignificant results are probably caused by the little amount of mixed dyads, giving the results an insignificant effect. A follow-up study with more mixed-cultural dyads might find different results.

Lastly, although the amount of mixed-cultural dyads was on the small side, this study found that deception detection rates center around chance level, like previously stated by other research (DePaulo, Lassiter, & Stone, 1982; Kassin, Meisner & Norwick, 2005; Memon, Vrij, & Bull, 2003; Vrij, 2000). This provides more support for the theory that human beings are actually better in hiding their lies than they think. Many people suffer from the 'illusion of transparency', the tendency to overestimate the extent to which one's own thoughts, emotions, and other states can be seen by others (Gilovic, Savitsky, & Medvec, 1998; Kassin, 2005). Apparently, this can indeed be considered an illusion.

To conclude, this study found interesting new perspectives that contribute to the low-context versus high-context communication field and debate. Low-context individuals are more depleted, indicating that they rely on more cognitive strategies in communication. When it comes to mimicry, various results were found, the most important one being the differences in results for both types of lies. Furthermore, even though both orientation and position mimicry do not differ significantly for same-cultural dyads, they do for mixed-cultural dyads. This indicates that cultural differences between two interacting individuals influence mimicry patterns. Even though not all findings in this study might provide hard cues to aid deception detection, the insight it provides in cross-cultural communication patterns and deception hopefully leads to a decrease in wrongful suspicion, or even sentencing, of suspects with different cultural backgrounds.

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APPENDIX A: Never End description

Instruction: Please study this description of the game 'Never End' carefully and imagine yourself playing this game. Afterwards, you will be interviewed by another person, who is instructed to find out whether you played this game or not. It is your job to convince him or her that you actually did play this game, instead of just reading a description.

Never End is a free online game provided by www.freeonlinegames.com/game/never-end. According to the website, it is a strategic game. The objective of the game is to collect keys and other items to help you exit a maze. The whole game is one big maze, which consists of different smaller mazes, or 'rooms'. The whole maze is interconnected and each time you finish up a room, you are one step closer to escaping this crazy labyrinth.

To get out of a maze, you can move your character by making it walk or jump. Those are the most basic movement instructions. However, this game has an additional feature. The room you are in (i.e. the level you are playing) can rotate. This makes your character fall up and down, depending on how you rotate the room. But, you have to think first before rotating the puzzle! Throughout the room, spikes are put on the floor/walls, these can kill you. Also, in some levels there are huge blocks you have to move by rotating the room. But, if you stand in the way and a block falls on top of your character, it dies as well. So, try to avoid spikes and watch out when rotating with blocks! When you die, you return to the starting point of the room, which means you have to do all movements again. When you die 3 times in a row, you go back to the first level.

APPENDIX B: Standardized questions for the interviewerGAME:

I was told that you were here playing a game called 'Never End'. I would like to ask you some questions about this game.

1. Please tell me how your game ended.
2. At what level did your game end?
3. What was your total score?
4. How was the score calculated?
5. For what item did you get the most points?
6. What did this item look like?
7. What other items were there in the game?
8. Please describe these other items for me.
9. What happened when you went through an exit?
10. How many times did you go through an exit?
11. How many times did your character die?
12. How did your character usually die?
13. Please tell me about the lay-out of the game: any specific colors, effects or sounds?
14. Please tell me about the keys you used to play this game.
15. What is the main aim of this game?
16. Please tell me how your game started.
17. Please tell me how you felt when playing the game.
18. What was the best part of the game?

WALLET:

I was told that while you were here playing Never End, £5 got taken from a wallet that was in here. I would like to ask you some questions about this.

1. Did you take the £5 while you were here playing 'Never End'?
2. Please explain what you were doing while you were in this room from start to finish. Include all details please.
3. So did you go out of the room at all?
4. Why did you decide to bring the wallet to lost property?
5. Why did you think the wallet was considered lost property?
6. Did you look inside the wallet? If yes, how much money was in it?

7. How long was the walk to the room where the lost property box was located?
8. Did you see anyone in the hallway while you were walking to the lost property box? If so, how did he/she look like?
9. When you arrived in the room, was the lost property box visible immediately?
10. How many items were in the lost property box? Please give me a number.
11. Could you describe these items for me please?
12. Could you describe the lost property box please?
13. What was written on the box?
14. What was next to the box?
15. Was the box standing on a table or on the ground?
16. Describe the room the lost property box was in.
17. Have you ever been in that room before?
18. Was there anyone else with you in the room where the lost property box was located?
19. Where did you put the wallet in the box, in relation to the other items?
20. How long were you gone from this room?
21. Did you leave the door open when you went out of this room?
22. How do you feel about this money gone missing?
23. Lastly, I will ask you again: did you take the £5?

APPENDIX C: Suspect questionnaire

Personal information:

Gender: Male/Female

Age: _____

Country of birth: _____

Country of birth (mother): _____

Country of birth (father): _____

Native language: _____

You just told the other student about what happened before the interview. Please answer the following questions about your assignment:

What assignment did you have to complete?
Please colour in your answer.

- Telling the truth about the game and the stolen money
- Lying about the game and about the stolen money

How well did you understand your assignment?
Please circle your answer.

1	2	3	4	5	6	7
I didn't understood it at all				I absolutely understood it		

How difficult was it for you to do your assignment?
Please circle your answer.

1	2	3	4	5	6	7
Not at all difficult				Very difficult		

How well did you think you convinced the other student (considering your assignment)?
Please circle your answer.

1	2	3	4	5	6	7
I wasn't convincing at all				I was very convincing		

Now, please respond to the statements below, describing how you feel right now (not usually). We are interested in your feelings at this moment. Circle one response (one number) under each item using the following scale:

- 1 = not true
- 2 = a little not true
- 3 = somewhat not true
- 4 = neutral
- 5 = a little true
- 6 = somewhat true
- 7 = very true

1. I feel mentally exhausted.

not true 1 2 3 4 5 6 7 very true

2. Right now, it would take a lot of effort for me to concentrate on something.

not true 1 2 3 4 5 6 7 very true

3. I need something pleasant to make me feel better.

not true 1 2 3 4 5 6 7 very true

4. I feel motivated.

not true 1 2 3 4 5 6 7 very true

5. If I were given a difficult task right now, I would give up easily.

not true 1 2 3 4 5 6 7 very true

6. I feel drained.

not true 1 2 3 4 5 6 7 very true

7. I have lots of energy.

not true 1 2 3 4 5 6 7 very true

8. I feel worn out.

not true 1 2 3 4 5 6 7 very true

9. If I were tempted by something right now, it would be very difficult to resist.

not true 1 2 3 4 5 6 7 very true

10. I would want to quit any difficult task I was given.

not true 1 2 3 4 5 6 7 very true

11. I feel calm and rational.

not true 1 2 3 4 5 6 7 very true

12. I can't absorb any more information.

not true 1 2 3 4 5 6 7 very true

13. I feel lazy.

not true 1 2 3 4 5 6 7 very true

14. Right now I would find it difficult to plan ahead.

not true 1 2 3 4 5 6 7 very true

15. I feel sharp and focused.

not true 1 2 3 4 5 6 7 very true

16. I want to give up.

not true 1 2 3 4 5 6 7 very true

17. This would be a good time for me to make an important decision.

not true 1 2 3 4 5 6 7 very true

18. I feel like my willpower is gone.

not true 1 2 3 4 5 6 7 very true

19. My mind feels unfocused right now.

not true 1 2 3 4 5 6 7 very true

20. I feel ready to concentrate.

not true 1 2 3 4 5 6 7 very true

21. My mental energy is running low.

not true 1 2 3 4 5 6 7 very true

22. A new challenge would appeal to me right now.

not true 1 2 3 4 5 6 7 very true

23. I wish I could just relax for awhile.

not true 1 2 3 4 5 6 7 very true

24. I am having a hard time controlling my urges.

not true 1 2 3 4 5 6 7 very true

25. I feel discouraged.

not true 1 2 3 4 5 6 7 very true

Now please answer the following questions. There are no right or wrong answers, just fill in the extent to which you agree or disagree on the following statements.

I catch on to what others mean even when they do not say it directly.

1	2	3	4	5	6	7	
Strongly disagree					Strongly agree		

I am able to recognize others' subtle and indirect messages.

1	2	3	4	5	6	7	
Strongly disagree					Strongly agree		

Even if I do not receive a clear response from others, I can understand what they intended.

1	2	3	4	5	6	7	
Strongly disagree					Strongly agree		

I try to adjust myself to others' feelings when we are communicating.

1	2	3	4	5	6	7	
Strongly disagree					Strongly agree		

I am modest when I communicate with others.

1	2	3	4	5	6	7	
Strongly disagree					Strongly agree		

I qualify (e.g., use "maybe," "perhaps") my language when I communicate.

1	2	3	4	5	6	7	
Strongly disagree					Strongly agree		

If I think a person will be hurt by my refusing an invitation, I provide additional reasons for my response.

1	2	3	4	5	6	7
Strongly disagree				Strongly agree		

I listen very carefully to people when they talk.

1	2	3	4	5	6	7
Strongly disagree				Strongly agree		

In interacting with someone I dislike, I keep my true feelings hidden.

1	2	3	4	5	6	7
Strongly disagree				Strongly agree		

When flattered, I am humble.

1	2	3	4	5	6	7
Strongly disagree				Strongly agree		

If I have something negative to say to others, I am tactful in telling them.

1	2	3	4	5	6	7
Strongly disagree				Strongly agree		

I often bend the truth, if it protects the social harmony.

1	2	3	4	5	6	7
Strongly disagree				Strongly agree		

I might make up information to make a story more interesting.

1	2	3	4	5	6	7
Strongly disagree				Strongly agree		

I am generally firm in pursuing my side of the issue.

1	2	3	4	5	6	7
Strongly disagree					Strongly agree	

I assert my wishes.

1	2	3	4	5	6	7
Strongly disagree					Strongly agree	

Now please answer the following questions. There are no right or wrong answers, just fill in the extent to which you agree or disagree on the following statements.

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1	2	3	4	5	6	7
Strongly disagree					Strongly agree	

I qualify (e.g., use "maybe," "perhaps") my language when I communicate.

1	2	3	4	5	6	7
Strongly disagree					Strongly agree	

Strongly disagree

Strongly agree

I often bend the truth if the truth would hurt someone.

1 2 3 4 5 6 7
Strongly disagree Strongly agree

I often bend the truth if it will produce a better outcome in the end.

1 2 3 4 5 6 7
Strongly disagree Strongly agree

Sometimes it is better not to tell the truth.

1 2 3 4 5 6 7
Strongly disagree Strongly agree

I do not like to engage in several activities at the same time.

1 2 3 4 5 6 7
Strongly disagree Strongly agree

People should not try to do many things at once.

1 2 3 4 5 6 7
Strongly disagree Strongly agree

When I sit down at my desk, I work on one project at a time.

1 2 3 4 5 6 7
Strongly disagree Strongly agree

