UNIVERSITY OF TWENTE.

Faculty Behavioural, Management and Social Sciences (BMS)

Deception cues in WhatsApp
An empirical study identifying the role of emoticons in deceptive messages on WhatsApp

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M.Sc. Thesis
May 2018

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Abstract - English

Are the frequency and type of emoticons different when people lie on WhatsApp compared to telling the truth? Research done on verbal and non-verbal deception cues in face-to-face interaction is abundant. However, there is not much research on non-verbal deception cues in computer-mediated communication (CMC). Since WhatsApp is one of the most popular CMCs, this research was conducted to get more insight in deception cues on WhatsApp, with a focus on emoticon use. An empirical online study, in which participants were asked to send three screenshots of each deceptive and truthful answers to questions they texted on WhatsApp, was conducted to answer the research question. The emoticons of these screenshots were counted and sorted into levels of valence (positive, negative, surprising, and neutral) and intensity (strong versus weak). In the analysis per valence and intensity, the content (lie versus truth) was the independent variable while the frequency of emoticons was the dependent variable. The results indicate that there are more negative emoticons used in lies compared to truths and more positive emoticons used in truths compared to lies. However, no difference is found in the frequency of emoticons used during lies compared to truths. These findings suggest that the type of emoticon can be used as indication of deception. Moreover, regarding the amount of literature available on the topic, emoticons as deception cues, only little research is done. Therefore, more research is necessary to understand the depths of emoticon use on WhatsApp.

Samenvatting - Dutch

Is er een verschil in de hoeveelheid en type emoticons tussen leugens en waarheden? Onderzoek naar verbale en non-verbale deceptiesignalen in rechtstreekse interactie is er in overvloed, maar er is niet veel onderzoek gedaan naar non-verbale deceptiesignalen in computer-gemedieerde communicatie (CMC). Omdat WhatsApp een van de meest gebruikte applicaties in CMC is, is dit onderzoek gedaan om meer inzicht in deceptiesignalen, en in het bijzonder het gebruik van emoticons in WhatsApp te krijgen. Hiervoor werd een empirische online studie gedaan om deze onderzoeksvraag te beantwoorden. De deelnemers werd gevraagd om schermafbeeldingen van drie leugens en drie waarheden op te sturen die een antwoord op een vraag in WhatsApp zijn. De emoticons uit deze schermafbeeldingen werden geteld en in niveaus van valentie (positief, negatief, neutraal, en verrassend) en intensiteit (sterk versus zwak) gesorteerd. Tijdens de analyse per valentie en intesiteit was de inhoud (leugen versus waarheid) de onafhankelijke variabele en de hoeveelheid aan emoticons de afhankelijke variabele. Uit de resultaten blijkt dat er meer negatieve emoticons gebruikt worden in leugens en meer positieve emoticons in waarheden. Aan de andere kant werd er geen verschil in de hoeveelheid gebruikte emoticons gevonden. Deze resulaten laten zien dat het type emoticon gebruikt kan worden om een indicatie te geven over leugens en waarheden in WhatsApp. Verder, rekeninghoudend met de bestaande literatuur van emoticons als deceptiesignalen, is deze studie een eerste stap om hun gebruik in deceptie beter te begrijpen. Daarom is er meer onderzoek op dit gebied nodig.

People deceive each other approximately one to two times a day in face-to-face interaction (Buller & Burgoon, 1996; DePaulo, Kirkendol, Kashy, Wyer, & Epstein, 1996). The most popular deceptions are about feelings, actions, plans, and whereabouts (DePaulo et al., 1996). To identify these kinds of face-to-face interaction (ftf-interaction) deceptions, verbal and non-verbal cues can be used (e.g. DePaulo et al., 1996; DePaulo et al., 2003). However, nowadays communication is not limited to ftf-interaction but goes beyond it by means of computer-mediated communication (CMC), such as social networks and instant messaging. Until now, only verbal deception cues are identified since there are no non-verbal cues in social networks and instant messaging.

One of the most used instant messaging software is WhatsApp (Bobrov, 2018; O'Hara, Massimi, Harper, Rubens, & Morris, 2014). This software supports communicating with others through chats with either one or more people at any time and place via internet. In July 2017 1.3 billion people used WhatsApp (Statista, 2018a), furthermore, 58% of the users in 2016 used WhatsApp one or more times a day (Statista, 2018b) indicating that WhatsApp is a tool in everyday life and therefore a possible communication-channel to deceive others. Additionally, WhatsApp has a gallery of emoticons and GIF's that can be shared with others (O'Hara et al., 2014). Through the evolving use of emoticons, non-verbal cues seem to be added to CMC and can therefore be used as indicators of deception (Carter, 2003; Utz, 2000). Since being truthful and knowing if the other is truthful is not only important in romantic but also in business relationships (Frankel, 2005), it is important to study whether emoticons can indicate deception. Therefore, because WhatsApp is one of the most used instant messaging software (Bobrov, 2018), this paper investigates the question if *the frequency and type of emoticons are different when people lie on WhatsApp compared to telling the truth*.

Lying, also called deception in this paper, is defined as the intentional act of falsifying information that is communicated to a receiver to achieve a false impression. It is important the receiver is kept unaware of the falsification of this information. Incidents wherein the sender is mistaken or wrong are not seen as deception, whereas withholding information is (DePaulo et al., 1996; DePaulo et al., 2003; Tsikerdekis & Zeadally, 2014a; Tsikerdekis & Zeadally, 2014b; Van 't Veer, Stel, & Van Beest, 2014). However, since this study concentrates only on lying as a form of deception, lying is used here as a synonym for deception.

Within deception, DePaulo and colleagues (2003) showed two different indicative cues: deception cues and leakage cues (DePaulo et al., 2003). Deception cues are indicators of dishonesty of senders (e.g. incongruent details in a story), whereas leakage cues show what

deceivers really feel and think, such as a smile while they apologize or a slip-of the tongue (DePaulo et al., 2003). Both cues can either be non-verbal or verbal.

Non-verbal cues to deception. Non-verbal communication includes everything that does not contain words of any kind or form, for example facial expressions and body language. Research indicated that non-verbal cues give contextual information during ftf-communication about the sender's true intentions (Carter, 2003; Lo, 2008). These true intentions can differ from what they want the receiver to believe. Therefore, multiple indicators of deception can be found in the body language of a deceiver and are sometimes more conclusive and more trustworthy than words (Carter, 2003). However, there is no set behavior or group of behaviors only occurring while lying. Therefore, these behaviors are only more or less likely to occur when lying and do not flawlessly predict deception (Burgoon, Blair, Qin, & Nunamaker, 2003; DePaulo et al., 2003; Toma & Hancock, 2012; Vrij, Granhag, Mann, & Leal, 2011).

Some of these non-verbal behaviors were indicated by DePaulo and colleagues (2003), who concluded that deceivers want their lies to be believed and therefore they want to appear friendly and honest. Hence, liars will have an open body language and smile more frequently. On the other hand, they also found that liars are less likely to use illustrators – hand movements to support what is said. DePaulo and colleagues (2003) explain this contradiction through the characteristics of illustrators to be unintentional movements that cannot be fully controlled.

However, since CMC lacks these non-verbal cues, most research concentrates on verbal cues in CMC (Carter, 2003; Lo, 2008).

Verbal cues to deception. Verbal deception cues are included in spoken and written language, including the way in which the message is said or written, for example through intonation and choice of words (DePaulo et al., 2003).

There are contradicting findings concerning verbal deception cues. However, meta-analysis found that deceivers are more informal than truth tellers (Burgoon et al., 2003; Zhou, Burgoon, Nunamaker, & Twitchell, 2004; Zhou & Zhang, 2008). It was also found that liars tend to be more expressive in verbal ftf-interaction (Burgoon et al., 2003; Zhou et al., 2004; Zhou & Zhang, 2008). Research, finally, showed that deceptive messages more often concern feelings that are described as more positive than they actually are (DePaulo et al., 1996). DePaulo and colleagues (1996) assume people do this to protect others because they do not want to hurt other people's feelings.

The above mentioned non-verbal and verbal deception cues are predominantly researched in ftf- interaction, whereas nowadays CMC use increases. Therefore, an extension of research on how to detect lies in CMC is needed. Since emoticons can substitute non-verbal cues in CMC (Carter, 2003; Utz, 2000) and might therefore be used as deception cues, research on emoticon use is necessary to fully understand their role in computer-mediated deception.

Emoticons. The word "emoticon" comes from the words "emotion" and "icon" and each is a graphic representation of a facial or emotional expression which mostly follows messages in written CMC (Dresner & Herring, 2010; Skovholt, Grønning, & Kankaanranta, 2014). They can either be ASCII symbols " :-) " or pictograms "☺" and were first implemented in 1982 in an email by a computer scientist named Scott Fahlman to indicate jokes (Dresner & Herring, 2010). Evolving since then, emoticons nowadays have various forms and meanings, and are used by men and women equally frequent (Walther & D'Addario, 2001).

The use of these forms and meanings can have three different underlying motives: (1) expression of emotion, for example a positive tone with signatures, (2) shifting the tone of the verbal part of the message, such as softening criticism, and (3) expressing humor, like sarcasm (Derks, Bos, & Von Grumbkow, 2008; Dresner & Herring, 2010; Lo, 2008; Skovholt et al., 2014; Walther & D'Addario, 2001).

Although emoticons help in understanding the emotion, attitude and attention that the sender intended to communicate to the reader (Dresner & Herring, 2010; Lo, 2008), they are not the same as emotions or gestures (Dresner & Herring, 2010; Walther & D'Addario, 2001), since they do not have to be an indication for the real state of mind of the sender. Furthermore, non-verbal behavior is non-intentional and not always controllable, which makes it more trustworthy in showing a sender's intentions (Walther & D'Addario, 2001). Emoticons, on the other hand, are intentional and added to messages in a controlled way (Walther & D'Addario, 2001). Sarcasm, for example, can be marked by emoticons on WhatsApp, while in ftf-communication the tone-of-voice and context disclose the true meaning of the message.

Carter (2003) found that emoticons help in CMC to add non-verbal cues. This is furthermore supported by the findings that emoticons are mostly used in playful and informal communications (Derks et al., 2008; Dresner & Herring, 2010), for example, getting to know each other is easier when using emoticons. They are also used more in positive contexts than in negative ones (Derks et al., 2008). Furthermore, research indicated that a higher use of

emoticons results in a lower detection of a lie (Briscoe, Appling, & Hayes, 2014). This indicates that receivers are less skeptical when the deceiver tries to cover up their real emotions and thoughts by supporting their messages with emoticons. Briscoe and colleagues (2014) argue that the use of emoticons indicates that the sender wants to build a relationship and therefore the receiver is less likely to assume deception. However, it is not researched yet what role emoticons play as deception cues and therefore how they can be used in the detection of deception. Hence, this study was conducted.

The current study

To investigate how emoticons are used in deceptive messages compared to truthful messages this study was done. Research indicates that people want their lies to be believed and therefore they want to appear honest and friendly through an open and informal body language (Derks et al., 2008; Dresner & Herring, 2010; Lo, 2008; Skovholt et al., 2014; Walther & D'Addario, 2001). Whereas DePaulo and colleagues (2003) find that deceivers (unintentionally) use less illustrators, Burgoon and colleagues (2003; Zhou & Zhang, 2008; Zhou et al., 2004) find that liars tend to be intentionally more expressive to make their story believable. These contradictions can be explained by the fact that illustrators are mostly not controllable (Knapp, Hall, & Horgan, 2013) while expressions and emoticons are. Since emoticons can be used as a form of non-verbal communication in CMC, are intentionally used to support a message (Carter, 2003) and deceivers are intentionally more expressive to make their story believable (Burgoon et al., 2003; Zhou & Zhang, 2008), it is expected that *people use more emoticons in WhatsApp when they lie compared to telling the truth.*

Research also indicates that people are more likely to lie about positive than negative matters (DePaulo et al., 1996). The positivity would indicate that more positive emoticons should be used since they are strengthening illustrators for the positive verbal utterance. Therefore, it is expected that *people use more positive emoticons than negative emoticons when telling a lie compared to when they are telling the truth.*

Moreover, the usage, frequency and intensity of emoticons in deception are interesting. Therefore, the question arises if stronger or weaker emoticons are more frequently used for lying than for telling the truth.

Finally, an additional question arises on whether there is a difference in the use of kiss emoticons between lies and truths, since kisses signal love and affection (Giunness, 2015). This question was raised since kiss emoticons are globally used in 2.6% of the time, therefore, standing on position 5 of the most used emoticons (Ljubešić & Fišer, 2016). Due to

the difference in use of kiss emoticons, showing affection and love, and lies, intentionally misleading somebody, an additional analysis will be conducted to answer this question.

Methods

This study was approved by the Ethics Committee of the University of Twente in Enschede, the Netherlands. Furthermore, the study was pre-registered in AsPredicted.

Design

The design of this study was a within-participants design (lie versus truth). For the first hypothesis, that the use of emoticons in WhatsApp increases when people lie compared to when they are truthful, the dependent variable was the mean number of emoticons per participant and the independent variable was the content (lie versus truth). For the second hypothesis, that participants use more positive emoticons when lying, the frequency of emoticons per participant was the dependent variable and the independent variable was the content (lie versus truth). The analysis of the second hypothesis was done per valence (positive versus negative) and intensity of emoticons (strong versus weak) per valence.

Participants

Power analysis. A power analysis showed that the optimal sample size for a paired sample with a power of .80 (1-β), a type 1 error rate of 5% and an effect size of .1 is 620 pairs. This small effect size was chosen to increase the needed participant pool and therefore to increase the reliability of the results. Since each participant uploaded three lies and three truths, the sample size is divided by three resulting in 207 participants needed for a power of .80 (1-β).

Requirements. Volunteers participating in this study had to meet several requirements. These included that participants had to be at least 18 years of age and live in the Netherlands or in Germany. Because the study was done in English, participants who declared that their English skills are less than 'Average' (on a 5-point-Likert-scale from 'Excellent' to 'Terrible'), were not included in the analysis. Furthermore, participants were free to choose between German, English and Dutch writing in their text messages on WhatsApp, since these are the languages spoken by the researcher. To make sure that a participant would have opportunities to lie on WhatsApp, participants who used the texting application less than five times per week were not included in the analysis. Due to incompatibility, lies that were not answers to questions were excluded from the analysis. To

prevent lies that are used on a daily basis, screenshots that included answers to questions such as, 'Are you okay?', 'How old are you?' or 'How are you?' were not included in the analysis. These requirements were also included in the pre-registration on AsPredicted. As a last requirement, to make sure there is enough material to compare lies with truths, participants had to fill in at least one lie-form and one truth-form to be included in the analysis.

Demographics. In total 281 people voluntarily participated in this study, of which 89 were not included in the analysis because they did not meet the requirements or only partly filled in the study, by for example leaving out the screenshots. Of the 192 remaining participants included in the analysis 186 were undergraduate psychology students of the University of Twente, 40 were male participants and 152 were female. The mean age of the 192 participants was 20.52 years ($SD = 1.88$). There were 170 participants with a highest education of a high school diploma and 22 with a Bachelor's degree. Furthermore, 34 were Dutch, 142 were German and 16 had a different nationality. There were 96 living in the Netherlands and 96 living in Germany. Of those living in Germany one was born somewhere else but lived in Germany for 10 years and 13 participants living in the Netherlands were not born there but lived in the Netherlands for 0 to 3 years ($M = 1.06$; $SD = .77$). Of the 192 participants included in the analysis 6 used the texting application WhatsApp between five and seven days per week. The remaining 186 participants used WhatsApp seven days per week. The variation of the English skills of the participants ranged from excellent to average, with 93 declaring to have excellent English skills, 93 indicating to have good English skills and six admitting to have average English skills. All together, the 192 participants uploaded 1140 screenshots resulting in 570 pairs included in the analysis.

Procedure and Materials

The study was an online study published via Qualtrics and spread via a webpage of the University of Twente, on which psychology students can earn credit points for volunteering in researches (SONA), as well as through the Facebook and the LinkedIn profile of the researcher and her connections on those social media. See Appendix B and C for the questionnaire.

The study took the participants about five to six times five to ten minutes during a week or about 50 to 60 minutes once. Participants read the instructions and filled in the demographic questions after agreeing to the terms of participation in the first online session. To prevent bias of the participants, the introduction did not mention that the study

concentrated on the use of emoticons of liars compared to truth tellers, but that it researched deception cues in WhatsApp.

There were eight demographic questions that asked about age, gender, highest educational status, nationality, country of residence, if they were not born in the Netherlands or Germany for how long they have lived in either of the countries, WhatsApp usage per week, and the English skills of the participants.

Participants were then asked to disclose, during the week of participation, three times they lied and three times they told the truth on WhatsApp. These could be either previously sent messages or messages send during the week of participation. To disclose these lies and truths, which had to be answers to a question, it was necessary that participants took a screenshot of the conversation. To clarify what the truth or lie is, participants were asked to mark (by circling) the lie/truth, as well as to anonymise the person they were communicating with for confidentiality reasons.

As a backup, in case the screenshot was not uploaded or marked correctly, there were six screenshot forms to be filled in, one form per screenshot, in alternating order starting with a lie. These included seven questions concerning each screenshot of the participants. Four of these were open questions where the content or the exact text of the message had to be inserted. To assure that the lies and truths were answers to questions and to assure that lies as well as truths were uploaded, specific questions were asked. Furthermore, these questions were asked to be able to sort the screenshots as lies and truths for the analysis. At the end of each form, the participants were able to upload their screenshot[1].

These forms were also used to sort them to the matching screenshots, before the data was analyzed to notice differences between them. Due to the fact that participants did not always fill in the forms with the exact words of the message, the screenshots were used for the analysis.

Whenever the participants came back to the Qualtrics-link, they were able to continue where they stopped. After the last truth form, participants were thanked for their participation and the survey ended.

Coding system of the emoticons. To narrow the research down it was chosen to include only emoticons that reflect facial expressions ($N = 60$) (Appendix A), which were sorted into valence (neutral, positive, negative, or surprising) and intensity (weak and strong). This resulted in seven categories since no distinction was made between weak and strong

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[1] There was one participant who had to send the screenshots per email to the researcher.

intensity in the neutral valence. The researcher and three independent individuals sorted the emoticons independently. These scorings were then compared and emoticons that were sorted in the same category by all four individuals ($N = 14$) and by three of the four individuals ($N = 31$) were sorted into the final table. Finally, emoticons that only two individuals rated similarly were checked for differences ($N = 15$). In all of these 15 cases left, there were two individuals that sorted the emoticon in the same valence and intensity while a third individual chose the same valence but disagreed on the intensity. The fourth individual disagreed with both, valence and intensity; therefore it was chosen to sort the emoticon in the valence of the three individuals and in the intensity of the two raters agreeing with each other. No discussion took place to confine disagreements. Emoticons that were used in the conversations that are not included in these categories were sorted as 'others'. During the analyses, six more emoticons were added because they were previously forgotten ($N = 66$). These emoticons were sorted by three of the raters with complete agreement (1.🙁; 2. :-)/:) ; 3. :(/:-(; 4. :D/:-D ; 5. :p/:P/:-P/:-p ; 6. :-O/:-o/:o/:O). The coding system and the specific emoticons were not pre-registered in AsPredicted.

Results

The data analyses were done as registered in AsPredicted. However, a test for normal distribution (Shapiro-Wilk test) on all relevant variables showed that there is a validation of the general assumption of normality p < .01 (see Table 1) and a log 10 transformation did not have sufficient influence. Therefore, it was chosen to use a Wilcoxon Signed Rank Test for non-parametrical data for comparison of means between two related variables in a sample, instead of the registered repeated measures ANOVA. Also, the additional analysis was not pre-registered.

Table 1

Shapiro-Wilk statistics of the variables important for the testing of the hypotheses

Variables	Statistics (W)	df	p- value
Number Words Lie	0.90	192	< .01
Number Words Truth	0.88	192	< .01
Number Emoticons Lie	0.92	192	< .01
Number Emoticons Truth	0.89	192	< .01
Number Positive Emoticons Lie	0.79	192	< .01

Number Positive Emoticons Truth	0.81	192	< .01
Number Negative Emoticons Lie	0.58	192	< .01
Number Negative Emoticons Truth	0.42	192	< .01
Number Kiss Emoticons Lie	0.14	192	< .01
Number Kiss Emoticons Truth	0.22	192	< .01
Number Positive Strong Emoticons Lie	0.50	192	< .01
Number Positive Strong Emoticons Truth	0.56	192	< .01
Number Positive Weak Emoticons Lie	0.70	192	< .01
Number Positive Weak Emoticons Truth	0.73	192	< .01
Number Negative Strong Emoticons Lie	0.22	192	< .01
Number Negative Strong Emoticons Truth	0.24	192	< .01
Number Negative Weak Emoticons Lie	0.58	192	< .01
Number Negative Weak Emoticons Truth	0.33	192	< .01
Number Emoticons/ Number Words Lie	0.84	192	< .01
Number Emoticons/ Number Words Truth	0.84	192	< .01

The number of emoticons. To test the first hypothesis, that people use more emoticons in lies compared to truths, the number of emoticons were counted and compared. A Wilcoxon Signed Rank Test was conducted with the content (lie versus truth) as independent within variable and number of emoticons as dependent variable.

The analysis showed that participants did not use different numbers of emoticons in deceptive messages [*Median* = 0.67, *M* = 0.68] compared to truthful messages [*Median* = 0.67, *M* = 0.68], two-sided p = .79, Z = -0.27. Therefore, the first hypothesis was rejected.

The type of emoticons. To investigate the second hypothesis, that more positive emoticons than negative emoticons are used in lies compared to truths, two Wilcoxon Signed Rank Tests were conducted. The first test was conducted within the positive valence of emoticons with the content (lie versus truth) as independent variable and frequency of emoticons as dependent variable. This test indicated that participants used significantly more positive emoticons when telling the truth [*Median* = 0.17; *M* = 0.19] compared to telling a lie [*Median* = 0.17; *M* = 0.12], two-sided p < .01, Z = 3.48. Therefore, the second hypothesis was rejected.

The second test was conducted within the negative valence of emoticons with the content (lie versus truth) as independent variable and frequency of emoticons as dependent variable. It signaled that participants used significantly more negative emoticons while telling

lies [*Median* < 0.01; *M* = 0.08] compared to telling the truth [*Median* < 0.01; *M* = 0.04], two-sided *p* < .01, *Z* = 4.22. This also indicated that the second hypothesis had to be rejected.

Moreover, four Wilcoxon Signed Rank Tests were conducted to investigate whether there is a difference in the intensity (strong versus weak) of the emoticons between lies and truths (Table 2). The tests were done within the valence (positive versus negative) and intensity (strong versus weak) of emoticons, with content (lie versus truth) as independent variable and frequency of emoticons as dependent variable.

Table 2

Mean number emoticons Lie versus Truth per Valence and Intensity

	Positive (*M*)*		Negative (*M*)*	
Lie	0.12		0.08	
Truth	0.19		0.04	
	Strong (*M*)*	Weak (*M*)*	Strong (*M*)	Weak (*M*)*
Lie	0.07	0.17	0.04	0.13
Truth	0.13	0.24	0.02	0.05

Note: * significant difference

The results of the first test showed that participants used significantly more positive strong emoticons in truths [*Median* < 0.01] compared to lies [*Median* < 0.01], two-sided *p* = .01, *Z* = 2.52. Furthermore, the second test indicated that participants used significantly more positive weak emoticons while telling the truth [*Median* < 0.01] compared to telling a lie [*Median* < 0.01], two-sided *p* = .01, *Z* = 2.45. Thirdly, participants used the same number of negative strong emoticons in lies [*Median* < 0.01] and truths [*Median* < 0.01], two-sided *p* = .50, *Z* = 0.68. Finally, the fourth test indicated that participants used significantly more negative weak emoticons while telling a lie [*Median* < 0.01] compared to telling the truth [*Median* < 0.01], two-sided *p* < .01, *Z* = 4.61.

These four tests indicated that participants used significantly more positive strong and positive weak emoticons in truths compared to lies and used more negative weak emoticons in lies compared to truths.

Correction for words. To control the first hypotheses for the number of words, as research indicates a difference in the number of words in lies compared to truths, another Wilcoxon Signed Rank Test was conducted with the content (lie versus truth) as an independent within variable and the number of emoticons divided by the number of words as dependent variable. This analysis showed that participants did not use a different number of

emoticons in deceptive messages [*Median* = 0.06, *M* = 0.08] compared to truthful messages [*Median* = 0.07, *M* = 0.09], two-sided *p* = .24, *Z* = 1.18. Therefore, the first hypothesis stayed rejected.

Additionally, another test, with number of words as dependent and content (lie versus truth) as independent variable, indicated that participants did not use more words in lies [*Median* = 9.00, *M* = 10.24] compared to truths [*Median* = 8.17, *M* = 9.64], two-sided *p* = .10, *Z* = -1.67.

Additional analysis. Although there was no hypothesis regarding this, a Wilcoxon Signed Rank Test with content (lie versus truth) as independent and number of kiss emoticons as dependent variable was conducted. This analysis was done to see if there is a difference in the kiss emoticons used in lies versus truths because kisses usually signal love and affection and lies do not (Guinness, 2005). It was found that participants used the same number of kiss emoticons in lies [*Median* < 0.01, *M* < 0.01] and truths [*Median* < 0.01, *M* < 0.01], two-sided *p* = .38, *Z* = -0.88.

Discussion

This study was concerned with the question whether there is a difference in the frequency and type of emoticons used between lies and truths. In more detail, it was expected that there would be more emoticons used in lies than in truths and that there are more positive emoticons than negative emoticons used in lies compared to truths. The results indicate that the frequency of emoticons cannot indicate if a message is deceptive or truthful, although the type of emoticon used can give an indication.

No difference was found in the number of emoticons used between truths and lies. There are two possible explanations for this. First, since deception cues and leakage cues are triggered by feelings of guilt and stress, and everyday lies, such as those researched in this study, are mostly harmless, people do not regret those (DePaulo et al., 2003). Although their emotional involvement might be weaker than in more harmful lies, this does not mean that deceivers do not feel bad about the lies. However, the reduced levels of stress during deceiving could lead to very weak deception cues which are hardly noticeable. Since deception cues are found to already be weak in most situations, low stress levels could lead to situations of undetectable or even no deception cues. This would explain why no difference is found in the number of emoticons in lies compared to truths.

Second, research indicated that participants use more emoticons in socio-emotional contexts than in task-oriented contexts (Derks, Bos, & Von Grumbkow, 2007). Therefore, a possible explanation is that the truths and lies in this study had different contexts. For example, lies could have been in more task-related contexts through which fewer emoticons were used and truths could have been in more socio-emotional contexts through which more emoticons were used. Therefore, the expected use of more emoticons in lies could be negated by the lies being in more task-related contexts. Also, the expected use of fewer emoticons in truths might be negated by them being more used in socio-emotional contexts. These could explain why there was no difference found in the number of emoticons between lies and truths.

Furthermore, the results of this study indicate the use of more positive emoticons in truths than in lies (weak and strong) and that there are more negative emoticons used in lies compared to truths. Research shows two possible explanations for this.

Firstly, they found a difference in the expression of positive and negative emotions online compared to ftf-interaction (Derks et al., 2007), meaning that people tend to express negative emotions more online than through ftf-interaction. Additionally, they showed that students used more positive emoticons in positive contexts as well as negative emoticons in more negative contexts. Therefore, since more negative emoticons were used in lies and more positive emoticons in truths, it could be assumed that participants in this study may have lied more in negative contexts than in positive contexts. Therefore, further research should sort lies and truths based on their context in order to get to more distinguished conclusions.

Secondly, earlier research found more negations (Taylor, Larner, Conchie, & Menacere, 2017; Tom & Hancok, 2012) and more negative emotion words used by deceivers (Newman et al., 2003). This is comparable to more negative emoticons used in deceptive messages as to truthful messages as found in this study. Additionally, DePaulo and colleagues (2003) concluded that deceptive messages contain more negative statements and complaints than truthful messages. Hereby, the context of the messages could again be of influence. When truthful messages are more about confirming relational meetings and lies are more often about cancelling relational meetings it is more likely (logically even) to have negative emoticons in the lies and positive emoticons in the truths. Since emoticons are used to support the content of a message these negative emotion words and negations could explain why more negative emoticons are used in lies compared to truths. Furthermore, it could be argued that lies are considered negative contexts because of the negative emotions

felt during lying, such as guilt and fear (DePaulo et al., 2003). These assumingly would lead to more negative emoticons in lies compared to truths.

Another finding of this study was that more weak emoticons were used in lies and truths, negative and positive respectively. To explain why, it is important to consider that emoticons have little effect on the content of the message, complementing it at best and not enhancing or contradicting it according to Walther and D'Addario (2001). Therefore, regardless of the importance of everyday communications, it is assumed that in the context of answering questions, weaker emoticons are more frequently used in a complementing function, supporting the emotional value that the sender wants to convey in the lie or truth.

The additional analysis showed that participants used kiss emoticons very little and there was no difference found in their use between lies and truths. This can be explained by considering that no literature was found on the use of kiss emoticons in lies on social media. Even though, the effect size of this study is .77, there were only a few kiss emoticons used during both lies and truths. This indicates that kiss emoticons are either not used as often as literature suggests (2.6% of the time, therefore, standing on position 5 of the most used emoticons; Ljubešić & Fišer, 2016) or that they are not often used in the context of answering questions as studied in this paper.

Finally, no difference was found in the number of words used in lies compared to truths. Research of DePaulo and colleagues (2003) indicated that sentences of deceptive messages are shorter while Briscoe and colleagues (2014) and Zhou and Zhang (2008) found that there are more words and more sentences used in deceptive messages. This contradiction could be explained by the methodology of the studies. DePaulo and colleagues (2003) did a meta-analysis concentrating on ftf-interaction while Briscoe and colleagues (2014) and Zhou and Zhang (2008) concentrated on social media communication.

Although, no significant difference was found in the number of words in this study, this might also be explained by the methodology. Briscoe and colleagues (2014) and Zhou and Zhang (2008) conducted lab studies in controlled environments with scripts while this research was a field study using real life communication in an uncontrolled environment. This could indicate that there is a difference between lying in a controlled and an uncontrolled conversation. Further research should be considered, first, to compare deceptive cues in ftf-interaction with deceptive cues in CMC. Secondly, further research should compare lab- with field studies and finally, answers to questions should be compared with other types of messages, for example opening-sentences.

Next to this, further research should consider the strengths and limitations of this study. The first strength is that participants were not at risk of harm at any point in the study. On the one hand, it is possible that participants, confronted with their lying, think about their messages more carefully. On the other, anonymity of the participants reduces the impact since they know that the researcher cannot identify who lied to whom.

However, since there was no manipulation done in this study no causal relationship can be predicted. Which means that it is not clear if the emoticons are caused by the lies or if there are other factors, such as context or mood, that influence the use of emoticons. This can be seen as a limitation of this study and further research should be done in this field.

Furthermore, since the participants chose lies and truths from the past, it is possible that they did not know for sure whether it was a lie or a truth. Especially with the students that participated in exchange for credits, this could be the case and lead to biased results, which could be seen as a limitation. However, this study assumes participants acted in good conscience.

A last strength of this study is that it was a field study and used real life communication to analyze the frequency and type of emoticons used in lies and truths. Since it is not staged it is more reliable to transfer drawn conclusions to practice.

To sum up, so far research has either concentrated on verbal and non-verbal deception cues in ftf-interaction or on verbal/linguistic deception cues in CMC. Furthermore, to the researcher's knowledge no research has been done on the relationship between the emoticon use on WhatsApp and deception, and if emoticons could be used as non-verbal deception cues. This study, therefore, provides a first step in understanding the use of emoticons in the context of computer-mediated deception. Moreover, deception cues, non-verbal and verbal, are only cues and not 100% reliable to predict deception (DePaulo et al., 2003). This is similar to the case of emoticons as cues.

As a final remark, even though this study was not able to prove that the number of emoticons can be used as cues to deception, the results conclude that the use of weak negative emoticons can indicate deception while positive weak emoticons can indicate truths, allowing a first step towards lie detection on WhatsApp.

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
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Appendices:

Appendix A:

Table 3

Valence and intensity of emoticons

Positive emoticons		Negative emoticons		Neutral emoticons	Surprising emoticons	
Strong	Weak	Strong	Weak		Strong	Weak

For the text-based emoticons shown in the table:

- Positive / Weak: :)/:-) , :D/:-D , :p/:P/:-P/:-p
- Negative / Weak: :(/:-(, / :/
- Surprising / Weak: :o/:-o/:- , O/:O

Note: All emoticons retrieved from Smileys & People Emojis in WhatsApp and their meaning - List. (n.d.)

Appendix B:

Deception Cues in the texting Application WhatsApp

Start of Block: Introduction

Introduction text
Dear Participant,
Thank you for volunteering to take part in my Master thesis project concerning deception cues in the texting Application WhatsApp. Participating in my study is completely voluntarily and you can quit at any time if you want to, without explaining yourself. My study takes about 5 minutes on three days during one week. Your data will be stored anonymously. Therefore it is not possible to give you information about your individual results.
During the next week I would like to ask you to take screenshots of your WhatsApp messages when you answer a question with a truth or a lie. In total I would like to get six screenshots from you (3 truths and 3 corresponding lies) in the end of the week. The language in your screenshots/conversations can be English, Dutch or German as long as you answer a question and there is enough context provided you to interpret your answer to that question.Further explanations will come after you agreed to the terms of participation and clicked on the arrow in the right corner in the end of the screen.
If you have any questions before, during or after the participation in my study please do not hesitate to contact me under:
M.walther@student.utwente.nl

Terms
Please indicate that you read and understood the conditions of this study and agree to the terms of participation.

○ Yes (1)

○ No (2)

End of Block: Introduction

Start of Block: Demographics

Intro Demographics
Great that you are up for it. Let's start with some questions about your person. The following questions are important for my analysis so please answer them as honest as possible, and remember: everything is stored anonymously.

Age
How old are you? *Please answer with numbers.*

_____

Gender
What is your gender?

    ◯ Male (1)

    ◯ Female (2)

    ◯ Other, specify (If you want to) (3)
    _____

Education
What is your highest achieved education?

    ◯ High School, specify level of school (HBO,...; Hauptschule,...) (1)
    _____

    ◯ Bachelor (2)

    ◯ Master (3)

    ◯ PhD (4)

    ◯ No degree (5)

Nationality
What is your nationality?

    ◯ Dutch (1)

    ◯ German (2)

    ◯ Other, specify (3) _____

Country of residence
What is your country of residence?

○ Germany (1)

○ The Netherlands (2)

○ Other (3)

If not DE,NL
If you were not born in the Netherlands or Germany: I have been living in

○ Germany for ... years (1) _____

○ The Netherlands for ... years (2)

_____

How often WhatsApp
How many days per week do you use WhatsApp?

○ Every day (1)

○ Between 5 and 7 days per week (2)

○ Less than 5 days per week (3)

English skills
Please indicate your answer as honest as possible.

	Excellent (1)	Good (2)	Average (3)	Poor (4)	Terrible (5)
How good is your understanding of the English language? (1)	○	○	○	○	○

End of Block: Demographics

Start of Block: Intro screenshots

Intro screenshots

Alright, the first part of the study is done. The goal of my study is to examine the differences on WhatsApp when people lie and when they are telling the truth. For this, I would like to ask you to help me. I know lying and talking about lying is not always easy, especially admitting it. That is why this is anonymous.

In the next week, while you are texting with your friends on WhatsApp, I would like you to take screenshots of your conversations three times that you answer a question untruthfully and three times when you answer a similar question truthfully. That means you will have three lies and three truths in the end of the week to upload here.

I do not want you to lie on purpose!! If you do not lie during the following week, please go back in your conversations and look for situations from the last weeks when you did lie (as an answer to a question).

To make sure that you stay anonymous, I would like you to mark (by circling) the lie or truth and write next to it "lie" or "truth" and cut out or bowdlerize (paint with black) the name of the person you were chatting with. You can do that easily on your phone, it does not have to look perfect.

For each screenshot you take I would like to ask you to fill out one form here on Qualtrics (you can always reopen the survey without starting over) and upload the screenshots.

To clarify:
Examples of a question to be answered with a lie or truth are:
Where are you?
Are you coming to (my party next week)?
What are you doing?
Where have you been?
What have you been doing?

Not included are questions as:
Are you okay?
How old are you?
How are you?

Understood
Do you know what to do?

○ Yes (1)

○ No (2)

End of Block: Intro screenshots

Start of Block: Lie 1

Intro lie1
Welcome to your first lie.

If you lied answering to a question on WhatsApp, please take a screenshot of that particular conversation-part. If you did not lie yet, please go back in your conversations of the last weeks and look for a situation in which you did lie.

In the following I would like to ask you to take the screenshot and bowdlerize the name of your contact, circle your lie and write down "lie" next to it on the screenshot, if you did not do it yet.

If you already took those steps: Please fill out the form carefully and as precise as possible.

If the screenshot alone does not give enough context to understand your answer, please give the contextual background in the fitting space of the form.

Your screenshot should look like this before you upload it:

Example lie

Question content
What was the question about? *Please enter the exact words of the question you answered to.*

_____

Message words
Please insert here the exact words of your message and the emoticons you used.

_____

Answer to Q
Was your message an answer to a question?

◯ Yes (1)

◯ No (2)

Lie
Was your message a lie?

◯ Yes (1)

◯ No (2)

Elaboration
Please further elaborate the situation if necessary.

_____

Lie
Please upload the screenshot of your first lie here.

End of Block: Lie 1

Start of Block: Truth 1

Intro truth 1
You have arrived at the first form for the truth.
As already mentioned I would also like to ask you to take screenshots of situations that you
answered a question with the truth and to fill in a form corresponding to that screenshot
(preferably a similar question to the one to answered with a lie).
Again, I want to ask you to mark the truth on the screenshot and to cut out or bowdlerize
(paint with black) the name and the profile picture of the person you were texting with so that
your screenshot looks like the picture below. Afterwards, please fill in the form below.

Example truth

Question
What was the question about? *Please enter the exact words of the question.*

_____

Answer words
Please insert here the exact words of your message and the emoticons you used.

_____

Answer to question?
Was your message an answer to a question?

○ Yes (1)

○ No (2)

Lie or truth
Was your message a lie?

○ Yes (1)

○ No (2)

Elaboration
Please further elaborate the situation if necessary.

_____

Truth
Please upload the screenshot of your first truth here.

End of Block: Truth 1

Start of Block: Lie 2

Intro lie2
This is your second lie for this week. Thank you for being honest with yourself and me!
Again:
I do not want you to lie on purpose!! If you do not lie during the following week, please go back in your conversations and look for situations from the last weeks when you did lie (as an answer to a question).

First thing I would like you to do: work on your screenshot and fill in the form afterwards.
As a reminder, this is how it should look like:

Example lie

Question about
What was the question about? *Please enter the exact words of the question.*

_____

Message words
Please insert here the exact words of your message and the emoticons you used.

_____

Answer to question
Was your message an answer to a question?

    ◯ Yes (1)

    ◯ No (2)

Lie or truth
Was your message a lie?

    ◯ Yes (1)

    ◯ No (2)

Elaboration
Please further elaborate the situation if necessary.

_____

Lie2
Please upload the screenshot of your second lie here.

End of Block: Lie 2

Start of Block: Truth 2

Intro truth2
This is your second truth this week. You are almost finished.
Please first work on your screenshot and then fill in the form as honest as possible.
Remember? This is what your screenshot should look like:

Example truth

Question words
What was the question about? *Please enter the exact words of the question.*

_____

Answer words
Please insert here the exact words of your message and the emoticons you used.

_____

Answer to question?
Was your message an answer to a question?

○ Yes (1)

○ No (2)

Lie or truth?
Was your message a lie?

◯ Yes (1)

◯ No (2)

Elaboration
Please further elaborate the situation if necessary.

_____

Truth2
Please upload the screenshot of your second truth here.

End of Block: Truth 2

Start of Block: Lie 3

Intro lie3
We are almost there. This is your third lie.
Please, again, work on your screenshot and then fill in the form as good as possible.
And remember:
I do not want you to lie on purpose!! If you do not lie during the following week, please go back in your conversations and look for situations from the last weeks when you did lie (as an answer to a question).

Question words
What was the question about? *Please enter the exact words of the question.*

_____

Answer words
Please insert here the exact words of your message and the emoticons you used.

_____

Answer to question?
Was your message an answer to a question?

◯ Yes (1)

◯ No (2)

Truth or lie
Was your message a lie?

◯ Yes (1)

◯ No (2)

Elaborate
Please further elaborate the situation if necessary.

_____

Lie3
Please upload the screenshot of your third lie here.

End of Block: Lie 3

Start of Block: Truth 3

Intro truth 3
This is the last truth, thank you for hanging in there. Please fill out the last form and click on the right arrow to store the data.

Question words
What was the question about? *Please enter the exact words of the question.*

_____

Answer words
Please insert here the exact words of your message and the emoticons you used.

_____

Answer to question?
Was your message an answer to a question?

○ Yes (1)

○ No (2)

Truth or lie
Was your message a lie?

○ Yes (1)

○ No (2)

Elaborate
Please further elaborate the situation if necessary.

_____

Truth3
Please upload the screenshot of your third truth here.

End of Block: Truth 3

Thank you very much for participating in my study. Your answers have been recorded and stored anonymously. If you have any questions or are interested in my results please do not hesitate to contact me under: m.walther@student.utwente.nl

Appendix C:

Hello fellow social media users! ☺

Have you ever been interested in how to spot lies of your friends on WhatsApp?

Well, I certainly am. Therefore, I am doing my Master thesis on deception cues in WhatsApp. To help me figuring out when people lie and how to spot the cues I would like to invite you to click the link below and to participate in my study. The study will take approximately 1 hour split into four sessions during one week. To take part in my study you have to be at least 18 years of age, live in Germany or the Netherlands, have sufficient English skills, text in English, German or Dutch on WhatsApp, and use WhatsApp at least five times per week. Curious about what I'll find out? Click the link, read the introduction, agree to the terms and send me your lies. And I can send you my conclusions after we're done.

Thanks in advance,

Michelle

I advise to use a laptop or computer to participate for more comfort.

https://utwentebs.eu.qualtrics.com/jfe/form/SV_bvDNupkIs5JFbeJ