The Presence of ‘Um’ as a Marker of Truthfulness in the Speech of TV Personalities

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The aim of this study is to determine whether the presence of the interjection ‘um’ can distinguish between the deceptive and truthful speech of individuals who are practised in the art of impression management. A total of 50 truthful and 61 deceptive statements were extracted from the speech of celebrities participating in a televised comedy panel show where celebrity guests try to convince an opposing team of their truthfulness. Participants’ use of ‘um’ (measured as a percentage of the total word count of each statement) was analysed. The results show that, on average, ‘um’ was used almost three times as often in the speakers’ true statements compared to their false ones. A discriminant analysis revealed that the presence of ‘um’ is more effective than human judgement alone in determining veracity. These findings suggest that the presence of the filler ‘um’ in speech is useful in the identification of true versus false oral statements.

Key words: deception; lie detection; linguistic markers of lying; lying; ‘um’.

Introduction

Language provides a window into the emotion, cognitive effort, and attempts at behaviour control that people often experience when they lie (Arciuli, Villar, & Mallard, 2010). While a growing body of evidence suggests that changes in certain language features can provide clues to the presence of deception (DePaulo et al., 2003; Moberley & Villar, 2016; Newman, Pennebaker, Berry, & Richards, 2003; Porter & Yuille, 1994, 1996; Spence, Villar, & Arciuli, 2012; Villar, Arciuli, & Patterson, 2013a, 2013b, 2014; Vrij 2008; Zhou, Burgoon, Nunamaker, & Twitchell, 2004), with a few exceptions (Carter, 2014; Clemens, Granhag, & Strömwall, 2011; Davis, Markus, Walters, Vorus, & Connors, 2005; Fuller, Biros, Twitchell, & Wilson,

2015; Mann, Vrij, & Bull, 2002; McQuaid, Woodworth, Hutton, Porter, & ten Brinke, 2015; Villar, Arciuli, & Mallard, 2012; Vrij & Mann, 2001a; Wright Whelan, Wagstaff, & Wheatcroft, 2014a, 2014b), much of what is known about linguistic markers of lying comes from the study of laboratory-based data elicited from university students. In particular, very little is known about lying behaviour among individuals who are practised in the art of public performance, impression management, and (in the case of actors, for example) pretence. Furthermore, no research – to the authors’ knowledge – has examined instances of lying by these individuals in real-world, ecologically-valid contexts. The aim of the current study is to examine the presence of the interjection ‘um’ in the speech of real-

world liars and truth-tellers, all of whom are experienced in public performance.

Several formal tools have been developed for the assessment of veracity in oral and written language. Some of the most widely used techniques include the statement validity assessment (SVA), of which criterion-based content analysis (CBCA; Steller & Köhnken, 1989) is a core component, along with reality monitoring (RM; Johnson & Raye, 1981) and scientific content analysis (SCAN; Sapia, 1987). Robust lie detection accuracy rates of up to 73% of truthful statements and 72% of false statements have been reported in studies where CBCA criteria have been used to judge veracity (Vrij, 2005). There is some theoretical and empirical support for the diagnostic utility of CBCA, RM and, to a much lesser extent, SCAN in the identification of true versus deceptive oral and written statements (for reviews of these techniques, see Armistead, 2011; Masip, Sporer, Garrido, & Herrero, 2005; Nahari, Vrij, & Fisher, 2012; Sporer, 1997). Nonetheless, there are limitations that prevent their widespread use, the most noteworthy of which is that each technique requires extensive input and interpretation by trained analysts. The assessments are prone to subjective interpretation which makes a standardisation of these tools problematic (Vrij, 2008). Hence, the search for *objective* markers of deceit – which can be used to supplement the veracity judgements of the human observer – is a research imperative (Porter & ten Brinke, 2010). In the current study, the presence of ‘um’ in speech is examined as an index of truth versus deception. The utterance ‘um’ can be considered an objective marker because it can be systematically tracked and measured independently of the human observer’s subjective judgement.¹

A number of theories have been proposed to explain the manifestation of behavioural changes during lying, but the most influential theory to date is Zuckerman, DePaulo, and Rosenthal’s (1981) Four Factor Model. The popularity of this theory lies in its ability to

account for both the strategic and non-strategic nature of the behaviours that accompany lying. Zuckerman *et al.* propose four psychological processes that are believed to occur during lying. Three of these are considered an unconscious (and therefore non-strategic) by-product of engaging in the culturally-aversive act of lying – *generalised arousal*, *increased emotion* and *cognitive load* – while the remaining process, labelled *attempted control*, refers to the strategic attempt by the communicator to suppress any leakage of behaviours that are perceived as having the potential to give away that he or she is lying. It is known that humans can and do modify their behaviour during lying in order to appear more credible (Buller, Stiff, & Burgoon, 1996); however, this can be a difficult task – and in many instances liars simply fail to suppress the suspicious behaviours that are the target of their control (DePaulo *et al.*, 2003; Vrij, 2008).

With this model in mind, Arciuli, Mallard, and Villar (2010) describe two possibilities regarding the presence of ‘um’ during lying. One option is that ‘um’ appears more frequently during deceptive compared to truthful speech, perhaps as a result of the increased emotion and cognitive processing demands associated with lying, which in turn lead to speech planning problems that manifest as speech disturbances (e.g. Sporer & Schwandt, 2006; Vrij, Edwards, Roberts, & Bull 2000). The alternative possibility is that ‘um’ appears *less* frequently during deceptive compared to truthful speech as a result of strategic self-regulation as the liar attempts to reduce behaviours that he or she believes will reveal the deception (e.g. Buller *et al.*, 1996).

At face value, both possibilities seem equally persuasive. Yet, in the case of ‘um’, there is convergent evidence from both low-stakes laboratory-elicited lies (Arciuli, Mallard, & Villar, 2010; Arciuli, Villar, & Mallard, 2009; Benus, Enos, Hirschberg, & Shriberg, 2006) and one real-world high-stakes case study (Villar, Arciuli, & Mallard, 2012), where ‘um’ was measured as a stand-alone

variable, to show that liars strategically reduce their use of 'um' during lying. From studies unrelated to deception, it is known that speakers are quite capable of successfully reducing their usage of 'um' via conscious control (Clark & Fox Tree, 2002; Kowal et al., 1997). There is a commonly held belief that 'um' is a marker of uncertainty and, in particular, of deceptive behaviour (DePaulo, Rosenthal, Rosenkrantz, & Green, 1982; Vrij, Edward, & Bull, 2001a). Hence, the reduced usage of 'um' during deceptive speech suggests that speakers deliberately control their use of 'um' in order to appear more credible.

While the evidence regarding the utility of 'um' as a marker of lying is compelling, further real-world observations of the use of 'um' during lying compared to truth-telling – and in differing contexts – are required. To lie successfully it is important not only to know *how* to make a credible impression but also to possess the necessary skills to craft that credible impression (Vrij, Edward, & Bull, 2001b). Consequently, one way in which some light may be shed on the behaviour control debate with regard to the presence of the interjection 'um' is to examine the language behaviour of individuals who are practised in impression management. It is expected that professional entertainers, actors, and media personalities are particularly accomplished at impression management. Vrij, Edward, and Bull (2001b) argue that actors possess skills that better enable them to control their behaviour, including the regulation of unwanted behaviours such as those that are stereotypically believed to indicate deception (e.g. averted gaze behaviour and increased vocal pitch). There is some support in the literature for this premise. For example, Vrij and Semin (1996) showed that lies are more difficult to detect when told by good liars compared to bad liars. Similarly, DePaulo (1992) found that participants who were expressive (which is a characteristic associated with acting; Friedman, Prince, Riggio, & DiMatteo, 1980) were less likely to exhibit stereotypical indicators of deceit.

While these studies shed valuable light on the ability of actors – compared to non-actors – to regulate their behaviour in a way that minimises or prevents the leakage of unwanted behaviour, it is noteworthy that these studies are all laboratory-based. Furthermore, they were conducted with non-professional actors. Very little is known about the lying behaviour of professional actors or entertainers in a real-world context. The current study aims to address this omission by investigating whether one previously implicated marker of lying – the presence of 'um' – is also effective when applied to the speech of individuals who are experienced in impression management through public performance and pretence (such as professional actors and entertainers). This is accomplished by examining the speech of celebrities engaged in a reality TV gameshow where they are required to either tell the truth about a real-life, verifiable event in their own past or lie about a falsified event. Given that the statements in these data are unscripted, with no preparation time, and are provided by individuals who are (presumably) experienced with impression management and, in many cases pretence, they provide an invaluable opportunity to examine whether the lying abilities of professional performers in a real-world context are consistent with the findings of previous laboratory-based studies of non-actor participants. Importantly, these data make it possible to examine verifiable truths, which are often difficult to establish in real-world data (Vrij, 2008).

The Current Study

It was expected that the presence of 'um' would be useful in distinguishing a true from a false statement in the speech of television personalities in the same way that 'um' has demonstrated its lie detection utility in other contexts. However, it was uncertain which of the two possibilities regarding the use of 'um' would be salient in a media context. One option is that the additional cognitive

demands and potential anxiety generated by having to lie on international television without the benefit of preparation or scripting produces *more* frequent use of instances of ‘um’ during lying. The other possibility is that because many television personalities and actors are practised in the art of behavioural control and performance under pressure, they might therefore be superior at strategically planning and monitoring the content of their speech under public scrutiny, which would produce *less* frequent use of instances of ‘um’ during deceptive speech. Hence, the hypothesis was that the proportion of ‘um’ usage in the speech of these actors and television personalities would differ between true and false statements, with no prediction made on whether there would be more instances for true statements or false statements.

These data also provide a novel opportunity to examine the accuracy of the veracity judgements that were made by the celebrity judges on the opposing team, following the speakers’ truthful and deceptive statements. Humans are notoriously poor lie detectors (e.g. Castillo, Tyson, & Mallard, 2014; Levine, 2016; Vrij & Mann, 2001b), although there is some evidence that accuracy improves when real-life high-stakes stimuli are the target of the veracity judgments (e.g. Carlucci, Compo, & Zimmerman, 2013; Wright Whelan, Wagstaff, & Wheatcroft, 2015). In the current study, there was no expectation with regard to the lie detection performance of the celebrity judges. A recent study has found that small groups demonstrate an elevated lie detection performance relative to individuals (Ein-Dor, Perry-Paldi, Daniely, Zohar-Cohen, & Hirschberger, 2016). Given that the veracity judgements in the current data were made by groups of three individuals assessing one speaker, it was considered possible that the celebrity judges in this study would show a lie detection accuracy that is above chance. In any case, a point of interest is whether the accuracy of the celebrity judges’ determinations of veracity is as good or better than the discriminative

utility of the presence of ‘um’ as a marker of lying. It was expected that the presence of ‘um’ – which is based on an objective measure – would be more useful in the identification of truthful versus deceptive statements compared to the subjective judgement of the celebrities on the team opposing the speaker.

Method

Participants

The participants were 16 female and 48 male English-speaking adult celebrities ($n = 64$) – including actors, television presenters, media personalities, comedians, writers, directors, and entertainers – aged between 27 and 83 years ($M = 47.98$, $SD = 9.86$).

Procedure

This research used archival video footage from an award-winning British comedy television programme aired on the United Kingdom’s BBC One channel from 2007 to present, called *Would I Lie to You?* (Westwell, McLean, & McDermott, 2007).² The show includes segments involving two teams of three celebrities competing to successfully deceive the other team. The celebrities take turns to reveal previously verified personal facts or falsehoods about themselves.

These are typically unusual, funny, or embarrassing events, and the celebrities do not know whether they will be given a true or false event and – if a true event – precisely which life event it will be until the moment they read the target statement on a card (live, to a studio audience). Hence, there is no opportunity for the preparation of responses.

Each celebrity’s goal is to be as convincing as possible, while the opposing team’s goal is to determine which event is a lie and which is the truth. The panel members of the opposing team are permitted to question the speaker about the event. To illustrate, this truthful event (from Series 2, Episode 8) elicited the following question (Q) and answer

(A) sequence between opponents and speaker: 'When I was little I used to dress myself as an eighteenth-century nobleman'.

Q: *Why?* A: *Well, um, fun?* Q: *What did you wear?* A: *Well, um, it wasn't perfect um I – it basically involved tucking my trousers into my sort of knee length socks and ah tying a bit of string around a small mac to make it more like a kind of tailored coat. I'll be honest with you, I could have wandered into a costume drama and people would have gone 'that's not right'.* Q: *What did you do when you were dressed up?* A: *I had a sword ah.* Q: *Did you have sword fights?* A: *Sort of with the air.* Q: *No shield?* A: *No, no...you didn't ... no it's not that – in the eighteenth century... that's all wrong...shield? No.*

This fact-finding simulates an interrogative (albeit low-stakes) context where questions are asked with a view to eliciting clues regarding the veracity of the speaker's statement (e.g. through self-contradictions or admissions of dishonesty) or with the goal of unsettling the speaker.

A total of 111 true and false statements extracted from the first 22 episodes of *Would I Lie to You?* (Series 1 to 3) constitute the data for this study (note that some participants provided more than one statement). The 111 veracity judgements (i.e. true versus false) that were made by the opposing team following each participant's statement were also logged. Given that the recordings of *Would I Lie to You?* are in the public domain, it was unnecessary to seek ethical approval for this study.

Data Preparation and Analysis

The parts of each half-hour show which contain the truthful and false speech segments (hereafter referred to as the 'target statements') were extracted for analysis from the recordings. The target statements were transcribed verbatim (including all interjections such as 'well' and 'ah', not just 'um') and checked for accuracy by two independent raters. The simple word count function in

Microsoft Word was used to calculate word counts for each target statement, and to identify all instances of 'um', followed by a manual check of the tagged instances of 'um' by an independent rater. All interjections and word repetitions (e.g. 'I, I, I did say that') were included in the word count, while contractions (e.g. don't, can't, it's, etc.) were counted as single words.

Results

Of the 111 target statements ($n = 12,637$ words) examined in the current analysis, the range of words per statement was between 19 and 278 in participants' true statements and between 27 and 334 in their false statements. Participants produced an average of 110.24 ($SE = 7.64$) words in their true statements ($n = 50$) compared to an average of 116.59 ($SE = 7.84$) words in their false statements ($n = 61$). An independent samples t -test revealed no significant differences between the number of words in participants' true versus false statements, $t(109) = 0.573$, $p = .568$, $d = .10$.

Participants' use of 'um' (as a percentage of the total word count of each statement) ranged from 0.00% to 4.44% in the true condition and from 0.00% to 3.14% in the false condition. Shapiro Wilks tests revealed that the proportion of instances of 'um' is significantly non-normal in both the true, $W(50) = .794$, $p < .001$, and false, $W(61) = .554$, $p < .001$, conditions. Consequently, bootstrapping procedures were applied to subsequent analyses.

As language style can vary according to gender (Pennebaker, Mehl, & Niederhoffer, 2003), whether or not there is an association between the use of 'um' and gender was assessed. In the current study, instances of 'um' on average comprised 0.90% ($SE = 0.27$) of females' ($n = 15$) speech compared to 0.87% ($SE = 0.19$) of males' ($n = 35$) speech in the true condition. In the false condition, instances of 'um' on average comprised 0.68% ($SE = 0.18$) of females' ($n = 9$)

speech compared to 0.34% ($SE = 0.10$) of males' ($n = 32$) speech. A Spearman's ρ test revealed no significant association between gender and 'um' use in either the true, $r_s(50) = -.016, p = .913, r^2 = .026$, or false, $r_s(61) = .018, p = .892, r^2 = .036$, condition. Thus, it was not necessary to include gender as a covariate in any further analyses.

An independent samples t -test, with equal variances not assumed, $F = 27.636, p < .001$, revealed that participants used a significantly higher proportion of instances of 'um' in their true ($M = 0.76\%, SE = 0.14$) compared to their false ($M = 0.21\%, SE = 0.06$) statements, $t(70.049) = 3.660, p = .002$, two-tailed. The 95% confidence interval of the difference in means (.55), based on 1000 bootstrapped samples, is 0.26 to 0.84, and the effect size is large ($d = .87$).

The deception literature has traditionally operationalised 'um' in combination with other so-called fillers such as 'ah' and 'er'. Villar et al. (2012) presented evidence to show that this practice can obscure the discriminative ability of 'um'. Consequently, the opportunity was taken to test whether or not this is the case in the current study. Participants' use of 'ah', 'er', and 'um' in combination (total instances of these words as a percentage of the total word count of each statement) ranged from 0.00% to 11.43% for the true condition and from 0.00% to 8.38% for the false condition. Of the true target statements, 14 contained no instances of 'ah', 'er', or 'um' compared to 20 of the false

statements. An independent samples t -test revealed that participants used a higher proportion of instances of 'ah', 'er', and 'um' in their truthful statements ($M = 2.09\%, SE = 0.31$) compared to their fabricated statements ($M = 1.47\%, SE = 0.23$), but the difference is not significant, $t(109) = 1.642, p = .103$, two-tailed. The 95% confidence interval of the difference in means (.62), based on 1000 bootstrapped samples, is 0.13 to 1.40, and the effect size is small ($d = .31$).

Notably, 24 of the true versus 47 of the false target statements contain no instances of 'um' at all. A discriminant function analysis was conducted using the presence versus absence of 'um' to predict veracity. The analysis revealed a significant discriminant function, eigenvalue = .093, $\lambda = .915, X_2 = 9.555, p = .002$, with an overall correct classification rate of 65.5% of all statements.

It was also of interest to see whether the judgements made by the speakers' opponents were more or less accurate than the presence of 'um' in classifying the true versus false statements. The speakers' opponents judged 29 of the 111 target statements as true and 82 as false. The results of a discriminant analysis revealed a significant discriminant function, eigenvalue = .064, $\lambda = .940, X_2 = 6.699, p = .010$. Overall, the judging team was able to correctly identify the veracity of 63.1% of the target statements.

Although the correct classification rate is only marginally worse for the human judges compared to the rate reported for the presence

Table 1. Determination of the veracity of true and false statements by assessment method.

Condition	Determination	Assessment method	
		Presence of 'um'	Team judgement
True	True	51% ^a	38% ^a
True	False	49% ^b	62% ^b
False	True	23% ^b	16% ^b
False	False	77% ^a	84% ^a
Overall		66%	63%

Note: ^aProportion of statements identified correctly; ^bProportion of statements identified incorrectly.

of 'um', Table 1 shows interesting differences between the correct veracity classification rates by assessment method (presence of 'um' versus human judge). Importantly, there appears to be a lie bias in the team judgments such that they incorrectly identified 62% of the true statements compared to 16% of the false statements, while the presence of 'um' produced incorrect classification of 49% of truthful statements and 23% of false statements.

Discussion

This study explores the utility of a previously identified linguistic marker of lying – the presence of 'um' – in a real-world context. The aim of the current study is to examine the presence of the interjection 'um' in the truthful versus deceptive speech of individuals who are experienced in public performance. It was expected that the presence of 'um' would be useful in distinguishing a true statement from a false one in the speech of television personalities in the same way that 'um' has demonstrated lie detection utility in other contexts. However, it was uncertain which of the two possibilities regarding the use of 'um' would eventuate in a media context. One option is that the additional cognitive demands and possible anxiety generated by having to lie on international television without the benefit of preparation or scripting produces *more* frequent use of instances of 'um' during lying, while the other is that because many television personalities and actors are practised in the art of behavioural control and performance under pressure they are therefore superior at strategically planning and monitoring the content of their speech under public scrutiny, which would result in instances of 'um' being produced *less* frequently during deceptive speech.

The results provide support for the hypothesis that the presence of 'um' changes during truthful compared to deceptive speech; the proportion of instances of 'um' in participants' speech is almost four times as high in

their truthful compared to their fabricated statements. Moreover, the effect size is large ($d = .87$). These findings are in line with those of previous studies which show a reduction in instances of 'um' during lying as opposed to truth-telling (Arciuli, Mallard, & Villar, 2010; Arciuli, Villar, & Mallard, 2009; Benus, Enos, Hirschberg, & Shriberg, 2006; Villar et al., 2012). These results provide important real-world evidence for the claim that humans can and do engage in behavioural control strategies with a view to appearing more credible. Television personalities and actors are practised in the art of behavioural control and performance under pressure, and it is telling that their speech includes significantly more instances of 'um' during truth-telling compared to lying.

However, there might be other explanations for the increase in 'um' during truth-telling observed here. Many of the target truthful events occurred several years ago and would presumably have required participants to retrieve information from long-term memory in order to produce a response. Studies have shown that when individuals are recalling a past episode, they can use so-called filled pauses, such as 'um', either to signal their ongoing retrieval of information (e.g. Brennan & Williams, 1995) or in response to the increased attentional demands of memory retrieval (e.g. Bock, 1987). There are times when telling the truth can be more effortful than telling a lie (Burgoon, 2015). Consequently, in the current study it is possible that the increase in the presence of 'um' in participants' truthful statements was produced by the processing complexities of memory retrieval as opposed to deliberate behavioural control strategies. Further exploration of the relationship between the presence of 'um' and differing types of lies which might not rely to the same extent on memory retrieval (i.e. lies about events are presumably more reliant on memory retrieval processes than lies about feelings and attitudes) would be worthwhile. Other researchers have raised this question (e.g. Sporer & Schwandt, 2006),

although typically their investigations have conceptualised 'um' as a variable in combination with other utterances such as 'uh', 'mmh', and so on. The possibilities and limitations of 'um' as a stand-alone variable require further examination in order to tease out the mechanisms underpinning the increase in instances of 'um' observed in the current study.

These data also afford a novel opportunity to compare the effectiveness of human veracity judgements versus the objective analysis of the presence or absence of 'um' as a marker of deception. It was predicted that the presence of 'um', an objective measure, would be more useful in the identification of truthful versus deceptive statements than the subjective determinations of the celebrity judges.

The results of the discriminant analyses reported above suggest that the presence of 'um' is effective in the identification of a lie, with 65.5% of all statements identified correctly. Importantly, an acceptable probability (23%) of making a false positive identification (i.e. incorrectly identifying a true statement as false) was maintained. Conversely, while the human judges were almost as accurate in their identification of lies (with the correct identification of 63.1% of the target statements), the chance of incorrectly identifying a true statement as false was high (62%). Studies show that most laypeople demonstrate a propensity to judge others as truthful, a phenomenon known as 'truth bias' (e.g. Levine, Park, & McCornack, 1999; Vrij & Baxter, 1999). However, the 'lie bias' (a tendency to incorrectly judge truthful statements as lies) observed in the current study can perhaps be attributed to the characteristics of this particular show; judges are expecting to be lied to at some point in the programme, and by individuals who are likely to be experienced in the art of impression management. Moreover, many of the target events seem factually unlikely, which might also elicit the observer's disbelief (e.g. the true statement which was judged by the

opponent celebrity team as false: 'I have eaten a diamond').

If these same results were obtained from *high-stakes* real-world observations, such as those that occur in a forensic context, this proportion of true statements incorrectly identified as false would represent the probability that an innocent interviewee or innocent (i.e. false) confessor would be erroneously judged as guilty. In a high-stakes context, a 62% chance of falsely judging an innocent individual as a liar could be considered unacceptably high. Consequently, it is contended that although the overall accuracy of each assessment method is quite close in terms of overall percentage of statements identified correctly (65.5% versus 63.1%), the presence of 'um' represents a superior technique for the identification of deception. Unlike the human observer, the presence of 'um' is not prone to the biases inherent to subjective judgement, and hence it offers a more reliable measure of deceit.

Limitations and Future Research

The most notable limitation of this study is that while the data include real-world observations, and while the interactive questioning procedure implemented loosely mirrors an interrogative format, the consequences of being caught out are unimportant – the lies featured on the show are essentially trivial, and as a result they cannot be considered consistent with the lies produced in real-world, *high-stakes* contexts. It might be argued that the mechanisms underpinning the production of lies in this context, where participants are motivated to be as convincing as possible and to consequently outwit their opponents and win the game, remain the same. However, in reality, the increased levels of anxiety that are ubiquitous for most individuals (whether liar or truth-teller) in a forensic context might take their toll on language production, and subsequently on linguistic content. Future studies could consider the relationship between anxiety and specific linguistic

features of speech (e.g. the presence of 'um') as a function of veracity.

The second limitation is that the television series from which the data were extracted is primarily a comedy show. Aside from the fact that the target events were likely chosen primarily for either their entertainment value or their implausibility (e.g. the true statement 'I once stole toilet paper from George Michael's bathroom'), given that 'humor and wit are complex cognitive, social, and linguistic phenomena' (Long & Graesser, 1988, p. 35), it might be expected that language production is affected when a speaker is attempting to be funny. It would be valuable in future research to consider the interaction between deceptive and humorous language; however, it is suggested that the patterns of usage of the interjection 'um' observed in the current study will be robust in the face of any changes to language production during humorous speech. While the communicative function of speech might change in different contexts (e.g. to express humour versus to persuade), it is likely that in low-stakes situations such as these, the goal remains the same: to convince the listener/watcher of one's credibility during deception and to reduce the incidences of 'um' accordingly.

Note that the effects observed here – while impressive from a statistical viewpoint – equate to a difference of only one or two instances of 'um' per narrative, which would be difficult to detect by the human observer without the benefit of comparative baseline data. Furthermore, several participants did not use 'um' at all when they were telling the truth. Consequently, it is contended that an *absence* of 'um' should not be used as incontrovertible evidence for the presence of deception but rather that the *presence* of 'um' should point to the possibility of *truthfulness*. Nonetheless, not only do the current findings add to a growing body of evidence for the viability of 'um' as a stand-alone marker of lying, 'um' has the added advantage of being well suited to automation, as like any other

word it can be objectively identified and tracked using basic computer software programs. However, in order to determine whether the presence of 'um' – or other cues – indicate that a speaker is lying, it must first be possible to determine his or her usual language patterns in relation to the target cue. The challenges here, as has been noted before (Burgoon, Blair, Qin, & Nunamaker, 2003), are in developing systems that can not only track the presence of these markers in real-time but that can also perform online comparisons with baseline speech data from that speaker.

Last, observations from the current study were extracted from English speakers. Investigation of the presence of interjections that fulfil a similar purpose to 'um' in other languages (e.g., 'euh' in French and 'em' in Spanish) is warranted. Investigation of linguistic features of speech that are not language dependent, such as vocal pitch (Sporer & Schwandt, 2006), would also be worthwhile, as would an examination of visual behaviours that have previously been implicated as viable markers of deceit (Burgoon, Schuetzler, & Wilson, 2015).

Conclusion

With a few exceptions, most of what is known about markers of lying comes from the study of laboratory-based data elicited from university students, as opposed to real-life observations. The archival data accessed in the current study provides a valuable opportunity to examine lying performance in a real-world context. This study represents a novel contribution to the understanding of deception. The findings have implications in real-world forensic, policing, and border security contexts where the identification of truth versus lie, by all individuals (both experienced and inexperienced in impression management), is critical.

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Notes

1. Arciuli, Mallard, and Villar (2010) contend – with reference to the psycholinguistic literature – that ‘um’ serves different communicative functions to other so-called filled pauses such as ‘uh’ and ‘er’, and consequently cannot be considered interchangeable with these or other such utterances. In line with Arciuli et al., in the present study ‘um’ is measured as a stand-alone variable, rather than in combination with other variables (as it has traditionally been conceptualised in the deception literature).
2. It won first place for ‘Best British TV Panel Show’ in the British Comedy Awards in 2010, 2013, and 2014.

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