Automated insights: verbal cues to deception in real-life high-stakes lies

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Automated insights: verbal cues to deception in real-life high-stakes lies

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This study differentiated between the language of deceptive and genuine pleaders who were pleading for the return of a missing loved one during a televised press conference. The Wmatrix linguistic analysis tool was used to examine the language of 78 pleaders. Approximately half (n = 35) of these individuals were deceptive and were responsible for the disappearance. Transcripts of the pleas were analyzed for various linguistic cues, and a separate analysis was conducted across gender. Results revealed that deceptive pleaders used the word ‘they,’ singular indefinite pronouns (e.g., ‘anybody,’ ‘some-body’), and exclusivizers/particularizers (e.g., ‘just’) significantly more than genuine pleaders, while genuine pleaders used more temporal words (e.g., ‘days,’ ‘weeks’), and the word ‘we’ more frequently in their pleas. Specific gender differences were also revealed across credible and deceptive pleaders. Our analysis of linguistic differences across pleader veracity provides an enhanced understanding of the verbal elements of high-stakes deception and what differentiates truths from deceptions in high-stakes cases. It also provides further validation of the use of automated linguistic tools like the Wmatrix in forensic contexts.

Keywords: deception; language; high-stakes lies; missing persons; automated linguistic analysis

Researchers have begun to examine how language can be used to delineate aspects of our personality as well as provide insights into our emotional state. For example, Baddeley, Daniel, and Pennebaker (2011) considered the writings of a man who unexpectedly committed suicide. They found that as his depression increased, his language use changed to denote more isolation and negativity. Importantly, language can also potentially reveal other implicit or hidden aspects of psychological functioning, including providing potential cues as to whether or not one is lying (Pennebaker, Mehl, & Niederhoffer, 2003; Vrij, Granhag, & Porter, 2010). The ability to detect deception is an incredibly difficult task. However, it is crucial for law enforcement agents and a variety of other mental health and criminal justice professionals to be able to reliably detect deceit. This is particularly true in ‘high-stakes’ lies where the potential outcome for the individual involved in the lie could be highly consequential.

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Empirical and anecdotal evidence suggests that there is much value in attending to language in catching liars, particularly high-stakes liars (Porter & ten Brinke, 2010), with a substantial amount of research finding that, compared to nonverbal, a number of speech-related cues are potentially more diagnostic of deception (Vrij, Edward, Roberts, & Bull, 2000). It has also been proposed that a number of the linguistic variables thought to be indicative of veracity are beyond conscious control (Hancock, Woodworth, & Porter, 2013). In high-stakes situations in particular, the liar is dealing with elevated cognitive load in maintaining a consistent and plausible story, controlling nonverbal behavior, and acting convincingly; some ‘leakage’ of language that reveals deception may be inevitable. Some language may also be indicative of the perpetrator attempting to distance him/herself from the truth. Referred to as ‘psychological distancing,’ this may be in the form of using fewer self-references or more tentative words (Hancock & Woodworth, 2013; see also Schimel, Pyszczynski, Greenberg, O’Mahen, & Arndt, 2000). Despite these possible ‘red-flags,’ language patterns and specific aspects such as verbal leakage are often challenging for human coders to accurately and reliably detect.

Perhaps due to discouraging findings that law enforcement professionals are only marginally better than laypersons at detecting deceit – and that their accuracy rates are roughly at the level of chance (Vrij & Mann, 2001) – some relatively reliable verbal veracity assessment tools have been developed. These include Statement Validity Analysis techniques like Criterion-based Content Analysis (CBCA; Steller & Kohnken, 1989) and Reality Monitoring (RM; Johnson & Raye, 1981). CBCA includes evaluating such criteria as the logical structure of the account, the amount of details or unusual details provided, and indications of a lack of memory, among others (Blandon-Gitlin, Pezdek, Lindsay, & Hagen, 2009; Raskin & Esplin, 1991). RM proposes that truthful accounts are more likely to contain external-sensorial details because the individual has experienced the event through perceptual processes, while accounts based on imagined or fabricated memories will likely contain internally generated details and cognitive information like thoughts or opinions (Johnson & Raye, 1981; Elntib, Wagstaff, & Wheatcroft, 2014). While these techniques (and particularly RM) are also used to parse apart genuine versus false memories, both have been used, oftentimes in combination, in deception detection research (see Colwell, 2007; Vrij, Akehurst, Soukara, & Bull, 2004b; Vrij, Mann, Kristen, & Fisher, 2007). As ten Brinke and Porter (2012) pointed out, however, these techniques require lengthy statements (which are often not available) and a careful analysis and coding of the statement by human coders. Additionally, it is often not possible for humans to reliably code or interpret some of these aspects of language. For example, it would be extremely difficult for human coders to reliably identify all terms representing or relating to a certain semantic category (e.g., terms relating to the speaker’s level of knowledge). Notably, studies exploring the accuracy rates of RM and CBCA techniques are typically laboratory-based, with limited generalizability to real-life situations – especially those considered high-stakes – which these techniques are often aimed at being applied (see Vrij, Akehurst, Soukara, & Bull, 2004a). Having access to cues that are reliably associated with veracity in real-life settings could enhance the application of deception detection techniques to law enforcement situations.

An important advancement in the analysis of language has been the development of automated linguistic analysis programs. These programs have the ability to reliably and objectively identify virtually all aspects of an individual’s linguistic output which would be an extremely challenging task for human coders (see Bond & Lee, 2005; Hancock et al., 2013; Tausczik & Pennebaker, 2010). For example, Newman, Pennebaker, Berry,
and Richards (2003) compared untrained human judges to the Linguistic Inquiry and Word Count (LIWC; Pennebaker, Francis, & Booth, 2001) program. They found that use of the LIWC program resulted in significantly better than chance prediction of the veracity of participants’ true and false statements pertaining to their opinions on abortion, while human judges did not. Using the Wmatrix program (Rayson, 2008), Hancock et al. (2013) were able to effectively identify common semantic themes in the language of psychopathic murderers – characterized by a callous disregard for others, shallow affect, and antisocial behavior (Porter & Woodworth, 2006). For instance, compared to nonpsychopaths, psychopaths used more past tense and disfluencies and a higher number of cause and effect descriptors. Their language also included more descriptions of money, food, and sex and fewer mentions of family and religion, suggesting that they focus more on basic material and physiological needs even when describing their homicide offense.

A number of potentially useful linguistic variables including the use of first- and third-person pronouns and the use of tentative words have been examined in the literature. Studies investigating whether the use of pronouns differs between liars and truth-tellers have generally found that liars tend to employ fewer self-references than truth-tellers (Hancock, Curry, Goorha, & Woodworth, 2008; Newman et al., 2003). In addition, offenders’ truthful statements contained more references to others than nontruthful statements (Vrij, 2000). Other studies have found that liars use fewer third-person pronouns during their statements (Bond & Lee, 2005; Newman et al., 2003; Tausczik & Pennebaker, 2010). These somewhat mixed findings suggest that it is currently unclear whether liars use more or fewer third-person or other pronouns in their speech.

Among a large sample of genuine and deceptive individuals pleading for the safe return of their missing loved ones via televised press conferences, ten Brinke and Porter (2012) employed LIWC and found no differences in the use of pronouns across veracity, although results indicated that deceptive pleaders used fewer words overall than genuine pleaders and more tentative words in their speech, denoting psychological distancing and cognitive load. A follow-up study by ten Brinke, Porter, and Baker (2012), examined a number of nonverbal cues using this high-stakes pleader sample and found that, among other intriguing findings, deceptive pleaders used specific muscles to form a smile, and speculated that this was intended to mask their genuine disgust.

The current study extends the above-mentioned pleader research by examining additional linguistic variables that differentiate the language of liars and truth-tellers. Wmatrix (Rayson, 2008) was employed to provide a more refined and detailed insight into the different aspects of language used in the narratives and to tap into aspects of language use that would not have been considered with LIWC. Specifically, Wmatrix measures the extent to which individuals use words in semantic groupings that denote similar concepts and provides a variety of important linguistic information including the frequencies of words and parts-of-speech. Importantly, unlike LIWC (which employs a word-counting approach), Wmatrix is arguably more appropriate for some types of analyses because it takes into consideration the context in which the word is used, which is particularly important with this high-stakes sample of pleaders. For example, Wmatrix can identify words like ‘just’ or ‘only’ in the context in which they function as exclusivizers or particularizers, which draws focus to the surrounding words. These words may also be considered discourse markers, which are used in speech to add some significance or attention to the statement without changing its meaning. In a recent study using a similar sample of pleader cases, Wright Whelan, Wagstaff, and Wheatcroft (2013) included the word ‘just’ under their category of equivocation as an example of
minimizing or psychological distancing. Further, Wmatrix can consider semantic categories such as the speaker’s ‘level of knowledge,’ which could be an important indicator of deception. Indeed, although deceptive pleaders are trying to present their plea as though they have little knowledge surrounding the events of the missing person’s disappearance, they are potentially riddled by the fact that they do have guilty knowledge concerning the crime. This guilty knowledge is thought to increase cognitive load in deceptive individuals and is frequently used in conjunction with polygraph testing using the Guilty Knowledge Test (GKT). Psychophysiological responses are examined during GKT in an attempt to determine a participant’s level of knowledge of information that would only be known by a guilty individual (Ben-Shakhar & Elaad, 2003; MacLaren, 2001). Similarly, the overall quantity of details provided in speech has previously been found to be indicative of veracity and has been used as a predictor of truthfulness (Sporer, 1997; Vrij, 2005; Warmelink, et al., 2013). A greater use of terms describing temporal or spatial details, or the personality and physical appearance of a victim, may potentially be indicative of truthfulness not only because the pleader is providing more details, but also because this may be suggestive of less psychological distancing from the victim and the current situation. Deceptive pleaders may use fewer of these descriptive details to avoid the added cognitive load of having more details to remember and relay again later. Arguably, the (likely unconscious) propensity to provide greater or fewer details is an important aspect for law enforcement to consider, as liars would be unaware that this could potentially be indicative of deception. Finally, ten Brinke and Porter’s examination of the sample was largely focused on nonverbal cues, providing the opportunity for a more detailed consideration of the language employed by this group of high-stakes pleaders.

Gender differences were not considered by ten Brinke and Porter (2012) but were a specific focus of the current study which sought to understand how gender may influence linguistic cues to deception. Limited previous research suggests that males and females use deception in different ways (see DePaulo, Kashy, Kirkendol, Wyer, & Epstein, 1996; O’Hair & Cody, 1987). For example, Tyler and Feldman (2004) found that females lied more often, and lied more when expecting future interaction than when not, suggesting that lies were used as a self-presentation tactic. In another study by O’Hair and Cody (1987), females displayed more vocal stress than males while telling a prepared lie, suggesting that females may exhibit more cues of anxiety while telling prepared rather than spontaneous lies. Newman, Groom, Handelman, and Pennebaker (2008) demonstrated that the language used by women differs in important ways from the speech of males. For example, females’ language includes more words related to psychological and social processes whereas men’s language focused on impersonal topics and object properties. Despite these studies showing differences in language use across gender, few studies have considered whether males and females use different strategies when being deceptive and how these potential differences may be demonstrated through their use of language.

This study is the first to examine the underlying semantic content of deceptive and genuine pleaders’ speech using Wmatrix. It provided a unique opportunity to carefully examine the language of deceptive individuals in an extremely high-stakes situation, outside of an official interrogation context, and even before they are necessarily strongly suspected of committing any crime. We expected differences in the language of genuine and deceptive pleaders that may be indicative of factors previously linked to deceptive behavior (e.g., psychological distancing and verbal leakage). Deceptive pleaders were expected to use language that distanced them from the truth (potentially in
a nonconscious effort to minimize the difficulty of deceiving others), whereas genuine pleaders were expected to use language that personalized the situation for them. Certain aspects of language were expected to be leaked more often by deceptive pleaders (such as terms relating to an individual’s level of knowledge) due to the cognitively demanding task of maintaining a lie, particularly an extremely high-stakes lie.

Method
Cases
Transcripts from 78 pleaders were provided by ten Brinke and Porter (2012) who collected and transcribed videos of individuals pleading for the safe return (or information leading to the arrest of an unknown suspect in the murder) of their missing loved one at televised press conferences. Almost half ($n = 35$) of the pleaders were later found to be guilty based on overwhelming physical evidence (e.g., DNA). In all cases where the pleader was labeled as genuine, another individual had been convicted of the crime on overwhelming physical evidence, or there was no foul play (i.e., the missing individual returned; see ten Brinke & Porter, 2012, for additional details regarding determination of ground truth). Over half ($n = 48$) of the pleaders were male, and 26 of the male pleaders were found guilty. Of the 30 female pleaders, 9 were found guilty. Each case we examined included only one appeal. To the best of our knowledge, these were the first public and televised appeals that had been made in each of these cases. Appeals were, on average, 31.711 ($SD = 58.82$) seconds long. The authors used the version of pleas that appeared on television, as law enforcement footage was not available. However, again to the best of the authors knowledge, these were the complete pleas and do not appear to have been edited in any substantive way.

Coding procedure
In accordance with ten Brinke and Porter (2012), the pleas, transcribed from the television footage, were broken into two parts: the whole plea and the direct plea. The direct plea consists of the individual asking the public for information regarding their missing loved one, appealing directly to the perpetrator to come forward, or directly addressing the missing person. It is within the direct plea that verbal leakage may be more likely because, as ten Brinke and Porter (2012) suggest, this is the portion of the plea that is most easily proven to be a lie in the cases where the individual actually already has guilty knowledge of the whereabouts of their missing loved one. This is because during the direct plea the guilty pleader is either asking for information that they already know, or speaking directly to an individual whom they know is dead (in the case of addressing the missing family member), or nonexistent (in the case of addressing an unknown perpetrator). The whole plea consists of the entire statement, including the direct plea and might include a description of the victim, thanking the public for help, and/or describing how the family is dealing with the loss (ten Brinke & Porter, 2012). The text constituting the whole plea and the direct plea was entered separately into the Wmatrix program and each variable was examined for both plea types. Fifty-three pleaders provided direct pleas in their statements, and 27 of these direct pleas were taken from the transcripts of deceptive pleaders.
Materials

Wmatrix is a word analysis tool that identifies and compares word use, parts-of-speech, and semantic categories between two word corpora (Rayson, 2008). The program automatically creates contingency tables from the word frequencies within each corpus. From the contingency tables, Wmatrix derives a one-degree of freedom log-likelihood ratio (LLR; see Rayson, 2003). Wmatrix has been successfully employed in research comparing the effectiveness of problem-based learning to more traditional methods in the context of medical education (Da Silva & Dennick, 2010) and has recently also been applied in a forensic (Hancock et al., 2013) and deception detection (Villar, Arciuli, & Mallard, 2012) context. The program has attained a high level of accuracy. Specifically, parts-of-speech tagging typically achieves 96–97% accuracy and semantic tagging typically achieves 92% accuracy (Rayson, 2008). In the current study, the speech produced by deceptive pleaders (deceptive pleader corpus) was compared to the speech produced by genuine pleaders (genuine pleader corpus) (see Table 1). Particular attention was paid to aspects of language that fit into one of five categories at the semantic level: level of knowledge (e.g., ‘dunno,’ ‘insight,’ ‘anybody’s guess’), words describing personality characteristics (e.g., ‘friendly,’ ‘generous’), and physical attributes or appearance of the missing person (e.g., ‘beautiful’), self and other references, and the use of discourse markers. The program automatically identifies these most pertinent categories and provides the corresponding LLR. Categories that are not present in the pleas are not provided in the Wmatrix output, and therefore not all categories of interest appear in the results tables provided below. Differences at the word, parts-of-speech, and semantic levels were also considered.

To determine what language was used more frequently by deceptive pleaders than genuine pleaders, the deceptive pleader corpus was compared to the genuine pleader corpus. The inverse was done to determine variables used more by genuine pleaders than deceptive pleaders. Consistent with Hancock and colleagues (2013), a conservative cut-off ($p < .01$) was employed to control for having multiple LLR computations. This $p$ value translates to an LLR critical value of 6.63.

Results

An analysis considering the whole plea revealed that deceptive pleaders used exclusivizers and/or particularizers significantly more often than genuine pleaders (freq =

<table>
<thead>
<tr>
<th>Corpus</th>
<th>Deceptive Number of words</th>
<th>Genuine Number of words</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole plea</td>
<td>1787</td>
<td>3827</td>
<td>5614</td>
</tr>
<tr>
<td>Direct plea</td>
<td>572</td>
<td>1274</td>
<td>1846</td>
</tr>
<tr>
<td>Whole plea female</td>
<td>378</td>
<td>1546</td>
<td>1924</td>
</tr>
<tr>
<td>Whole plea male</td>
<td>1409</td>
<td>2281</td>
<td>3690</td>
</tr>
<tr>
<td>Direct plea female</td>
<td>109</td>
<td>568</td>
<td>677</td>
</tr>
<tr>
<td>Direct plea male</td>
<td>463</td>
<td>706</td>
<td>1169</td>
</tr>
</tbody>
</table>

Table 1. Number of words across deceptive and genuine pleader and genders for the whole and direct pleas.
47, 2.63% of words versus freq = 46, 1.20% of words, respectively), LLR = 13.98, \( p < .001 \). This category includes discourse-marking words like ‘just’ and ‘especially.’ The word ‘they’ was used significantly more by deceptive pleaders (freq = 19, 1.07%) than genuine pleaders (freq = 14, 0.37%), LLR = 9.26, \( p < .01 \). Moreover, indefinite singular pronouns such as ‘anyone’ or ‘somebody’ were used significantly more by deceptive pleaders (freq = 44, 2.47%) than genuine pleaders (freq = 41, 1.07%), LLR = 14.47, \( p < .001 \). In contrast, the word ‘we’ was used significantly more by genuine pleaders (freq = 94, 2.46%) than deceptive pleaders (freq = 19, 1.06%), LLR = 13.18, \( p < .001 \). Genuine pleaders also use plural temporal nouns (e.g., ‘days,’ ‘weeks’) significantly more than deceptive pleaders (freq = 20, 0.52%; freq = 1, 0.06%, respectively), LLR = 9.58, \( p < .01 \).

Many of the same patterns were significant in the direct pleas (see Table 2). In addition, genuine pleaders use more quasi-nominal adverbs of time (e.g., ‘today,’ ‘tomorrow’; freq = 10, 0.83%) than deceptive pleaders (freq = 0, 0%) in their direct pleas, LLR = 9.48, \( p < .01 \). The frequency, percentage, and LLR of these variables for both the deceptive pleader corpus and genuine pleader corpus are also included in Table 2.

**Gender analysis**

Deceptive females used the word ‘just’ significantly more (freq = 11, 2.90%) than genuine females (freq = 11, 0.71%), LLR = 10.09, \( p < .01 \). Deceptive females also used exclusivizers and/or particularizers significantly more (freq = 11, 2.90%) than genuine females (freq = 13, 0.84%), LLR = 8.36, \( p < .01 \). Genuine females were found to use the word ‘we’ significantly more (freq = 43, 2.78%) than deceptive females (freq = 2, 0.53%), LLR = 8.98, \( p < .01 \).

Deceptive males used the word ‘never’ significantly more (freq = 6, 0.42%) than genuine males (freq = 0, 0.00%), LLR = 10.09, \( p < .01 \). Deceptive males also used more wh-determiners (i.e., ‘which,’ ‘what’) than genuine males (freq = 14, 0.99% versus freq = 3, 0.13% respectively), LLR = 13.98, \( p < .001 \). Genuine males, on the other hand, used more temporal plural nouns (freq =15, 0.66%) than deceptive males (freq = 1, 0.07%), LLR = 8.89, \( p < .01 \).

Deceptive females did not have any words, parts-of-speech, or semantic tags that they used significantly more than deceptive males and the reverse was also true.

Using our stringent LLR cut-off, no other variables of interest were considered significant for the whole plea (see Table 3). This was also consistent for the direct plea (see Table 4). As mentioned above, the Wmatrix program only provides output for categories that were present in the corpora. Thus, while we were interested in examining...
all five semantic categories for both the whole and direct pleas, not all of the categories appear in the results tables.

**Discussion**

Utilizing a large sample of family ‘pleaders,’ the current study examined linguistic differences between honest, distressed individuals and deceptive killers. This study exemplifies the importance of exploratory research by extending on the previous work of ten Brinke and Porter (2012) and revealing additional differences between deceptive and genuine language.

Our analysis of the language of deceptive and genuine pleaders revealed a number of intriguing findings. Consistent with ten Brinke and Porter (2012), our analysis demonstrated no differences in the use of singular first person pronouns (e.g., ‘I,’ ‘me,’ ‘my’) across veracity; however, the findings indicated that deceptive pleaders used the word ‘they’ and singular indefinite pronouns (e.g., ‘somebody,’ ‘anybody’) more often than genuine pleaders in both the whole and direct plea corpora. Deceptive pleaders were using more language that refers (even vaguely) to others (presumably rather than focusing so much on themselves). While referring to others was not a significant predictor for the similar Wright Whelan et al. (2013) study, it is possible their hand-coding scheme did not consider the breadth of terms that were included in the Wmatrix program. This finding is
likely indicative of psychological distancing where a guilty individual subconsciously distances him or herself from the victim or the crime due to having guilty knowledge (Hancock et al., 2013). At a more conscious level, guilty individuals may also be attempting to use more generalized terms that do not sound as personalized or attached to themselves, any particular person, or even the situation. As a case example, consider the following plea from Graham Alderton who was eventually found guilty of the manslaughter of his three children by burning their house down with the children inside (Hartlepool Mail, 2000):

I just want everyone who’s done something to give themselves up. Somebody’s got to know something, somewhere. I think so. I think there’s somebody who’s got to be running scared, who knows what they’re doing. If there’s anybody out there who knows anything, just tell the police. Anyone who’s done it has got a conscience. Give it up, you’ve killed them, my kids.

Deceptive pleaders were also found to use exclusivizers and/or particularizers more than genuine pleaders in their whole and direct pleas. In particular, it was the word ‘just’ that was the most popularly used word in this category and may be considered a discourse marker. For example, one deceptive pleader stated, ‘It just seems so unfair that someone could take such two beautiful children.’ The word ‘just’ can be used to make the words that follow sound more salient and could be a conscious technique used by deceptive pleaders to present as more distraught in hopes of masking a lie. Alternatively, by using discourse markers, speakers are conceivably providing unnecessary information that distracts from the true meaning of the sentence. Discourse markers may be indicative of another type of psychological distancing and indicative of guilt (Hancock & Woodworth, 2013; Wright Whelan et al., 2013). Alternately, using a filler word like ‘just’ may be demonstrative of the pleader, consciously or subconsciously, stalling for more time during the statement, potentially demonstrating the additional cognitive demands placed on a deceptive speaker.

In contrast to the finding that deceptive pleaders use the word ‘they’ more often, genuine pleaders use the word ‘we’ more in their whole pleas, but not in their direct pleas. While the current study utilized pleas from individual speakers, many of the pleaders were speaking as the parents of a missing child or the family of a missing sibling, spouse, or parent. Therefore, it makes sense that they would use ‘we’ rather than ‘I,’ and that under these specific circumstances these words would be indicative of more personalized self-referencing. By using self-focused words, genuine pleaders are arguably placing the public’s attention on the pleaders and their feelings, which could potentially enhance the public’s desire to assist with finding the missing person. In contrast to the vague ‘other’ references exemplified in the case example given above, compare the much more self-focused plea of the truth-telling mother of Sarah Payne, a young girl who had been abducted and later murdered (Gould, 2001):

You can’t imagine what Sarah means to us. We are a strong family, and we don’t survive well apart. We need her home now, today, quickly as we possibly can. Our family name for Sarah is our little princess, and that’s just what she is. She’s a soft, gentle little girl.

The finding that genuine pleaders used the word ‘we’ more in their whole plea but not in their direct plea is consistent with the idea that the direct plea is used to ask the public for information, to appeal directly to the perpetrator to come forward, or to directly address the missing person. As such, the attention is being turned away from the pleader and their
family thereby reducing the use of self-focused words. This finding also attests to the importance of examining a larger sample of language rather than just the direct plea when assessing credibility, particularly when examining linguistic differences. Indeed, although ten Brinke and Porter (2012) placed more emphasis on the direct appeal, an analysis of the entire plea appears important to parse apart the various ways that language use differences may be used to consider veracity.

Within the whole pleas, genuine pleaders used temporal plural nouns (e.g., ‘days,’ ‘weeks,’ ‘years’), more than deceptive pleaders. By using time words, genuine pleaders are placing the disappearance and investigation in a concrete, and arguably more real, temporal context. Indeed, the greater use of temporal plural nouns is believed to be a reflection of them genuinely considering how long they have been struggling with their current situation. The use of temporal nouns by the genuine pleaders may again be an attempt to make the details of the incident more personalized and salient for the public in the hopes of appealing to their audience to help them find the missing person or to a possible perpetrator to release the family member. Alternatively, deceptive pleaders are using fewer tangible time words to avoid providing temporal details that they may eventually lose track of. Further, without a genuine temporal context to reflect upon, it is less likely that deceptive individuals would employ words that reflect various aspects of the passage of time. This appears to be another important example in which the use of the whole plea, as opposed to restricting analysis to the direct plea, provided more insight into deceptive language use. Deceptive pleaders’ lack of time words is also consistent with ten Brinke and Porter’s (2012) finding that more tentative words were used by deceptive than genuine pleaders. It may be that deceptive individuals find the cognitive load of using many words or phrases that definitively relate to specific temporal periods too challenging when they are having to create completely fictitious accounts relating to those particular aspects of time. Indeed, within the direct plea, genuine pleaders also use different kinds of time words than deceptive pleaders: quasi-nominal adverbs of time (e.g., ‘today,’ ‘now,’ and ‘tomorrow’). Again, it is evident that genuine pleaders are placing the experience within a more detailed temporal context. Notably, these words are somewhat more vague than the temporal plural nouns used in their whole pleas which could be a result of the honest pleaders directly addressing the missing person (whom they are not sure is dead or alive) during the direct plea. Due to this uncertainty, these pleaders may be more inclined to use words that are slightly less definite and concrete.

Our consideration of gender revealed some important findings and allowed us to further clarify some of the findings already considered. Deceptive females used exclusivizers and/or particularizers and the word ‘just’ more than genuine females, mirroring results for the entire sample. In addition, the use of the word ‘we’ was used more often by genuine females than deceptive females. Interestingly, these findings were not found when comparing deceptive and genuine males, suggesting that one of the most important considerations concerning differences in the sample, particularly amongst females, was the frequency with which pleaders used exclusivizers and/or particularizers. Additionally, when comparing genuine males to deceptive males, wh-determiners and the word ‘never’ were used more by deceptive males. Wh-determiners (i.e., ‘which,’ ‘what’) appear in statements like ‘who knows what they’re doing,’ and ‘that’s what I’m really worried about’ and may be an effort by deceptive male pleaders to provide statements that are vague in detail in an attempt to convince the public that they lack knowledge about what is going on. Further, the finding that deceptive males used the adverb ‘never’ more than those who were genuine could be a form of psychological distancing whereby the
guilty individual is using language that communicates a lack of action. A comparison of genuine to deceptive male pleaders demonstrated that temporal plural nouns were used more often by genuine males and was a particularly important cue to consider.

The above differences in patterns of language use between genuine and deceptive males and genuine and deceptive females in our sample could be indicative of general gender differences in language use. While past research on differences in language use between genders have found mixed results, males have been found to be less emotional and more precise in their language use (Pennebaker et al., 2003). This could explain their lack of using the emotional discourse marker ‘just’ and their increased use of more precise temporal details. While additional research is certainly required to more closely consider this topic, in the current study, gender was important when considering where some of the differences lie between genuine and deceptive pleaders. We recommend future researchers also include age, ethnicity, and relationship to the victim as these factors may impact type of language used and provide further insight into differentiating the language of deceptive and genuine pleaders.

We had expected that deceptive pleaders would use more negative words denoting their level of knowledge than genuine pleaders, but that both genuine and deceptive pleaders may potentially use positive knowledge terms. A handful of deceptive pleaders directly stated their level of knowledge (e.g., ‘It’s bad enough for us, but we don’t know where they are, you don’t know where they are. But, someone’s got them’). These statements could be considered denials of allegations (i.e., they are denying knowledge of the whereabouts of the victim). However, we did not find any differences across pleader veracity in the use of words indicating level of knowledge. It is possible that deceptive pleaders could use more semantically negative terms relating to level of knowledge (e.g., ‘forget,’ ‘can’t tell,’ ‘anybody’s guess’) due to their motivation to appear genuine. However, deceptive pleaders’ use of semantically positive terms relating to level of knowledge (e.g., ‘aware,’ ‘insight’) may also be leaked verbally due to their guilty knowledge, creating a canceling-out effect. Additionally, perhaps the words and phrases within the level of knowledge category were not consistent with the words potentially denoting knowledge used by the pleaders. For example, while the Wmatrix identifies words like ‘dunno’ and ‘anybody’s guess,’ the type of confession of knowledge available in the pleas is more often in the form of statements like ‘somebody somewhere knows who did this’ or ‘for Christ sake look after her, whoever’s got her, and let us have her back.’ Statements like ‘whoever’s got her’ imply that the pleader does not know who has taken the victim; however, these kinds of statements may not have been picked up by Wmatrix’s level of knowledge category. While Wmatrix provided a number of important new insights into potential language cues in the current sample, future studies may consider hand-coding these types of statements.

We had also expected genuine pleaders to use more descriptive words in terms of physical attributes and personality traits in their language. Although the data did not confirm the greater presence of these words in genuine pleaders’ statements, the findings did shed light on the language and motives of deceptive and genuine pleaders. For instance, it is interesting that deceptive pleaders did not use fewer details than genuine pleaders since we anticipated that a lack of detail would suggest psychological distancing and would allow the deceptive pleader to be less cognitively constrained. However, since anyone pleading for the return of a missing loved one would be expected to describe the missing person, most deceptive pleaders were likely aware of this and were able to prepare in advance a number of details concerning the physical and personality traits of the victim.
Limitations
The current study has potential limitations that ought to be acknowledged. First, the pleader sample that was collected comprised a relatively small sample size, particularly when divided by gender. Further, it considered deception in a very specific context of pleading for the return of a missing loved one. Although it could be argued that this provides a unique opportunity to examine language within an extremely high-stakes situation, we acknowledge that the atypical nature of the type of lie (conveyed at a press conference) reduces the generalizability of the findings, and urge other researchers to examine similar types of lies. Second, with any studies that rely on the distinction of ground truth in real-life cases, there is always the possibility that a pleader classified as genuine is in fact deceptive or vice versa. The authors, however, made every effort to ensure the accuracy of ground truth by only accepting pleader statements as ‘genuine’ if another individual had been convicted of the crime based on overwhelming physical evidence, or there was no foul play such as in cases where the missing individual returned unharmed.

Conclusion
In summary, the current study expands on previous limited studies and uncovered a variety of interesting linguistic differences between deceitful and honest individuals pleading for the return of a loved one. This type of deception detection technique can have important implications for law enforcement, particularly in high-stakes cases. An invested effort to continue research of this type could facilitate additional methods for law enforcement to consider in terms of the credibility of individuals involved in the investigation. These kinds of verbal cues to deception may assist with a multi-cued approach to deception detection and, indeed, may help point law enforcement toward investigating a potential suspect further. This study suggests that a careful analysis of language may increase the likelihood of knowing whether a speaker is deceptive or not. It has also enhanced our understanding of verbal elements of high-stakes deception and has provided further validation of the use of automated linguistic tools like the Wmatrix in forensic contexts.

Notes
1. A breakdown of the number of words in both the deceptive and genuine pleader corpora across whole plea and direct plea and gender are included in Table 1.
2. A careful analysis of the Wmatrix output revealed two word misclassifications. First, the Wmatrix classified the word ‘appeal’ into the physical attributes category when its intended meaning did not fit that category. For example, this word was used in the following context, ‘I would appeal someone to come forward.’ This word was used as frequently in the guilty corpus as it was in the innocent corpus. The second misclassification involved the word ‘just.’ For example, this word was used by a deceptive pleader in the following statement, ‘it’s just unbearable to think about.’ The word was incorrectly tagged as a personality trait. This word was used twice in the genuine pleader corpora and once in the deceptive pleader corpora.

Disclosure statement
No potential conflict of interest was reported by the authors.
References


