

# Verbal Indicators of Deception



Jack Schafer<sup>1</sup>, Ekici Niyazi<sup>1</sup>, Dave Young<sup>1</sup>, Kelsey Maldonado<sup>1</sup> and Marvin Karlins<sup>2</sup>

<sup>1</sup>Western Illinois University, Macomb, Illinois, United States

<sup>2</sup>University of South Florida, Tampa, United States

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\*Corresponding author: Marvin Karlins, University of South Florida, Tampa, United States

## Abstract

Suspects involved in criminal investigations will withhold information from law enforcement personnel to avoid potential legal consequences. Discovering where suspects utilize this form of deception during interviews can help investigators identify specific portions of their narratives where follow-up inquiries should be made, providing an opportunity to gain critical information that would not otherwise be revealed. To gain this vital information, it is necessary to develop a noninvasive technique that law enforcement investigators can deploy in the field to detect deception in verbal communication as quickly and accurately as possible. This paper presents one such technique-grammatical structural analysis (GSA)-and discusses its viability in detecting deception, its limitations, and potential avenues for future research in determining the veracity of suspects statements by examining the structure and patterns in their verbal behavior.

**Keywords:** Grammatical Structural Analysis; Law Enforcement; Criminal Investigation; Forensic Science

## Introduction

Law enforcement investigators-particularly those deployed in the field-have a pressing need for a noninvasive technique that can help them quickly detect deception in verbal communications. Detecting deception is difficult but not impossible [1]. A comprehensive list of deceptive verbal indicators has yet to be compiled [1-4]. Still, researchers have determined that verbal indicators of deception should exist [5]. If deceptive indicators can be empirically identified and cataloged, a set of valid indicators could be compiled to increase the effectiveness of law enforcement investigators to discriminate fact from fiction. This would be particularly useful when it is only possible to get a verbal (versus a written) response from a person of interest.

Cognitive load plays an important part in detecting deception. Vrij [4,6,7] posited that verbal indicators of deception often signal cognitive overload associated with deception. Truthful people merely convey facts. Liars not only have to monitor their verbal and nonverbal behaviors, but they must also keep track of what they said and what they did not say [8]. Additionally, liars must monitor the verbal and nonverbal behaviors of their lie target to ensure that the lie is believed. Liars often give off verbal, nonverbal, and paralinguistic deceptive indicators during increased cognitive processing [6]. Increased cognitive processing can also occur for reasons other than deception, which complicates deception detection. Truthful people must think hard if they are asked to recall events that occurred in the distant past.

Physiological changes can also signal deception [6]. Physiological changes occur when a person is faced with the threat of

getting caught in a lie. The fear of getting caught triggers the fight or flight response. The physiological changes associated with the fight or flight response include increased blood pressure, increased skin conductance, and changes in respiration patterns. Physiological changes do not directly detect deception but, rather, measure the intensity of the fight or flight response associated with lying. Notwithstanding, truth-tellers can manifest the same physiological responses as do liars if the truth-tellers fear they are not believed. Discerning the cause of the physiological changes can lead to misperceptions with severe consequences, especially for innocent people. Further complicating the use of physiological responses to detect deception is the fact that people have different fight or flight thresholds.

Accomplished liars have higher fight or flight thresholds than do inexperienced deceivers, which further confounds deception detection. Since the cognitive load and the fight or flight thresholds differ with each person, developing a more stable platform to examine veracity may produce a more reliable index of deceptive cues. This study takes a unique approach to detecting deception by examining grammar structures people use during deception- grammatical structure analysis (GSA)-instead of measuring nonverbal and verbal cues based on physiological changes or cognitive load. Truthful people and deceptive people use the same grammar rules to construct sentences in both stressful and non-stressful environments. The difference between truthful narratives and deceptive narratives is the omission or obfuscation of the truth. Analyzing grammar structures eliminates the need to rely on cognitive processing and

physiological cues that detect deception, which have been found to be inconclusive.

Words and grammar structures serve as blueprints to construct sentences. Grammar rules are relatively stable in native English language speakers and only vary slightly despite intellect, vocabulary strength, language competence, and education. The stability of grammar rules provides a more stable platform to study the differences between truthful and deceptive narratives. Most people lie by omission [9]. Therefore, this study will examine lies of omission rather than lying by obfuscation. Liars typically do not concoct entirely false narratives but, rather, tell the truth up to the point where they want to withhold information, skip over the withheld information, and once again tell the truth, thus creating information gaps [9]. Grammar structures are the only mechanism liars have at their disposal to bridge information gaps in oral and written narratives.

Words comprise sentences, and sentence construction follows a predetermined set of grammar rules. A careful examination of the differences between the words and the grammar structures in deceptive narratives and truthful narratives may identify specific words or grammar structures that signal deception. Grammar rules provide a standard measure against which to record changes in truthful and deceptive narratives.

### Text Bridges

A text bridge is a grammatical structure that can bridge intentionally or unintentionally withheld information. At the point where liars want to withhold information, they must use a text bridge to cross over the intentionally or unintentionally withheld information [10-13]. Identifying text bridges isolate the portions of narratives that contain intentionally or unintentionally withheld information. The grammar structures that function as text bridges include adverbial conjunctions, transitional words, and subordinating words [14]. A review of basic sentence construction is essential because text bridges are an integral part of sentence construction.

Sentences are divided into four basic types: imperative, declarative, interrogative, and exclamatory. The focus of this study is on declarative sentences. Declarative sentences are categorized as simple, compound, complex, or compound-complex [14]. Simple declarative sentences contain a subject and a verb. For example, "I walked." A compound declarative sentence comprises two or more independent clauses [14]. For example, "Tom went to the store, and he bought a soda." Complex declarative sentences comprise one independent clause and one or more subordinate clauses [14]. For example, "Jim went to class when the bell rang." A compound-complex sentence includes two or more independent clauses and one or more subordinate clauses. For example, "The car ran out of gas, and the driver walked five miles because no one could drive him to the filling station."

### Information Gaps

The simple declarative sentence restricts time and activities.

Using a simple declarative sentence, a thief could say either "I stole the money" or "I did not steal the money." With the use of a compound declarative sentence structure, the same thief could either say, "I stole the money, and I bought a new cell phone" or "I did not steal the money, and I did not buy a cellphone." Compound sentences place limitations on time and activities. The conjunction "and" creates an information gap to some degree because "and then" is implied in some instances. Complex sentences and compound-complex sentences allow for gross distortions of time and activities. For example, in the sentence, "After I came home from work, I found my husband dead," an information gap is created between the subordinate clause, "After I came home from work" -- and the main clause, --"I found my husband dead."

The writer did not clarify her activities from the time she arrived home until the time she found her husband dead. There are two possible explanations. First, the writer told the truth and used a text bridge as a behavioral contraction to omit her activities from the time she arrived home until the time she found her husband dead. Second, the writer used the text bridge after to skip over the fact that the woman engaged in an altercation with her husband and killed him after she arrived home. Text bridges do not signal deception but signal the presence of information gaps. In this case, identifying the information gap is critical.

Subordinating clauses link unequal but related ideas to form complex sentences [14]. Subordinating words include after, although, as if, as long as, because, before, even though, if, in order that, since, so, that, then, though, unless, until, when, whenever, wherever, and while. Subordinating clauses create information gaps wherein liars can secrete information. Truthful people often use subordinating clauses as behavioral contractions to redact information they consider unimportant or because they think that the withheld information is irrelevant. Transitional words also create information gaps. Transitional words serve as behavioral contractions to redact irrelevant information intentionally or unintentionally. Adverbial conjunctions couple two complete ideas [14]. Adverbial conjunctions include accordingly, again, also, besides, consequently, finally, furthermore, however, indeed, moreover, nevertheless, otherwise, then, therefore, and thus [14].

Adverbial conjunctions produce information gaps. As with subordinating words and transitional words, truthful people can use adverbial conjunctions as behavioral contractions to withhold information intentionally or unintentionally. In many instances, information gaps can be explained. For example, in the sentence, "I got up, and then I took a shower, and then I ate breakfast," the adverbial conjunction then creates an information gap. This missing information can be logically explained. The writer omitted the lesser-included activities of taking a shower or eating breakfast. Text bridges allow the speaker or writer to redact irrelevant activities such as turning on the water, soaping, rinsing, drying off, putting on clothes, walking to the kitchen, securing a bowl, filling the bowl with cereal, pour-

ing milk, and so on. Likewise, liars use text bridges to bypass an event they want to remain secret. Text bridges indicate where to locate withheld information in written and oral narratives. In some instances, the withheld information is appropriate to the inquiry. In some instances, the withheld information is of little interest to the reader or listener.

Text bridges are critical in that interviewers can quickly examine an interviewee's oral or written statement and identify where the interviewee intentionally or intentionally created information gaps. The interviewer must determine if the withheld information is important to the investigation. The investigator can ignore the text bridge if the withheld information is of no value. For example, if a crime occurred at 7:00 pm, the suspect should be instructed to produce a narrative regarding his activities from the time he woke up that morning until the time he went to sleep. If the suspect begins his narrative with the sentence, "I woke up and then took a shower, and then ate breakfast" the text bridge "then" indicates withheld information. An information gap exists between the time the suspect woke until the time the suspect took a shower. Another information gap is created between the time the suspect took a shower until the time the suspect ate breakfast.

The withheld information does not necessarily mean the suspect is deceptive. The suspect decided to omit the included activities of eating breakfast and taking a shower. The text bridge can be ignored because the information is not significant. If, conversely, the suspect wrote, "At about 6:00 pm that night, I drove to a friend's house and then I went directly home," the text bridge then is meaningful because the writer created an information gap between 6:00 pm and the time the writer arrived home. In this case, the suspect may have perpetrated the crime after he departed his friend's house but prior to arriving home at 8:00 pm. The suspect used the text bridge, then, to avoid telling a lie. The suspect went to his friend's house at 6:00 pm, and the suspect arrived home at 8:00 pm. The suspect withheld the fact that he committed the crime between the time he left his friend's house and the time he arrived home.

Schafer [11] identified the most used text bridges. They are then: so, after, when, as, while, and once. The results of the study demonstrated that the combined variables, total words, text bridge ratio, and spontaneous negation ratio correctly predicted deceptive written narratives 67% of the time and truthful written narratives 89% of the time [11]. The results of a cross-validation study demonstrated that the three variables, total words, text bridge ratio, and spontaneous negation ratio correctly identified deceptive narratives 76% of the time and truthful narratives 85% of the time [11]. The information gaps created by text bridges now allow targeted inquiries to focus on, and obtain, the intentionally or unintentionally withheld information.

### Fewer Words

Research has documented that liars use fewer words, and their narratives contain less detailed information, [6,9]. Because

liars do not experience the activities they are describing, they possess fewer facts. If liars are asked to repeat their stories, fewer facts are easier to command than a larger number of fabricated details [4,6,9].

### Text Bridge Ratio

Discriminating truthful narratives from deceptive narratives requires an additional element. In experimental conditions, a person's truthful narrative can be compared to his or her deceptive narrative. However, side-by-side comparisons of truthful narratives and deceptive narratives is rarely possible because deceptive statements are constructed to mimic truthful narratives to avoid social or legal sanctions if the truth is revealed. When no direct comparison between truthful narratives and deceptive narratives is possible, text bridge ratios may serve as a predictive indicator of veracity. Dividing the total number of text bridges in a narrative by the total number of words in the same narrative produces a text bridge ratio. Since liars use fewer words, the ratio of text bridges to the total words in the narrative might provide a more reliable indication of deception. A text bridge ratio might prove useful in verifying the veracity of narratives because listeners and readers must judge veracity without the benefit of making direct comparisons between truthful and deceptive narratives.

### Spontaneous Negation

Words such as not, no, and all contractions of not comprise spontaneous negations. Negations occur during responses to open-ended questions as opposed to closed-ended questions. The concept of negations divides into two concepts, negations, and spontaneous negations. The answer to the closed-ended question, "Did you steal the money?" a truthful person as well as a deceptive person, would answer, "No, I did not steal the money." A negative answer to a direct question constitutes a negation. When asked open-ended questions, people should relate what they did, not what they did not do. When people tell you what they did not say or do in an open-ended response signals deception [11].

Spontaneous negations allow liars to bridge the information gap in the same way text bridges do. Spontaneous negations may provide additional cues to differentiate truthful narratives from deceptive narratives, especially when they are used in conjunction with text bridges. Schafer [11] developed a predictive model for veracity using the three variables: total words, text bridge ratio, and spontaneous negation ratio. The three variables predict truthful and deceptive written narratives at a rate higher than the current model deceptive indicia, where the credibility continues to be slightly about the 50th percentile [4,6]. This study will duplicate Schafer [11] using the same methodology to determine if the predictive model for veracity remains consistent using verbal narratives instead of written narratives.

### Hypotheses:

The following hypotheses examine the effectiveness of dis-

cerning truthful oral narratives from deceptive oral narratives using grammatical structures:

**Hypothesis 1:** Deceptive oral narratives contain fewer words than do truthful oral narratives. (The total number of words was calculated by the word count feature in Microsoft word.)

**Hypothesis 2:** Text bridge ratio of deceptive oral narratives will be higher than text bridge ratio of truthful oral narratives. (Text bridge ratio was calculated by dividing the total number of text bridges by the total number of words in the same narrative.)

**Hypothesis 3:** Deceptive oral narratives contain higher spontaneous negation ratios than truthful oral narratives. The spontaneous negation ratio was calculated by dividing the total number of spontaneous negations by the total number of words in the same narrative.

**Subjects:**

The 110 participants in this study were drawn from college students studying law enforcement and criminal justice administration in a midwestern university. Of the 110 samples collected, 108 samples were collected successfully. Two samples were excluded from the analysis due to a misinterpretation of the directions. Since college students must demonstrate minimum literacy skills upon enrollment, this population ensured that the participants of this study were fluent in spoken English. The participants comprised 64 males and 44 females. Fifty-six percent of the subjects were Caucasian, 13% Hispanic, 19% African American, 1% Asian American, 8% of Mixed Heritage, 2% Asian Pacific Islander, and 1% Asian. The average age of the participants was 21 years.

The participants were asked to read and sign consent forms.

After signing the consent form, each participant was randomly assigned to one of two groups, Group I and Group II. To compensate for individualistic writing styles, education levels, age, ethnicity, and gender, each person served as his/her own control. Groups I and II watched a digital video of a shoplifting event that occurred in a convenience store. Groups I and II were instructed to pretend that they were the person depicted in the digital video and provide a truthful and a deceptive verbal narrative describing their actions in the store. Group I participants were instructed to provide their truthful verbal narratives first and then provide their deceptive verbal narratives. Group II participants were instructed to provide their verbal deceptive narratives first and then provide their verbal truthful narratives. The grammar structures used in the truthful verbal narratives were compared to the grammar structures used in the deceptive verbal narratives, and the differences were objectively measured.

**Results**

**Descriptive Statistics**

Descriptive statistics were conducted to the mean, standard deviation of the variables: length of statement, truth or false condition, total number of text bridges, text bridge ratio, number of spontaneous negations, spontaneous negation ratio, text bridge/spontaneous negation ratio, total number of just, and text bridge/spontaneous negation/just ratio. (Table 1) show sdescriptive statistics for all the variables that were tested within the independent variables. Between truthful and deceptive statements, the word count minimum was 13 and the maximum was 221, making the range 208. The mean of text bridges across the truthful and deceptive statements was on average 2.34 text bridges per statement. On average there were .83 spontaneous negations in each statement.

**Table 1:** Descriptive Statistics of Test Variables.

Variables	Minimum	Maximum	Mean	S.D.	Valid N
Word Count	13	221	58.74	28.282	216
Total Text Bridges	0	8	2.34	1.574	216
Text Bridge Ratio	0	0.125	0.04115	0.024	216
Filler Words	0	15	1.58	2.019	216
Spontaneous Negations	0	5	0.83	1.018	216
Stopped Action Words	0	2	0.03	0.191	216
Spontaneous Negation Ratio	0	1	0.01948	0.069	216
Text Bridge/Spontaneous Negation Ratio	0	0.51	0.05993	0.049	216
Total Just	0	5	0.44	0.799	216
Text Bridge/Spontaneous Negation/Just Ratio	0	0.187	0.06534	0.036	216

A ratio was taken by dividing the number of spontaneous negations and/or text bridges by the word count. The average

spontaneous negation ratio was .01948. The average text bridge ratio was .04115 (Table 2). Table 2 shows that there are seven-

ral statements where the participant uses the word “just.” Most of the participants did not use the minimizing word just within their statement. In truthful statements, the percentage of just

usage for one time or more was 20.4% whereas in deceptive statements it was 39.1%.

**Table 2:** Use of “just” in Statements (N=216).

N of times ‘just’ used	Truthful		Deceptive	
	N	%	N	%
0	85	-78.7	65	-60.2
1	16	-14.8	31	-28.7
2	4	-3.7	10	-9.3
3	1	-0.9	1	-0.9
4	2	-1.9	0	0
5	0	0	1	-0.9
Total	108	100	108	100

**Bivariate Results**

Table 3 shows the correlation matrix, utilizing the Pearson Correlation for continued variables. Accordingly, different variables were tested within the correlation matrix. Some of the variables that were tested were truthful/deceptive statements, word count, total text bridges, spontaneous negations, total just

used, and the ratios of the text bridges, spontaneous negations, and just. There was a positive correlation between word count and spontaneous negations at the  $p < .01$  level. There is an inverse correlation between word count and the text bridge/spontaneous negation/just ratio at the  $p < .01$  level. The final example is a positive correlation between total just and the truthful/deceptive statements at the  $p < .05$  level (Table 3).

**Table 3:** Pearson Correlations Between the Test Variables (N=216).

Truthful/Deceptive Statement	1										
Word Count	-.195**	1									
Total Text Bridges	-0.065	.573**	1								
Text Bridge Ratio	0.1	-0.127	.661**	1							
Total Filler Words	-.136*	.471**	.252**	-0.07	1						
Spontaneous Negations	.449**	.266**	.202**	-0.002	0.074	1					
Stopped Action Words	0.006	0.041	0.048	0.022	0.002	0.105	1				
Spontaneous Negation Ratio	0.071	-0.046	0.018	0.044	0.087	.225**	.344**	1			
Text Bridge/ Spontaneous Negation Ratio	.163*	-0.12	.301**	.485**	-0.076	.264**	0.019	0.081	1		
Total Just	.139*	.186**	0.007	-0.082	0.088	.205**	-0.051	0	0.014	1	
Text Bridge/ Spontaneous Negation/ Just Ratio	.419**	.221**	.349**	.674**	-0.129	.442**	-0.037	.135*	.525**	.373**	1

The statistical analyses allowed us to determine if the truthful and deceptive statements are statistically different from each other in terms of word count, spontaneous negations, and text bridges.

1. Hypothesis: was supported: Truthful statements have a higher word count when compared to deceptive statements ( $t = -2.902$   $df = 214$   $p < .01$ ).
2. Hypothesis: was supported: Deceptive (oral, not

written) statements have a statistically significant higher occurrence of text bridges when compared to truthful statements ( $t = -.951$   $df = 214$   $p < .01$ \*\*).

3. Hypothesis: was supported: Deceptive statements use more spontaneous negations versus truthful statements ( $t = 7.341$   $df = 214$   $p < .001$ ). Additionally, text bridge/ spontaneous negation/ just ratios was statistically different in truthful/deceptive statements ( $t = 6.742$   $df = 214$   $p < .001$ ) (Table 4).

**Table 4:** Independent Samples t-test Results (N=216).

	Mean		t	Sig. (2-tailed)
	Truthful	Deceptive		
Word Count	64.23	53.25	-2.902	0.004**
Total Text Bridges	2.44	2.24	-0.951	0.343**

Text Bridge Ratio	0.03867	0.04363	1.468	0.1438**
Total Filler Words	1.85	1.31	-2.002	0.047*
Spontaneous Negations	0.37	1.29	7.341	0.000***
Stopped Action Words	0.03	0.03	0.091	0.927
Spontaneous Negation Ratio	0.01459	0.02436	1.036	0.301**
Text Bridge/ Spontaneous Negation Ratio	0.0518	0.06806	2.423	0.016*
Total Just	0.32	0.55	2.06	0.041*
Text Bridge/ Spontaneous Negation/ Just Ratio	0.05005	0.08063	6.742	0.000***

**Multivariate Results**

This study, as indicated above, produced different results for deceptive and truthful statements. After conducting a t-test and the Pearson Correlation, this study further tested the relative predictive value of the independent variables on the dependent variable. The binary logistic regression analysis was conducted resulting in two statistically significant models (Table 5). For this procedure word count, total text bridges, total filler words, spontaneous negations, spontaneous negation ratio, and “just”

were added to the independent variables list. In the first model, spontaneous negations were seen to be statistically significantly predicting truthful/deceptive statements (model was significant at  $p < .001$ ). Spontaneous negations have 3.503 higher odds ( $p < .001$ ). Then, the SPSS program created a second model adding the word count to the equation. The model was found to be statistically significant at  $p < .001$  level. Word count had .967 lesser odds ( $p < .001$ ). The odds of spontaneous negations increased to 4.953 in the second model (Table 5).

**Table 5:** Binary Logistic Regression Models (N=216).

Variables in Equation		B	S.E.	Wald	df	Sig.	Exp(B)
Model 1	Spontaneous Negations	1.254	0.213	34.787	1	0	3.503
	Constant	-0.901	0.204	19.599	1	0	0.406
Model 2	Word Count	-0.034	0.007	21.222	1	0	0.967
	Spontaneous Negations	1.6	0.245	42.67	1	0	4.953
	Constant	0.758	0.394	3.694	1	0.055	2.133

**Discussion**

The combination of the variables total words, text bridge ratio, and spontaneous negation ratio predicted truthful and deceptive narratives at a rate higher than chance and exceeded the predictive value of nonverbal deception indicia, which is slightly above the 50th percent [4,6]. The variable total words predicted truthful and deceptive written narratives at a rate higher than chance and predicted truthful written narratives at a rate higher than the predictive value of nonverbal indicia but predicted deception at a rate like the predictive value of nonverbal deception indicia [4,6]. The variable text bridge ratio predicted truthful and deceptive written narratives at a rate like the predictive value of nonverbal deception indicia [4,6]. The variable spontaneous negation ratio predicted deceptive written narratives at a rate above chance and truthful written narratives at a rate higher than the predictive value of nonverbal deception indicia but predicted deceptive written narratives at a rate like the predictive value of nonverbal deception indicia [4,6].

The variable spontaneous negation ratio is clearly the most powerful predictor of veracity in written narratives. The reason

spontaneous negation ratio is the most powerful predictor of deception may harken back to the theory that liars undergo physiological changes when they lie [6]. These physiological changes include increased skin conductance, increased blood pressure, and increased respiration, which reflect an increase in general anxiety [6]. To avoid an increase in general anxiety, liars may use spontaneous negations to block the anticipated increase of general anxiety caused by a potential breach of credibility. A pronouncement of what a liar did not do potentially blocks the current line of questioning and shifts the focus of the questioning to less anxiety-provoking topics; however, additional research is required to find support for this hypothesis. If this proves to be the case, then there may be some correlation between the grammar structures liars use and their physiological states.

If a narrative does not contain a spontaneous negation, then the two variables total words and text bridge ratio must be relied on to measure the veracity of written narratives. The variables total words and text bridge ratio each predicted veracity of written narratives at about the same rate as nonverbal deception indicia [4,6].

## Text Bridges

The results of this study confirm that text bridges only signal withheld information in narratives. Truthful people edit information that they think is not relevant, thus unintentionally creating information gaps in their narratives that are not the result of deception. Conversely, liars omit information to hide the truth creating information gaps in their written narratives for deceptive purposes. If text bridges occur during a critical portion of a narrative, then the withheld information may be of value depending on the specific circumstances of the inquiry. The most used text bridges in both truthful and deceptive narratives were then, so, after, when, and as. A higher percentage of truthful narratives contained the text bridges as and when. The text bridges as and when have the connotation of conveyance.

The notion of conveying ideas supports Rabon's concept that truthful people simply relate the facts of their story. Conversely, the text bridge is an adverbial conjunctive that denotes causation [14]. In other words, a cause-and-effect relationship exists in the sentence. Some action in the sentence caused another action to take place. In a sense, the writer is trying to explain his actions. The attempt to explain actions supports Rabon's concept that liars try to convince people that their story is true rather than simply conveying facts. Additional research is required to determine which subgroup of text bridges may be more effective discriminators of truthful and deceptive written narratives. The most used text bridges in both truthful and deceptive narratives were then, so, after, when, and as. A higher percentage of truthful narratives contained the text bridges as and when. The text bridges as and when have the connotation of conveyance.

The notion of conveying ideas supports Rabon's concept that truthful people simply relate the facts of their story. Conversely, the text bridge is an adverbial conjunctive that denotes causation [14-18]. In other words, a cause-and-effect relationship exists in the sentence. Some action in the sentence caused another action to take place. In a sense, the writer is trying to explain his actions. The attempt to explain actions supports Rabon's concept that liars try to convince people that their story is true rather than simply conveying facts. Additional research is required to determine which subgroup of text bridges may be more effective discriminators of truthful and deceptive written narratives.

## Fewer Words (Hypothesis 1)

The results of this study showed that deceptive narratives contain significantly fewer words than truthful narratives. This finding is consistent with extant research that found that deceptive narratives contain fewer words than truthful narratives [6].

## Text Bridge Ratio (Hypothesis 2)

The results of this study showed that deceptive written narratives have significantly higher text bridge ratios than do truthful verbal narratives. The text bridge ratio represents the total number of text bridges in a narrative divided by the total number of words in the narrative. Text bridge ratios may be more

effective in situations where several people write narratives about a shared experience. For example, if five coworkers were suspected in the theft of money from a common work area and each of them wrote narratives describing their activities during the time of the theft, then text bridge ratios could be useful in discriminating truthful narratives from the deceptive narrative. The thief's deceptive written narrative will probably contain fewer words than the truthful written narratives of the innocent workers; however, caution is advised because other factors may affect verbal output. Calculating the text bridge ratios of the narratives provides an added predictor of veracity, thus increasing the likelihood of identifying the deceptive narrative.

## Spontaneous Negation Ratio (Hypothesis 3)

The results of this study also clarified Rabon's notion of abjuration and Adams and Jarvis' notion of negations into the umbrella terms negation and spontaneous negation. Rabon defined abjuration as words that withdrew the assertion previously made. Abjuration words include but, yet, however, although, nevertheless, though, and anyway. Adams and Jarvis defined negations as responses to open-ended questions that include words such as no, not, and all contractions of not. A spontaneous negation occurs when a writer, in response to an open-ended question, writes down an action that he or she did not do. A negation is a response to a direct question or an affirmation of a nonverbalized question in the mind of the writer. The model using the variables total words, text bridge ratio, and spontaneous negations in combination with text bridges has practical applications, especially in the law enforcement and military arenas.

Interviewers and interrogators could use the three predictor variables to quickly assess written narratives in the field to form hypotheses as to the veracity of written narratives. The interviewers or interrogators could then examine the written statements for text bridges to locate temporal-spatial lacunae. If the interviewers or interrogators deem the withheld information as relevant, then further inquiries could be made to determine the exact nature of the withheld information. Additional research is required to determine if the three-variable model predicts veracity in verbal communications. Detecting withheld information in real-time by listening for text bridges in conjunction with the three-variable model will give interviewers an advantage, especially when this technique is used in combination with the extant nonverbal, verbal, and paralinguistic predictive cues.

## Study Limitations and Future Research

One of the limitations of this study is that in practical situations narratives in isolation typically do not have comparative values for the variable's total words, text bridge ratio, and spontaneous negation ratio. Predicting deception using the variables total number of words and text bridge ratio is more difficult without comparative values. Since liars use fewer words, deceptive narratives lack elements that are contained in truthful narratives. Another limitation of the study is that only one portion of a narrative was examined. Narratives typically contain three com-

ponents: a prologue, the body, and an epilogue. The body or description of the event is typically the most critical component of narratives because the body contains a description of the event or the focus of the inquiry.

The variables: total words, text bridge ratio, and spontaneous negation ratio may be more effective when used to examine the separate component parts of a narrative body. Using the variables: total words, text bridge ratio, and spontaneous negation ratio to analyze the body of a narrative written in isolation may enhance the predictive value of the total number of words, text bridge ratios, and spontaneous negations. The present study consisted of short narratives that only asked the participants to describe the shoplifting event, which would typically comprise the body of the narrative. Another approach might be to use the prologue and the epilogue as baseline indicators against which to examine the body of the narrative.

Additional research is required to confirm the effectiveness of analyzing the body of narratives using total words and text bridge ratio to evaluate veracity. A third limitation of this study is that the participants were forced to lie by omission. Most liars lie by omission because the only thing they must leave out of their otherwise truthful narratives is the intentionally withheld information. The participants may have been forced to lie by omission, but they were free to choose the way they circumvented the withheld information. Not all the participants chose to use text bridges or spontaneous negations to circumvent withheld information. Additional research is required to determine if additional predictor variables will increase the probability of discriminating truthful narratives from deceptive narratives.

### Summary

The three-variable deception model developed in this study performed as well as, and, in some instances, better than the predictive value of nonverbal deception indicia [4,6]. This study demonstrated that structural grammatical analysis (GSA) may be an effective method to discriminate truthful written narratives from deceptive written narratives. The results of this study also support the potential value of GSA as a promising new area for conducting deception research.

### References

1. DePaulo BM, Morris WL (2004) Discerning lies from truths: Behavioral cues to deception and the indirect pathway of intuition. In PA Granhag, LA Stromwall (Eds.), *The detection of deception in forensic contexts* Cambridge, Cambridge University Press, UK pp. 15-40.
2. Miller GR, Stiff JB (1993) *Deceptive communication*. Newbury Park, Sage Publications, Inc, California, United States 6(5).
3. Tausczik YR, Pennebaker JW (2010) The Psychological Meaning of Words: LIWC and Computerized Text Analysis Methods. *Journal of Language and Social Psychology* 29(1): 24-54.
4. Vrij A (2000) *Detecting lies and deceit: The psychology of lying and the implications for professional practice*. John Wiley & Sons, New York pp. 276.
5. Porter S, Yuille JC (1996) The language of deceit: An investigation of the verbal clues to deception in the interrogation context. *Law and Human Behavior* 20(4): 443-458.
6. DePaulo BM, Lindsay JJ, Malone BE, Muhlenbruck L, et al (2003) Cues to deception. *Psychological Bulletin* 129(1): 74-118.
7. Vrij A, Mann SA, Fisher RP, Leal S, Milne R, et al. (2008) Increasing cognitive load to facilitate lie detection: The benefit of recalling an event in reverse order. *Law and Human Behavior* 32(3): 253-265.
8. Gombos VA (2006) The cognition of deception: The role of executive processes in producing lies. *Genetic, Social, and General Psychology Monographs* 132(2):197-214.
9. Ekman Paul (1992) *Telling lies: Clues to deceit in the marketplace, politics, and marriage*. WW Norton, New York, USA.
10. Decicco A, Schafer J (2015) The grammatical difference between truthful and deceptive narratives. *Applied Psychology in Criminal Justice* 11(2): 75-92.
11. Schafer J (2007) *The grammatical differences between truthful and deceptive written narratives*. Unpublished doctoral dissertation, Arizona State University, Fielding Graduate University, Santa Barbara, City in California 11(2).
12. Schafer J (2019) *Psychological narrative analysis: A professional method to detect deception in oral and written communications*. Springfield, Illinois: Charles C Thomas Publishing pp. 219 pages.
13. Schafer J, Karlins M (2020) *The truth detector*. Simon & Schuster, New York, USA.
14. Forlini G, Bauer MB, Biener L, Capo L, et al. (1990) *Grammar and composition*. Englewood Cliffs, NJ: Prentice Hall, India.
15. Ali Mohammed, Levine T (2008) The language of truthful and deceptive denials and confessions *Communication Reports* 21(2): 82-91.
16. Buller DB, Burgoon JK (1996) Interpersonal deception theory. *Communication Theory* 6(3): 203- 242.
17. Levine TR (2014) *Encyclopedia of Deception*. Sage Publications, Inc, California, United States.
18. Stamatis E, Wagstaff GF, Wheatcroft JM (2014) The role of account length in detecting deception in written and orally produced autobiographical accounts using Reality Monitoring. *Journal of Investigative Psychology and Offender Profiling* 12(2): 185-198.





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