For the Department of Defense’s (DoD) multi-national operations, trust and cohesion across coalitions or allied forces can mean the difference between mission success and failure at the tactical and strategic level. The Joint Chiefs of Staff for the U.S. Armed Forces place a premium on confidence, respect, rapport, and other aspects of multi-cultural operations that emanate from trust. Without trust, team cohesion across different cultures, religions, and languages is all but impossible. Therefore, improved methodologies for measuring truth vs. deception in spoken language is crucial for successful multi-national operations and interactions.

The Air Force’s Office of Scientific Research is sponsoring research at Columbia University regarding indicators of deception and trust in order to find common markers of honest vs. dishonest speech across various languages and genders. Identification of these common markers can enable increased confidence when dealing with trusted vs. untrusted actors during multi-national operations.

Researchers at the University of Columbia’s Department of Computer Science constructed several experiments looking at speech features in both truthful and deceptive responses during an interview. While many studies look to discover deception in the content of language itself, their approach went a step further and examined the sounds associated with speech, such as acoustic and prosodic features (tone, intensity, speed, jitter, shimmer, etc.) [2-4]. In addition to researching the characteristics of deceptive language, they also examined the characteristics of speech that listeners perceived as deceptive—agnostic of its objective truth value.

**Acoustic/Prosodic Analysis of Speakers/Listeners**

After testing 340 speakers (male, female, native Mandarin speakers, and native English speakers) across approximately 122 hours of English speech, they identified key differences in truthful vs. deceptive, as well as trusted vs. untrusted speech. Tables 1-3 illustrate the differences of acoustic/prosodic speech features in deceptive and truthful speech across different genders and cultures [2-5].

**Lexical Features of Deceptive/Truthful Speech**

In addition to acoustic/prosodic analysis, Columbia University researchers also examined the differences of lexical features in deceptive and truthful speech across different genders and cultures [2-5]. This text-based lexical analysis utilizes “Linguistic Inquiry and Word Count (LIWC)…which groups words into psychologically motivated categories [3].”

For all speaker groups (male, female, native English speakers, and native Mandarin speakers), lies were significantly longer by: Joseph Swanner, HDIAC

<table>
<thead>
<tr>
<th>Table 1: Each column provides comparisons of male vs. female and native English speakers vs. native Mandarin speakers [2-5].</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acoustic/Prosodic Differences in Trusted vs. Mistrusted Speech by Speaker</strong></td>
</tr>
<tr>
<td><strong>Male Speakers</strong></td>
</tr>
<tr>
<td>Trusted Speech</td>
</tr>
<tr>
<td>Exhibit somewhat higher jitter (variation in pitch)</td>
</tr>
<tr>
<td>Mistrusted Speech</td>
</tr>
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</tbody>
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than truthful responses not only in the number of words, but also in the average response time and filled pauses. Cognitive process terms like “cause”, “know”, and “ought” were also more pronounced in deceptive speech, as well as interrogatives (e.g., “can you repeat the question?”) [3]. Conversely, truthful answers were more likely to contain a simple “yes” or “no” response [2-5], and favored informal language over words that indicate power of influence [3].

In terms of female vs. male speakers, female speakers used more LIWC classified language pertaining to family, the future, perception, and power in deceptive speech. Females also used more articles, adverbs, and first person plural pronouns in deceptive speech, while males used more analytical terms, indications of friendship, and interrogative speech when lying.

In terms of native English vs. native Mandarin speakers, “English native speakers used more LIWC categories indicating power, achievement, affiliation, comparison, relativity, and space, and more swear words [4].” Native Mandarin speakers used more “feeling words, perception words and more fillers in lying [4].”

**Conclusion**

While the identification of lies will always be limited by human error [2], the introduction of stable data points related to what a person says and how they say it when lying can enable greater accuracy in deception detection. Columbia University’s acoustic, prosodic, and lexical analysis of deceptive, truthful, trusted, and mistrusted speech across different genders and cultures can serve as a foundation to enhance the DoD’s confidence in identifying trusted vs. untrusted actors during multi-national operations.

**REFERENCES**


5. Levitan, S., Hirschberg, J. (2019, June 6) Discussion on acoustic, prosodic, and lexical analysis of deceptive, truthful, trusted, and mistrusted speech [Phone Conversation].
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