

DON'T LIE TO ME: THE IMPACT OF DECEPTION ON VOCALIC AND LINGUISTIC SYNCHRONY

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Three Approaches to the Study of Deception:

1. *The Sender Approach*

- ❖ What does a liar look like?
 - ❑ This approach examines particular behaviors of the deceiver.
 - ❑ Many of the proposed cues to deception, such as gaze aversion, are no more likely to be exhibited by liars than truth-tellers (Vrij, 2008).
 - ❑ A meta-analysis of 158 cues to deception revealed that many behaviors showed no discernible links, or only weak links, to deceit (DePaulo et al., 2003).
 - ❑ Great individual and situational variation.
 - ❑ There is no clear-cut behavioral cue that is diagnostic of deception.



Three Approaches to the Study of Deception:

2. *The Receiver Approach*

- ❖ Who can detect a liar?
 - ▣ We tend to think that we are good at detecting deception; we are wrong.
 - ▣ Average accuracy is around 54% and even experts rarely top 70%.
 - ▣ Receivers use stereotypical cues and are truth-biased (or lie-biased in some cases).
 - ▣ Interviewing style and question type can have an effect.
 - An information gathering style of interview may facilitate the interviewer's ability to detect deceit.
 - Accusatory questioning tends to elicit nervous and short responses from the interviewee, whether guilty or innocent (Vrij, Mann, Kristen, & Fisher, 2007).

Three Approaches to the Study of Deception

3. *A Dyadic Approach*

- ❖ New approach: Examine the dyadic synchrony between sender and receiver.
 - ❑ Conversations involve an intricate and dynamic exchange of information across many channels.
 - ❑ This approach recognizes and utilizes the complex interplay between the deceiver and the receiver.
 - ❑ Even in a simple conversation, interactants will tend to coordinate their behaviors, such as adopting the same posture, matching a partner's speech rate, or using similar vocabulary.
 - ❑ This process of mutual entrainment is known as ***interactional synchrony***.

What is Synchrony?

- ❖ Interactional synchrony is defined as the “similarity in rhythmic qualities and enmeshing or coordination of the behavioral patterns of both parties” in a dyadic interaction (Burgoon, Stern, & Dillman, 1995).
- ❖ Interactional synchrony is considered to be the glue of social interaction and relationships
- ❖ Conveys politeness & improves mutual understanding
- ❖ Enhances the flow of the interaction
- ❖ Research indicates that high levels of synchrony are related to a sense of connectedness and empathy

What is synchrony?

❖ Synchrony is manifest in a number of ways:

- ❑ Accents
- ❑ Speech rate
- ❑ Vocal intensity
- ❑ Movement
- ❑ Gaze
- ❑ Facial affect
- ❑ Self-disclosure
- ❑ Postural and gestural behaviors



Example: Synchrony



Example: Dissynchrony



Linguistic Style

- ❖ Linguistic Inquiry and Word Count (LIWC) - categorizes words across a number of linguistic and psychological dimensions.
- ❖ An individual's linguistic style is reliable across time and is reflective of perceptions and thought processes (Pennebaker & King, 1999).
- ❖ A shared linguistic style is hypothesized to be indicative of like-mindedness and affinity.
- ❖ Niederhoffer and Pennebaker (2002) found that partners tend to coordinate their word use across a number of linguistic, social, and cognitive categories.

Verbal Indicators of Deception

- ❖ A linguistic analysis by Newman, Pennebaker, Berry, and Richards (2003) found that deceptive statements included more negative words, fewer first and third person pronouns, and were less complex than truthful statements.
- ❖ Liars tend to lack involvement and immediacy as they tell their tales.

Vocalic Synchrony

- ❖ Vocalic qualities can be assessed along a variety of parameters such as pitch, response latency, intensity, tempo, rhythm, and variation.
- ❖ Conversational partners often tend to match each other in terms of prosody and accent.
- ❖ Pitch, vocal tension, response latency, and talking time have been found to be associated with deception, but the findings are somewhat inconsistent due to moderator variables such as motivation and whether the lie was planned or spontaneous.

Rapport & Synchrony

- ❖ Along with mutual attention and positivity, interactional synchrony is a component of rapport.
- ❖ Rapport-building techniques and synchrony are used by law enforcement practitioners and considered effective:
 - ❑ with terrorists (Turvey, 2007)
 - ❑ In FBI interviews (Navarro, 2008)
 - ❑ In Police investigations (Kassin et al. 2007)
- ❖ By using synchrony and establishing rapport, criminal interviewers hope that the subject will be more forthcoming in terms of details or, if guilty, more likely to confess.

Deception and Interactional Synchrony

- ❖ Does deception impact interactional synchrony?
- ❖ Synchrony and rapport are disrupted by emotional or behavioral distance.
- ❖ According to Inbau et al. (2011), liars will be less cooperative and friendly than truth-tellers.
- ❖ Alternatively, guilty suspects are likely highly motivated to appear cooperative, while an innocent person may feel indignant and resistant (Vrij, Mann, Kristen, & Fisher, 2007).
- ❖ The stress of an interrogation and accusatory questions may break down rapport and coordination for both truth-tellers and liars.

Research Questions

- ❖ RQ1: To what extent do vocalic and linguistic synchrony of the interviewer-interviewee dyad distinguish between truthful and deceptive interviewees?
- ❖ RQ2: Do the temporal patterns of linguistic and vocalic synchrony differ between truthful and deceptive interviewees?
- ❖ RQ3: Do the measures of linguistic and vocalic synchrony differ in terms of diagnosticity of deception?

Method: Sample

- ❖ Approximately 40 pre-polygraph interviews from criminal investigations.
- ❖ Interviews were selected from a corpus of 101 interviews according to case outcome on three factors:
 - ❑ the legal adjudication of the case
 - ❑ the results of the polygraph test
 - ❑ the opinion of the interviewer based on the evidence of the case and statements made during the course of the interview.
- ❖ In order to be included, all three factors needed to be in agreement with respect to guilt or innocence.

Sample

- ❖ The interviews were conducted by a professional white male with extensive polygraph interview experience.
- ❖ The interview style and questions were relatively consistent across the interviews, with some deviation due to case differences.
- ❖ All of the suspects were adults, ranging in approximate age from 18 to 70.
- ❖ The interviews included both male and female suspects.
- ❖ The cases involved a variety of charges, including child sexual assault, rape, sexual harassment, theft, attempted homicide, and assault.

Method

- ❖ The levels and patterns of interactional synchrony of those subjects that confessed, pled guilty, or were found guilty were compared to the level of synchrony when the subject was ultimately found innocent or the charges were dropped.

Measures

▣ Linguistic Synchrony

- The degree and direction to which the dyadic partners synchronize their linguistic style in terms of word use, length and complexity of utterances, the relative use of different linguistic and paralinguistic dimensions, as well as categories of words, such as affect and cognition.

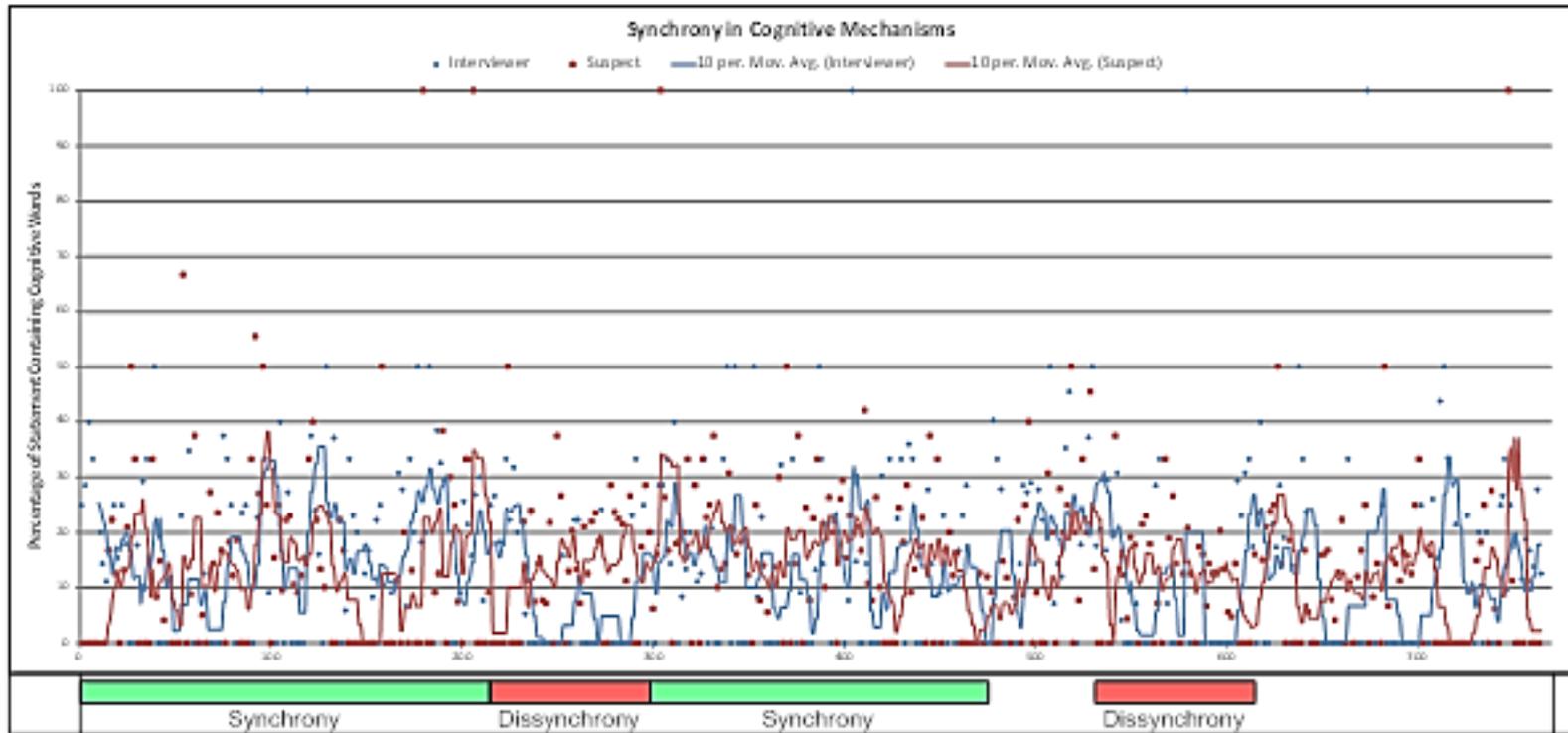
▣ Vocalic Synchrony

- The vocalic features of the utterances of the interviewer and subject are analyzed to determine the level of prosodic synchrony, including pitch and response latency across time.

Linguistic Style Matching

- ❖ Transcripts of the interviews were segmented into individual utterances (turns by each speaker).
- ❖ Language features were extracted from the utterances using Linguistic Inquiry and Word Count (LIWC).
- ❖ The features were normalized based on the length of the utterance and summarized across 10 utterances.
- ❖ The summarized utterances from the interviewer and suspect were correlated across the length of the interview to determine amount and placement of any synchrony.

Linguistic Style Matching



Synchrony between interviewer and suspect in cognitive processing words

Vocalic Synchrony



- ❖ Using time codes, each interview recording was cut into separate audio files of every utterance (turn) by speaker.
- ❖ Acoustic features of each utterance were extracted from the interview recordings using Praat (Boersma, 2001).
- ❖ The vocal features for each speaker were temporally aggregated into two minute overlapping intervals.

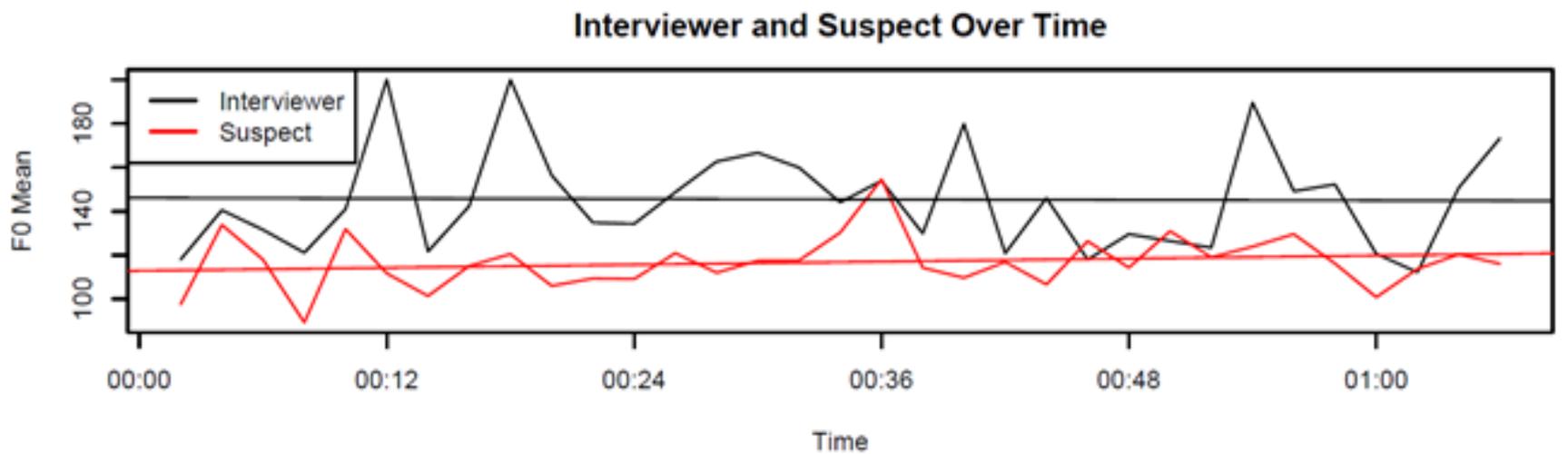


Illustration of mean vocal pitch (F0) for one interview after temporal aggregation

(Very) Preliminary Vocal Results

- ❖ Based on 19 interviews
 - ▣ 12 subsequently judged as innocent
 - ▣ 7 subsequently judges as guilty
- ❖ Correlations on vocalic pitch:
 - ▣ Overall, the suspect and interviewer had moderate correlation in their vocal pitch, $r=.31$ $p<.001$.
 - ▣ Guilty suspects had a greater correlation to the interviewer, $r=.40$ $p<.001$, than innocent suspects, $r=.21$ $p<.001$.

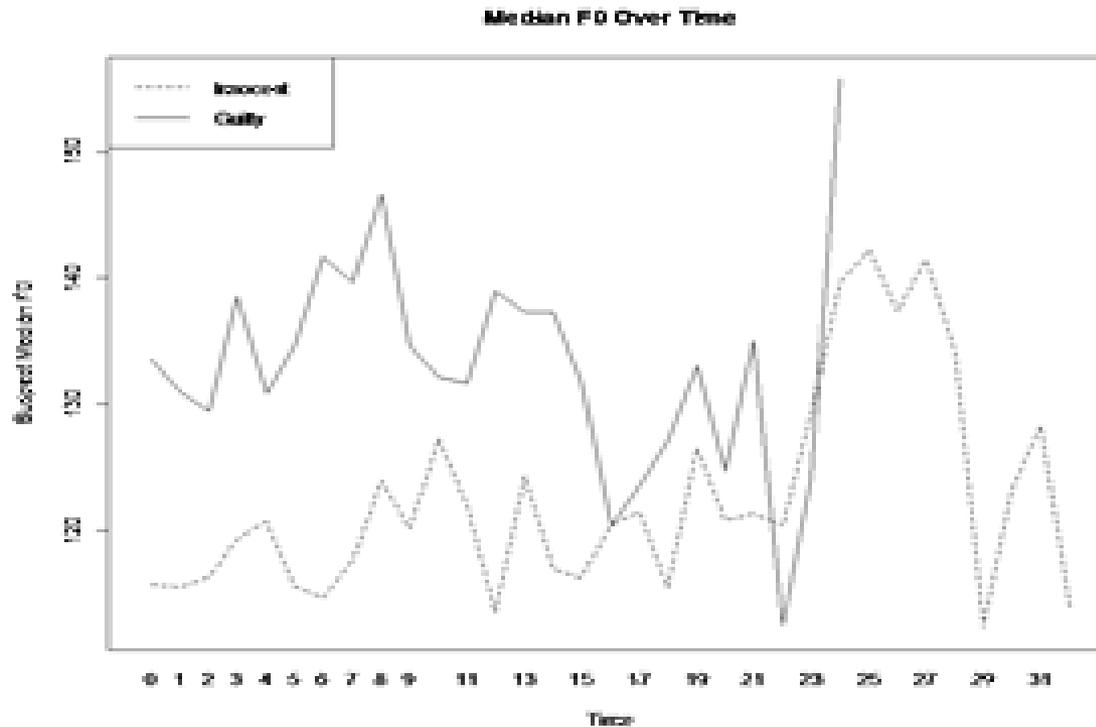
(Very) Preliminary Vocal Results, cont.

❖ Growth Model

- A multilevel growth model was specified with subject median F0 as the response variable (N=412) regressed on time (in two minute intervals), Guilt (1=guilty, 0=innocent), Interviewer median F0, Gender, and Dominance.
 - Dominance and Gender were included to control for the individual variation in speech.
 - Time and the intercept of median F0 were modeled to vary with Subject (N=19) as random effects.

(Very) Preliminary Regression Results

- ❖ Significant interaction between Guilt and Time,
 $b = -3.39$ $p = .02$
 - ❑ This indicates that guilty suspects decreased their median vocal pitch at a rate of -3.39 Hz slower than innocent suspects every two minutes.
- ❖ Significant interaction between Guilt, Time, and Interviewer median F0, $b = .03$ $p = .02$.
 - ❑ The median vocal pitch of the interviewer affects and increases guilty suspect's vocal pitch later in the interaction.
 - ❑ This could be because relevant issues to the cause get brought up later in the interview and during this period suspects are attempting to be more synchronized with the interviewer.



Median F0 of Guilty and Innocent Suspects Over Time

Tentative Conclusion

- ❖ At this time, only preliminary findings are available so all results should be considered tentative.
- ❖ The initial vocalic analysis on the partial data set indicates that guilty (deceptive) suspects tend to synchronize with the interviewer more than innocent suspects.
- ❖ If true, this may represent a strategic attempt by guilty suspects to maintain rapport with the interviewer in order to appear credible.

Future Analyses

- ❖ Interview questions have been coded along a number of dimensions, including:
 - ❑ Question type (e.g., open-ended, closed)
 - ❑ Case relevant versus background
- ❖ Subject answers have been coded in terms of relevance, detail, and ambiguity.

Questions:

- ❖ How does interview style/question type impact synchrony?
- ❖ Is there a relationship between synchrony and the quality of the subject's answer?
- ❖ Are there differences between guilty and innocent subjects in terms of impact of question type on synchrony?

Application



- ❖ Law enforcement personnel, including security and border control agents already often use synchrony to help establish rapport.
- ❖ Many professionals believe that the maintenance of rapport by the interviewee is an indicator of truthfulness; this may need to be reevaluated if findings indicate that deceivers tend to use synchrony in an attempt to appear credible.
- ❖ Attention to changes in synchrony could assist agents in discerning between truthful and deceptive interviewees.
- ❖ Automated analyses of vocalic patterns and synchrony could be a useful tool for agents.



Thank you!

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