Identifying Deceptive Speech Across Cultures

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Outline

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What is "Deception"?

- Deliberate choice to mislead
  - Without prior notification
  - To gain some advantage or to avoid some penalty

- Not:
  - Self-deception, delusion, pathological behavior
  - Theater
  - Falsehoods due to ignorance/error

Previous Deception Research

Has focused on…

- Facial expression cues (Ekman '76, Frank '03)

- Body posture and gestures (Burgoon et al '94)

- Brain imaging technologies (e.g. MRI) (Langleben et al '02)

- Biometric factors (e.g. increases in blood pressure, perspiration, etc.) (Horvath '73)

- Variation in lexical choice (Streeter et al '77)

Previous Work (Hirschberg et al '05)

- CSC Corpus

- Automatic deception detection procedures: accuracies 20% better than human judges.

- Interesting individual differences in some behaviors were observed. (e.g. variation in overall pitch range when lying vs. truth)

- Human judges' accuracy in judging deception could be predicted from their scores on simple personality tests.

- Examined only American verbal deceptive behaviors.

Goals

- To develop technologies which help humans detect deception by providing more relevant information

- To identify techniques to help select humans who are good at deception detection.

Research Questions

- ☐ What objectively identifiable features characterize peoples' speech when deceiving in different cultures?

- ☐ What objectively identifiable audio cues are present when people of different cultures perceive deception?

- ☐ What language features distinguish deceptive from non-deceptive speech when conversants speak a common language? When one conversant is not a native speaker of that language?

Hypotheses

- H1: Acoustic, prosodic and lexical cues can be used to identify deception in native Arabic and Mandarin speakers speaking English with accuracy greater than human judges.

- H2: Results of simple personality tests can be used to predict individual differences in deceptive behavior of native American, Arabic, and Mandarin speakers when speaking English.

- H3: Simple personality tests can predict accuracy of American judges of deceptive behavior when judging Arabic and Mandarin speakers speaking English.

- H4: Particular acoustic, prosodic and lexical cues can be used to identify deception across native and nonnative English speakers while other cues can only be used to identify deception within English speakers of a particular culture.

Hypotheses, continued.

- H5: Some personality traits can predict individual differences in deceptive behaviors across native and nonnative English speakers while other personality traits can only predict individual differences in deceptive behaviors within a particular culture.

- H6: Simple personality tests can predict accuracy of Arabic and Mandarin judges of deceptive behavior when judging native American and nonnative American speakers speaking English.

- H7: Acoustic, prosodic and lexical cues of deception can be mediated by the gender and/or culture of the deceiver and target.

- H8: Judges' ability to detect deception is mediated by the gender and/or culture of the deceiver.

The Experiment

◘ Background Information (e.g. gender, race, language)

◘ Biographical Questionnaire
  ◘ "Fake Resume" paradigm
  ◘ Personal questions (e.g. "Who ended your last romantic relationship?", "Have you ever watched a person or pet die?")

◘ NEO FFI

◘ Baseline

◘ Lying game
  ◘ Payment scheme
  ◘ No visual contact
  ◘ Keylogging

Biographical Questionnaire

Participant No. _____   Date _____

Instructions

Please carefully look through the questions. Write down the true answer to each question in the "True Answer" column. When you have finished that, for all the questions that have don't have "X"s in the "False Answer" column, make up an answer. Consult the additional sheet you have been given. You want to choose a lie that you are not as familiar with as the true answer.

This experiment is completely anonymous- your name will never be linked to the data.

No.	Questions	True Answer	False Answer
1	Where were you born?		
2	How many years did you live in your first home?		
3	What is your mother's job?		
4	What is your father's job?		
5	Have your parents divorced?		
6	Have you ever broken a bone?		
7	Do you have allergies to any foods?		
8	Have you ever stayed overnight in a hospital as a patient?		
9	Have you ever tweeted? (posted a message on twitter)		
10	Have you ever bought anything on eBay?		
11	Do you own an e-reader of any kind?		
12	Who was the last person you were in a physical fight with?		
13	Have you ever gotten into trouble with the police?		
14	Who ended your last romantic relationship?		
15	Whom do you love more, your mother or father?		
16	What is the most you have ever spent on a pair of shoes?		
17	What is the last movie you saw that you really hated?		

Samples

Sample 1:
Interviewee

Sample 2:
Interviewer

Current Status

- Data collection: Only 4 more pairs to go!

- Feature extraction
  - Acoustic/Prosodic (i.e. duration, speaking rate, pitch, pause)
  - Lexico/Syntactic (i.e. laughter, disfluencies, hedges)

- Correlate behavioral variation in lies vs truth with standard personality test scores for speakers (NEO FFI)

- Participant pool
  - American English and Mandarin Chinese speakers
  - Recruited from Columbia and Barnard campus

Feature Extraction
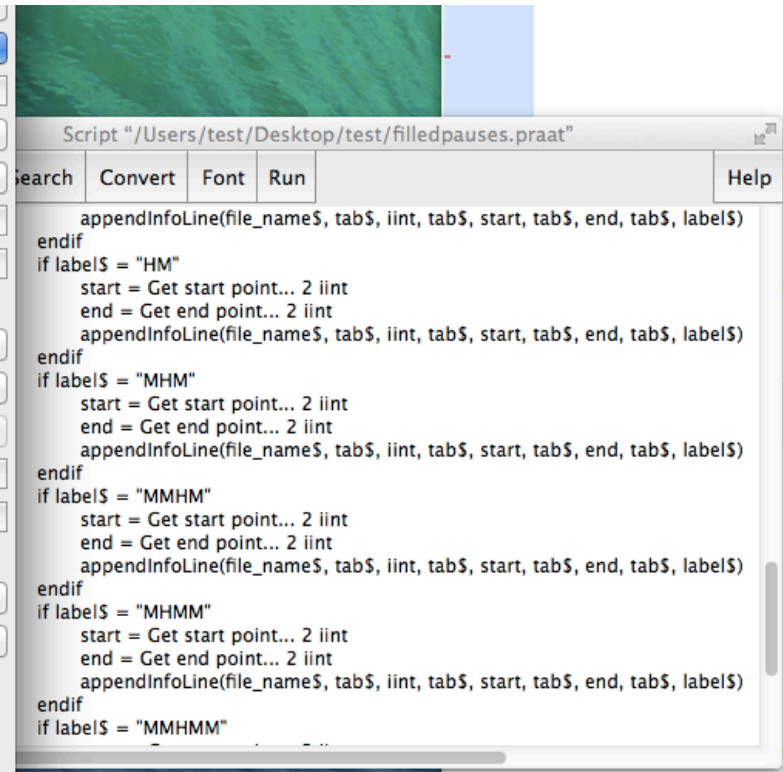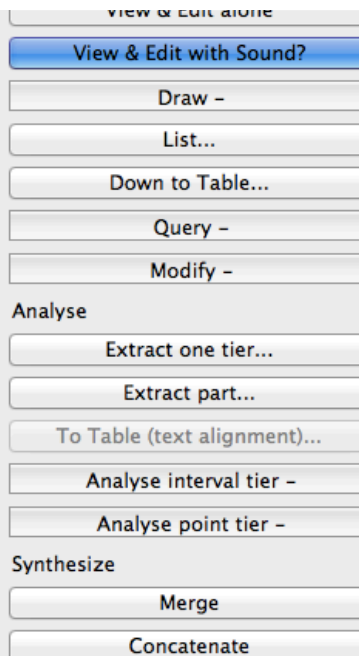
Findings: Female-Only

- Overall Female:
  - Deception Detection + Successful Deception

  n= 130, r = 0.220, p = 0.01
    - BUT, also– Successful Deception+ more Guesses "F".

  - Deception detection – Average Confidence

  n= 130, r = -0.230, p = 0.01

- English Female:
  - Successful Deception – Conscientiousness Score

    n= 62, r = 0.220, p = 0.04

- Mandarin Female:
  - Truth Detection + Agreeableness Score

    n= 62, r = 0.259, p = 0.02
  - Successful Deception – Neuroticism Score

    n= 64, r = -0.274, p = 0.03

Findings: Balanced Set

- **Overall:**
  - Truth Detection - Successful Deception

  n= 145, r = -0.169, p = 0.04

- **Mandarin:**
  - Successful lying + Confidence Judgment

  n= 72, r = 0.227, p = 0.05

- **English and Mandarin Male:** *No major findings*

- **English Male:**
  - Deception Detection – Agreeableness Score

  n= 35, r = -0.326, p = 0.05

    - BUT– Guesses F - Agreeableness Score
  - Total Correct Guesses + Confidence Lies

  n= 35, r = 0.350, p = 0.03

Answered Questions

- Do confidence scores correlate with successful judgment of truthful and untruthful statements? Yes

- Are personality traits correlated with successful deception, or judgment of truthful and untruthful statements? Yes

- Are people who are successful at lying also better at judging truthful/untruthful statements? Yes

- How does performance of Mandarin/Mandarin pairs compare with English/English pairs?
  - Do individuals in different pairs (M/M, M/E, E/E) differ in ability to detect or produce successful lies? Yes
  - Does gender play a role? Yes

Remaining Questions

- Does duration of session affect outcome?

  (Do follow up questions help?)

- Are some questions easier to judge or to lie about?

  (ex. Yes/no questions, personal questions)

- Does ethnicity play a role?

Future work

- Machine learning experiments to identify features significantly associated with deceptive vs non-deceptive speech.

- Arabic speakers

Thank you!