What Online Reviewer Behaviors Really Matter?

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Objectives and Significance

The objective of this project is to Investigate potential impacts of verbal and nonverbal behavioral features of online consumer reviews on fake review detection.

Fake Reviews are a growing problem for market regulation.

A threat to credibility and value of online reviews.

19 New York based companies sentenced to pay penalties and stop posting fake reviews

Reports on New York Times and other news outlets of fake reviews on iTunes, TripAdvisor.com, and Amazon.com

Companies advertise on Craigslist to hire freelance fake reviewers or use specialized fake review writing services.
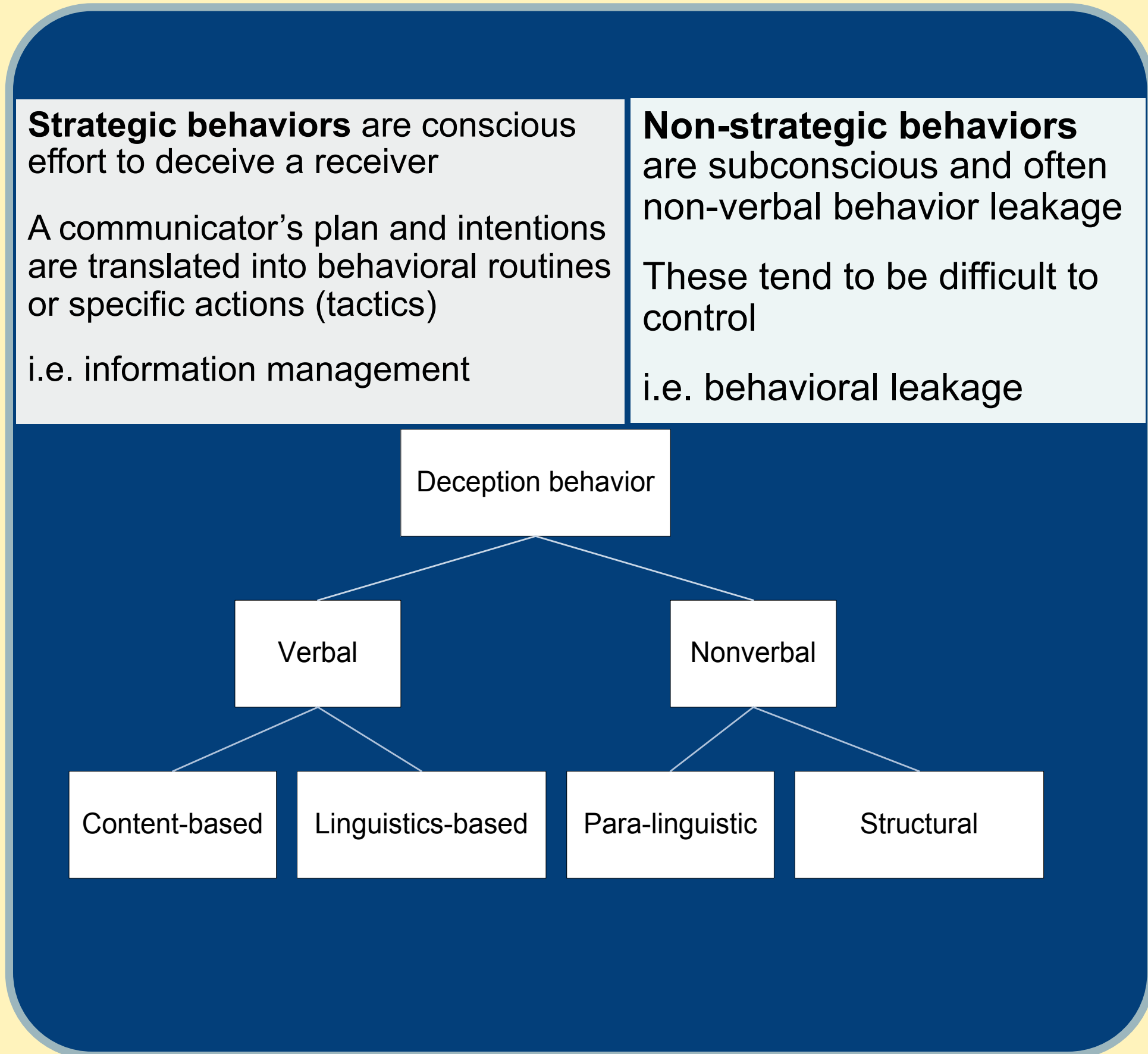
Can nonverbal behaviors of reviews be effective cues for fake review detection, and if so, to what extent?

H1: *Combining nonverbal with verbal behavioral features of reviewers will improve the performance of online fake review detection in comparison to using verbal features alone.*

H2: *Compared with verbal behavioral features, nonverbal features of reviewers will be more important for the detection of online fake reviews.*

Strategic behaviors are conscious effort to deceive a receiver

A communicator's plan and intentions are translated into behavioral routines or specific actions (tactics)

i.e. information management

Non-strategic behaviors are subconscious and often non-verbal behavior leakage

These tend to be difficult to control

i.e. behavioral leakage

Approach

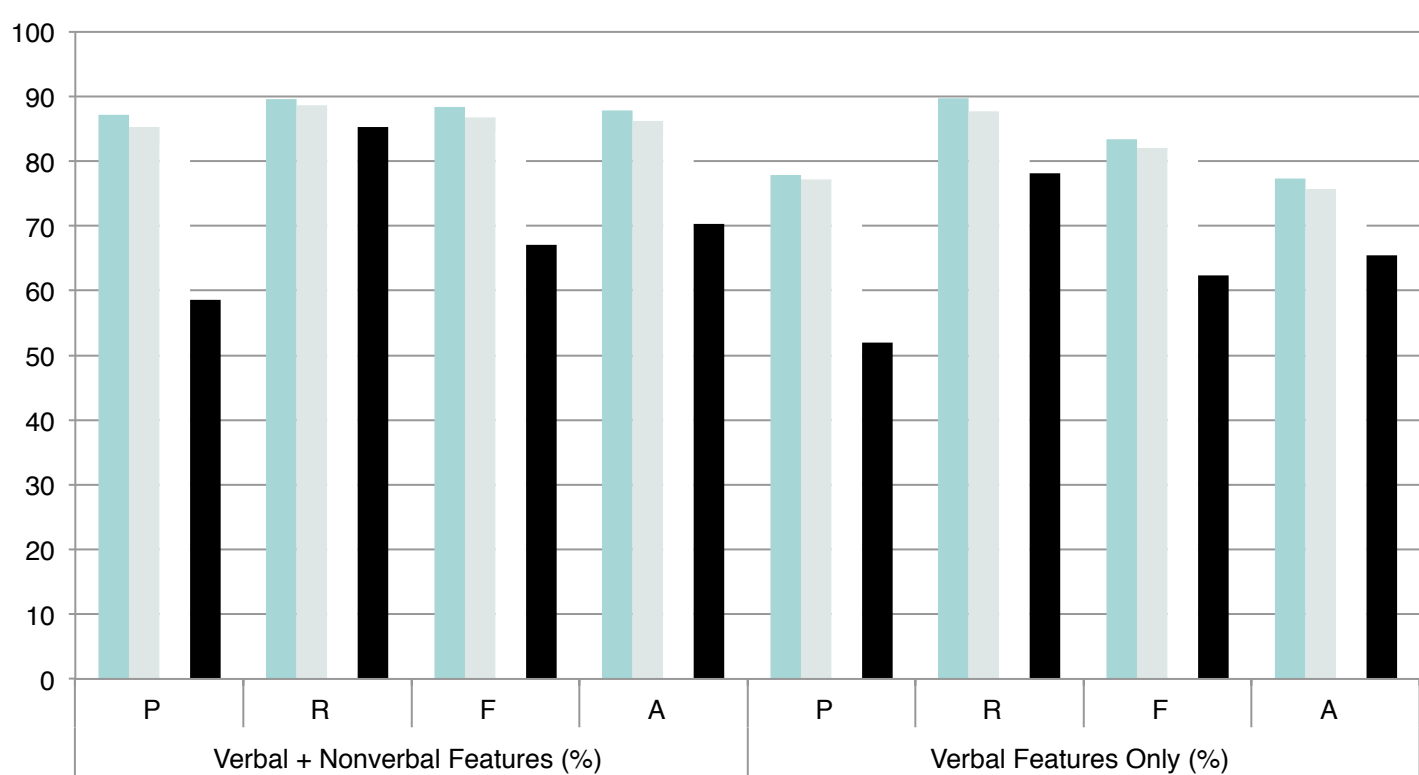### Sample Verbal Behavioral Features

review length: the total number of words

avg. sentence length: average number of words per sentence

noun ratio: the percentage of nouns

noun, verb, personal pronoun, adjective, adverb, pronoun counts: the total numbers

subjectivity: the ratio of subjective to objective words

sentiment orientation: the ratio of sentiment indicators to the total number of words

Sample Non-verbal Behavioral Features

positive ratio: the percentage of positive reviews

elite reviewer term: the number of years being an 'elite' reviewer at Yelp.com

review duration: the number of day elapse between the first and the last reviews

membership length: the number of months that a reviewer has been a Yelp member

maximum posting rate: the maximum number of reviews over one day

Rank	Features (Restaurant)	Importance Scores	Rank	Features (Hotel)	Importance Scores
1	useful votes	280.2	1	useful votes	153.9
2	review burstiness	232.6	2	review count	46.1
3	cool votes	66.8	3	average posting rate	45.1
4	friend count	51.7	4	review duration	43.0
5	review count	48.6	5	reviewing burstiness	37.6
6	funny votes	41.4	6	cool votes	23.8
7	review duration	32.3	7	membership length	23.4
8	average posting rate	20.8	8	funny votes	21.4
9	membership length	18.4	9	friend count	18.6
10	average content similarity	15.6	10	capitalized diversity	14.7
11	positive ratio	15.0	11	average content similarity	13.1
12	positive-to-negative ratio	13.7	12	tips count	13.1

Detection Performance

Major Findings

- This study extends the Interpersonal Deception Theory and the notion of nonverbal behavior to the context of online review detection.
- Incorporating nonverbal features can significantly improve the performance of fake review detection models.
- Nonverbal features can be more effective for detection online fake reviews than verbal features
- The performance of fake review detection models using only verbal features is comparable to the state-of-the-art and some of them make the list of most important features.

Ongoing Work

- Test the generality of the findings in online financial credit market
- Determine the complexity of online deception behavior
- Assess the effects of complexity of online deception behavior
- Deception behavior training for online deception detection

Interested in meeting the PIs? Attach post-it note below!

The 3rd NSF Secure and Trustworthy Cyberspace Principal Investigator Meeting
January 9-11, 2017
Arlington, Virginia

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