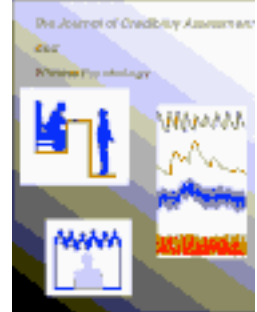


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Toward a Neurocognitive Basis of Deception

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Toward a Neurocognitive Basis of Deception

Introduction

- The past 5 years has brought an explosion in our knowledge about the brain mechanisms underlying cognitive control and other higher-order processes.
 - These are exactly the kind of cognitive processes that are likely to be used when a person is being deceptive.
- Thus, now is a good time for a major effort aimed at identifying the cognitive and neural basis of deception.

Rationale

- We wanted to determine which cognitive processes are the antecedents of the ANS activity associated with deception.
- Identifying the cognitive processes that people use when they are deceptive could potentially provide:
 - Additional methods for detecting deception in individuals that could be used alone or in conjunction with ANS measures
 - A better understanding of deception-related ANS activity
- The cognitive approach outlined here is different from those used previously to reveal the presence of guilty knowledge in individuals.

Conceptual Framework for Studying Deception

- To begin creating a model of deception, we divided the possible cognitive processes that might be involved into two broad categories:
 - Those related to the intent or motivation for being deceptive
 - Those related to making deceptive responses
- Although motivations may vary across different types of deceptions and from day to day, making a response that is incompatible with the truth is a necessary component of all deceptions.
- Thus, we began by investigating how the response conflict generated by deceptive responses is controlled.

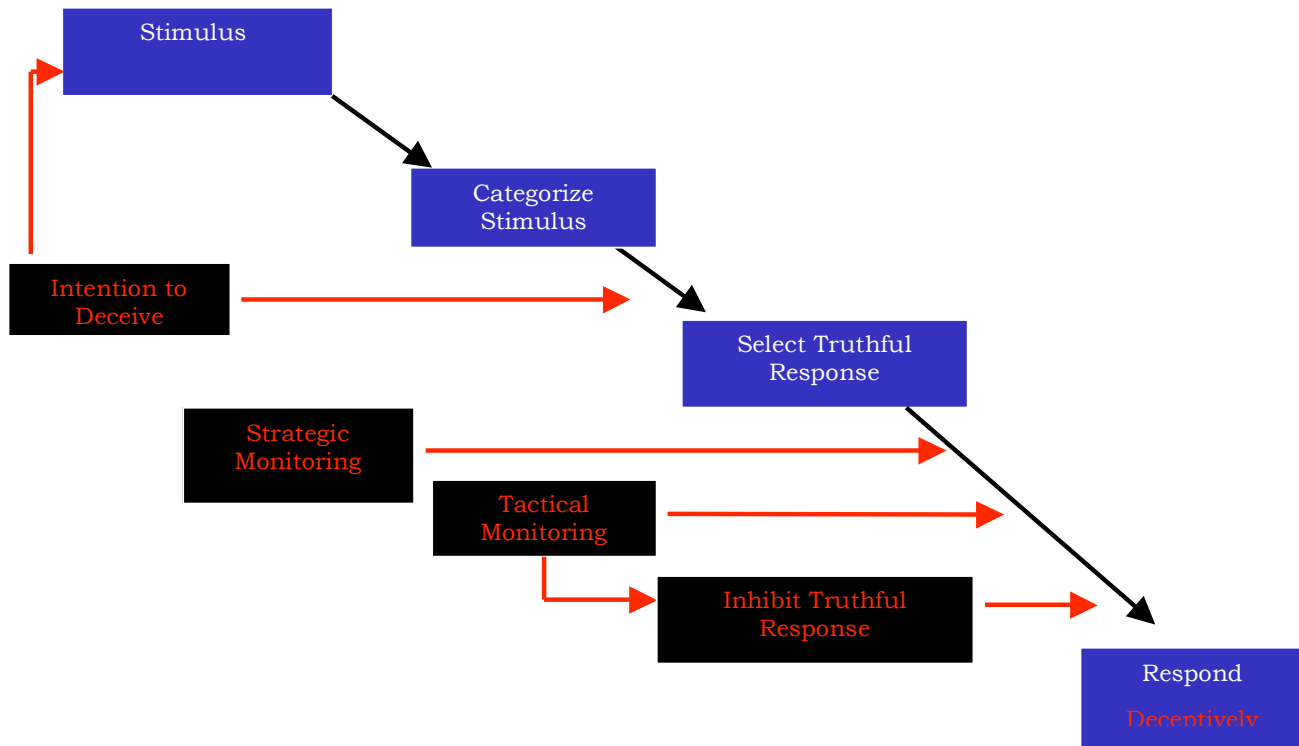
Role of Cognitive Control

- A central hypothesis was that cognitive control processes play a key role in all deceptions.
- Cognitive control is the term used to describe how, through a variety of executive processes, one is able to control the selection and execution of willed actions.
- Because truthful responses are pre-potent, making deceptive responses requires extra cognitive control to:
 - Inhibit the pre-potent truthful response
 - Overcome conflicting response tendencies (i.e., Tactical monitoring)

Strategic Monitoring

- We also hypothesized that additional control processes would be necessary if one wanted to monitor the long-term pattern of their responses to make them conform to an overall plan or goal (i.e., Strategic monitoring).
- Strategic monitoring processes are separate and provide the context in which tactical monitoring processes operate.
- Because both all cognitive control processes require attention, engaging them will place additional demands on the limited pool of attentional resources. Thus, being deceptive can be thought of as equivalent to performing a separate task concurrently with the task of being truthful.

Model of Truthful Responding Deceptive



Initial Experiments

- Participants made truthful and deceptive responses about perceptual events and items in memory in a series of tasks. The tasks were structured to create comparisons that allowed us to isolate a variety of cognitive processes:
 - Perceptual vs. Conceptual (memory-based) response conflicts
 - Consistent Truthful vs. Consistent Deceptive responses
 - Tactical vs. Strategic monitoring processes
 - Effect of practice on truthful and deceptive responding
 - Effect of deceptive responding on retrieval-related processes

Results

- We found 26 differences between truthful and deceptive responses.
 - Behavioral measures revealed that deceptive responses were slower and more variable than truthful responses.
 - Multiple ERP effects were found that arose from different brain areas and in different temporal intervals.
 - Some ERP differences reflected activity in the anterior cingulate cortex (ACC), a brain area that plays a vital role in cognitive control.
 - In every case, the truthful-deceptive differences increased when responses were monitored strategically.

Conclusions

- Tactical and strategic monitoring processes were associated with different patterns of ACC activity.
- Both types of monitoring required additional processing resources over those normally used to make truthful responses.
- Although practice benefited truthful responses, it did not reduce the level of cognitive control needed for deceptive responses.
- Different patterns of ERP activity previously shown to reflect an item's memory status were not altered for deceptive responses. This indicates that they can provide a cognitively-based index of both guilty knowledge *and* confabulation.

Role of "Self" in Deception

- Making evaluative judgments about social and physical aspects of our environment is an important aspect of everyday life.
- In contrast to memory retrieval, evaluative judgments are self-referential in that they draw on one's attitudes, beliefs, values and preferences.
- Evaluations on a good-bad dimension are known to evoke both automatic (unconscious) and controlled (conscious) processes.
- Making good/bad judgments bridges both cognitive and affective domains so will likely have both CNS and ANS effects.

Evaluative Judgment Paradigm

- Participants provided agree/disagree ratings on a wide variety of items:

AGREE ITEMS

Political-Social

Patriotism, Gun control, Bill Clinton, Welfare, Death penalty, Abortion

Personal

Marriage, Birth control, Dancing, Basketball

Religion

God, Angels, Heaven, Hell, Miracles

Food Preferences

Chocolate, Pizza, Meat, Coffee, Candy

DISAGREE ITEMS

Political-Social

Al Q'aeda, Bin Laden, Traitors, Adultery, Racial profiling, Assisted suicide

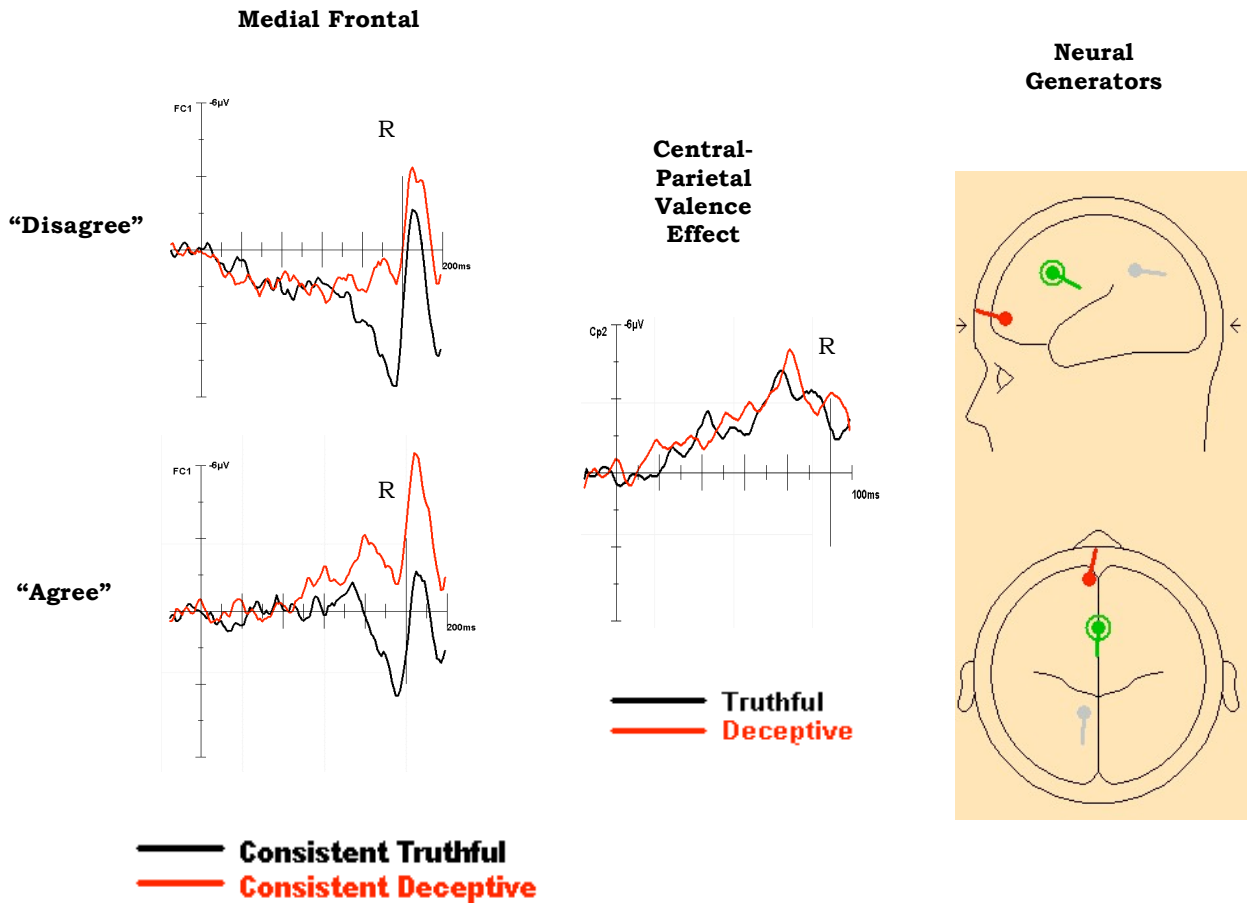
Personal

Casual sex, Smoking, One night stands

Crimes

Treason, Murderers, Rapists, Shoplifting

Evaluation Results



Conclusions

- The evaluation task elicited ERP activity related to both automatically activated and consciously controlled cognitive processes.
- The large response for deceptions about positively viewed items suggests that one component of at least some deceptions is a “denial of self” reaction that has its own characteristic pattern of brain activity.
- The brain activity in this task was shown to be generated in three midline brain areas shown to be involved in the processing of self.
- The pre-response valence-related (good/bad) ERP activity appears to be generated automatically and thus may provide an index of how items are unconsciously categorized as good and bad.

Future Directions

- Overall, these results demonstrate the utility of taking a cognitive approach to understanding the nature of deception.
 - Studies measuring both ANS and ERPs in cognitive paradigms should further increase our understanding of the inter-relations between the cognitive and emotional aspects of deception.
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