Using Response Time Measures to Assess "Guilty Knowledge"

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Abstract

Ascertaining a suspect's guilt or innocence frequently involves use of the polygraph, which measures changes in physiological arousal, coupled with a questioning regimen (e.g., the Guilty Knowledge Test, Lykken, 1981), despite controversy regarding reliability (e.g., Bashore & Rapp, 1993; Rosenfeld, 1995). Recently, Farwell and Donchin (1991) presented an alternative "guilty knowledge test" using event-related potentials (ERP) during a memory interference task. The present study extends this paradigm to determine whether response times (RT) can accurately reveal "guilty knowledge." Results from Experiment 1 show RT alone is sufficient to discriminate "guilty" from "innocent" responses, while Experiments 2a and 2b indicate the RT-based paradigm is more resistant to strategic manipulation than previously suggested. The RT-based measure may be preferable due to lower equipment, training, and analysis costs. Finally, Experiment 3 suggest that "guilt" per se may play little role in "guilty knowledge" based lie detection.

based on <u>Farwell & Donchin 1991</u>

Method

Scenario Phase	• Introduce "mission" and 6 **critical items**. (e.g. "Go to **Perch** street, meet **Phil**, pick up the **Rain** file containing the **Sub** Plans. Mention operation **Cow**...")

Execution Phase	• Physically carry out mission.

24 hour Delay

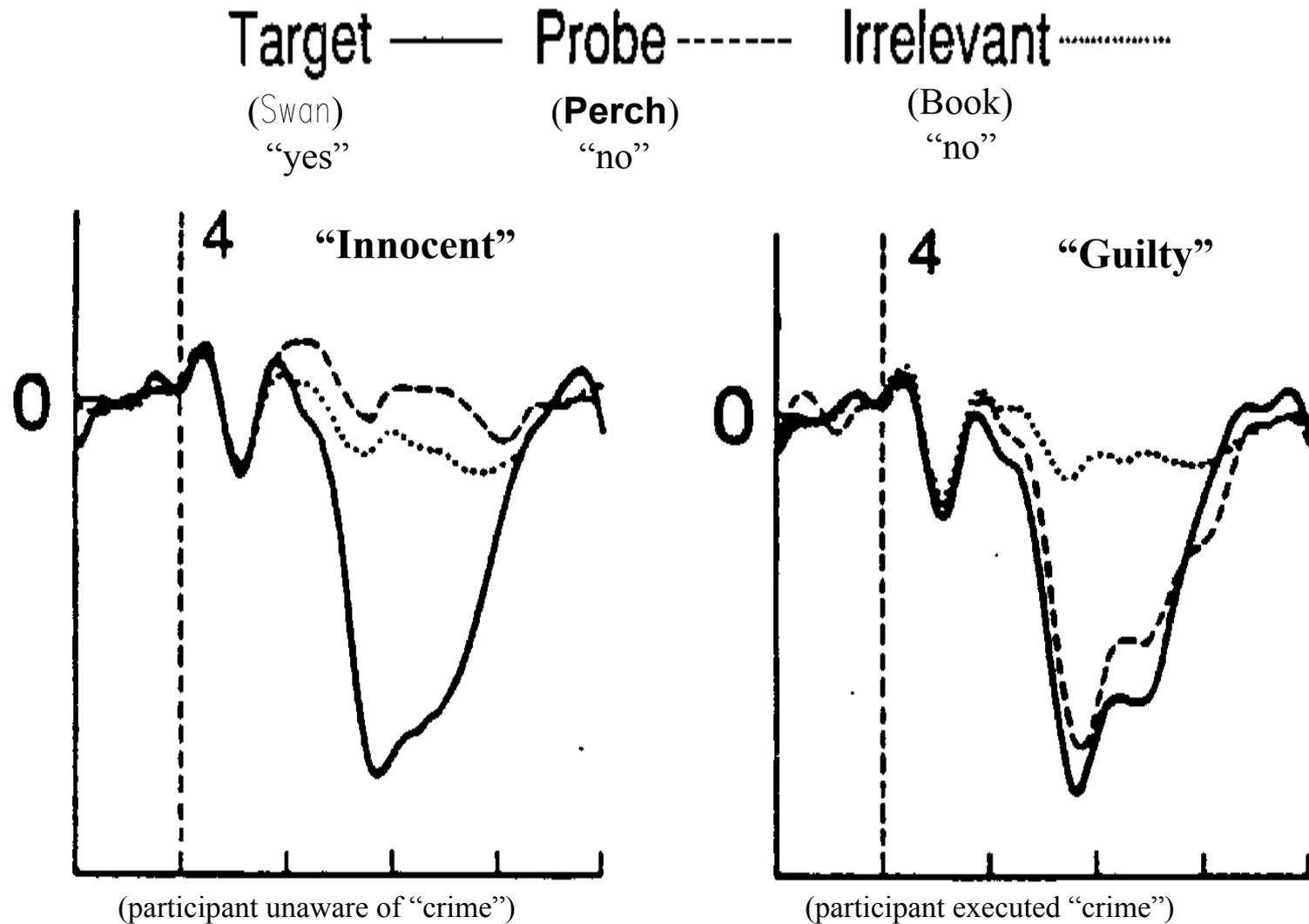|	
Test Phase	• Return for list learning & verification task. • Introduce 6 new TARGET items (e.g. Tie, Wayne, Fir, Swan, Steel, Fox) . • Presented with series of words, participants verify if presented items are from TARGET set or not. E.g. swan = *yes*, book = *no*, **perch** = *no*.
Measure	• Time to correctly reject crime-related words
Control Task	• Same, but without exposure to crime on day 1

Farwell & Donchin 1991

Previous Results

Target ——— Probe - - - - - Irrelevant ············

(Swan)   (**Perch**)   (Book)

"yes"   "no"   "no"

"Innocent"

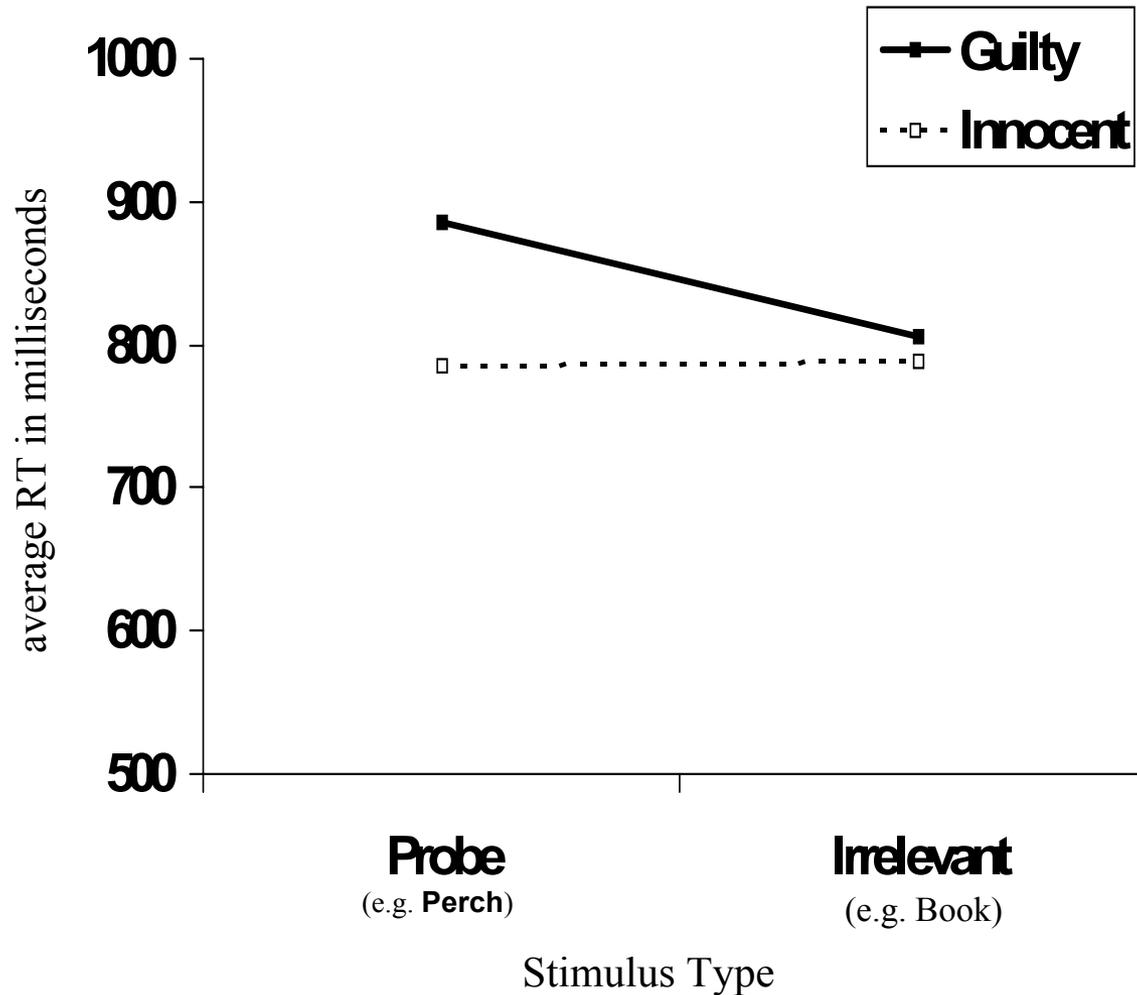**"Guilty"**

(participant unaware of "crime")   (participant executed "crime")

• With Bootstrapping Procedure on EEG data, Farwell & Donchin show that ERPs can reliably differentiate "guilty" responses from" innocent" responses.

Farwell & Donchin 1991

Previous Results

Farwell & Donchin claim that RTs are too malleable to reliably differentiate "guilty" and "innocent" response patterns, despite the trend apparent in their RT data.

Goals of current study

- Consider the efficacy of RT as a measure of Guilty Knowledge using modified version of Farwell & Donchin's (1991) paradigm.

  1) Can RT detect the **Guilty Knowledge effect**?

  2) Are RTs too easily manipulated to be useful?

  3) Look at the role of Guilt in "Guilty Knowledge" test.

Changes to paradigm

- Single 1-hour Session with 10 minute distractor task.

- Computer-based crime scenario:

  Participants were told to carry out operation **Cow**: Pose as **Phil Jenks**, log into his email account and set up a meeting with another person asking him to meet at **Perch** street wearing a **Blue** hat, carrying the **Rain** file which contains **Bomb** plans.

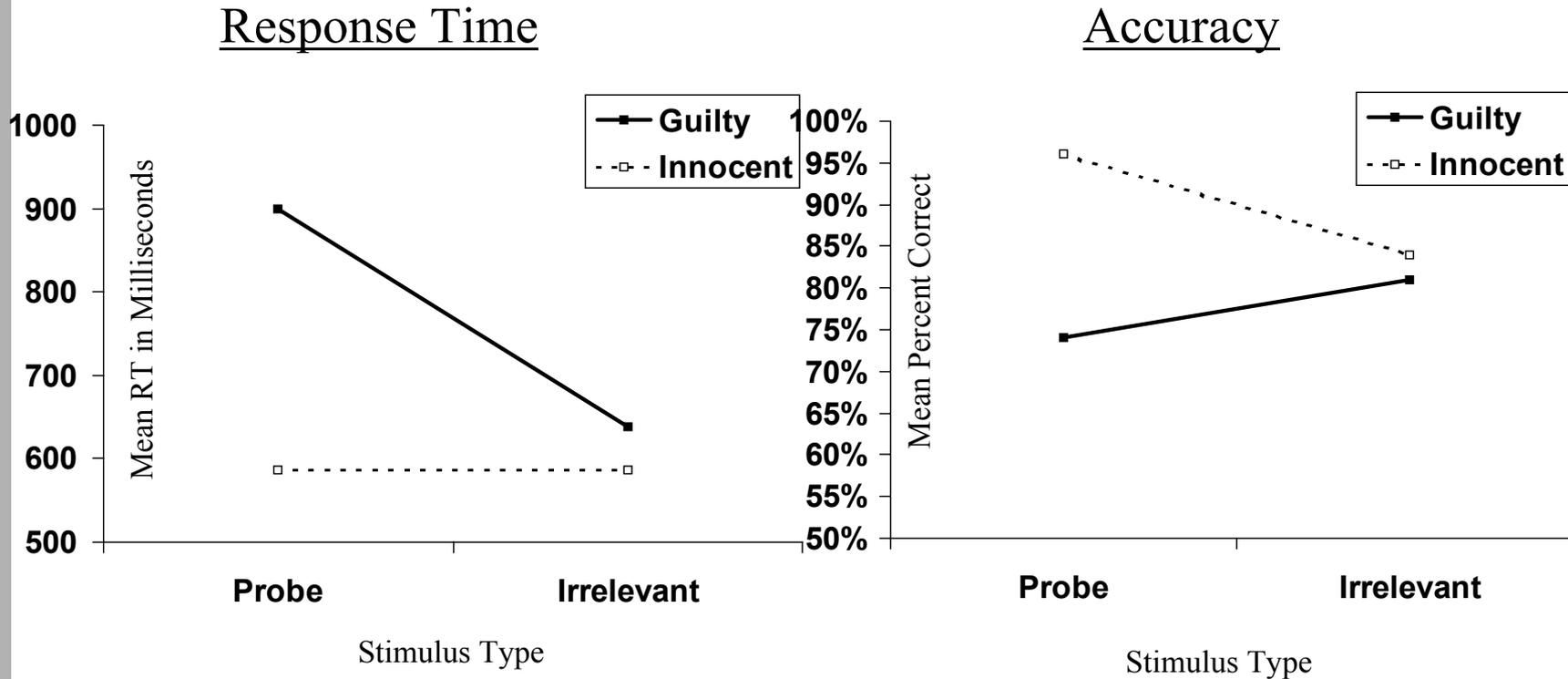*Current Paradigm*

Experiment 1

Purpose:

Replicate Farwell & Donchin (1991) RT results and show whether a paradigm using RT is capable of detecting reliable differences among "guilty" and "innocent" trials.

Expectations:

Response to Probe ("crime") items slower and accuracy poorer for Guilty-Probe trials.

Results

Response Time

Accuracy

Experiment 1

- For both RT and Accuracy, only Probe difference is significant.
- A discriminant function analysis is able to reliably categorize "guilty" responses 89% of the time and "innocent" responses 100% of the time. This rate is nearly identical to the discrimination afforded by ERPs.

Experiment 2

Next Question:

Can the Guilty Knowledge Effect be strategically attenuated by participants with prior knowledge of the test?

Purpose:

Test claim that RTs are easily manipulated by giving participants
2a) Knowledge about purpose of test" **or**
2b) Detailed knowledge about purpose test, expected pattern of results, and hints on how to avoid this pattern.
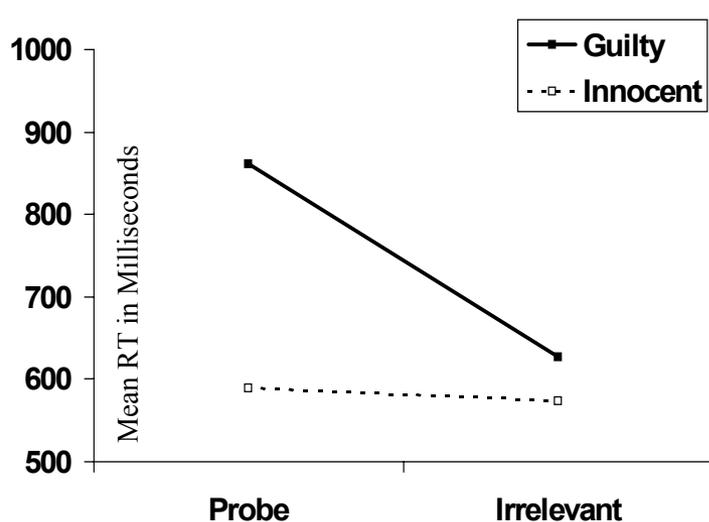
Expectations:

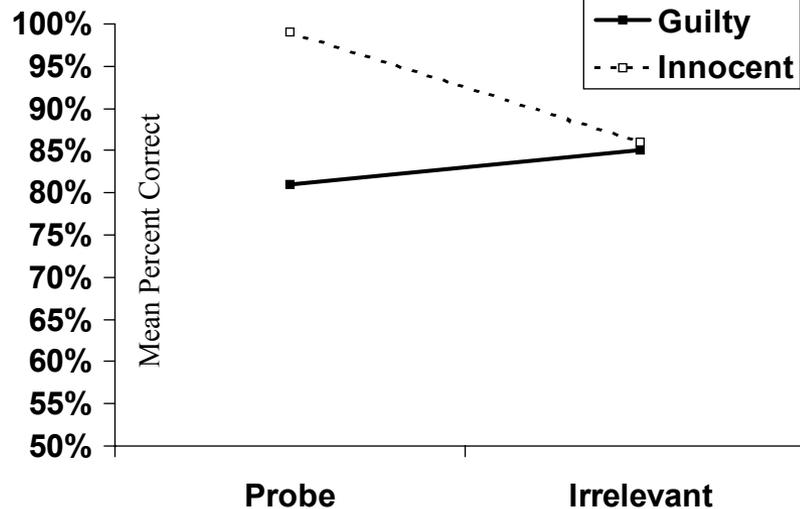Guilty Knowledge Effect should be attenuated as participants attempt to disguise their guilt.
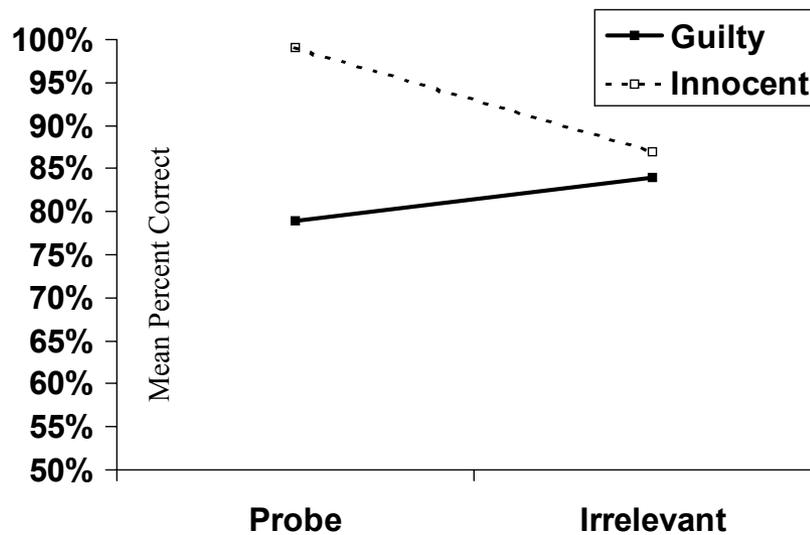
Results

Experiment 2

Experiment 2a

Response Time

Mean RT in Milliseconds

- Guilty
- Innocent

1000, 900, 800, 700, 600, 500

Probe — Irrelevant

Accuracy

Mean Percent Correct

- Guilty
- Innocent

100%, 95%, 90%, 85%, 80%, 75%, 70%, 65%, 60%, 55%, 50%

Probe — Irrelevant

Experiment 2b

Mean RT in Milliseconds

- Guilty
- Innocent

1000, 900, 800, 700, 600, 500

Probe — Irrelevant

Stimulus Type

Mean Percent Correct

- Guilty
- Innocent

100%, 95%, 90%, 85%, 80%, 75%, 70%, 65%, 60%, 55%, 50%

Probe — Irrelevant
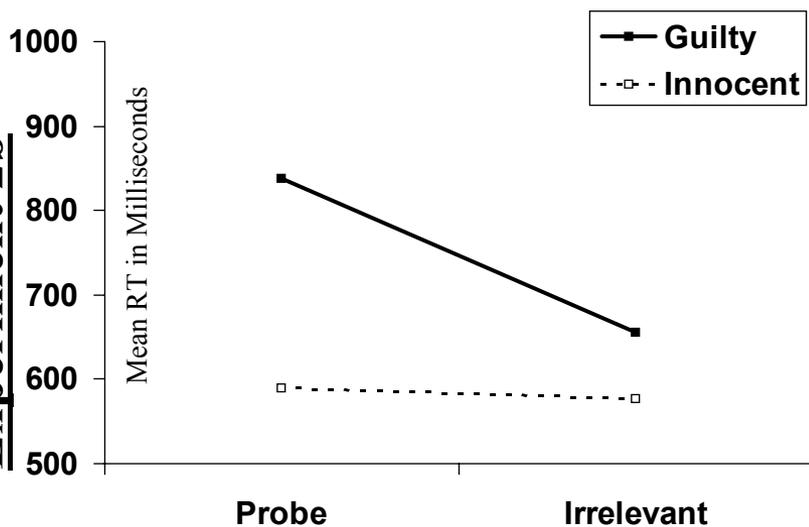
Stimulus Type

Experiment 2

- As in Expt. 1, for both RT and Accuracy, only Probe differences are significant.
- Surprisingly, the data from both Experiment 2a and 2b are nearly indistinguishable from the data of Experiment 1.
- General knowledge and motivation of the test and more detailed knowledge of how the test works did not help participants mask their Guilty Knowledge.

Experiment 3

Next Question:

Is Guilty Knowledge Effect mediated by guilty knowledge per se or by knowledge only?
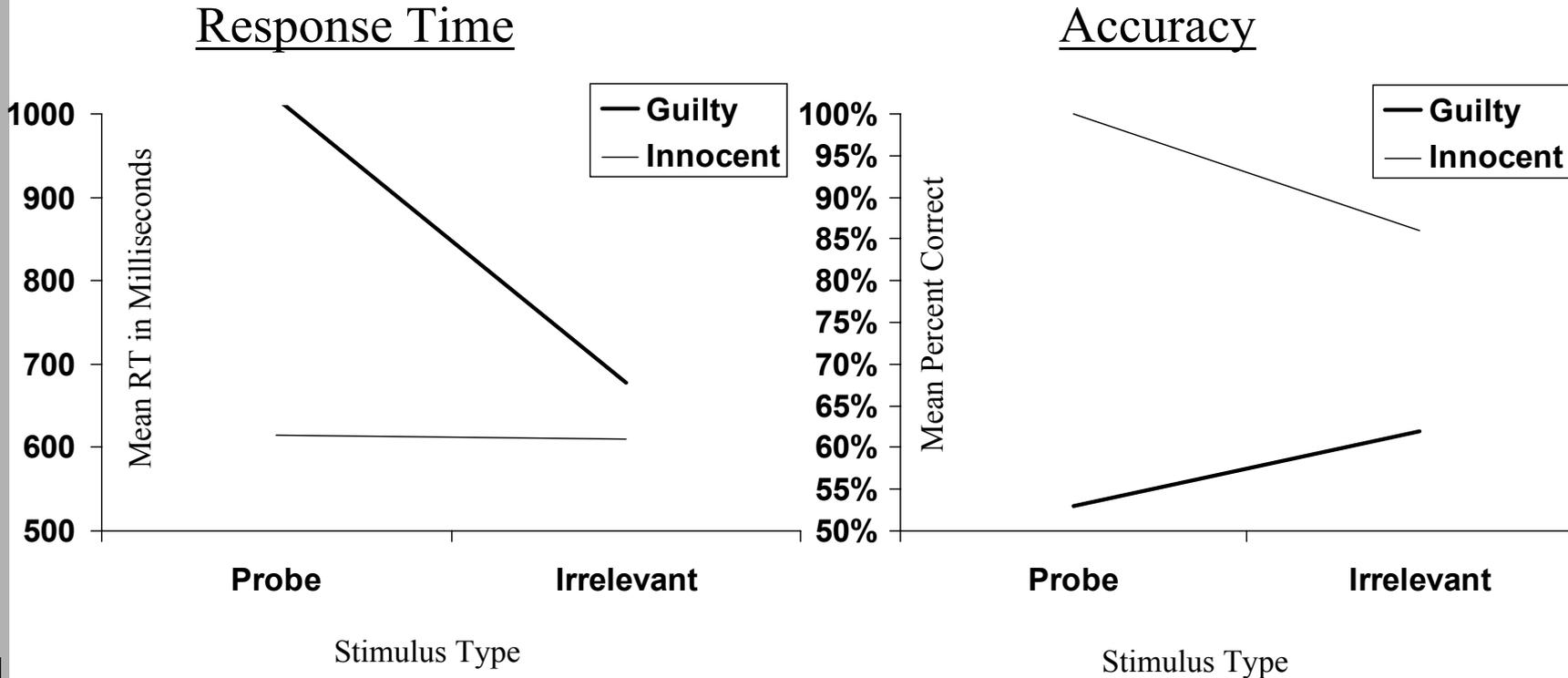
Purpose:

Determine whether "guilt" is required for the Guilty Knowledge effect evidenced in Experiments 1 and 2 by having participants only **read** about crime details.

Expectations:

If "guilt" is required then participants possessing only knowledge of a crime scenario, should not show the Guilty Knowledge effect.

Results

Response Time

Accuracy

Experiment 3

- Reliable Guilty Knowledge Effect still remains for RT data.
- Accuracy is worse than prior experiments. However, the crime *story* involved much more material to learn than the crime *scenario*.

Conclusions:

- Guilt was not distinguishable from knowledge-only.

- More appropriately called a **Privileged Knowledge Effect.**

- Other so-called Guilty Knowledge tests may also be Privileged Knowledge Tests.

- Extent to which such tests measure guilt depends on how privileged the crime knowledge is!

- Other measures of emotional response may capture guilt (though Farwell & Donchin failed to detect differences using a polygraph).

Discussion

- If you know something, it is difficult to avoid automatic activation by relevant cues.

- RT-based paradigm may be a useful alternative to current Lie Detectors and Guilty Knowledge tests.

- Lower equipment costs, less training required, and simpler analysis when compared to ERP based method.

- Results show RT method is not susceptible to manipulation and is reliable.