

Ocular-motor Detection of Deception in Laboratory Settings

Patnaik, P., Woltz, D.J., Hacker, D.J., Cook, A.E., Webb, A.K., Raskin, D.C., & Kircher, J.C.

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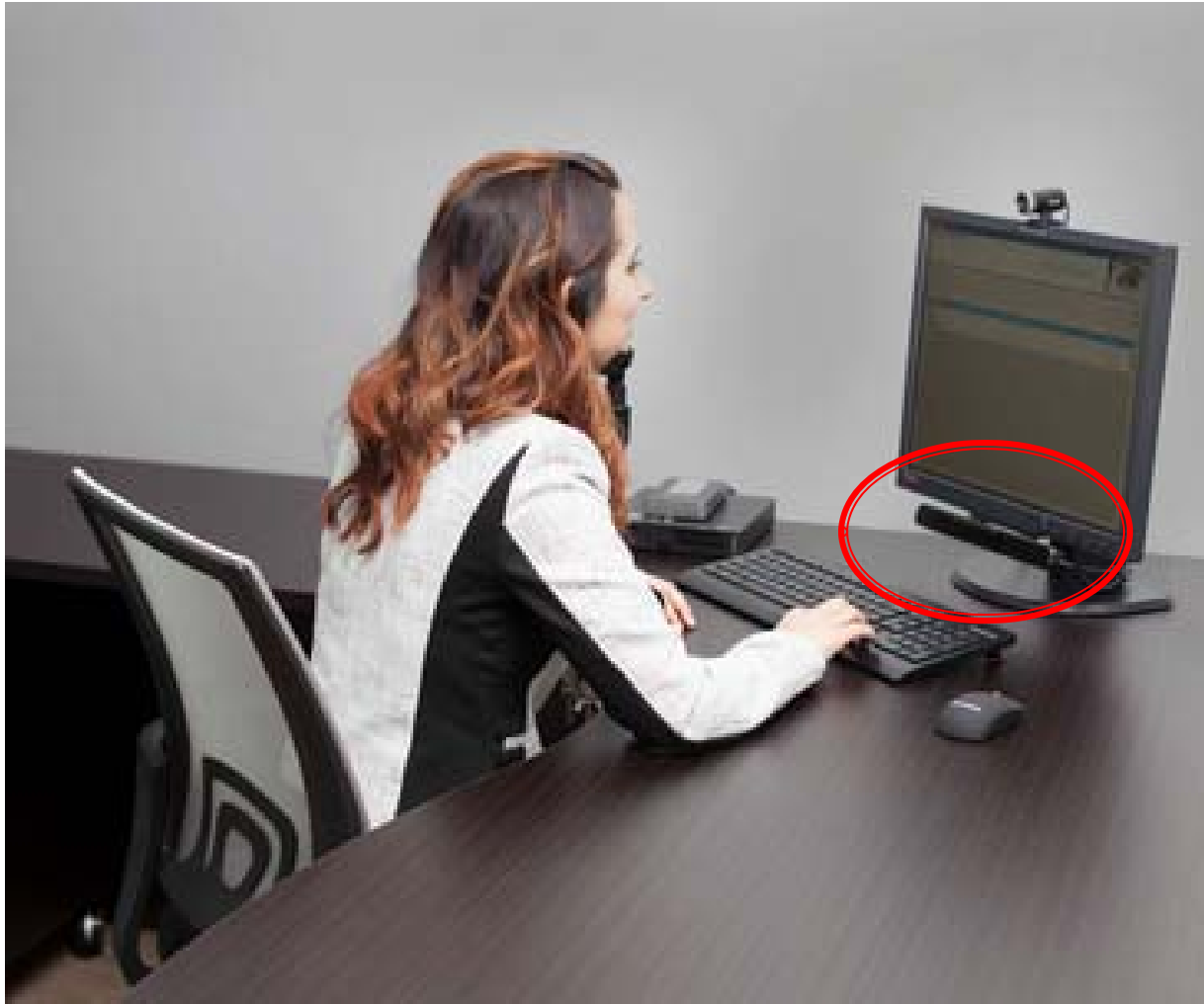
Theoretical Assumptions

- Deception requires cognitive effort
 - Effects of cognitive effort
 - Pupil enlargement
 - Increased reading and rereading
 - Decreased blink rate
- Deception evokes an emotional response
 - Effects of emotional response
 - Pupil enlargement
 - Other physiological responses

Hypothesis Testing

- Mock Crime Paradigm
- Instructions 
- Test administration

Test Station



Ocular-motor Deception Test

I did not take the \$20 from the secretary's desk.

T/F

R1 I did not take the \$20 from the secretary's purse.

T/F

R2 I took the exam from the professor's office.

T/F

Neutral In our solar system, planets revolve around the sun.

T/F

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Reading Measures

- I did not take the \$20 from the secretary's desk.

T/F

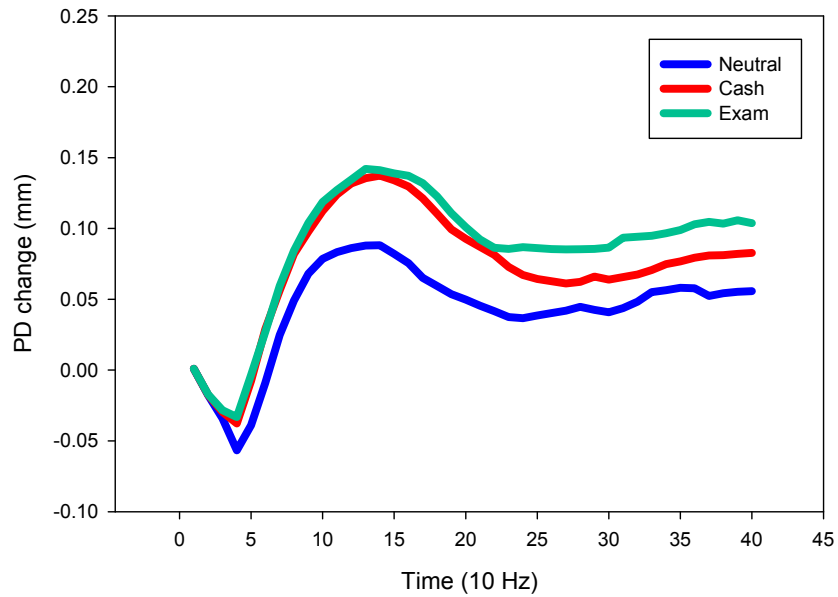
Reading Measures

- I did not take the \$20 from the secretary's desk.

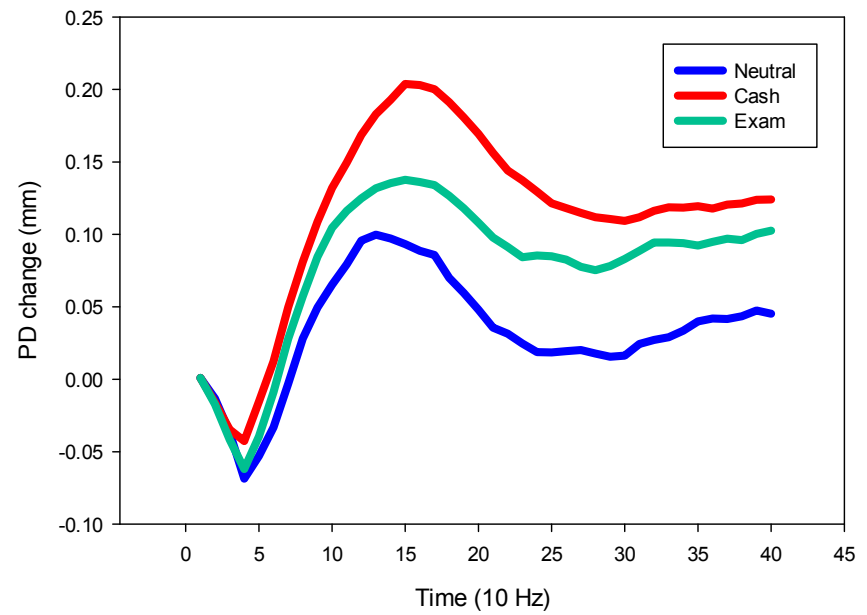
T/F

Pupil Responses (Patnaik, 2013)

Innocent



Guilty



Outcome Measure	Point-Biserial
FirstPassCashExam	0.55
NFixCashExam	0.53
PDAreaCashExam	0.50
RereadCashExam	0.49
RTCashExam	0.48
PDAmplitudeCashExam	0.45
NFixCrimeNeutral	0.33
RTNeutral	0.32
RTCCrimeNeutral	0.31
PDAreaCrimeNeutral	0.30
PDAreaNeutral	0.30
RereadNeutral	0.29
NextItemBlinkRateCashExam	0.29
RereadCrimeNeutral	0.27
NFixNeutral	0.27
FirstPassCrimeNeutral	0.27
PDAmplitudeCrimeNeutral	0.24
PDAmplitudeNeutral	0.24
PropWrongNeutral	0.23

Jackknifed Accuracy in Lab Experiments with Discriminant Analysis

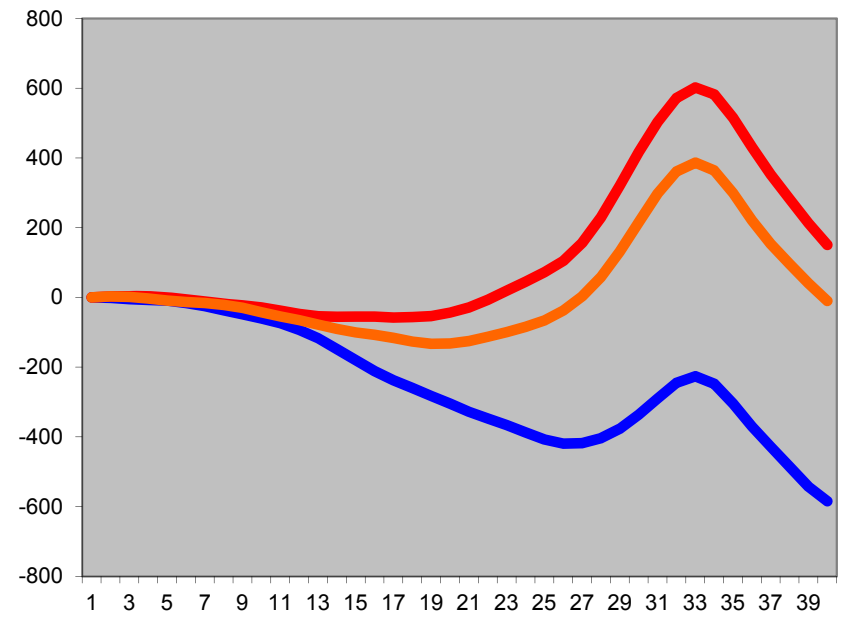
Experiment	Factors	N	Guilty	Innocent	Mean
Osher	Single-item display	40	85	70	77.5*
	Multiple-item display	40	50	75	62.5
Webb	Sex; motivation; syntactic complexity	112	82.1	89.2	85.7*
USTAR	Indirect; 4-category classification	74	59.6	77.8	68.7
NSA	Cross-validation	232	61.9	61.3	61.6*
Patnaik	Direct	48	83.3	83.3	83.3*
	Indirect	48	58.3	66.7	62.5
MIT	Language; culture	146	81.9	90.4	86.2*
*Total	Standard Conditions	398	79.8	82.4	81.1

Future Directions

- Field validation studies
- Additional unobtrusive measures
 - Movement
 - Cardiovascular
 - Respiration



Webb Guilty Subjects (n=56)



Guilty PGR Subjects (n=26)

