



**Presentation to: ADSA15 Next Generation Screening Technologies
for the Checkpoint**

Name: Mark Handler

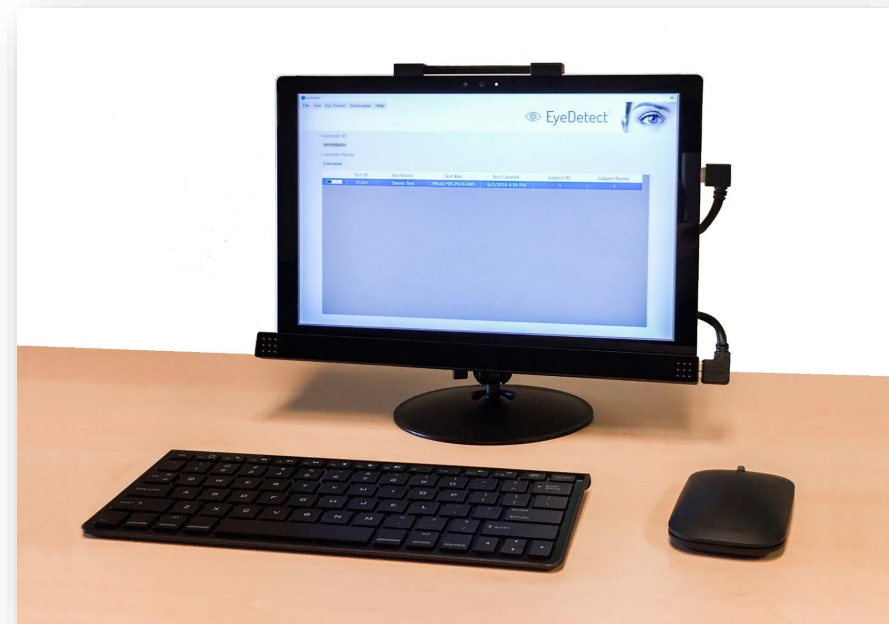
Title: NextGen Credibility Assessment

Date: Tuesday, November 15, 2016 5:10 PM



So What? Who Cares?

- Assess veracity/deception by measuring involuntary dilation of the pupils and 15 other indicators in response to cognitive load (questions).
 - 30 minute test; can be reduced
 - Based on answers to true/false questions
 - Measure response using infrared camera
 - Validated with scientific studies at U. of Utah.
- Potential uses for TSA
 - Vetting applicants and/or current employees; detect insider threats
 - Detect malicious passenger intent at the checkpoint.





Questions?



Thank You!



Carl's questions

- What questions are asked? $16 \times 16 \times 18 \times 5$ (250) + 3×20 (60) =310
- What features are assessed? 16 features
- How accurate? what are probabilities of detection and false alarm? I=88, G=83
- How has the method been validated? Slide 24/26
- For which applications has it been validated? Screening and diagnostic
- How can the method be sped up? Possibly fewer presentation, DLC version, GQT version
- How much does it cost? \$3500 hardware; \$100 software
- Who is using it now? 300 customers
- Is DHS/TSA already engaged in discussions? yes
- For TSA, how would it be applied to detect insider threats (workers) and malicious intent (passengers)? Slide 31
- How does it compare to other lie detection methods such as polygraph? Similarly
- Who were the developers? U of Utah
- What is the calibration procedure and why is it required? Diagnostic and calibration
- Can the questioner bias the results? Only if interrogate prior to test
- What is its deterrence value? Go teams, DDD



Back up Slides



Presentation Topics & Goals

- Area is addressed?
 - Pre-employment, current employee, possible portal credibility assessment (CA) screening
- Problems solved?
 - Need for fast, accurate, minimally intrusive lie detection for field use.
- How we solved the problem?
 - Dedicating 10 years of bench and field research and a top rate product development team to build and test the technology.
- Why should TSA and DHS care?
 - Both can benefit from a rapidly deployed CA technique
 - Insider threats
 - Outsider threats
 - Better personnel screening through successive hurdles.



Presentation Topics & Goals

- Describe this emerging hardware and algorithm.
 - What it is/What does it do?
 - Who developed it?
 - How does it work?
 - How accurate is it?
 - What research supports it?
 - One example of how it may be applied – Insider threats.

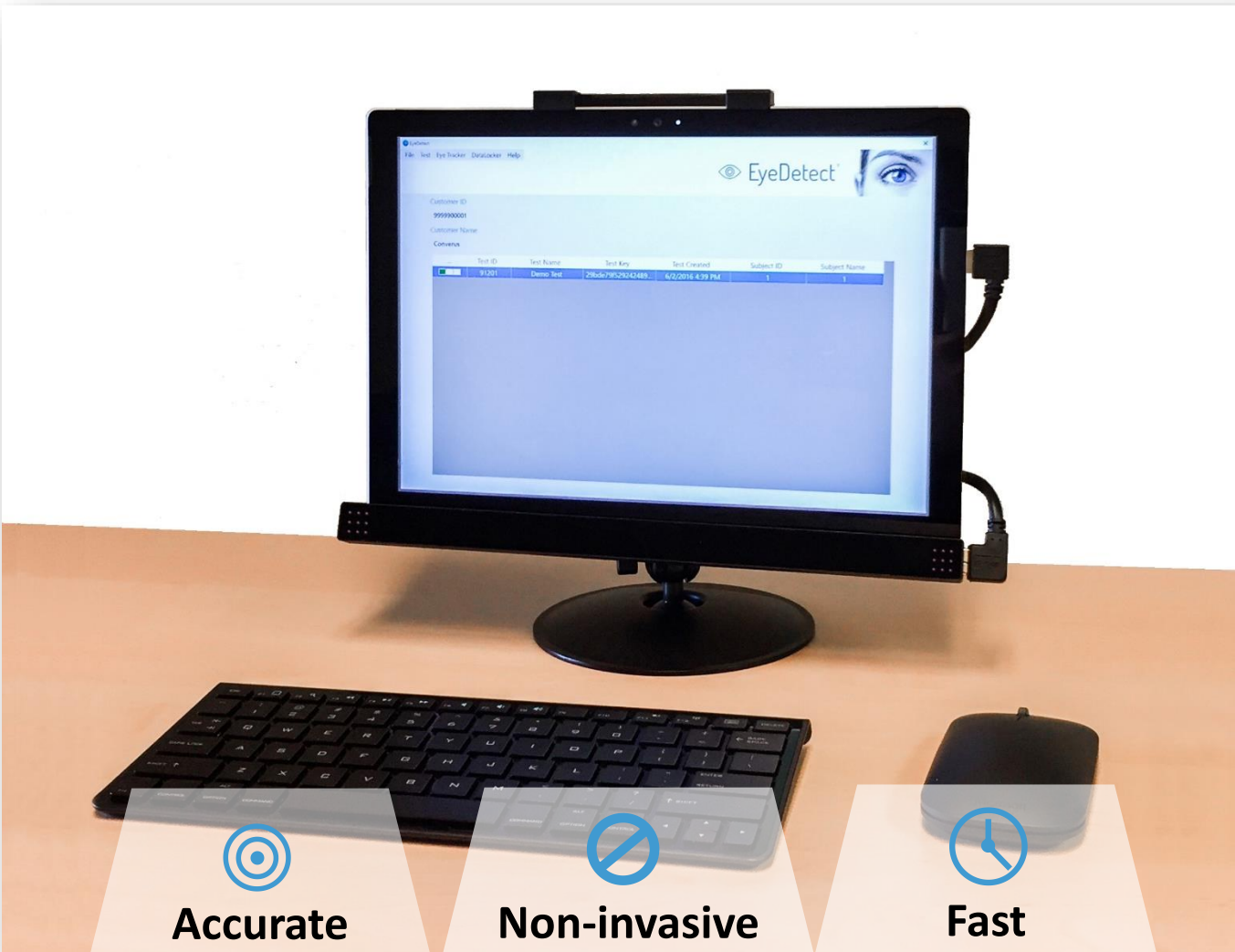


Describe this emerging hardware and algorithm.

- What is it/What does it do?

Meet EyeDetect

An accurate, non-intrusive technology that detects lies by analyzing eye behavior during a 30-minute test.





Describe this emerging hardware and algorithm.

- Who are the developers?

World Class Science Team



Dr. John Kircher



Dr. David Raskin



Dr. Dan Woltz



Dr. Anne Cook



Dr. Doug Hacker

- Inventors of the computerized polygraph
- World-renowned, widely published experts
- EyeDetect tested over 13 years and peer reviewed

2012

Lyin' Eyes: Ocular-motor Measures of Reading Reveal Deception

Journal of Experimental Psychology: Applied, 18(3), 301-313. September 2012



2016

Generalizability of an Ocular-Motor Test for Deception to a Mexican Population

International Journal of Applied Psychology, Volume 6, Number 1, January 2016





Describe this emerging hardware and algorithm.

- How does it work?

Introducing  EyeDetect®

THE EYE CANNOT **LIE**

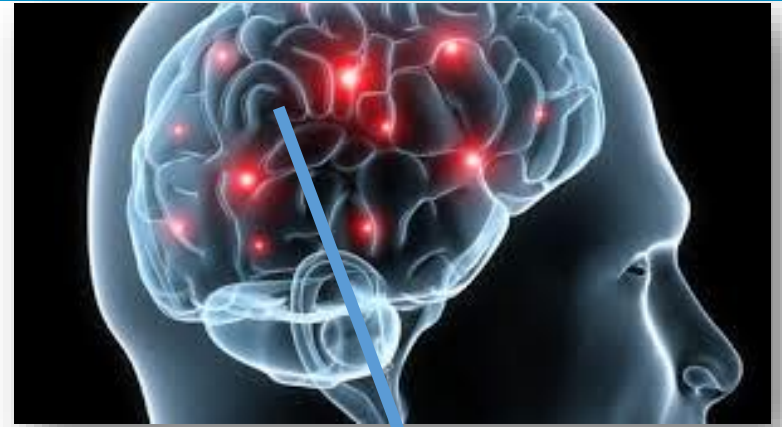




EyeDetect

A Breakthrough Discovery

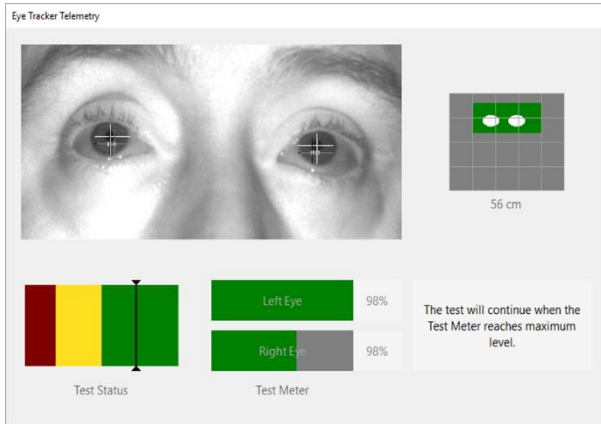
- Deception causes an increase in cognitive load
- Cognitive load causes involuntary dilation of the pupils (1/10th millimeter)
- 15 other indicators are also diagnostic



How EyeDetect Works

4 Simple Steps

1. Calibrate eyes



2. Answer T/F questions



3. Upload data to cloud



4. Online Test Results and Report in 5 minutes



Not Credible
Deceptive

Drug Use:
Forgery:



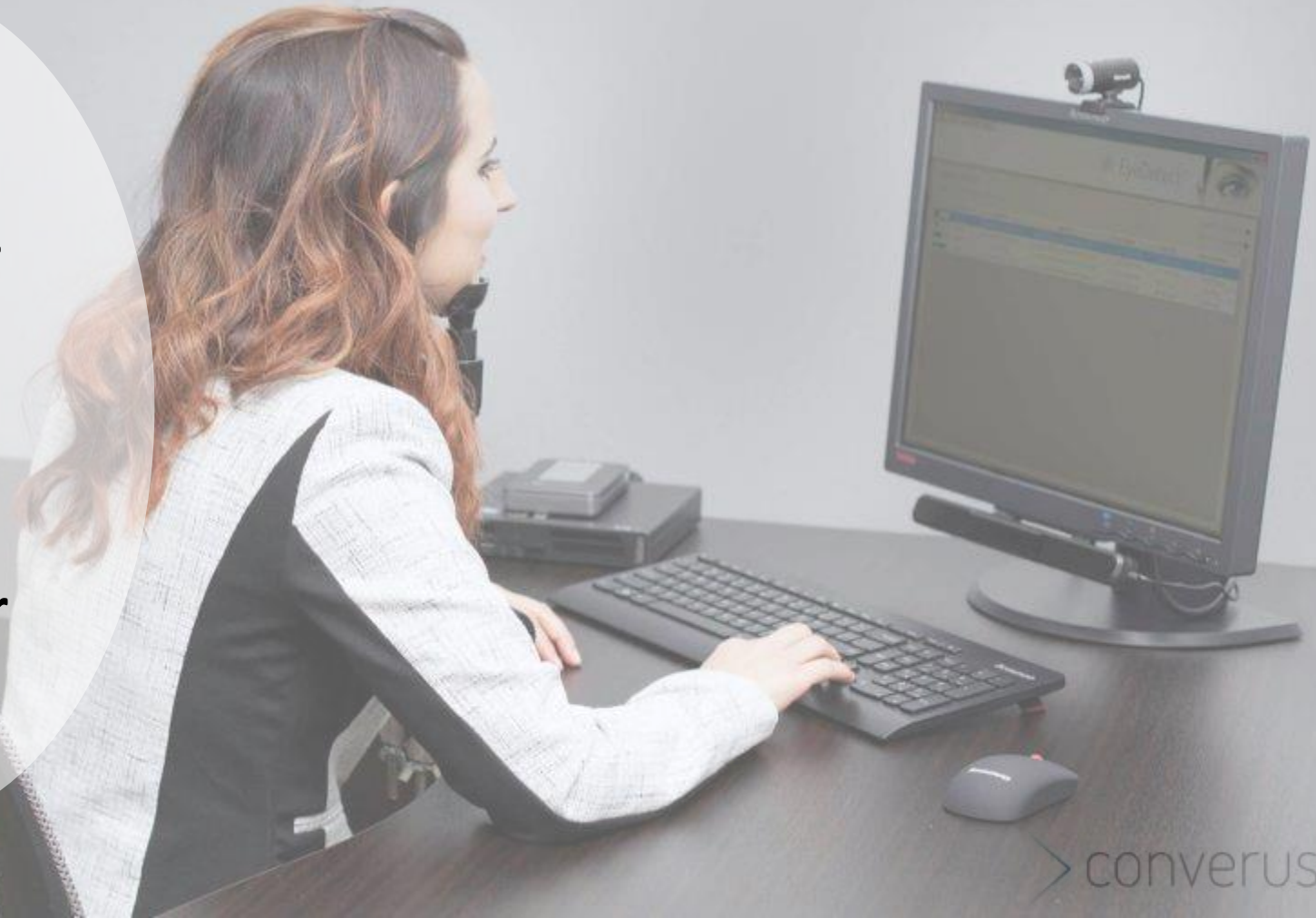
Credible
Truthful



**How it
Works**

Step 2

- **Examinee answers simple T or F questions**
- **Infrared sensor captures eye behavior data**





Individual Summary


EyeDetect® | Report

Customer Information

Customer ID: 9999900001
Customer Name: Converus

Test Information

Examinee: [Redacted]
Test ID: 12301
Test Name: Employment: Cyber Crimes and Stealing >\$500 USD
Test Key: 1fe21eae3e40499f80e4eddc56b447a3
Test Date: 1/22/2015 2:40 PM

 Credible
Truthful





Results in 5 minutes!

converus® | Operations Tests Accounts Reports ▾ 1234500006 ▾

Tests 1-25 ◀ ▶

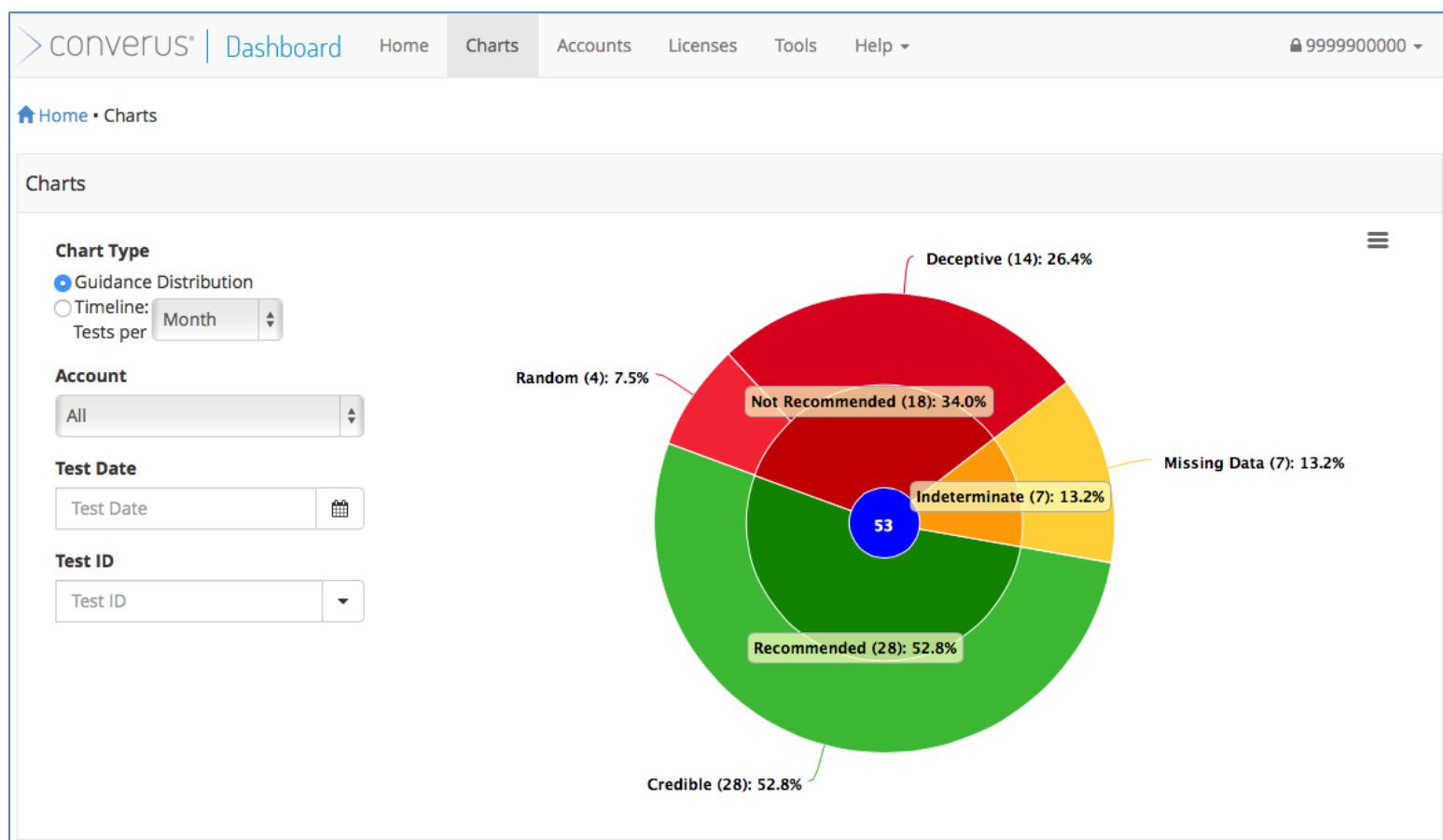
Recent ODTs (F8GG7PRDHG)

#	↓	Examinee Name Examinee ID	Customer Name - Subaccount	Test ID	Test Name & Test Key	Test Date	Credibility Score (R1)	Credibility Score (R2)	Guidance
1		██████████ 011	(F8GG7PRD ██████████ S.A.-██████████	22907	██████████: guardia 61c4e3e4ac9d44ff9bdd56864e391e24	9/14/2015 6:22 PM	35	98	Not Recommended Deceptive
2		██████████ 010	(F8GG7PRD ██████████ S.A.-██████████	22907	██████████: guardia 4595d9f9ee95471e941c73ec44f50d4e	9/14/2015 5:28 PM	9	99	Not Recommended Deceptive
3		██████████ 009	(F8GG7PRD ██████████ S.A.-██████████	22907	██████████: guardia e09525e5466e44b58fbf5b3bc12b306a	9/14/2015 4:53 PM	58	98	Recommended Credible
4		██████████ 008	(F8GG7PRD ██████████ S.A.-██████████	22907	██████████: guardia d86a36034b3e49768fcb9f7bdbd8259b	9/14/2015 3:43 PM	54	94	Recommended Credible
5		██████████ 007	(F8GG7PRD ██████████ S.A.-██████████	22907	██████████: guardia 844e98708e2446a7be74af74d8f38c62	9/14/2015 2:56 PM	79	98	Recommended Credible



Dashboard

Analysis

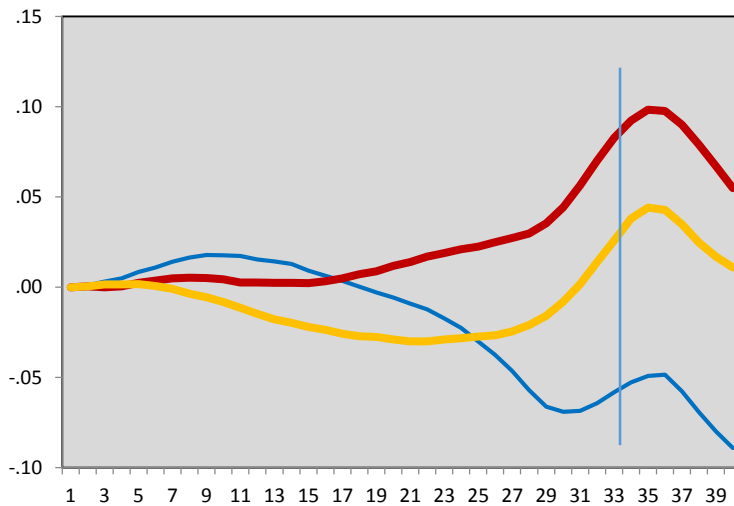




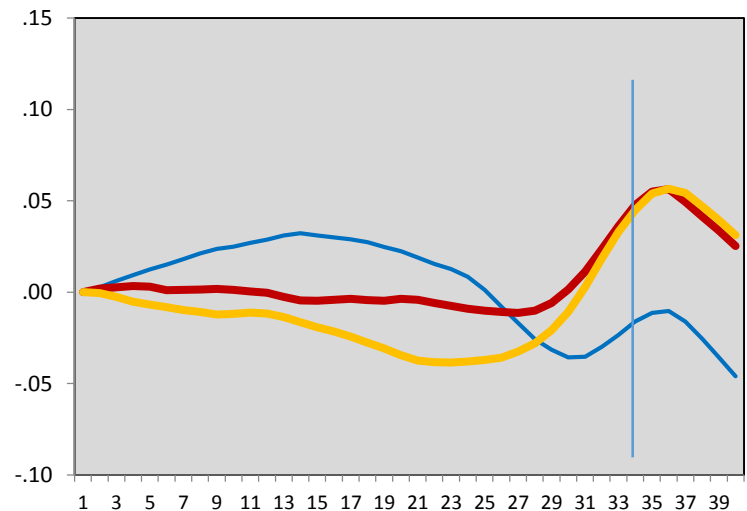
EyeDetect is 85% accurate

Pupil Diameter Response*

Guilty Subjects



Innocent Subjects



Tec,
2013
N=200

- Relevant Declarations
- Secondary Declarations
- Neutral Declarations

* just one of various measurements



Describe this emerging hardware and algorithm.

- How accurate is it?



Accuracy in Lab Experiments

Experiment	Factors	N	Guilty	Innocent	Mean
Osher	Parallel format	40	70.0	95.0	82.5
	Serial format	40	85.0	85.0	85.0*
Webb*	Sex; motivation; difficulty	112	82.1	89.2	85.7*
USTAR	Indirect issues; self selected; 4-way classification	74	59.6	77.8	68.7
NSA	Cross-validation	232	61.9	61.3	61.6
Tec de Monterrey	Language, culture	147	84.1	87.3	85.5*
Patnaik MS	Direct issues	48	83.3	83.3	83.3*
	Indirect issues	48	58.3	66.7	62.5
Patnaik PhD	Distributed format	80	82.5	90.0	85.0*
	Blocked format	80	82.5	85.0	83.8
Total		901	74.4	79.0	76.7
Standard Conditions		427	83.4	87.6	85.4



Describe this emerging hardware and algorithm.

- What research support it?



Seven peer-reviewed EyeDetect Studies, poster presentations, or edited book chapters.

1. Cook, A. E., Hacker, D. J., Webb, A. K., Osher, D., Kristjansson, S., Woltz, D. J., & Kircher, J. C. (2012). Lyin' Eyes: Ocular-motor Measures of Reading Reveal Deception. Journal of Experimental Psychology: Applied, 18(3), 301-313.
2. Hacker, D. J., Kuhlman, B., & Kircher, J. C., Cook, A.E., & Woltz, D.J. (2014). Detecting deception using ocular metrics during reading. In D. C. Raskin, C. R. Honts, & J. C. Kircher (Eds.), Credibility assessment: Scientific research and applications. Elsevier, pp 159-216.
3. Kuhlman, B. B., Webb, A. K., Patnaik, P., Cook, A. E., Woltz, D. J., Hacker, D. J., & Kircher, J. C. (2011, September). Evoked Pupil Responses Habituate During an Oculomotor Test for Deception. Poster presented at the Society for Psychophysiological Research convention, Boston, MA. (abstract)
4. Patnaik, P., Woltz, D.J., Cook, A.E., Webb, A.K., Raskin, D.C., & Kircher, J.C. (2015, March). Ocular-motor Detection of Deception in Laboratory Settings. Meeting of the American Psychology and Law Society, San Diego, CA.
5. Webb, A. K., Hacker, D.J., Osher, D., Cook, A.E., Woltz, D. J., Kristjansson, S. K., & Kircher, J. C., (2009). Eye movements and pupil size reveal deception in computer administered questionnaires. In D. D. Schmorow, I. V. Estabrooke, & M. Grootjen (Eds.), Foundations of Augmented Cognition. Neuroergonomics and Operational Neuroscience (553-562). Berlin/Heidelberg: Springer-Verlag.
6. Webb, A. K., Honts, C. R., Kircher, J. C., Bernhardt, P.C., & Cook, A. E. (2009). Effectiveness of pupil diameter in a probable-lie comparison question test for deception. Legal and Criminal Psychology, 14(2), 279-292.
7. Patnaik, P., Woltz, D. J., Hacker, D. J., Cook, A. E., de Lourdes, M., Webb, A. K., & Kircher, J. C. (2016). Generalizability of an ocular-motor test for deception to a Mexican population. International Journal of Applied Psychology, 6, January. Published, 12/31/2015.



Describe this emerging hardware and algorithm.

- How does it compare to polygraph?



EyeDetect + Polygraph (PDD) Accuracies

Accuracy estimates from the multiple EyeDetect studies as presented by Dr. David Raskin at the 2015 APA seminar and for PDD from the APA Meta-Analytic Review (APA 2012).

Accuracy Rates for EyeDetect (Raskin, 2015) and PDD (APA 2012 table 2)

Ground Truth	Pass Test	Fail Test
EyeDetect		
Innocent	0.88 (TN)	0.12 (FP)
Guilt	0.17 (FN)	0.83 (TP)
PDD		
Innocent	0.72 (TN)	0.14 (FP)
Guilt	0.08 (FN)	0.81 (TP)

Polygraph peer-reviewed studies

Table 4. Criterion accuracy profiles for evidentiary/diagnostic PDD techniques.

Technique	Federal You-Phase	IZCT*	MQTZCT*	Utah PLT (combined)	ZCT ESS
TDA Method	ESS	Horizontal	Matte	Utah	ESS
Number of Studies	2	3	3	7	6

Table 5. Criterion accuracy profiles for paired-testing techniques.

Technique	Backster You-Phase	Federal You-Phase	Federal ZCT	Federal ZCT	AFMGQT
TDA Method	Backster	7-position	7-position	7-position evidentiary	ESS
Number of Studies	2	2	3	2	3

Table 6. Criterion accuracy for investigative techniques.

Technique	CIT/GKT	DLST/TES	DLST/TES	AFMGQT
TDA Method	Lykken	7-position	ESS	7-position
Number of Studies	39	4	4	3



**A New
Lie Detector**

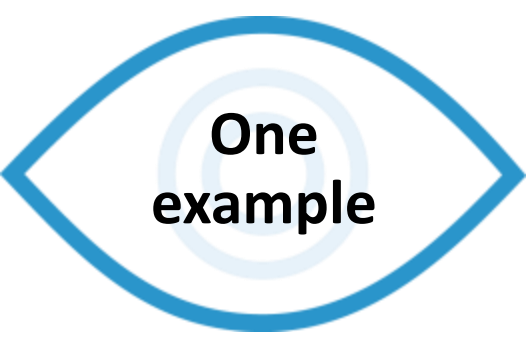
EyeDetect: The first viable lie detection technology invented since the polygraph

5x faster

2-7x less costly

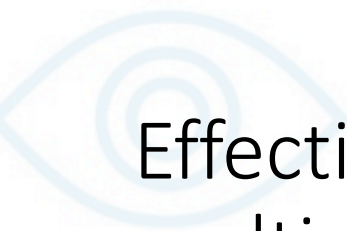
100% less invasive

And it's 85% accurate.




Combating Insider threats

- a. **Thefts from travelers**
- b. **Allowing contraband to board aircrafts**
- c. **Potentially abusing passengers**



Effective credibility assessment tools have multiple benefits

- Deter bad behavior.
 - The word gets out fast this random surveillance is occurring.
- Induce disclosure of bad behavior.
 - People tell on themselves and others.
- Detect bad behavior.
 - EyeDetect is about 85% accurate.



EyeDetect could be used to randomly screen for all of these problems.

- A. A “go team” could be sent to randomly screen up to 42 people per operator per day.
- B. Results can be accessed by Internal Affairs who decide what actions to taken
 - A. Increased surveillance
 - B. Interview
 - C. Socio-economic background investigation
 - D. Polygraph
- C. Additional potential for portal monitoring of those entering the country.

The logo for EyeDetect, featuring a stylized eye with concentric circles inside, rendered in a light blue color.

Summary – EyeDetect is:

- Fast
- Non-invasive
- Accurate
- Supported by science
- Easily trained for, and
- Mobile



Questions?
