Announcements (2/11/19)

- Electricity Test Today
- Class resumes at 2:25 pm
Applications

- Orienting (Bauer, 1984; Tranel and Damasio, 1985)
- Fear conditioning (Őhman)
- Individual Differences in Neuroticism
- Deficient anticipatory anxiety in psychopathy (Hare)
- Deception Detection

Figure 1. Mean skin conductance responses (SCRs) (square-root transformed) to fear-relevant (snakes, spiders, and rats) or fear-irrelevant (flowers and mushrooms) stimuli previously followed (CS+) or not followed (CS−) by an electric shock unconditioned stimulus among the fearful and nonfearful groups of subjects during extinction.
Applications

- Orienting (Bauer, 1984; Tranel and Damasio, 1985)
- Fear conditioning (Őhman)
- Individual Differences in Neuroticism
- Deficient anticipatory anxiety in psychopathy (Hare)
- Deception Detection (Myriad authors)
Neuroticism

- A trait-like tendency to experience negative affect and for increased reactivity to stress and aversive stimuli
- Would skin conductance reflect greater physiological reactivity to negative stimuli, and poorer physiological recovery?
Figure 1. Skin conductance reactivity as a function of picture valence, time, and neuroticism. Pictures were presented from 1–6 s. Estimated means for participants lower (1 SD below the mean) and higher (1 SD above the mean) in neuroticism are plotted separately.
Applications

- Orienting (Bauer, 1984; Tranel and Damasio, 1985)
- Fear conditioning (Őhman)
- Individual Differences in Neuroticism
- Deficient anticipatory anxiety in psychopathy (Hare)
- Deception Detection (Myriad authors)
Anticipatory Arousal in Psychopathy

- Hare Countdown Task (1965)
- #'s appear from 1..8
- At "8" punishment is given (shock):
Fearless Dominance
(dual-process model of Psychopathy)

Figure 1. Mean skin conductance change (log [μS + 1]) for high and low fearless dominance groups when viewing CS+ and CS– during acquisition (ACQ-1 and ACQ-2) and extinction (EXT) phases of the fear conditioning procedure.

“Lie” Detection: The Problematic Polygraph Test and Some Alternatives
“I don't know anything about lie detectors other than they scare the hell out of people.”

-- Richard Nixon

“I’m not a crook”
People Sometimes Lie

An Armchair Taxonomy Of Lies

- Little Harmless Lies
- The Social Graces
- All Other Lies

- Accusations
  - about parental habits
  - about fidelity
  - about abuse: physical, sexual

- Denials
  - about parental habits
  - about fidelity
  - about abuse

- Inaccuracies
  - income
  - assets

- Inaccuracies
  - about income
  - about assets
The Difficulty in Detecting Lying

<table>
<thead>
<tr>
<th>Observer Group</th>
<th>Accuracy</th>
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<td>Psychiatrists</td>
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<td>Special Interest</td>
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<tr>
<td>College Students</td>
<td>52.8</td>
</tr>
</tbody>
</table>

\(^a\text{chance } = 50\%\)

from Eckman & O'Sullivan, 1991
The Polygraph and the American Psyche

 Lady 1: [My coworker]'s husband is being sent to polygraph school in Atlanta for three weeks so he can give the polygraph test.
 Lady 2: Cool! That's like the test that can read your mind, right?

Conversation overheard in W. Lafayette, Indiana, December, 1990

What we, the American people, are witnessing is the beginning of the end of mankind’s search for an honest witness. For the first time in the history of civilization, mankind has the opportunity to prove beyond a reasonable doubt the veracity of his testimony through a generally accepted and scientific (sic) valid examination of his own psyche. God gave us the polygraph.


Media Portrayals:
- Political Ad
- Entertainment
- More Entertainment
Roadmap

- Abbreviated History and Overview of the Conventional Polygraph
- Limitations to Conventional Polygraphy
  - The Polygraph Test is especially likely to falsely incriminate the innocent
  - Why polygraphers over-estimate the accuracy of the test
  - No credible scientific exists to support using the Polygraph Test
- Overview of alternatives: Assessing recognition
Polygraph invented in 1915 by Harvard-trained Ph.D., LL.B. William Moulton Marston

Claimed it could detect lies by measuring blood pressure

Not his main claim to fame
The Polygraph Test

Fundamental assumption:

Physiological responding differs when one is truthful versus being deceptive

Note: Detects physiological responses, but not lying per se
Uses (and abuses) of Polygraph Tests

- **Specific Incident Investigations**
  - Criminal Investigations: Defendants, Complainants, Witnesses
  - Insurance Claims Investigations
  - Investigating Prison Inmates Accused of Violating Rules
  - Substantiation of Claims Made in Civil Suits
  - Accusations of parental wrongdoing
  - Paternity Suits (historically)

- **Screening Situations**
  - Pre-employment Screening
  - Screening of Current Employees
  - Child Custody Cases
  - Convicted Sex Offenders
Uses (and abuses) of Polygraph Tests

- **Employee Polygraph Protection Act (EPPA; 1988)**
  - Prohibits Screening Tests for employment in private sector
  - Allows tests for those reasonably suspected of involvement in a workplace incident
  - “Friendly” Tests to the currently employed and to criminal defendants still permitted
  - Federal, State, and Local Government Employers, Federal Contractors, and Police can still use for screening!

- **And yet...**
  - *National Defense Authorization Act* of 2000 requires scientists at nuclear weapons laboratories to submit to polygraph tests to maintain their security clearance
  - “Maintenance polygraphs”
Instrumentation and Measures

- Polygraph examinations involve multi-channel recorders in a flightcase.

- Typically recorded:
  - Respiration
  - Cardiovascular activity (BP, HR)
  - Skin resistance

- These measures:
  - provide an indication of changes in autonomic activity
  - do not index the "lie response"
Conventional Polygraphs

Each instrument comes with a one year warranty on all parts and labor. With each four- or five- pen instrument you will receive the following standard accessories: two pneumatic assembly, gas, pump head assembly, pens and bottles for each recording module, one extra ink bottle, pen pad, ink, tool kit, two rolls of chart paper and an instruction manual. Other optional accessories include auto power conversion, in-case calibrator, various styles of event markers and thermal writing capabilities.

The Statesman

Zero® case, the clean Halliburton lines are enhanced by the black morocco grain finish. The case is high-impact thermo-formed ABS plastic to ensure durability. (Total weight: 21.5lbs. or 24.5lbs. with calibrator. Dimensions: 13"W x 21"L x 6.5"D).

The Factfinder II

The 10" chart drive allows five pens to be used simultaneously with greater pen swing. The practice of "pigeon-toed" the outside pens on a five-pen polygraph is no longer necessary and charts are easier to read because of reduced tracing overlap. This leaves plenty of room for important notations. Every Factfinder II maintains all of the quality and conveniences of our standard 8" chart drive models. Available only in a Statesman case, no thermal models are available.

The Courier II

Our newest conventional case style offers a gold anodized look and compact size. The case was designed with the traveling examiner in mind. The lid is designed with plenty of storage space and includes an in-case calibrator. The case is made of exceptionally strong, deep-drawn aluminum that resists dent and is dust and weather resistant. (Total weight: 21.5lbs. Dimensions: 13"W x 18"L x 6.5"D).
EXHIBIT "B"
A CLASSIC "LYING" REACTION

PNEUMO TRACINGS

GSR TRACINGS

CARDIO TRACINGS

THE POINT AT WHICH THE SUBJECT ANSWERED A RELEVANT QUESTION.
Office of Technology Assessment 1983 report:

"There is no known physiological response that is unique to deception."
Thus...

Anyone who claims to measure lying ...

... is lying!
# Approaches to Detecting Deception

<table>
<thead>
<tr>
<th>Emotion/Arousal</th>
<th>Memory/Recognition</th>
<th>Other Cognitive Correlates</th>
</tr>
</thead>
<tbody>
<tr>
<td>“The” Polygraph</td>
<td>Guilty Knowledge Test</td>
<td>Response Conflict</td>
</tr>
<tr>
<td>Facial Expression</td>
<td>Autonomic (SCR)</td>
<td>Attention and Memory Load</td>
</tr>
<tr>
<td>Voice Stress</td>
<td>Central (ERP, fMRI?)</td>
<td>Both ERP and fMRI</td>
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<tr>
<td>Facial Blood Flow</td>
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<td>Linguistic Analysis</td>
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<tr>
<td>Thermography</td>
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<tr>
<td>Demeanor</td>
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</tr>
</tbody>
</table>

Note that none detect lying *per se*
The Polygraph Examiner

- Requisite skills
  - Knowledge of test construction
  - Knowledge of the basic psychometric properties of tests: reliability and validity
  - Clinical interviewing skills
  - Knowledge of physiology of the autonomic nervous system
  - Knowledge of autonomic psychophysiological recording, scoring, and interpretation
  - Knowledge of the ethics of administering and reporting the results from psychological tests; limits of interpretation, limits of confidentiality
  - ???

- Training
  - Graduated from professional polygraph training school, which are administered and staffed primarily by professional polygraphers (31 schools accredited by the American Polygraph Association (APA) in the U.S. and Canada)
  - Curriculum spans a minimum 320 hours
What is the Polygraph Test?
Control Question Test (CQT; John Reid, 1947) (for Specific Incidents Investigations)

- Approximately 10 questions

- Relevant Questions
  - address the subject matter under investigation

- Control Questions
  - questions developed by the examiner after a pretest interview with the subject
  - address generally questionable behavior

- At least 3 separate charts (i.e. 3 separate presentations of the set of questions) are administered

- The pretest interview stresses 2 ways to fail test, and that test is infallible
CQT “Theory” (Raskin, 1982)

- Innocent subjects should react with stronger emotion to the *Control* questions since their content are of greater direct concern.

- Guilty subjects should respond with stronger emotion to the *Relevant* questions.

- Comparing the magnitude of the responses (usually skin-resistance) to the control and relevant questions yield a verdict of Guilty, Innocent, or Indeterminate.
“CONTROL” TEST QUESTIONS

- Did you touch Susie between her legs?
- Have you found teen girls attractive? Relevant
- Have you been naked in sight of Susie? “Control”
- Have you lied to try to stay out of trouble?
- Have you viewed pornography?
- Have you fantasized sexually about Susie?
Hypothetically…

Innocent

Guilty

(a)

Respiration

Perspiration

Heart rate

Control question Relevant question (a)

Control question Relevant question (b)
Typical Scoring -- Semiobjective Method

- Each relevant question paired with a "control" item adjacent in the sequence of questioning
  - A score of -1 to -3 is assigned if response to relevant item is (a little, somewhat, clearly) larger than response to control item
  - A score of +1 to +3 is assigned if response to relevant item is (a little, somewhat, clearly) smaller than response to control item
- Separate scores derived for each channel, and scores are summed over charts, channels, and question pairs
  - Total score < -6: DECEPTIVE
  - Total score > +6: TRUTHFUL
  - -5 < Total score > +5: INCONCLUSIVE
Typical Scoring (less than objective method)

- Polygrapher uses a global impressionistic decision-making strategy that incorporates:
  - Case facts
  - Examinee behaviors
  - Polygraph Chart data
  - Examiner's "professional" hunches and impressions
The Importance of Blind Scoring

- Expectancy Effects (the "60 Minutes study")
  - Three polygraph firms each examined four employees accused of theft of a camera (none actually stolen)
  - Without the knowledge of the employees, each polygrapher was told that a different employee was suspected by management
  - In each instance, the suspected employee was deemed guilty (probability by chance = 1.5%)
Validity and Ethical Concerns: Examine the Assumptions

- Assumptions that must be met in order for the CQT to produce valid results:
  - Examiner formulates relevant questions that guilty subjects will answer deceptively (reasonable)
  - Examiner constructs control questions that subjects will answer untruthfully or with some doubt as to their veracity (plausible, but difficult)
  - An innocent person will be more disturbed by the control questions than by the relevant questions (implausible)
  - A guilty person must be more disturbed more by the relevant questions (reasonable)
Roadmap

- Abbreviated History and Overview of the Conventional Polygraph
- Limitations to Conventional Polygraphy
  - The Polygraph Test is especially likely to falsely incriminate the innocent
  - Why polygraphers over-estimate the accuracy of the test
  - No credible scientific exists to support using the Polygraph Test
- Overview of alternatives: Assessing recognition
# The CQT Box Score

<table>
<thead>
<tr>
<th>Study</th>
<th>Guilty</th>
<th>Innocent</th>
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<tbody>
<tr>
<td><strong>Professional Polygrapher's Research</strong></td>
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<tr>
<td>Horvath &amp; Reid (1971)</td>
<td>85</td>
<td>91</td>
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<tr>
<td>Hunter &amp; Ash (1973)</td>
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<td>Slowick &amp; Buckley (1975)</td>
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<td>Wicklander &amp; Junter (1975)</td>
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<tr>
<td>Davidson (1979)</td>
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<td>100</td>
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<tr>
<td>Yankee, Powell, &amp; Newland (1976)</td>
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<td>98</td>
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<tr>
<td><strong>Weighted Total</strong></td>
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<td>94</td>
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<th>Study</th>
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<tr>
<td><strong>Social Scientist's Research</strong></td>
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<td>Barlanda &amp; Raskina (1976)</td>
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<tr>
<td>Horvatha (1977)</td>
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<td>Kleinmuntz &amp; Szucko (1984)</td>
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<tr>
<td>Iacono &amp; Patrick (1988)</td>
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<td>55</td>
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<tr>
<td><strong>Weighted Total</strong></td>
<td>88</td>
<td>57</td>
</tr>
</tbody>
</table>

* is also a trained polygrapher

---

*after Iacono & Patrick, 1997*

**Assessing deception: Polygraph techniques.**

In R. Rogers, Ed., *Clinical Assessment of Malingering and Deception*.

New York: Guilford.
Types of Validity Studies

- **Laboratory**: Mock Crime
- **Field**: Real Life Cases
## Effects of Enhancing Realism in Laboratory Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Group</th>
<th>N</th>
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<th>Innocent</th>
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## Effects of Enhancing Realism in Laboratory Studies

<table>
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<tr>
<th>Study</th>
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<th>% Accuracy</th>
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<tr>
<td></td>
<td>Nonpsychopath</td>
<td>21</td>
<td>91</td>
</tr>
</tbody>
</table>
Problems with Field Studies

- How is ground truth established?
- Judicial verdicts inadequate
  - plea bargains and false convictions
  - evidence not beyond a reasonable doubt
  - judicial verdict may be influenced by outcome of polygraph!

Therefore confessions are used to identify the culpable and to clear the innocent.

- Confessions gathered only after the subject has failed the test, which leads to an unfortunate selection bias
Roadmap

- Abbreviated History and Overview of the Conventional Polygraph
- Limitations to Conventional Polygraphy
  - The Polygraph Test is especially likely to falsely incriminate the innocent
  - Why polygraphers over-estimate the accuracy of the test
- No credible scientific exists to support using the Polygraph Test
- Overview of alternatives: Assessing recognition
Why Using Confessions Overestimates Accuracy

In Fact Guilty

- Passed Polygraph
  - No Confession
    - Not Selected (False Negative) 0%
  - Confession
    - Selected (True Positive) 100%

- Failed Polygraph
  - No Confession
    - Not Selected (Unverified True Positive) 0%

In Fact Innocent

- Passed Polygraph
  - Confession
    - Selected (True Negative) 100%

- Failed Polygraph
  - No Confession
    - Not Selected (False Positive) 0%
Feedback Polygraphers Receive

In Fact Guilty

Passed Polygraph

No Confession

Not Selected (False Negative) 0%

Failed Polygraph

No Confession

Not Selected (Unverified True Positive) 0%

Confession

Selected (True Positive) 100%

In Fact Innocent

Passed Polygraph

Confession of another accused

Selected (True Negative) 100%

Failed Polygraph

No Confession

100% of those who confess failed the polygraph!

100% of those who are exonerrated by another person’s confession passed the polygraph!
Screening Tests

- Because these tests have much higher false positive rates than false negative rates, they should not be used in instances where most folks are innocent.

<table>
<thead>
<tr>
<th>Test</th>
<th>Verdict</th>
<th>Actual</th>
<th>Guilty</th>
<th>Not Guilty</th>
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<tr>
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<td>1</td>
<td>10</td>
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<tr>
<td>Not Guilty</td>
<td>40</td>
<td>50</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

Total correct verdicts = 59%
Probability a guilty verdict is correct: 18.4%
Implications

- If most accused folks are not culpable, a very large number of False-Positives will result.
- Impact of False-Positives on the accused and the family.
- Cumulative risk of False-Positives with Maintenance Polygraph Tests is substantial (and no evidence to suggest that maintenance polygraphs are effective, Meijer et al. 2008, Int J Law Psych).
- Countermeasures can reduce True Positive rate.
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NRC (2003) Key Conclusions

- “What is remarkable, given the large body of relevant research, is that claims about the accuracy of the polygraph made today parallel those made throughout the history of the polygraph: practitioners have always claimed extremely high levels of accuracy, and these claims have rarely been reflected in empirical research.”

- “Almost a century of research in scientific psychology and physiology provides little basis for the expectation that a polygraph test could have extremely high accuracy.”
“Meta-Analytic Survey” by APA

- Ad-hoc Committee (Mike Gougler, Raymond Nelson, Mark Handler, Donald Krapohl, Pam Shaw, Leonard Bierman)

- Scope:
  - 45 samples (majority in *Polygraph*, many by Raymond Nelson)
  - 295 scorers
  - 11,737 examinations

- Omnibus accuracy 86.9% (23.5% inconclusive)

- No break-down of false-positive & false-negative

- Critical admission:
  
  - “Real world confirmation data are selective … and confirmed cases more often may have correct PDD results than do unconfirmed cases. As a result, field studies may overestimate PDD decision accuracy to some degree.”
To strategically plan for and ensure our survival in the years ahead, the APA has been implementing initiatives...

We are at a great time in polygraph history and we can be proud of the steps we are taking to move our profession forward.

Specific incident polygraph tests can discriminate lying from truth telling at rates well above chance, though well below perfection. Polygraph accuracy for screening purposes is almost certainly lower than what can be achieved by specific incident polygraph tests in the field.
Detour

- How I got involved in expert testimony
Syllabus addendum

Notification of Objectionable Materials:

This course will contain material of a mature nature, which may include explicit language or discussion of sexual situations, and/or violence. The instructor will provide advance notice when such materials will be used. Students are not automatically excused from interacting with such materials, but they are encouraged to speak with the instructor to voice concerns and to provide feedback.
Cases involving Sexual Misconduct

Allegations of sexual misconduct in domestic relations cases

- Typically custody cases
- One parent accuses other of sexual misconduct with a child

Psychological evaluation ensues

- Clinical interview
- Review of collateral information
- Polygraph test
- Personality Assessment Inventory
- Millon Clinical Multi-Axial Inv. III
- Multiphasic Sex Inventory II
- Abel & Becker Sexual Interest Card Sort
- Shipley Inst. Of Living Scale
Cases involving Sexual Misconduct

- Allegations of sexual misconduct in domestic relations cases
  - If a parent is deemed to be a risk - correctly or incorrectly - two statues may impose limits
    - ARS25 403.05 would prohibit awarding that parent sole or joint physical or legal custody
    - ARS25 408 (H1) may further limit the extent and nature of parenting time allowed
  - Thus the evaluation has a pivotal role
Cases involving Sexual Misconduct

- Sex offender monitoring
  - Maintenance Polygraphs
Never Trust the Polygraph
By John J.B. Allen, Ph.D., Distinguished Professor of Psychology, University of Arizona

Editor’s Note: This article is abridged with author’s permission.

Although polygraph tests are seldom admitted in court, their use influences cases when the results are part of the evaluation process in domains such as child custody, dependency and sexual misconduct. In such cases, the polygraph test may be part of a larger assessment to identify whether a parent poses a significant risk to a child. It is important that these assessments be accurate, as failure to identify a risk endangers children but false identification needlessly damages fundamental relationships. In cases where a parent is deemed to be a risk – correctly or incorrectly – ARS25–403.05 would prohibit awarding that parent legal decision-making, and ARS25–408 (H) (1) can limit the extent and nature of parenting time.

The idea of detecting lies with technology is appealing, perhaps because humans are notoriously poor at detecting deception. (1) Unfortunately, anyone who promises to accurately detect lying ... is lying. Why? There is no unique physiological response(s) associated with lying (2). The polygraph cannot assess lying per se, but instead assesses emotion that can arise when specific questions are asked. As such, a verdict of “guilty” or “lying” from a polygraph is best interpreted as “emotionally aroused” or “anxious.” Many innocent individuals are nervous or fearful when a polygrapher asks about sexual misconduct or other behavior that can restrict their parenting time. It is no surprise that the test is highly likely to misidentify innocent people as deceptive, misidentifying 40-50% of innocent individuals as culpable (2, 3) (false positives). Likewise, information about countermeasures is easily obtained (e.g., antipolygraph.org) and can create false negatives among dangerous individuals.

The test referred to as “The Polygraph” uses some variant of the Control Question Technique (CQT). A CQT involves about 10 questions, which fall into two categories. Relevant questions inquire about specific details (e.g., “Did you touch the child between the legs?”). Control questions inquire about questionable behavior but they do not directly accuse (e.g., “Do you find teenage girls attractive?”). Although examinees are not told the distinction between the questions, they are led to believe (falsely) that there are two ways to fail the test: 1) they can fail the relevant questions, in which case they are guilty; or 2) they can fail the control questions, in which case they appear capable of committing the crime. Thus, it is assumed they will deny both questions, and it is further assumed that for the guilty, relevant questions will be of greater concern and elicit larger physiological responses (a reasonable assumption). It is further assumed (unreasonably) that for innocent, control questions will be of greater concern and thus elicit a larger response than the relevant questions. Examinees that have sufficiently larger responses to relevant questions are deemed deceptive; examinees with larger responses to control questions are deemed innocent. For cases where relevant and control responses are similar, an “indeterminate” outcome is reported, which occurs in 5-20% of examinations.

A comprehensive scientific review by the National Research Council (NRC) of the National Academy of Sciences (2) found that the polygraph test suffers from acceptably low accuracy. The NRC committee held public hearings, visited government polygraph facilities, accessed unpublished government reports, including classified material, and produced a comprehensive volume that is available for free at www.nap.edu/catalog.php?record_id=10420. More recently, an ad-hoc committee of the American Polygraph Association published a survey of field polygraph results (4), including more than 45 published samples and 11,000 examinations, and reported overall accuracy of 86.9%, but only after excluding 23.5% of cases with indeterminate verdicts. Unfortunately, more than half the samples came from articles of the lead investigator, and all suffered from the inherent selection bias: to wit, cases selected for inclusion in a field study are biased in favor of demonstrating accuracy because the associated confessions are not independent but a consequence of the polygraph exam. This problem is widely known, and referenced in the executive summary written by this ad-hoc committee of the American Polygraph Association (4).
The Case

Child Custody Case
Psychological Evaluation: 39 page report

Highlights
- Ex-wife accuses defendant of touching daughter, first time at age 2
- History of domestic disputes with police dispatch (but no arrests)
- History of calls to CPS (but no action taken)
- History of parental drug abuse
- Court found “serious credibility issues with both parents”
The Case

Child Custody Case

Psychological Evaluation: 39 page report

Highlights

- As daughter becomes capable of verbal reporting, she reports inconsistent information concerning
  - Who touched her
  - Where she was touched

- Comprehensive risk assessment could not determine whether nor by whom she was touched

- Defendant took three polygraphs over 1 year span
The Case

Child Custody Case

Polygraph #1

“Have you ever put your fingers into Susie’s bare vagina, even a little other (sic) cleaning her as a small child?”

“Did you lie to me when you said you never put any of your fingers into Susie’s vagina, even a little, other than cleaning her as a small child?”

Verdict: Not Deceptive
The Case

- Child Custody Case
- Polygraph #2

Verdict: Not Deceptive
The Case

- Child Custody Case
- Polygraph #3

Verdict: Deceptive
The Case

Child Custody Case

My report
- Overview of Polygraph CIT procedure and logic
- Scientific opinion of the Polygraph
- Scientific research on the polygraph
- NRC Report (and comment on APA report)
- Specific comment on false positive and true positive rates
<table>
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<th>q for formula</th>
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<tr>
<td>Poly 2:</td>
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<td>Poly 3:</td>
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*Polygraph quality review questioned this test

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<td>0.88</td>
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**Probability that Mr. [Redacted] is Actually Being Deceptive given outcomes of Polygraph Examinations**
The Case

Child Custody Case

My report

- Overview of Polygraph CIT procedure and logic
- Scientific opinion of the Polygraph
- Scientific research on the polygraph
- NRC Report (and comment on APA report)
- Specific comment on false positive and true positive rates
- Specific comment about relevant items
Figure 1. Valence and arousal ratings for 1032 emotional words, with the ratings for “Vagina” shown in red. Ratings are from male research participants (Affective Norms for English Words [ANEW]; Bradley and Lang, 1999, Technical Report C-1, University of Florida). Valence is rated from 1 to 9 (unpleasant to pleasant) and arousal is rated from 1 to 9 (calm to arousing).
End of Detour
Roadmap

- Abbreviated History and Overview of the Conventional Polygraph
- Limitations to Conventional Polygraphy
  - The Polygraph Test is especially likely to falsely incriminate the innocent
  - Why polygraphers over-estimate the accuracy of the test
  - No credible scientific exists to support using the Polygraph Test
- Overview of alternatives: Assessing recognition
The GKT as an alternative to Traditional Polygraph Procedures

- Guilty Knowledge Test (GKT)
- Devised by Lykken (1959)
- Sometimes termed Concealed Information Test (CIT)
- Can utilize Skin Conductance or other measures (e.g. Event-Related Brain Potentials)
Guilty Knowledge Test (GKT)

- The GKT does not assess lying as indexed by fear of being detected, but probes for guilt as indexed by recognition.
- A series of questions is devised, each having several alternatives, only one of which is true about the crime in question.
- Chances of an innocent person looking guilty on a 10-item GKT are $1/5^{10}$. 
Assessing Recognition: For Specific Incidents Investigations

- Used when information about a crime or event is available that only a real culprit would know
- Series of questions constructed, only one of which has correct critical detail

Regarding the abduction location, do you know for sure it was…
1. ... at a Toy Store?
2. ... at a Shopping Mall?
3. ... at a City Park?
4. ... at a Friend’s House?
5. ... at School?
6. ... at a Restaurant?

Other questions about
- Time abductee taken
- Clothing worn
- etc. for 6-10 questions

- Subject instructed to answer "no" to each item, so that if guilty, subject would be lying to the critical item.
- Critical item never positioned at beginning.
- A consistent peak of physiological response on one critical alternative suggests guilt.
# GKT Accuracy: Lab Studies

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GKT – Box Score, and Concerns

- Superior to CQT, especially in protecting the innocent
- Resistance to use among those in the polygraph community
  - Concern about applicability, especially in high profile cases
  - The GKT for OJ
- Despite limitations of CQT, may have utility for eliciting confessions
- Over 5,000 GKT tests given in Japan each year, for example
Synopsis

- There is no unequivocal lie response
- Polygraphy:
  - assesses emotional reactions
  - has an unacceptably high false-positive rate
  - Is vulnerable to countermeasures that can reduce true-positive rate
- Polygraphers overestimate accuracy due to how cases are selected for inclusion in studies
- Assessing recognition may prove more accurate, but potentially less widely applicable
- Polygraphs are useful for eliciting admissions and confessions; i.e. “scare the hell out of people”
If proponents wish to convince the scientific community of the merits of polygraph lie detection, I submit that they will have to develop a more convincing case than the one currently on offer. Their case must be founded on studies which include the necessary controls for nonpolygraphic sources of information, that is, studies which compare the accuracy of assessments derived from case-file material and the subject's demeanor during questioning with that based on these sources plus the polygraphic record. I strongly suggest that such studies would confirm what the available data suggest: that polygraph lie detection adds nothing positive to conventional approaches to interrogation and assessment.

Carrol, 1988
If I announce to my scientific colleagues that I have invented a new test that can identify schizophrenia with 90% or 95% accuracy, my colleagues will be interested -- but skeptical. I would be expected to support my assertion with experimental evidence and that evidence would be very critically examined. Even if my proofs withstood such scrutiny, many would reserve judgment until an independent investigator had confirmed my findings. All this skepticism about a claim that I can distinguish "crazy people" from normal ones! The tools of the psychologist are not precision instruments; really high accuracy is seldom achieved. Skepticism is appropriate. Nevertheless, when the polygrapher announces that his psychological test can separate liars from the truthful with a validity of 90%, or 95%, or even 99%, the typical reaction is a kind of marveling acceptance. The critic who questions these claims is greeted with surprise and skepticism. Nearly every American has heard of the lie detector; without really knowing what is involved, many assume that it is nearly infallible. So deeply ingrained is this mystique that, gradually over the last 50 years, the burden of proof has somehow shifted to the critic.

Lykken, in *A Tremor in the Blood*, 1981
Unfortunately, the minute a small handful of psychologists -- one or two pseudo-knowledgeable and one or two completely ignorant of what they were even trying to do -- got into the picture, two expressions, "false positive" and "false negative", came to light. It appears that some people turn out to be weird ducks. Sadly, when that type of inquirer doesn't understand something, he is usually prone to attach strange names to it under the guise of professionalism or scientific exploration on both sides of the same coin. By confusing other people more so than himself he feels he can still call himself an "expert." Those two phrases appeared in a tumor in the brain [sic]. Before then, they had never existed in polygraph language. In all sincerely, however, foul ball psychologists are few and far between.

Ferguson, in *Preemployment Polygraphy*, 1984