

Psychophysiology and The Art of Detecting Deception

Psychophysiology and Fraud Detection

- Fraud-related deception elicits measurable autonomic and behavioral responses mediated by sympathetic nervous system activation.
 - Interview-based fraud examinations provide ecologically valid contexts for observing stress-induced psychophysiological leakage.
 - This presentation integrates behavioral indicators with empirical psychophysiology research to inform investigative practice.

Conceptual Framework: Psychophysiology

- Psychophysiology examines bidirectional relationships between cognitive-emotional processes and physiological systems.
 - Deception increases cognitive load, emotional regulation demands, and threat appraisal, amplifying autonomic arousal.
 - Observable behaviors (e.g., gesture, respiration, vocal pitch) often represent peripheral manifestations of central stress activation.

Autonomic Nervous System and Deception

- Sympathetic activation (fight or flight – lizard brain) triggers cardiovascular acceleration, vasoconstriction, and respiratory modulation.
 - Parasympathetic withdrawal (inability to relax) reduces vocal stability and increases physiological variability.
 - These shifts occur rapidly during evaluative threat, particularly when individuals fear detection or reputational damage (odd laughing/high pitch).

What this
looks/sounds like?

Chris Watts murdered his pregnant wife, Shanann Watts, and their two young daughters in Colorado in August 2018, initially reporting them missing before later confessing to the killings.



Cognitive Load Theory and Fraud Interviews

- Fabrication requires working memory allocation to narrative construction and consistency maintenance.
 - Simultaneous impression management increases executive control demands and behavioral suppression.
 - Elevated load is associated with increased speech disfluencies, blink rate variability, and motor leakage (involuntary physical behaviors).

Univ. of Illinois doctoral student charged in the slaying of a visiting Chinese scholar trembled when confronted with inconsistencies in his story



Manual and Upper-Body Leakage

- Increased bilateral gesturing reflects cognitive effort and narrative construction strain.
 - Palm withdrawal or blocking gestures may indicate defensive withholding under evaluative threat.
 - Hand-to-face movements correlate with self-regulatory attempts to inhibit disclosure.
 - Self massage (arms, neck, face, etc.)
 - Fetal position micro presentations

Jodi Arias accused and convicted of killing her boyfriend.



Orofacial Regulation and Emotional Suppression

- Lip compression (**monkey face**) and lip rolling are associated with emotional inhibition and speech suppression.
 - Micro-tension in perioral musculature (**mouth muscles**) reflects attempts to regulate affective expression.
 - Sudden pallor or facial perspiration may indicate vasomotor response linked to acute stress.

Lance Armstrong accused of taking performance enhancing drugs.



Ocular and Visual Indicators

- **Blink rate** often increases with cognitive load and stress reactivity.
 - **Overcompensated eye contact** may represent impression-management strategy rather than honesty.
 - Pupil dilation has been associated with heightened arousal and evaluative threat perception.

Prince Andrew accused of participating in child trafficking

BBC NEWS NIGHT

SUBSCRIBE



Vocal and Paralinguistic Markers

- Sympathetic activation tightens laryngeal musculature, elevating vocal pitch and instability.
 - Increased throat clearing, **disappearing lips**, **laughing**, may reflect vagal tension and dryness under stress.
 - Prosodic irregularities (e.g., pitch variability, loudness escalation) correlate with defensive responding.

Lance under duress, look for stress markers



Respiratory and Postural Responses

- Acute stress often produces shallow or exaggerated respiratory cycles.
 - Thoracic elevation and breath holding may accompany high-stakes questioning.
 - Rigid posture reflects a freeze response consistent with defensive immobility.

Deep breaths under stress



Speech Content and Structure

- Repetition and reinforcement phrases function as cognitive stalling mechanisms.
 - Filler words increase under heightened working memory demands (**can provoke voice shifting**).
 - Latency between question and response may signal internal conflict or fabrication.
 - **Nodding yes and shaking no**, and the inverse (**cross signaling**) – if you've been paying attention we've already seen this before.

Holmes cross signaling and voice shifting



Cluster-Based Interpretation

- Remember that single behavioral cues lack sufficient specificity for deception inference.
 - Baseline comparison is essential to differentiate trait anxiety from state-induced arousal.
 - Temporal clustering of multiple indicators increases inferential reliability.

Application to Fraud Examination

- So when interviewing establish behavioral baseline during neutral questioning prior to allegation-based inquiry.
 - Introduce strategically sequenced questions to elevate cognitive and emotional load.
 - Observe synchronous deviations across behavioral channels during critical disclosures.

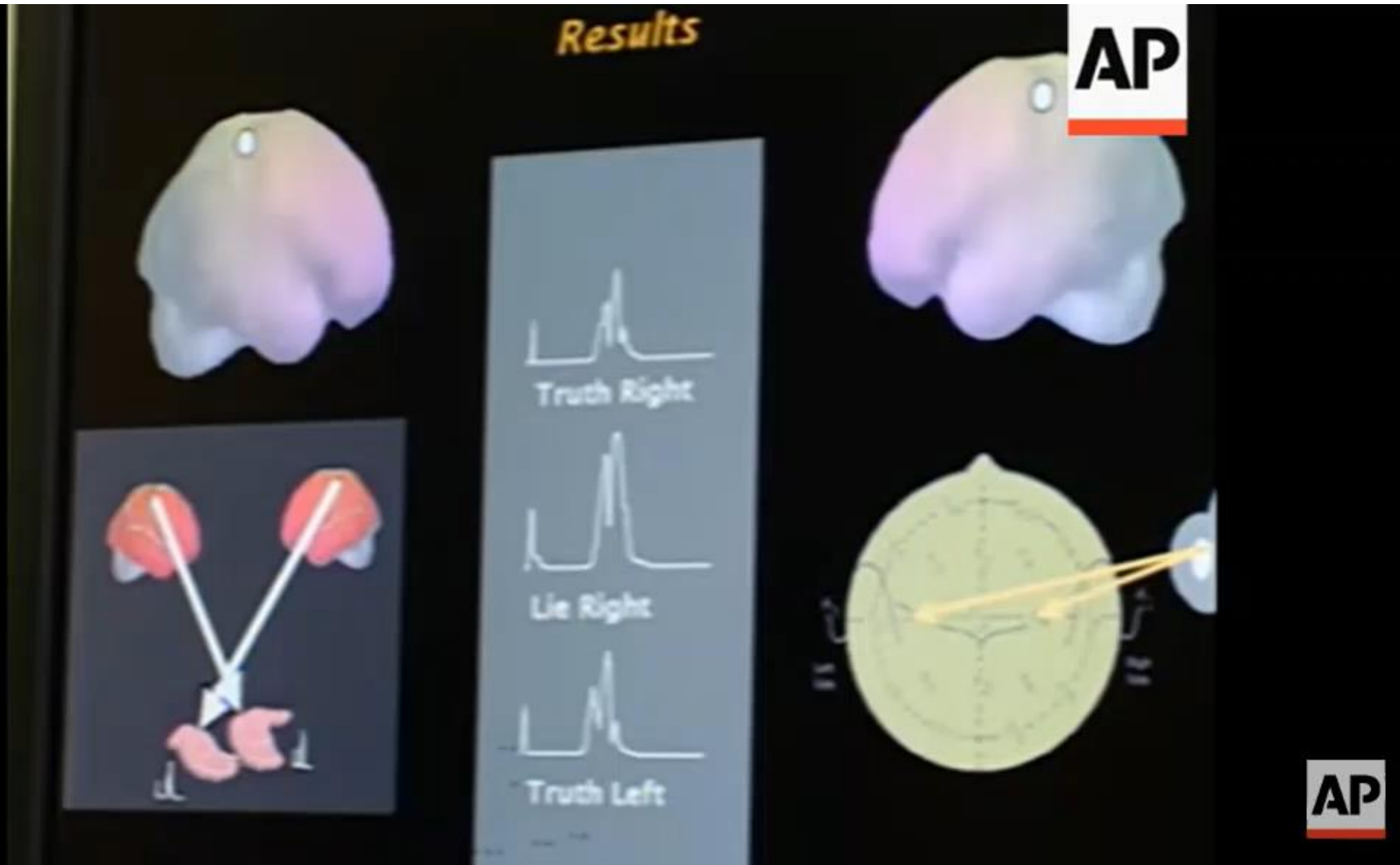
Limitations and False Positive Risk

- Anxiety, cultural display rules, and neurodivergence may mimic deception-related cues.
 - Physiological arousal reflects stress, not necessarily dishonesty.
 - Behavioral indicators must be corroborated with documentary and transactional evidence.

Neuroimaging and Laboratory Findings

- Functional neuroimaging studies implicate prefrontal and anterior cingulate activation during deception.
 - Laboratory paradigms show increased executive control demands in deceptive responding.
 - Ecological validity remains limited, necessitating caution when extrapolating to field interviews.

fMRI can detect lying



Emerging Technologies and Ethical Considerations

- AI-driven facial coding and voice stress analysis attempt to quantify micro-level behavioral variance (pupil dilation, micro expressions, voice hesitancy/pitch, blink rate, etc.)
 - Wearable biometric devices measure heart rate variability and electrodermal activity during interviews.
 - Automation bias and due process concerns require strong governance and validation frameworks.

Final exam, lying or
telling the truth?

**Amanda Knox accused of killing her
roommate in Italy**



#NIGHTLINE



References

- Ekman, P. (2001). Emotions Revealed.
 - Vrij, A. (2008). Detecting Lies and Deceit: Pitfalls and Opportunities.
 - National Research Council (2003). The Polygraph and Lie Detection.
- National Research Council (2003) – Polygraph and Lie Detection
 - Spence et al. (2001) – Neuroimaging of deception
 - Kassin et al. (2010) – False confessions and interrogation risk