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<https://doi.org/10.31749/2380-0550-EP2026-1-04>

Respiratory Hyperawareness in Polygraph Evaluations: A Psychophysiological Analysis and Critical Appraisal

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Abstract

Breathing is a unique bodily function controlled both automatically by the brainstem and voluntarily by conscious thought. When individuals become overly aware of their breathing—a phenomenon called respiratory hyperawareness—this dual control system becomes disrupted, leading to irregular breathing patterns. This paper examines how respiratory hyperawareness affects polygraph testing accuracy and proposes evidence-based solutions to minimize measurement contamination.

During polygraph evaluations, examiners often mention breathing mechanics or instruct examinees to “breathe normally.” However, these well-intentioned instructions paradoxically trigger hyperawareness, causing examinees to consciously monitor an otherwise automatic process. This conscious attention activates brain regions responsible for processing internal bodily sensations, particularly the insular cortex, and creates competition between voluntary cortical control and automatic brainstem regulation. The resulting breathing irregularities—changes in

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rhythm, depth, and rate—cascade into cardiovascular responses that polygraph instruments record as potential indicators of deception, even when no deception exists.

Drawing on established theories including ironic process theory and interoceptive processing frameworks, this analysis reveals how attentional focus on breathing amplifies bodily sensations and anxiety, particularly in individuals already prone to heightened internal awareness. The paper critically evaluates current polygraph practices, identifying significant gaps in empirical validation and standardized measurement protocols.

To address these limitations, this work recommends adopting the orienting reflex framework, implementing objective respiratory line excursion or line length measurements available through modern instrumentation, and utilizing a “silent answer test” baseline protocol with nonsensical questions. These evidence-based modifications can establish uncontaminated physiological baselines and improve credibility assessment accuracy. Ultimately, advancing polygraph methodology requires moving beyond traditional training dogma toward scientifically validated, standardized practices grounded in psychophysiological research.

Key words: respiratory hyperawareness, interoception, dysfunctional breathing, attentional bias, autonomic nervous system, polygraph evaluation, psychophysiology, respiratory control

Introduction

The connection between conscious attention, bodily awareness, and automatic physical processes is a critical area of study, offering profound insights into both physical assessments and the mind-body connection. While breathing is primarily controlled automatically by the brainstem, we can also control it voluntarily, placing it uniquely between automatic and conscious physical functions (Paulus, 2013; Van Diest, 2019). When a person pays too much attention to their breathing, it disrupts this automatic control—a condition known as respiratory hyperawareness (Sardinha et al., 2009; Vidotto et al., 2018). This issue is relevant to conditions like panic disorder and anxiety, as well as specific settings like polygraph evaluations (Sardinha et al., 2009; Vidotto et al., 2018). The reasons behind this involve a complex mix of how we process internal bodily signals, where we focus our mental energy, and the spectrum of voluntary versus involuntary breathing control (Ritz et al., 2024; Weng et al., 2021).

Some examiners look at this phenomenon during polygraph exams, arguing that simply talking about breathing mechanics may accidentally trigger hyperawareness, which then corrupts the physiological measurements. This highlights a largely unexplored crossover between physical psychology and forensic testing. This structured review of the subject will analyze polygraph ideas against established scientific literature.

2. Core Thesis and Theoretical Framework

2.1. *Central Hypothesis*

for many polygraph practitioners, the main hypothesis is that explicitly mentioning breathing before a polygraph test causes examinees to become hyper-aware of their breathing, fundamentally altering their natural breathing rhythm. Whether the examiner is explaining the equipment, telling the person to „breathe normally,” or trying to fix a measurement issue, drawing attention to breathing makes it a conscious effort rather than an automatic one. This leads to changes in breathing speed, depth, and regularity (Vidotto et al., 2018). This idea makes sense when looking at „ironic process theory” (Wegner, 1994), which suggests that explicitly trying to control or normalize a behavior often makes us focus on it more, disrupting its natural execution. In terms of breathing, this creates a feedback loop where increased attention amplifies bodily sensations, which further disrupts natural breathing patterns (Paulus, 2013).

2.2. *Conceptual Foundations*

The framework relies on a few established concepts. First is “interoception,” which is how we perceive our internal physical states. When we focus our attention inward, the brain processes these signals and compares them to what it expects to feel (Khalsa et al., 2018; Pinna & Edwards, 2020). Second, polygraph practitioners are frequently taught that our breathing patterns are deeply connected to our autonomic nervous system, influencing both heart rate and stress responses. Variations in heart rate that sync with breathing (respiratory sinus arrhythmia) are key indicators of our nervous system’s flexibility (Sperry et al., 2018). Irregular breathing can cascade into cardiovascular changes, potentially ruining polygraph readings that track multiple physical responses simultaneously. Finally, the framework looks at attentional bias, showing that people with high anxiety tend to focus heavily on their internal body signals, including their breathing (Rossignol et al., 2016). This creates a hypervigilant cycle, where focusing on breathing amplifies any perceived irregularities, leading to more anxiety and further breathing disruption (Van Diest, 2019).

2.3. Theoretical Positioning

Some polygraph practitioners contact polygraph-induced hyperawareness to functional respiratory disorders—conditions where people experience breathing symptoms without an underlying physical disease (Vidotto et al., 2018). These conditions share the common feature of heightened breathing awareness and disrupted natural regulation (Sardinha et al., 2009). By drawing this connection, the polygraph profession builds a strong theoretical bridge between forensic testing and the broader study of breathing dysfunction.

3. Critical Analysis: Strengths and Limitations

3.1. Strengths of the Arguments

Polygraph practice has demonstrated difficulty identifying a real-world problem within polygraph testing, an area that has not deeply explored how psychological factors cause measurement errors (Khalsa et al., 2018). Research supports the idea that breathing is highly sensitive to psychological states like attention and expectation (Lapidus et al., 2020; Paulus, 2013). Recognizing that an examiner's words can accidentally change a subject's physical state shows a nuanced understanding of the testing environment.

Additionally, some polygraph literature blends cognitive psychology (how we focus our attention) with biology (how the brainstem controls breathing), avoiding the trap of looking at the issue through only one lens (Ritz et al., 2024). Brain imaging and physical studies consistently show that focusing on breathing alters how we breathe (Van Diest, 2019; Vidotto et al., 2018; Weng et al., 2021). A highly practical recommendation: examiners should minimize explicit references to breathing during the setup phase (Meckley, 2013). Finally, it accurately describes this hyper-awareness as a temporary state that fades once attention is redirected, which is supported by behavioral research (Vidotto et al., 2018).

3.2. Limitations and Weaknesses

A significant weakness found in literature produced by the polygraph profession is its complete lack of experimental data or statistical analysis to back up its claims (Khalsa et al., 2018). Given that polygraph results carry heavy legal consequenc-

es, claims about testing validity require strong empirical proof (Paulus, 2013). Without this, the recommendations cannot be immediately applied to practice.

As practitioners, our mentors have failed to explain exactly *how* these physical and mental processes interact to cause hyperawareness, ignoring specific neural pathways identified in modern research (Ritz et al., 2024; Weng et al., 2021). Seldom does the polygraph literature explore how individual differences—like a person’s natural anxiety levels or bodily sensitivity—might make them more or less susceptible to this and other phenomenon (Rossignol et al., 2016; Snell, 2019). Furthermore, it does not deeply engage with existing research on bodily awareness or breathing disorders (Van Diest, 2019; Vidotto et al., 2018). Lastly, research created by the polygraph profession is too often methodologically vague; it doesn’t clearly explain how researchers could measure respiratory activity, such as hyperawareness or separate it from other forms of stress during a test (Meckley, 2013). It treats all individuals as reacting identically, which contradicts the substantial individual differences well documented in the literature (Lapidus et al., 2020; Sperry et al., 2018).

4. Key Psychophysiological Mechanisms

4.1. *Interoceptive Processing and Respiratory Awareness*

Being aware of our internal body signals (interoception) is vital for emotional regulation and mental health (Khalsa et al., 2018; Pinna & Edwards, 2020). For breathing, this means interpreting signals from our lungs, muscles, and blood oxygen levels (Van Diest, 2019). Our brains constantly predict how our bodies should feel; when the actual feeling doesn’t match the prediction, we become consciously aware of it (Paulus, 2013). If an examiner draws attention to breathing, the person’s brain becomes hyper-sensitive to these signals, making normal breaths feel unusual. Studies show that people who are highly sensitive to their bodies have stronger physical reactions to stress (Lapidus et al., 2020), and focusing on breathing naturally increases awareness of it (Vidotto et al., 2018). Brain imaging points to the right anterior insular cortex as a key area that connects this awareness to feelings of discomfort (Weng et al., 2021).

4.2. Attentional Bias and Cognitive Monitoring

People with anxiety disorders tend to obsess over their bodily signals, leading them to misinterpret normal sensations as dangerous (Rossignol et al., 2016; Van Diest, 2019). Consciously monitoring a normally automatic skill actually makes us worse at it, which explains why instructions to “breathe normally” often makes breathing erratic (Paulus, 2013; Vidotto et al., 2018). This disruption happens because conscious processing competes with automatic brainstem control.

4.3. Autonomic Nervous System Involvement

Because breathing is tied to heart rate and stress levels, disrupting it can trigger hyperventilation, lower blood carbon dioxide, and cause a spike in anxiety and physical arousal (Kyriakoulis & Kyrios, 2023; Perna et al., 2004; Sperry et al., 2018). This may mimic the exact physical signs of deception that polygraph practitioners look for, confusing test results.

4.4. Voluntary Versus Involuntary Respiratory Control

This interference occurs because the conscious part of our brain (the cortex) competes with the automatic part (the brainstem) for control over our breath (Ritz et al., 2024; Weng et al., 2021). Drawing attention to breathing engages the voluntary control network, producing the exact breathing irregularities that polygraph examiners view as indicative of deception (Prado et al., 2017; see also, Weng et al., 2021).

5. An Applied Remedy

Historically, the polygraph profession has been hesitant to embrace established scientific explanations for the physiological responses recorded during assessments. However, regardless of the specific polygraph paradigm employed, these recorded responses are fundamentally the result of a well-documented physiological phenomenon known as the orienting reflex (OR). Decades of rigorous research have examined how the OR influences the physiological parameters measured during polygraph examinations (Barry, 2006, 2009; Palmatier & Rovner, 2015a, 2015b).

Regarding respiration specifically, the relevant phenomenon is known as the respiratory pause. Traditionally, polygraph practitioners are trained to evaluate respiratory responses using a subjective feature assessment to assign categorical scores—a quali-

tative practice dating back to 1963. In contrast, both academic and applied scientists have long quantified this respiratory pause objectively as respiratory line excursion (Kircher & Raskin, 2002) or respiratory line length (Timm, 1982). Currently, it appears that only the Limestone Technologies Paragon and ParagonX instruments (Lafayette Instrument, n.d.) provide these objective measures as a metric, achieving accuracy up to 1/10,000 of a millimeter.

To improve the assessment of credibility, practitioners should conduct the initial physiological recording using a “silent answer test” comprising nonsensical questions (e.g., “Are there 12 months in a year?”, “Are there 7 days in a week?”, or “Does the sun shine at night?”). This initial test is presented to the examinee simply as an opportunity to become acquainted with the testing procedure. During this phase, the examinee is instructed not to answer any questions verbally and, if they prefer, to not even formulate an answer mentally. Their only instruction is to remain still and acclimate to the environment (i.e., “do not move, do not take deep breaths, and do not hold your breath”). Because of the mundane nature of this practice test, the resulting physiological data serves as an excellent, uncontaminated baseline for comparison with subsequent recordings.

Finally, when an examiner utilizes an instrument capable of precise respiratory line measurements, the OR can reliably distinguish which question is most salient to the examinee. This is typically indicated by a shorter measurement, whether it is a relevant or comparison question. Crucially, this physiological discrimination remains accurate even if the examinee consciously attempts to manipulate or alter their breathing patterns.

7. Conclusion

Understanding respiratory dynamics provides crucial insight into the field, particularly by highlighting how breathing hyperawareness can compromise polygraph accuracy. While psychological and physiological sciences have firmly established the connections between bodily awareness, anxiety, and conscious respiratory control, polygraph practitioners’ understanding of these issues will remain largely theoretical without concrete data, standardized measurements, and a deeper engagement with existing research.

The established scientific literature clearly demonstrates that drawing an examinee’s attention to their breathing disrupts its natural rhythm, triggering physiological stress responses that can easily be misread as deception. Moving forward, the field

must prioritize a comprehensive understanding of the orienting reflex and conduct controlled, empirical studies to evaluate these phenomena in testing environments. To advance as a discipline, the polygraph profession must champion the development of instruments that yield scientifically validated measures and adopt methodologies that are scientifically defensible—moving away from dogmatic practices traditionally used to train new examiners. Embracing these evidence-based efforts will substantially improve the accuracy of polygraph testing and deepen our understanding of how bodily awareness impacts physiological assessments.

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