Open Minds

Internacional Journal

ISSN 2675-5157 vol. 1, n. 2, 2025

ARTICLE 6

Acceptance date: 28/10/2025

NEUROBUSINESS: GUILT CAN BE AN EXERCISE IN DECISION-MAKING

Fabiano de Abreu Agrela Rodrigues
Post-PhD in Neuroscience, spec. Genomics
Heraclitus Research and Analysis Center (CPAH), Department of Neuroscience and Genomics, Brazil & Portugal
https://orcid.org/0000-0002-5487-5852

Adriel Pereira da Silva
Bachelor in Physics
Heraclitus Research and Analysis Center (CPAH), Department of Physics, Brazil & Portugal
https://orcid.org/0009-0003-1157-8318

Luiz Felipe Carvalho
Orthopedic Physician, Master in Neuroscience
Heraclitus Research and Analysis Center (CPAH), Department of Neuroscience and Genomics, Brazil & Portugal
https://orcid.org/0000-0002-5487-5852

André Di Francesco Longo
Master in Economics, Bachelor of Laws
Heraclitus Research and Analysis Center (CPAH), Department of Legal Research, Brazil & Portugal
https://orcid.org/0009-0001-0641-6862

Lincol Nunes Cruz
Bachelor in Philosophy and Psychoanalyst
Heraclitus Research and Analysis Center (CPAH), Department of Philosophy, Brazil & Portugal
https://orcid.org/0009-0008-7916-4062

Marco Aurélio Brocolli Lima
Bachelor in Administration specialized in Neurobusiness
Heraclitus Research and Analysis Center (CPAH), Department of Neurobusiness, Brazil & Portugal
http://lattes.cnpq.br/1129065074894512

Abstract: Life is inherently challenging, and we are often unprepared for its difficulties. Recognizing that suffering results from our own actions is essential to avoid a victim mentality, which can alter brain morphology and lead to inertia. This article explores the concept of self-confidence and personal responsibility as exercises in neuroplasticity in the frontal lobe. Reflecting on one's own guilt promotes humility and continuous development, crucial elements in both personal life and the corporate environment. Neurobusiness and metacognition are addressed as tools to improve decision-making and self-development, using neurolinguistic techniques and professional assessments. The functions of different regions of the prefrontal cortex and the neurotransmitters involved will be discussed, as well as techniques for identifying victimization behaviors and their relationships with mental disorders and personality traits. The goal is to provide applicable solutions for the comprehensive and effective development of individuals in various contexts.

Keywords: Neuroplasticity, Metacognition, Prefrontal Cortex, Neurobusiness, Self-Confidence, Decision Making.

Introduction

Life, in its essence, is not easy for anyone, and no one warned us about its difficulties. However, we must first recognize that all suffering is the result of our own actions. Thus, avoiding the victim position is an exercise for the frontal region of the brain, enabling us to make decisions in search of solutions, instead of settling into inertia, which leads us to not act to reverse situations. It is in stagnation and acceptance that we gradually alter brain morphology until we reach an irreversible stage.

I always say that before blaming something or someone, I must consider the possibility that I am to blame, as this enables me to act to mitigate or reverse the situation. Settling is a sign of laziness, and slowness is synonymous with delay, not progress.

Blaming yourself is an exercise that stems from the ability to develop self-confidence. There is no point in blaming yourself for no reason, or doing so in a way that victimizes you again, or makes you feel inferior and incapable. Reflecting on your own guilt is an exercise in humility that does not diminish your ability; on the contrary, you need to be able to admit mistakes and failures in order to improve and evolve.

In short, if something is bad, it is because we did or failed to do something that could have made it better. Therefore, it is necessary to do something to fix it. But first, we must analyze the nuances of our actions and the consequences of what we do, so that we can act effectively.

This topic is closely linked to neurobusiness and the use of metacognition, highlighting the exercise of decision-making and reflection on the possibility of guilt as processes of neuroplasticity in the frontal lobe. This exercise is not only a personal practice of self-development, but can also be applied in the business environment. Through professional analysis with questionnaires, neurolinguistic techniques, and observations, it is possible to determine whether an individual has insight into guilt or constantly places themselves in the position of a victim. With this data, it is possible to decide whether to work with the professional to adapt them to the position or consider replacing them.

The purpose of this article is to explore the use of techniques for metacognition and neuroplasticity in the frontal lobe of the brain. We will address the functions of different regions of the prefrontal cortex, including the dorsolateral, medial center, ventromedial, orbitofrontal, and rostral, as well as the neurotransmitters involved. Additionally, we will discuss neurolinguistic techniques for identifying people who place themselves in the role of victim or assume blame, and we will examine related mental disorders and personality traits. Finally, we will present solutions and insights applicable to both personal and professional life, aiming at the comprehensive and effective development of individuals.

Guilt, a complex and often underestimated emotion, plays a crucial role in the workplace. In the context of neurobusiness, guilt can be seen as a warning sign, indicating the need to review decisions, behaviors, and strategies. How leaders and employees deal with guilt can significantly impact individual and collective performance, motivation, engagement, and mental health in the corporate environment. Understanding the neurobiological mechanisms of guilt and how it influences decision-making is essential for developing effective emotional management strategies and optimizing human potential in companies. When used constructively, guilt can drive learning, innovation, and growth at both the individual and organizational levels.

Mapping the Brain for Effective Solutions

For a deeper understanding of the circumstances, I always seek to find a detailed step-by-step guide at the root of the issue

in order to assemble this puzzle and find a more effective solution. It is through understanding the underlying nuances and motives that we can better outline the project tasks, culminating in a more dynamic and assertive conclusion of the stipulated goal. With this in mind, I begin by mapping the regions of the brain related to the theme of this study.

Brain mapping, particularly of the areas involved in neuroplasticity and metacognition, is essential to understanding how our actions and reflections influence our behavior and decisions. Regions of the prefrontal cortex, such as the dorsolateral, medial, ventromedial, orbitofrontal, and rostral cortex, play crucial roles in regulating higher cognitive functions and mental adaptability.

Subregions of the Prefrontal Cortex and Their Functions Relevant to Guilt, Victimization, and Decision Making

The prefrontal cortex (PFC) is a complex area of the brain that is crucial for higher cognitive functions. Several subregions of the PFC play important roles in processes related to guilt, victimization, decision-making, and awareness of the possibility of guilt. Below, we detail each subregion and its relevant functions:

Dorsolateral Prefrontal Cortex (DLPFC):

- **Neuroanatomy:** Located on the lateral surface of the frontal lobe, the DLPFC is composed of several Brodmann areas, including areas 9 and 46.
- **Functions:** Working memory, planning, organization, cognitive flexibility, inhibitory control, complex decision-making, and logical reasoning.
- **Relevance:** Essential for objective analysis of situations, evaluation of consequences, and rational decision-making, weighing the possibility of guilt and responsibility. It allows for impulse inhibition and consideration of different perspectives.
- **Personality:** Individuals with a well-developed DLPFC tend to be organized, disciplined, goal-oriented, and capable of making logical and thoughtful decisions.
- **Disorders and Disorders:** Dysfunctions in the DLPFC may be associated with attention deficit hyperactivity disorder (ADHD), schizophrenia, depression, and obsessive-compulsive disorder (OCD), compromising the ability to plan, organize, and exercise inhibitory control.
- **Neurotransmitters:** Dopamine, norepinephrine, serotonin, and glutamate. Dopamine is particularly important for motivation and problem solving, while norepinephrine increases attention and focus. Serotonin and glutamate are involved in mood regulation and synaptic plasticity, respectively.

Ventromedial Prefrontal Cortex (VMPFC):

- **Neuroanatomy:** Located in the lower (ventral) and medial part

of the frontal lobe, the VMPFC includes areas such as Brodmann area 10.

- **Functions:** Emotional processing, emotion regulation, value- and emotion-based decision making, empathy, theory of mind, and reward and punishment processing.
- **Relevance:** Fundamental to the experience of guilt, remorse, and empathy, as well as to understanding other people's emotions and perspectives. It allows for the integration of emotional information into decision-making.
- **Personality:** Individuals with a well-developed VMPFC tend to be empathetic, compassionate, sensitive to the emotions of others, and capable of making morally complex decisions.
- **Disorders and Disorders:** Lesions or dysfunctions in the VMPFC can lead to impulsive behavior, social disinhibition, difficulties in recognizing emotions in oneself and others, and impairments in moral decision-making.
- **Neurotransmitters:** Dopamine, serotonin, GABA, and glutamate. Serotonin is particularly important for emotional regulation and empathy, while GABA helps control impulsivity.

Ventrolateral Prefrontal Cortex (VLPFC):

- **Neuroanatomy:** Located in the lower (ventral) and lateral part of the frontal lobe, the VLPFC includes areas such as Brodmann areas 44, 45, and 47.
- **Functions:** Motor control of speech and language, retrieval of semantic information, inhibition of behavioral and emotional responses, and regulation of competition between alternative representations during word and phrase selection.
- **Relevance:** Essential for verbal and nonverbal communication, expression of emotions, and regulation of behavior in social situations. It allows for the inhibition of impulsive responses and the choice of socially appropriate behaviors.
- **Personality:** Individuals with a well-developed VLPFC tend to be communicative, expressive, eloquent, and able to adapt their behavior to social demands.
- **Disorders and Disorders:** Lesions in the VLPFC can lead to aphasia (language difficulty), speech apraxia (difficulty coordinating speech movements), and difficulties in emotional and behavioral regulation.
- **Neurotransmitters:** Dopamine, GABA, and glutamate. Dopamine is involved in motivation for communication, while GABA helps control verbal impulsivity.

Orbitofrontal cortex (OFC):

- **Neuroanatomy:** Located in the lower (orbital) part of the frontal

lobe, the OFC includes areas such as Brodmann areas 11, 12, and 13.

- **Functions:** Evaluation of rewards and punishments, value-based decision making, inhibition of impulsive and socially inappropriate behaviors, processing of emotions, and integration of sensory information.
- **Relevance:** Participates in the evaluation of the consequences of actions, including the possibility of guilt and punishment, and assists in ethical and socially responsible decision-making. Allows behavior to adapt to changes in the environment and social expectations.
- **Personality:** Individuals with a well-developed OFC tend to be flexible, adaptable, sensitive to rewards and punishments, and capable of making decisions that take social norms into account.
- **Disorders and Disturbances:** Lesions in the OFC can lead to social disinhibition, impulsivity, risky behaviors, difficulties in learning from the consequences of one's actions, and insensitivity to social norms.
- **Neurotransmitters:** Dopamine, serotonin, and GABA. Dopamine is involved in reward evaluation, serotonin in emotional regulation, and GABA in impulse control.

Medial Prefrontal Cortex (mPFC):

- **Neuroanatomy:** Located in the medial part of the frontal lobe, the mPFC includes areas such as Brodmann areas 24, 25, and 32.
- **Functions:** Self-awareness, self-reflection, processing of social and emotional information, mentalization (reflection on one's own mental states and those of others), perspective taking, and emotional regulation.
- **Relevance:** Plays a central role in self-assessment, reflection on one's own guilt, and understanding the motivations and intentions behind behaviors that may generate guilt. Enables empathy and compassion for others.
- **Personality:** Individuals with a well-developed mPFC tend to be introspective, self-aware, empathetic, and able to understand the perspectives of others.
- **Disorders and Disorders:** Dysfunctions in the mPFC may be associated with depression, social anxiety, borderline personality disorder, and schizophrenia, compromising the ability for self-reflection, empathy, and emotional regulation.
- **Neurotransmitters:** Dopamine, serotonin, norepinephrine, and GABA. Serotonin is particularly important for emotional regulation and empathy, while dopamine is involved in motivation for social interaction.

Rostral Prefrontal Cortex:

- **Neuroanatomy:** Located in the most anterior part of the frontal

lobe, the rostral cortex includes areas such as Brodmann area 10 and parts of area 9.

- **Functions:** Metacognition (thinking about thinking), integration of complex information, strategic planning, abstraction, and mental flexibility.
- **Relevance:** It allows reflection on one's own thought processes, evaluation of the quality of decisions made, and consideration of different perspectives and scenarios, including the possibility of guilt and the best ways to deal with it.
- **Personality:** Individuals with a well-developed rostral cortex tend to be creative, innovative, capable of abstract thinking, and able to deal with complex information effectively.
- **Disorders and Disorders:** Dysfunctions in the rostral cortex may be associated with difficulties in strategic planning, complex problem solving, and mental flexibility.
- **Neurotransmitters:** Dopamine, norepinephrine, and glutamate. Dopamine is involved in motivation for planning and problem solving, while norepinephrine increases attention and focus.

Frontopolar cortex (FPC):

- **Neuroanatomy:** Located at the anterior end of the frontal lobe, the FPC corresponds to Brodmann area 10.
- **Functions:** Complex decision-making
- , strategic planning, abstract reasoning, metacognition, cognitive flexibility, and integration of information from multiple sources.
- **Relevance:** Assists in analyzing complex situations involving guilt, considering different options, and choosing courses of action that take into account the emotional and social consequences for oneself and others. It allows for adaptation to new situations and the revision of strategies, which is essential to avoid stagnation and victimhood, seeking alternatives to overcome challenges and correct mistakes.
- **Personality:** Individuals with well--developed FPC tend to be visionary, strategic, capable of dealing with uncertainty, and adapting to change, which are important characteristics for taking responsibility for their actions and seeking constructive solutions in situations of guilt.
- **Disorders and Disturbances:** Dysfunctions in the PFC may be associated with difficulties in making complex decisions, long--term planning, and dealing with ambiguous situations, which can lead to indecision and procrastination in situations that require action and responsibility.
- **Neurotransmitters:** Dopamine, norepinephrine, and glutamate. Dopamine is involved in motivation for planning and goal pursuit, norepinephrine increases at-

tention and focus, and glutamate is essential for synaptic plasticity and learning, allowing adaptation to new situations and revision of strategies.

To clarify the similarities and differences between the subregions of the prefrontal cortex, we can group them into three main categories:

1. Lateral Prefrontal Cortex:

- DLPFC: Focused on "cold" executive functions, such as planning, working memory, and inhibitory control.

- VLPFC: Involved in "hot" executive functions, such as emotional regulation, motivation, and reward-based decision-making.

2. Medial Prefrontal Cortex:

- VMPFC: Emotion processing, value-based decision-making, and empathy.

- mPFC: Self-awareness, self-reflection, mentalization, and processing of social and emotional information.

3. Anterior Prefrontal Cortex:

- OFC: Evaluation of rewards and punishments, value-based decision-making, and control of impulsive behaviors.

- Rostral Cortex: Integration of complex information, strategic planning, and abstraction.

- FPC: Metacognition, complex decision-making, strategic planning, and cognitive flexibility.

Although there is some overlap in function between these subregions, each has unique characteristics and contributes in specific ways to complex cognitive and emotional processes. For example, both the DLPFC and VLPFC are involved in decision-making, but the DLPFC focuses more on logical and analytical aspects, while the VLPFC takes emotions and rewards into account. Similarly, the VMPFC and mPFC are involved in emotional processing, but the VMPFC focuses more on basic emotions such as fear and anger, while the mPFC is more related to self-awareness and understanding complex emotions. In summary, the subregions of the prefrontal cortex work together, but each has unique specializations and contributions to human cognitive and emotional functioning.

In addition to the prefrontal cortex, several other brain structures play crucial roles in the experience of guilt, victimization, and decision-making. Understanding the interaction of these regions allows us to deepen our knowledge of how the brain processes guilt and how we can use this emotion to our advantage in the context of neurobusiness.

Limbic System

- **Amygdala:** The emotional processing center, the amygdala is fundamental to the experience of guilt, fear, and anxiety. It evaluates the emotional significance of events and stimuli, triggering physiological and behavioral responses associated with guilt, such as increased heart rate and chest tightness. Norepinephrine and glutamate increase its activation, intensifying emotional responses, while GABA inhibits it, promoting calm. In the context of neurobusiness, the amygdala can be activated in situations of risk or important decision-making, generating a sense

of urgency and the need to act to avoid negative consequences.

- **Hippocampus:** Responsible for memory and learning, the hippocampus stores information about past experiences, including those that generated guilt. These memories can influence our emotions and future decisions, shaping our perception of guilt and responsibility. Glutamate is essential for the formation and consolidation of these memories, while dopamine and norepinephrine can modulate their evocation. In neurobusiness, the hippocampus can be used to learn from past mistakes, avoiding repeating them and seeking more effective solutions.
- **Cingulate gyrus:** Connecting the emotional and cognitive regions of the brain, the cingulate gyrus is involved in emotional regulation, error detection, and conflict monitoring. It plays an important role in the experience of guilt, signaling discrepancies between our actions and moral values. Serotonin and dopamine play important roles in modulating cingulate gyrus activity. In the workplace, the cingulate gyrus can be activated in situations of conflict or ethical decisions, generating a sense of discomfort and the need to seek solutions that are aligned with our values.
- **Insula:** Associated with interoceptive awareness (perception of bodily sensations), the insula contributes to the emotional experience of guilt, generating physical sensations such as chest tightness and gastric discomfort. The insula is rich in opioid receptors, which can modulate the intensity of emotional pain associated with guilt. In neurobusiness, the insula can be used as a warning sign to identify situations that may generate guilt or emotional discomfort, allowing us to take measures to avoid or minimize these feelings.

Basal Ganglia

- **Nucleus Accumbens:** Part of the brain's reward system, the nucleus accumbens is involved in motivation, pleasure, and behavior reinforcement. It can influence decision-making related to guilt, seeking rewards, or avoiding punishment. In neurobusiness, the nucleus accumbens can be activated by the feeling of relief and reward after solving a problem or correcting a mistake, reinforcing the importance of taking responsibility and acting to overcome challenges.
- **Striatum:** Responsible for the formation of habits and automatic behaviors, the striatum is modulated by dopamine, which reinforces neural connections associated with rewarding behaviors and can contribute to guilt-related behavior patterns, such as the tendency to apologize excessively or avoid situations that may generate guilt. In the workplace, the striatum can be used to develop positive habits, such as seeking proactive solutions and open and transparent communication, which can help prevent and deal with guilt more effectively.

Other Structures

- **Hypothalamus:** Regulates essential bodily functions such as sleep, appetite, and temperature, and is involved in the stress response. Changes in the hypothalamus can influence mood and the ability to cope with guilt, making us more susceptible to feelings of anxiety and frustration. Serotonin, dopamine, and norepinephrine influence hypothalamic activity. Changes in these neurotransmitters can affect mood and the ability to cope with guilt.
- **Brain Stem:** Responsible for vital functions such as breathing and heartbeat, the brain stem, rich in serotonin and norepinephrine, is also involved in emotional regulation and stress response, influencing how we experience guilt. Changes in the brainstem can lead to physical symptoms such as sweating, tremors, and nausea, which can intensify the experience of guilt.

By understanding the complex interaction between different brain structures and the neurotransmitters involved in guilt and victimhood, we can develop more effective strategies for dealing with these emotions in the context of neurobusiness. Instead of avoiding or suppressing guilt, we can use it as a warning sign to identify problems, learn from mistakes, and seek constructive solutions, promoting personal and professional growth.

Metacognition as a Tool for Effective Decision Making: A Neuroscientific Approach to Guilt

Metacognition, the ability to reflect on one's own mental processes, is a tool for the objective analysis of guilt. By employing metacognitive techniques, individuals can discern the triggers of guilt, assess its intensity, and seek constructive solutions, transforming this emotion into a catalyst for learning and personal and professional growth.

Metacognitive Strategies for Guilt Management:

1. **Socratic Questioning:** Formulating questions that encourage deep reflection and critical evaluation of thoughts and beliefs allows one to examine the rational basis of guilt and challenge dysfunctional thinking patterns.
2. **Cognitive Restructuring:** Based on Cognitive Behavioral Therapy (CBT), this technique aims to identify and modify distorted thoughts about guilt, replacing them with more balanced and realistic perspectives.
3. **Mindfulness:** The practice of mindfulness cultivates metacognitive awareness, allowing individuals to observe their thoughts and emotions without judgment, reducing the intensity of guilt and promoting more conscious decision-making.

Scientific Evidence

Research corroborates the positive impact of metacognitive strategies on decision-

-making. Batha and Carroll (2007) demonstrated that metacognitive training improves decision-making performance, especially in individuals with less developed initial skills. Furthermore, Wokke et al. (2019) revealed that feedback on the consequences of our actions, i.e., action information, plays a crucial role in assessing the quality of decisions, highlighting the importance of integration between motor and cognitive processes in metacognition. In summary, the development of metacognition through these techniques allows guilt to be used as a tool for learning and growth, resulting in more effective and resilient decision-making in both personal and professional settings. The excerpt is consistent with the references provided, but could be improved to better reflect the content of the articles and use more technical and scientific language:

Temperamental Traits, Personality Disorders, and Mental Disorders Related to Victimhood

Individuals with a tendency toward victimhood often exhibit personality traits such as neuroticism, characterized by emotional instability and a tendency toward anxiety and depression (Kotov et al., 2010). This predisposition to emotional negativity can contribute to a distorted perception of events, amplifying feelings of injustice and fueling victimhood.

In addition, personality disorders such as borderline personality disorder (BPD) and dependent personality disorder (DPD) are often associated with victimization behaviors. BPD, marked by emotional instability, impulsivity, and fear of abandonment, can lead individuals to adopt a victim stance as a defense mechanism in response to conflicts and frustrations (Widiger & Costa, 1994). DPD, characterized by an excessive need for care and fear of separation, can foster emotional dependence and, consequently, victimization as a way to ensure support and attention (Brent et al., 1994).

Depression and anxiety also play a significant role in predisposing individuals to victimhood. Depression, with its persistent feelings of sadness, hopelessness, and low self-esteem, can lead individuals to feel powerless and wronged, reinforcing the belief that they are victims of circumstance (Krueger et al., 1996). Anxiety, especially in forms such as generalized anxiety disorder (GAD), can generate an exaggerated perception of threats and avoidance behavior, perpetuating a cycle of victimization (Widiger & Costa, 1994).

It is important to note that the presence of these personality traits and disorders does not determine victimization, but it does increase vulnerability to this pattern of behavior.

Neurolinguistic Techniques for Identifying Patterns of Victimhood

Neurolinguistics offers tools for identifying patterns of language and behavior that may indicate a tendency toward victimhood. Language analysis, in particular, can reveal how individuals construct their narratives and position themselves in relation to events, providing clues about their perception of themselves and the world.

Linguistic Clues

- **Excessive Use of First-Person Singular Personal Pronouns ("I," "my," "me"):** This pattern may indicate an excessive focus on oneself and how external events

affect the individual, suggesting a victim mentality.

- **External Attribution of Cause:** Individuals with a tendency toward victimhood often attribute the cause of their problems to external factors or other people, avoiding taking responsibility for their own actions and choices.
- **Emphasis on Negative Feelings:** Victim language often focuses on negative emotions such as sadness, anger, and frustration, reinforcing the perception of oneself as a victim of injustice and misfortune.
- **Resistance to Taking Responsibility:** Avoiding responsibility for mistakes and failures, accompanied by a tendency to blame others or circumstances, is a strong indicator of victim mentality.

Evidence from Studies

Research corroborates the association between linguistic patterns and victimization behaviors. Sheinov (2018) developed a technique to assess the degree of victimization in adults, revealing that predisposition to victimization is correlated with risk behaviors, anxiety, depression, and low self-esteem. Kaczmarek (2018), in turn, applied language analysis to narratives of crime perpetrators, highlighting significant differences in relation to healthy control groups. These findings corroborate the usefulness of linguistic analysis in identifying behavior patterns associated with specific personality traits, including victimization.

Applications in Neurobusiness

In the context of neurobusiness, the identification of victimization language patterns can be used to develop interventions that promote personal responsibility, emotional resilience, and the ability to deal with challenges proactively. By recognizing and modifying these linguistic patterns, individuals can develop a more empowered and solution-oriented mindset, driving their personal and professional growth.

Techniques for Neuroplasticity in Affected Regions

Neuroplasticity, or the brain's ability to change in response to experiences, can be used to strengthen neural connections in the brain regions involved in decision-making, emotional regulation, and empathy, promoting a more proactive and responsible attitude toward challenges. Several techniques have been proven effective in this process, including meditation, cognitive training, and cognitive behavioral therapy (CBT).

Evidence from Studies and Practical Examples

Meditation: Regular meditation, such as mindfulness meditation, has been shown to have positive effects on neuroplasticity, particularly in areas of the brain associated with attention, self-awareness, and emotional regulation. Neuroimaging studies have revealed that meditation can increase gray matter density in regions of the prefrontal cortex and hippocampus, improving decision-making, emotional control, learning, and memory.

- **Lazar et al. (2005):** Demonstrated that experienced practitioners of Vipassana meditation had greater gray matter density in pre-

frontal areas, such as the anterior cingulate cortex, associated with emotional regulation and attention. For example, an individual who has difficulty dealing with guilt could benefit from Vipassana meditation to strengthen their ability to observe their thoughts and emotions without judgment, reducing the intensity of guilt and promoting self-compassion.

- **Hölzel et al. (2011):** Revealed that an 8-week mindfulness program led to an increase in gray matter density in the hippocampus, a region crucial for learning and memory. A professional who blames themselves for past mistakes could use mindfulness meditation to re-evaluate these experiences more compassionately and learn from them, rather than holding on to feelings of self-criticism.

Cognitive Training: Cognitive training programs, such as memory games and reasoning exercises, are designed to improve executive functions, working memory, and problem-solving skills. Research indicates that such training can induce significant neuroplastic changes, increasing connectivity between neurons and strengthening neural circuits critical for cognition and decision-making.

- **Jaeggi et al. (2008):** The study demonstrated that working memory training, such as memory games and reasoning exercises, can improve fluid intelligence, the ability to solve new problems, and cognitive flexibility. An executive who feels guilty about a wrong decision could benefit from cognitive training to improve their analytical and decision-making skills, preventing future mistakes.
- **Morrison & Chein (2011):** The research highlighted the effectiveness of computer-based cognitive training in young adults, promoting neuroplastic changes in areas such as the dorsolateral prefrontal cortex, associated with inhibitory control and cognitive flexibility. A young professional who blames himself for procrastinating on important tasks could use cognitive training to strengthen his ability to inhibit impulses and focus on his goals.

Cognitive Behavioral Therapy (CBT): CBT is a therapeutic approach that aims to change dysfunctional thinking and behavior patterns. Studies show that CBT can promote neuroplasticity by modifying neural circuits related to emotional regulation and stress response, especially in the prefrontal cortex and amygdala.

- **Goldapple et al. (2004):** The study identified that CBT led to changes in the brain activity of patients with depression, with increased activity in the prefrontal regions and decreased activity in the amygdala. For example, an individual who feels guilty and depressed about a professional failure could benefit from CBT to identify and modify negative thoughts and develop more effective coping strategies.
- **Clark & Beck (2010):** The research provided a comprehensive review of the neurobiological

mechanisms of CBT, demonstrating its effectiveness in promoting neuroplasticity and altering neural circuits related to emotional regulation and stress response. A leader who blames himself for interpersonal conflicts in his team could use CBT to develop communication and conflict resolution skills, reducing guilt and promoting a more positive work environment.

Other techniques that may be effective include

1. Physical Exercise: Regular physical exercise has been shown to have positive effects on neuroplasticity, increasing the production of neurotrophic factors that promote the growth and survival of neurons. In addition, physical exercise can improve mood, reduce stress, and increase self-esteem, contributing to emotional well-being and the ability to cope with guilt.

2. Acceptance and Commitment Therapy (ACT): ACT is a form of psychotherapy that focuses on accepting difficult thoughts and feelings rather than fighting them. This approach can be helpful for people who feel stuck in cycles of guilt and self-criticism, helping them develop a healthier relationship with their emotions and make more conscious decisions.

3. Neurofeedback: Neurofeedback is a technique that uses sensors to monitor brain activity in real time, providing feedback to the individual about their brain patterns. This technique can be used to train the brain to regulate emotions and strengthen neural connections in areas related to decision-making and emotional regulation.

4. Exposure Therapy: Exposure therapy is a technique used to treat phobias and anxiety disorders, which involves gradual exposure to feared situations. This approach can be adapted to help people who feel guilty about past events, allowing them to process their emotions and develop new ways of dealing with guilt.

5. Schema Therapy: Schema therapy is a therapeutic approach that focuses on identifying and modifying dysfunctional patterns of thinking and behavior that originate in childhood. This approach can be helpful for people who feel stuck in patterns of victimhood and self-blame, helping them develop a more positive view of themselves and build healthier relationships.

It is important to note that the choice of the most appropriate technique will depend on each person's individual needs and characteristics. A qualified mental health professional can assist in assessing and choosing the best strategies to promote neuroplasticity and emotional well-being.

Conclusion

This article explored the complex relationship between guilt, neuroscience, and human behavior, with an emphasis on the context of neurobusiness. Guilt, an emotion often considered negative, can be understood as an essential brain mechanism for learning, personal growth, and more effective decision-making. By understanding the neurobiological basis of guilt and how it manifests itself in different regions of the brain, we can develop strategies to use it as a tool for self-knowledge and professional improvement. Metacognition techniques, such as Socratic questioning, cognitive restructuring, and mindfulness, are powerful

tools for managing guilt constructively. By promoting reflection on one's own thoughts and emotions, these techniques allow guilt to be used as a springboard for developing creative and effective solutions to challenges faced in the workplace. Neuroplasticity, the brain's ability to change in response to experiences, offers the opportunity to strengthen neural connections in the brain regions involved in decision-making, emotional regulation, and empathy. Techniques such as meditation, cognitive training, cognitive-behavioral therapy, physical exercise, acceptance and commitment therapy, neurofeedback, exposure therapy, and schema therapy can be used to promote neuroplasticity and assist in the development of a more proactive and responsible attitude toward challenges. In the context of neurobusiness, understanding the neuroscience of guilt and applying techniques to promote metacognition and neuroplasticity can have a significant impact on individual and organizational performance. By cultivating a culture of self-awareness, personal responsibility, and continuous learning, companies can create a healthier, more productive, and more innovative work environment. Ultimately, guilt should not be seen as a burden, but rather as an opportunity for growth and development. By embracing guilt as an exercise in decision-making, we can transform this emotion into a driving force for success, both in our personal and professional lives.

References

Lazar, S. W., Kerr, C. E., Wasserman, R. H., Gray, J. R., Greve, D. N., Treadway, M. T., ... & Fischl, B. (2005). Meditation experience is associated with increased cortical thickness. *NeuroReport*, 16(17), 1893-1897. doi:10.1097/01.wnr.0000186598.66243.19

Hölzel, B. K., Carmody, J., Vangel, M., Congleton, C., Yerramsetti, S. M., Gard, T., & Lazar, S. W. (2011). Mindfulness practice leads to increases in regional brain gray matter density. *Psychiatry Research: Neuroimaging*, 191(1), 36-43. doi:10.1016/j.pscychresns.2010.08.006

Jaeggi, S. M., Buschkuehl, M., Jonides, J., & Perrig, W. J. (2008). Improving fluid intelligence with training on working memory. *Proceedings of the National Academy of Sciences*, 105(19), 6829-6833. doi:10.1073/pnas.0801268105

Morrison, A. B., & Chein, J. M. (2011). Does working memory training work? The promise and challenges of enhancing cognition by training working memory. *Psychonomic Bulletin & Review*, 18(1), 46-60. doi:10.3758/s13423-010-0034-0

Goldapple, K., Segal, Z., Garson, C., Lau, M., Bieling, P., Kennedy, S., & Mayberg, H. (2004). Modulation of cortical-limbic pathways in major depression: treatment-specific effects of cognitive behavior therapy. *Archives of General Psychiatry*, 61(1), 34-41. doi:10.1001/archpsyc.61.1.34

Clark, D. A., & Beck, A. T. (2010). Cognitive therapy of anxiety disorders: Science and

Sheinov, V. (2018). Developing the Technique for Assessing the Degree of Victimization in Adults. Российский психологический журнал, *15*(2), 167-180. doi:10.21702/rpj.2018.2.1.5.

Kaczmarek, B. (2018). Application of Lurian Approach to Assessment of Perpetrators of Crimes. *KnE Life Sciences*, *4*(8), 3299-3305. doi:10.18502/kls.v4i8.3299.

Brent, D., Johnson, B., Perper, J., Connolly, J., Bridge, J., Bartle, S., & Rather, C. (1994). Personality disorder, personality traits, impulsive violence, and completed suicide in adolescents. *Journal of the American Academy of Child and Adolescent Psychiatry*, 33(8), 1080-1086. doi:10.1097/00004583-199410000-00003.

Kotov, R., Gámez, W., Schmidt, F., & Watson, D. (2010). Linking "big" personality traits to anxiety, depressive, and substance use disorders: a meta-analysis. *Psychological Bulletin*, 136(5), 768-821. doi:10.1037/a0020327.

Krueger, R., Caspi, A., Moffitt, T., Silva, P., & McGee, R. (1996). Personality traits are differentially linked to mental disorders: a multitrait-multidiagnosis study of an adolescent birth cohort. *Journal of Abnormal Psychology*, 105(3), 299-312. doi:10.1037/0021-843X.105.3.299.

Widiger, T. A., & Costa, P. T. (1994). Personality and personality disorders. *Journal of Abnormal Psychology*, 103(1), 78-91. doi:10.1037/0021-843X.103.1.78.

Batha, K., & Carroll, M. (2007). Metacognitive training aids decision making. *Australian Journal of Psychology*,59(1), 64-69. doi:10.1080/00049530601148371

Wokke, M., Achoui, D., & Cleeremans, A. (2019). Action information contributes to metacognitive decision-making. *Scientific Reports*. doi:10.1038/s41598-020-60382-y