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Propensity to Financial Suggestion: Neuropsychological and Psychophysiological Factors

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Abstract

Introduction. Currently, suggestion is employed as a means of manipulation, influence, and directing human activity toward specific goals. Financial suggestion is characterized by high susceptibility of individuals to manipulative influences when making financial decisions. The relevance of this research is driven by the necessity to understand the mechanisms of financial suggestion and develop effective strategies to counter fraudulent influences. The objective of this work is to demonstrate the psychophysiological aspects of susceptibility to suggestion, including the role of the prefrontal cortex, limbic system, and strategies of information perception and analysis in the process of financial decision-making. **Theoretical justification.** Susceptibility to suggestion is examined from the perspective of P.K. Anokhin's theory of functional systems, the concept of dual-stream information processing in the brain, and the specifics of cortical-subcortical interactions. This work identifies key factors that may increase susceptibility to financial suggestion and proposes algorithms aimed at countering manipulations, particularly those employed by telephone fraudsters. These algorithms ensure the formation of a "cognitive buffer" — a process of activating critical thinking and conscious choice. An individual's awareness of their strengths and weaknesses and associated behavioral patterns allows for the selection of the most effective strategies for each step of the anti-fraud algorithm, thereby enhancing the level of protection. **Discussion.** The study presents an interdisciplinary approach to the problem of financial suggestion, based on the synthesis of psychophysiological and social-psychological data. The algorithms proposed in this work can be effectively utilized

to enhance financial literacy among the population and prevent financial fraud, which represents an important direction for contemporary social and economic development.

Keywords

psychophysiology, financial suggestion, financial risks, counteraction algorithms

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Introduction

The dynamic development of civilization creates favorable conditions for the proliferation of manipulative suggestive phenomena. Contemporary communication processes inevitably contain elements of suggestive influence, the manipulative component of which is based on covert psychological impact on individual consciousness. The capabilities for information transmission and perception, as well as psychological control of physical processes, are so extensive that there arises a necessity not only for deeper scientific understanding of these phenomena, but also for widespread awareness of this phenomenon among the general population.

The absence of societal demand for understanding suggestion as a method of influence has proven to be fraught with the proliferation of its pragmatic use for manipulating human psyche.

The first among the conceptual foundations of suggestion is causality, based on physiological, informational, and psychosocial determinants. This sequence of their arrangement is determined by the fact that the original natural causality of suggestion has physiological foundations, functionally connected with informational processes occurring both within the organism and affecting it from the outside. The synthesis of these processes is realized not only at the level of elementary physiological reactions, but also determines cognitive responses, human social behavior, and social orientation. The degree of proliferation of suggestive phenomena inevitably increases with the growth of society's technological potential.

Despite these conclusions, there remains a lack of understanding of the specific psychophysiological processes that may determine the degree of human susceptibility to financial propositions. This knowledge gap limits the development of effective measures to reduce manipulative influences on financial decision-making.

This study is aimed at analyzing the psychophysiological aspects of susceptibility to financial suggestion and developing algorithms to counteract manipulation by fraudsters.

Theoretical justification

Psychophysiological Foundations of Financial Suggestion

Suggestion (suggestibility) today represents one of the most effective methods of influencing masses. Suggestion, as a guiding factor, regulates individual activity, prompting actions and behaviors or restraining from them. Numerous crisis situations, including those of an economic nature, emotional fluctuations in public mood, and the constant need of human consciousness for miracles and spectacle constitute the primary factors that increase suggestibility and contribute to the reduction of critical thinking across various social strata (Finucane et al., 2000; Kahneman, 2003; Griskevicius et al., 2006; Maner et al., 2005).

Biological predisposition to suggestion is determined by the characteristics of the structural-functional organization of the brain and the patterns of its functioning. Suggestibility is a universal property of higher nervous activity. According to the systems approach based on the principles of functional systems theory, formulated in the previous century by P.K. Anokhin (Anokhin, 1973), suggestibility is mediated by the influence of context on the perception of target stimuli. P.K. Anokhin defined context as situational afferentation, and target stimulus as trigger afferentation (Figure 1). Context or situational afferentation consists of external and internal factors that influence the perception of any stimulus.

The functional state of an individual is mediated by the influence of both external and internal factors. During fatigue, and particularly under stress conditions, susceptibility to suggestion increases.

Individual differences in suggestibility are also associated with specific characteristics of perception and analysis of information necessary for the brain to make decisions and program actions. According to the final common pathway principle — one of the fundamental laws of higher nervous activity — the prefrontal cortex serves as the site of accumulation for all information upon which decisions are made and actions are programmed. In accordance with the two-pathways theory (Goodale & Milner, 1992; Johnson-Frey, 2004; Laycock, Crewther & Chouinard, 2020; Shmuelof & Zohary, 2005), information necessary for decision-making is transmitted from the posterior (caudal) regions of the cerebral cortex to the anterior frontal areas, particularly to the prefrontal cortex, via two streams — the parietal (dorsal) and temporal (ventral) pathways (Figure 2).

Figure 1

A diagram of the structure of a behavioral act according to the theory of functional systems.

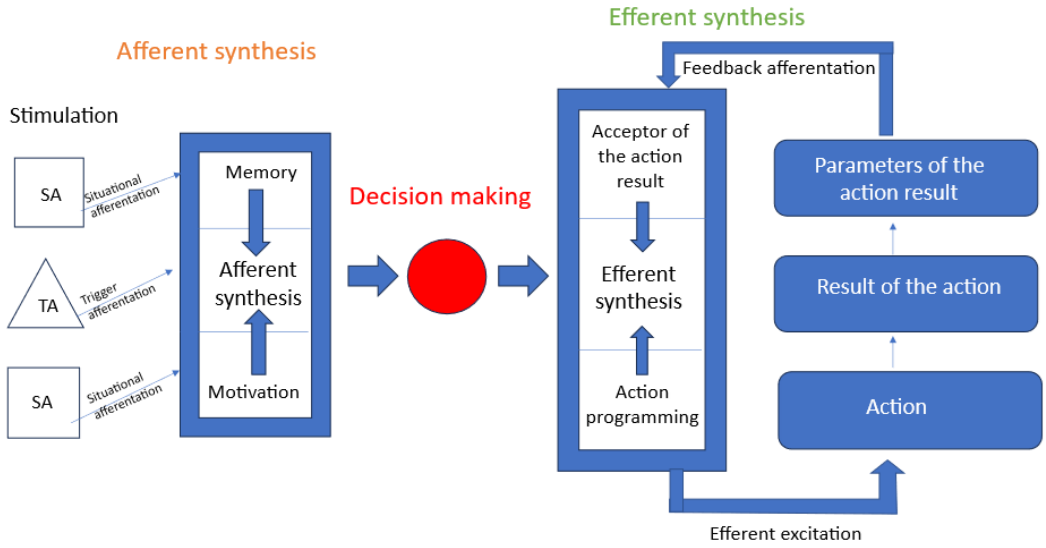
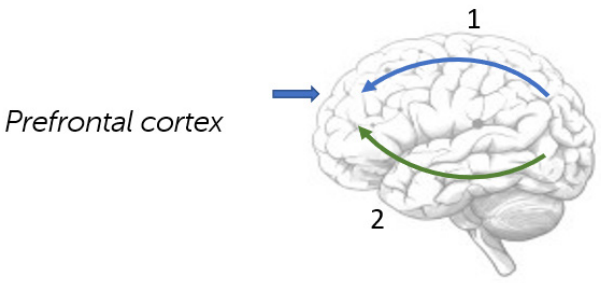


Figure 2

Schematic representation of the parietal (1) and temporal (2) information pathways from the pathways



The existence of two information transmission streams to the prefrontal cortex was initially demonstrated for the visual system (Livingstone & Hubel, 1987; Merigan & Maunsell, 1993), and later for the auditory system and the speech functional system. Perceptual integrity is achieved through the interaction between parietal and temporal streams, which essentially constitute large-scale neural networks. This involves not only the cortical level of information processing, but also the interconnections of these streams with subcortical structures. It has been shown that the inferior nuclei of the pulvinar — the thalamic hub for all information traveling through the brainstem to the cerebral cortex and back to executive structures — connect predominantly with the parietal (dorsal) pathway, while the more lateral nuclei connect with the temporal (ventral) pathway (Tamietto & Morrone, 2015; Troiani & Schultz, 2013; Troiani et al., 2014). The authors report the involvement of the amygdala — a key structure of the limbic system — along with the parietal cortex and frontal eye field, which are components of the parietal (dorsal) cortical pathway, in the process of rapid subconscious evaluation of emotional stimuli (fearful faces).

The nature of interaction between large-scale neural networks of the parietal (dorsal) and temporal (ventral) pathways has individual characteristics that determine strategies for information perception, thinking and decision-making, cognitive responses, and behavior (Shoshina, Shelepin, 2016). In behavioral terms, these characteristics are manifested, among other things, in susceptibility to suggestibility. The activity of the parietal (dorsal) pathway network is associated with the mechanism of global information analysis, while the temporal pathway is associated with the mechanism of local information analysis. The global mechanism of information analysis can alternatively be termed holistic, when information about different stimulus features is processed pathway processing of stimulus details, which requires considerably more time than global analysis. The dominance of the global information analysis mechanism over the local one, as an individual characteristic, manifests in a tendency to make quick decisions, which, in the absence of expertise, threatens a high number of errors. An important point here is that the parietal (dorsal) pathway has more extensive connections with subcortical structures, particularly with the amygdala, which is responsible for emotional reactions, including fear, aggression, anxiety, etc. Therefore, it is logical to assume that individuals with dominance of the global information analysis mechanism will be more prone to suggestibility.

Thus, neurophysiological mechanisms associated with the peculiarities of perception and information processing, as well as with emotional reactions, underlie people's susceptibility to financial suggestion and receptivity to manipulative influences. Based on the above, the following conclusions can be drawn:

1. Susceptibility to financial suggestion (suggestibility) has biological foundations related to the specific features of the structural-functional organization of the brain and the patterns of its functioning.

2. Susceptibility to suggestion is mediated by the influence of context (environmental afferentation) on the perception of the target stimulus. The functional state of an individual, such as fatigue and stress, is characterized by increased susceptibility to suggestibility.

3. Individual differences in susceptibility to suggestibility are associated with peculiarities of perception and information analysis. The dominance of the global (holistic) information analysis mechanism over the local (sequential) analysis is associated with greater susceptibility to suggestibility, as the parietal stream of information transmission to the prefrontal cortical areas has closer connections with central structures regulating emotional reactions, particularly with the amygdala.

4. The activity of emotional brain centers, such as the amygdala, and the suppression of prefrontal cortex functions in stressful situations contribute to reduced critical thinking and increased susceptibility to suggestion.

Factors That Increase the Propensity for Financial Suggestion

Analysis of factors that increase people's susceptibility to financial manipulations can help advance understanding of the mechanisms underlying human vulnerability to financial fraud and develop effective countermeasures. Contributing factors may be associated with emotional state, cognitive characteristics, social conditions, and personal traits. In this regard, we propose to identify five groups of factors: emotional state, lack of knowledge and awareness, social isolation, cognitive and age-related factors, and psychological characteristics.

Emotional state

Fear and Anxiety. Fraudsters frequently employ intimidation communication tactics to induce fear and anxiety, for example, by claiming that an individual has tax problems or that their banking information has been stolen (LeDoux, 2000). States of fear and anxiety are accompanied by activation of the amygdala – a key structure of the limbic system responsible for emotional reactions – and decreased activity in the prefrontal cortex, which is responsible for conscious behavioral control (Drozd et al., 2024). This makes individuals more susceptible to manipulation.

The fight-or-flight response represents one of the fundamental survival strategies activated by the organism in response to stressful or threatening situations. This response is triggered during interactions with financial fraudsters and encompasses the following physiological and behavioral changes:

1. Activation of the sympathetic nervous system: elevation of noradrenaline, adrenaline, and cortisol levels in the blood; increased heart rate and respiratory rate; elevated blood pressure; increased perspiration for body cooling; pupil dilation;
2. Mobilization of energy resources: redistribution of blood flow (e.g., from the digestive system to muscles); release of glucose and fatty acids into the bloodstream to provide energy for muscles;
3. Behavioral responses: "fight" strategy – aggressive resistance and confrontation with the fraudster; "flight" strategy – rapid termination of contact and avoidance of the situation;
4. Cognitive changes: diminished capacity for rational thinking and situational analysis; threat-focused attention; increased impulsivity and reduced self-control.

These physiological and behavioral reactions are adaptive in situations of real danger, but may be maladaptive when interacting with financial fraudsters. It is important to learn to recognize the signs of fight-or-flight response activation and apply regulatory strategies, such as deep (diaphragmatic) breathing, for example. This will help maintain critical thinking and facilitate more balanced decision-making.

The balanced interaction between the prefrontal cortex and limbic system represents a crucial neurophysiological mechanism that ensures adaptive human behavior across various situations (Hanganu-Opatz et al., 2023).

The prefrontal cortex (PFC) is responsible for higher-order cognitive functions, including decision-making, action planning, cognitive flexibility, emotional regulation (such as suppression of aggression or maladaptive behaviors), and critical thinking (Drozd et al., 2024). The PFC conducts "cold," rational situation analysis, risk and consequence assessment, and selection of optimal behavioral strategies.

The limbic system, comprising the amygdala, hippocampus, and other structures, governs emotional responses, motivation, and emotional memory formation. The amygdala plays a pivotal role in rapid assessment of stimulus emotional salience and initiation of corresponding emotional reactions (fear, anger, anxiety) (Polunina, Bryun, 2013; Lockwood et al., 2024). The hippocampus participates in forming new memories and associations related to emotional events.

Under normal conditions, the PFC regulates and controls emotional reactions initiated by the limbic system. The PFC can modulate limbic system activity, suppressing excessive emotional responses and directing behavior in accordance with current goals and situational context. However, during intense emotional arousal or stress, PFC functions may be temporarily suppressed, resulting in emotional reactions predominating over rational control. Thus, alterations in the interaction pattern toward predominant limbic structure activity (particularly the amygdala) leads to diminished conscious behavioral control.

The tendency toward instant financial gratification activates the brain's reward system, which is associated with the dopaminergic system (Volkow & Morales, 2015; Mazhirina et al., 2021). This can lead to impulsive, ill-considered decisions, thereby increasing vulnerability to fraud.

The influence of neurotransmitters on human behavior varies significantly depending on individual characteristics, experience, and current emotional state.

1. Individual characteristics:

• genetic predisposition to certain neurochemical profiles may influence tendency toward risk-taking, impulsivity, anxiety, and other behavioral patterns;

• baseline secretion levels of neurotransmitters such as dopamine, serotonin, and noradrenaline exhibit individual variations and may determine financial behavior;

• receptor sensitivity to neurotransmitters is also an individual characteristic.

2. Experience:

• previous investment experience, successes and failures can influence the development of conditioned reflexes and neurochemical reactions;

• duration of investment activity may alter sensitivity to risks and rewards;

• acquired skills and decision-making strategies, in turn, can modulate the influence of neurotransmitters.

3. Current emotional state:

• stressful situations, anxiety, and fear trigger surges of noradrenaline and cortisol, affecting risk perception;

• euphoria and excitement from successful trades activate the dopaminergic reward system, provoking overconfidence;

• depressive states, associated with reduced serotonin levels, may lead to pessimistic forecasts and risk avoidance.

Thus, neurochemical factors play a pivotal role in human financial behavior, but their influence is modulated by individual characteristics, experience, and current emotional state. Understanding these mechanisms is crucial for developing effective strategies for financial risk management.

Lack of knowledge and awareness

Individuals who lack awareness of existing fraud schemes, such as phishing, fraudulent investment offers, telephone scams, and similar tactics, are more susceptible to victimization as they cannot recognize warning signals (Cialdini, 2007). Without understanding how these schemes operate, it becomes more difficult to identify inconsistencies in the information provided by fraudsters. Ignorance of existing deception methods renders individuals more trusting toward enticing yet dubious propositions. They may be less inclined to verify information and subject it to critical analysis.

A lack of knowledge regarding how modern technologies function and what constitutes internet security can make an individual vulnerable to cybercrime (Furnell, 2005).

Social isolation

Lonely individuals experience a need for social acceptance and belonging, which makes them more susceptible to offers of friendship or romantic relationships, even from strangers (Cacioppo, Hawkley, 2009). Social isolation diminishes self-esteem and self-confidence, thereby increasing trustfulness toward other people.

The experience of loneliness activates brain regions associated with pain and stress, such as the anterior cingulate cortex (part of the limbic system) and the insular cortex. This creates physical discomfort that individuals seek to alleviate. Social isolation leads to decreased activity in cortical areas responsible for social cognition and empathy, such as the medial prefrontal cortex and the temporoparietal junction. The lack of social connections and support weakens the ability to critically evaluate information and make well-informed decisions, as these functions are linked to prefrontal cortex activity (Murugan et al., 2017).

The absence of support from close individuals with whom one can discuss suspicious situations reduces the likelihood of timely fraud detection (Catani, Mesulam, 2008).

Thus, loneliness and social isolation create favorable conditions for successful manipulation by fraudsters. Restoring social connections, enhancing self-esteem, and building self-confidence may serve as important preventive measures against financial fraud.

Cognitive and age-related factors

Age-related cognitive changes and deficits in digital literacy among elderly individuals represent significant factors that render them more vulnerable to financial fraud (Cialdini, 2006).

Age-related cognitive changes:

• The capacity to rapidly perceive, analyze, and respond to new information declines with age, thereby complicating the recognition of fraudulent schemes;

• Deterioration of memory function observed in advanced age impedes the ability to verify provided information, with elderly individuals generally demonstrating poorer recall of conversation details with fraudsters;

• Reduced capacity for abstract thinking may weaken elderly individuals' ability to critically analyze complex financial offers;

• Diminished ability to control impulsive decision-making increases elderly individuals' vulnerability to fraudster manipulation;

• Individuals with cognitive impairments or mental disorders exhibit heightened vulnerability to manipulation (Petersen, 2004).

Digital literacy deficits:

• Insufficient knowledge of modern technologies and lack of skills in using computers, smartphones, and the internet impedes recognition of online fraud;

• Absence of skills for secure use of banking cards, online payments, and other financial instruments also renders elderly individuals more vulnerable to fraudster manipulation.

Thus, age-related cognitive changes and digital literacy deficits among elderly individuals diminish their capacity to recognize fraudulent schemes, critically evaluate information, and make informed financial decisions. This renders them more vulnerable to various forms of financial fraud involving the use of modern technologies.

Psychological features

Gullibility. Individuals prone to trusting others without adequate information verification can easily fall victim to fraudsters (Greenspan, Rogers, 2016). They demonstrate reduced critical thinking, which impedes the recognition of deception indicators. Gullibility is associated with diminished capacity for reflection and analysis of one's own judgments.

Gullibility is often linked to personality traits such as low self-esteem, lack of self-confidence, and heightened need for approval. Certain personality characteristics, including naivety, altruism, and conformity, increase the likelihood of gullible behavior.

The neurobiological foundations of gullibility are related to the functioning of the social cognition system, encompassing the amygdala, medial prefrontal cortex, and other brain structures. Individuals with heightened amygdala activity and reduced prefrontal cortex activity tend to trust unfamiliar people and their claims more readily. Disruptions in these systems, such as those occurring in certain psychiatric disorders, may intensify gullibility.

Among the social factors influencing gullibility are loneliness and social isolation. An increased need for trusting relationships renders individuals more vulnerable. Persons with high affiliation needs (belonging to a group) are more prone to gullibility. Cultural norms that encourage trust in authorities may also contribute to the development of gullible tendencies.

Understanding the neurobiological, cognitive, social, and personality factors underlying gullibility is crucial for developing effective strategies to protect against financial fraud.

Desire to help. Fraudsters frequently exploit people's desire to help others by creating false stories about disasters or needs for assistance (McCrae, Costa, 2004). This manipulation is also accompanied by activation of limbic structures and the medial prefrontal cortex involved in the empathy functional system.

Increasing awareness of contemporary deception methods, training in recognition of fraud indicators, developing critical thinking and decision-making skills under manipulative conditions can help reduce the vulnerability of gullible individuals and decrease the risk of falling victim to fraud.

Decision-making algorithms in the context of financial suggestion

Contemporary research in behavioral economics and cognitive psychology demonstrates that the process of financial decision-making under suggestive influence is characterized by specific neurophysiological mechanisms that can be systematized as sequential algorithmic models (Kahneman, 2011). Understanding these mechanisms is critically important for developing effective strategies to counter financial fraud, as it allows identification of vulnerable points in human decision-making processes (Thaler & Sunstein, 2008).

Research by Daniel Kahneman and Amos Tversky in the field of prospect theory has shown that human decisions under conditions of uncertainty systematically deviate from rational models (Kahneman & Tversky, 1979). These deviations become particularly pronounced in situations involving emotional stress and time constraints, which is actively exploited in fraudulent schemes (Loewenstein & Lerner, 2003). Antonio Damasio, in his work on neuroeconomics, demonstrated that emotional processes play a pivotal role in financial decision-making, often prevailing over rational considerations (Damasio, 1994).

The algorithm of the impact of telephone scammers on the victim

The mechanism employed by telephone scammers represents a complex multi-stage system built upon the exploitation of cognitive biases and neurophysiological characteristics of the human brain. This algorithm can be conceptualized as a sequence of interconnected stages, each designed to suppress critical thinking and stimulate impulsive behavior. The initial contact is characterized by strategic utilization of the principle of authority, as described in the seminal works of Robert Cialdini (Cialdini, 2007). Fraudsters present themselves as representatives of banking institutions, law enforcement agencies, or government services, which triggers activation of the prefrontal cortex, responsible for assessing the social significance of information sources (Klucharev et al., 2009). Research in social neuroscience demonstrates that exposure to authoritative figures induces specific changes in medial prefrontal cortex activity, thereby reducing critical evaluation of incoming information (Berns, 2010). Simultaneously with the establishment of authority, a process of credibility validation occurs through the utilization of the victim's personal data. This mechanism is based on the operational principles of the hippocampus, which performs comparison of new information with existing memories (Squire et al., 2009). When a scammer demonstrates knowledge of the victim's name, address, or partial information about banking transactions, this creates an illusion of contact legitimacy and activates neural networks associated with trust formation (Rilling & Sanfey, 2011).

The next critical phase of the algorithm involves creating artificial time scarcity and emotional tension. Fraudsters report allegedly occurring unauthorized transactions or security threats, which leads to amygdala activation and triggers a stress response (LeDoux, 2000). Neurophysiological studies demonstrate that under conditions of acute stress, there is a significant deterioration in the functioning of executive functions of the prefrontal cortex, making individuals more susceptible to external influence (Arnsten, 2009). Simultaneously, the sympathetic nervous system is activated, leading to the release of noradrenaline and cortisol, further disrupting rational analysis processes (Sapolsky, 2004).

The introduction of threat elements enhances emotional impact and suppresses critical thinking. Scammers employ intimidation communication tactics, threatening arrest, account freezing, or other negative consequences (Petty & Cacioppo, 1986). This leads to further intensification of amygdala activity and suppression of prefrontal cortex functions, creating a state in which the capacity for rational thinking is minimized (Phelps, 2006).

Under conditions of emotional tension and time deficit, there occurs a critical reduction in information processing quality. Research shows that under stress, people tend to use heuristics and cognitive anchors, making them more vulnerable to manipulative influences (Starcke & Brand, 2012). Activation of the dopaminergic system through promises of quick problem resolution or reward acquisition stimulates impulsive behavior and reduces capacity for long-term planning (Berridge & Robinson, 2003).

The final phase of the algorithm involves direct execution of actions according to the scammer's instructions. At this stage, the victim follows the fraudster's directions, providing personal data or making money transfers. Neurophysiologically, this is accompanied by motor cortex activation for performing physical actions (Rizzolatti & Craighero, 2004). Scammers maintain constant contact to prevent doubt from arising and preserve control over the situation, achieved through continuous activation of the brain's emotional centers (Schachter & Singer, 1962).

After completion of the fraudulent operation and termination of contact, gradual restoration of the prefrontal cortex's controlling function over the limbic system occurs. This allows the victim to critically reflect on what transpired and begin situation analysis, which often leads to recognition of the fraud (Metcalfe & Mischel, 1999). This process may be accompanied by pronounced negative emotional reactions, including feelings of shame, anger, and self-blame (Tangney & Dearing, 2002).

An algorithm for countering phone scams from a potential victim

Developing effective strategies to counter phone fraud requires a deep understanding of the neurophysiological mechanisms of decision-making and cognitive processes underlying human behavior under stress conditions (Loewenstein & Cohen, 2008). Contemporary research in neuroeconomics enables the formulation of a scientifically grounded algorithm for protection against fraudulent influences, based on principles of emotional reaction management and critical thinking activation (Camerer, Loewenstein & Prelec, 2005).

The initial stage of counteraction begins from the moment of receiving a suspicious call and involves forming a defensive mindset based on the principle of healthy skepticism. Daniel Gilbert's research in social psychology demonstrates that the human brain is inherently predisposed to trust incoming information, which renders us vulnerable to manipulative influences (Gilbert, 1991). Overcoming this natural tendency requires conscious activation of the prefrontal cortex through the application of critical thinking techniques (Stanovich & West, 2000). An effective approach involves employing the principle of "presumption of distrust" toward unfamiliar callers, particularly when they identify themselves as representatives of financial or governmental institutions (Vrij, 2008).

A key element of the defensive strategy is the management of physiological stress responses. Barbara Fredrickson's work in positive psychology demonstrates that controlled breathing techniques can effectively modulate autonomic nervous system activity and reduce cortisol levels in the blood (Stanovich & West, 2000). Diaphragmatic breathing, in particular, activates the parasympathetic nervous system, leading to decreased amygdala activity and restoration of the prefrontal cortex's regulatory function (Porges, 2011). Research by Andrea Zaccaro and colleagues confirms that slow, deep breathing with emphasis on extended exhalation can rapidly reduce psychological stress levels and improve cognitive functions (Zaccaro et al., 2018).

Information verification represents a critically important component of the defensive algorithm, based on principles of evidence-based assessment. Robert Cialdini, in his work on the psychology of influence, emphasizes the importance of independent information verification as a method of counteracting manipulative techniques (Cialdini & Goldstein, 2004). Neurophysiological studies show that the process of actively searching for and comparing information stimulates hippocampal and dorsolateral prefrontal cortex activity, which contributes to more objective situational assessment (Buckner & Carroll, 2007). The practical implementation of this principle involves mandatory termination of conversation with suspicious callers and independent contact with the relevant organization through official communication channels (Klayman & Ha, 1987).

Managing emotional reactions during decision-making processes requires understanding the interaction mechanisms between the limbic system and prefrontal cortex. Kevin Ochsner's research in cognitive neuroscience demonstrates that conscious application of emotional regulation strategies can effectively modulate amygdala activity and reduce emotional influence on decision-making processes (Ochsner & Gross, 2005). The cognitive reappraisal technique allows for reformulating emotionally

charged stimuli in more neutral terms, facilitating the activation of rational thinking processes (Gross, 2002).

A particular role in the defensive algorithm is played by counteracting artificially created time pressure. Dan Ariely's research in behavioral economics demonstrates that time scarcity is one of the most effective tools for influencing decision-making processes (Ariely & Silva, 2002). The neurophysiological mechanisms of this phenomenon are associated with stress response activation, which disrupts normal executive brain function (Lupien et al., 2009). An effective counteraction strategy involves consciously slowing the pace of interaction and creating pauses for reflection, allowing for the restoration of prefrontal cortex control over emotional reactions (Baumeister & Heatherton, 1996).

Written information recording represents a powerful cognitive defense tool based on principles of distributed attention and external memory. Research by Betsy Sparrow and colleagues demonstrates that the process of recording information activates multiple cognitive systems, including working memory, attention, and executive functions (Sparrow et al., 2011). This leads to deeper information processing and enhanced critical perception (Mueller, P. A., & Oppenheimer, D. M., 2014). Additionally, the physical act of writing can serve as a form of "anchor," helping maintain emotional stability in stressful situations (Clark & Chalmers, 1998).

The recording process also contributes to disrupting the fraudster's communication scenario, forcing them to deviate from their pre-prepared script. Research in social psychology shows that disrupting habitual interaction patterns can significantly reduce the effectiveness of manipulative techniques (Pratkanis & Aronson, 2001). When a potential victim begins asking clarifying questions and requesting information repetition for recording purposes, this creates additional difficulties for the fraudster and may lead to their abandonment of the operation (Levine, 2014).

The final element of the defensive algorithm involves ensuring social support and external validation of decision-making processes. Shelley Taylor's research in social psychology emphasizes the importance of social connections for maintaining psychological well-being and making adequate decisions (Taylor, 2011). Practical implementation of this principle involves mandatory discussion of suspicious situations with trusted individuals or specialists, allowing for independent assessment and avoiding the isolation that fraudsters often create (House et al., 1988).

Personal characteristics and behavioral strategies of a potential victim of telephone fraud.

According to H.J. Eysenck's personality theory, several personality traits (sociability, impulsiveness, activity, etc.) can be identified and grouped into trait continuums of extraversion and neuroticism (Mitchell, Kumari, 2016). Each dimension possesses two poles: extraversion-introversion and neuroticism-emotional stability.

Extraversion is characterized as an orientation toward others, social interaction, and impulsiveness. Extraverts are distinguished by sociability, a desire for social contact, and activity, whereas introverts are characterized by withdrawal and avoidance of large groups. Extraverts establish contact more readily and may recognize manipulation attempts more quickly, but they may be prone to impulsive actions under emotional influence. Introverts are more inclined toward reflection and analysis, which helps them verify and analyze information. However, they may experience significant stress when communicating with strangers.

Neuroticism indicates a tendency to experience frequent and intense negative emotions (Cervone, Pervin, 2015). Individuals with high neuroticism are prone to anxiety, negative emotions, and worry. Low neuroticism—emotional stability—conversely implies balance, calmness, and restraint in emotional expression. High levels of self-control facilitate emotional regulation and resistance to pressure. Individuals who prefer to actively avoid conflicts may terminate suspicious conversations more quickly, but they may consequently miss opportunities to gather important information for subsequent verification. Proponents of active resistance strategies tend toward actively clarifying circumstances and verifying information, but may be more vulnerable to emotional pressure.

Strategies of behavior in the context of possible fraudulent actions

When confronting potential fraud, every individual undergoes several critical stages where their psychological characteristics can either facilitate or impede appropriate responses. Initial contact with fraudsters often catches people off guard, particularly introverts who experience significant stress from unexpected calls. At this moment, it is crucial to activate defensive mechanisms and resist the first impulse. Extraverts, conversely, may engage in conversation too readily, making them vulnerable to manipulation.

The subsequent stage involves verifying the credibility of incoming information. Here, individuals with a skeptical disposition gain an advantage, as they are naturally inclined to

question any assertions. High levels of self-control enable individuals to maintain clarity of thought and methodically request additional information for verification. It is precisely this capacity for self-control that becomes the decisive factor in managing emotions, which fraudsters actively attempt to exploit to achieve their objectives.

Decision-making under fraudulent influence requires a specialized approach. Active resistance helps gather more information about the interlocutor's intentions, though it is essential to avoid emotional decision-making. Sometimes an active avoidance strategy proves more effective, allowing for rapid termination of suspicious contact. The conclusion of interaction also has distinct characteristics: extraverts are more likely to report fraud attempts to appropriate authorities, which is important for preventing future incidents.

This entire process represents the activation of critical thinking—creating a cognitive buffer between stimulus and response. At the neurophysiological level, this means maintaining the controlling function of the prefrontal cortex over limbic structures responsible for emotional and impulsive reactions. The better an individual can preserve this control, the higher their chances of avoiding fraudulent schemes.

Conclusion

Currently, the use of suggestion as a means of manipulation, influence, and directing human activity toward specific objectives is inevitable. It is essential to recognize the biological and social predisposition to suggestion. Telephone fraudsters employ a systematic algorithm of influence on victims, aimed at activating emotional brain centers (amygdala, limbic system) and suppressing rational thinking (prefrontal cortex). This algorithm enables fraudsters to effectively manipulate the victim's consciousness and achieve their objectives.

Countering telephone fraud requires a conscious approach to each step of interaction. It is crucial to maintain composure, employ critical thinking, and verify information accuracy (Medyanik, 2024). These actions help reduce the influence of emotional brain centers (amygdala) and maintain the activity of rational areas (prefrontal cortex), enabling thoughtful and safe decision-making. Recording information provided by the fraudster can serve as a strategic tool that helps activate higher cognitive brain functions, reduce stress levels, and improve decision-making quality.

This article proposes algorithms and strategies for countering financial fraud based on understanding the psychophysiological characteristics of information perception and victim behavior. Awareness of one's strengths and weaknesses regarding personality

traits and associated behavioral strategies will help select the most appropriate strategies for each step of the fraud countermeasure algorithm and enhance overall security.

Increasing awareness of contemporary deception methods, training in fraud recognition, developing critical thinking, and decision-making skills under manipulative conditions can help reduce the risk of becoming a victim of fraud.

References

Acierno, R., Hernandez, M. A., Amstadter, A. B., Resnick, H. S., Steve, K., Muzzy, W., & Kilpatrick, D. G. (2010). Prevalence and correlates of emotional, physical, sexual, and financial abuse and potential neglect in the United States: The National Elder Mistreatment Study. *American Journal of Public Health, 100*(2), 292–297. https://doi.org/10.2105/AJPH.2009.163089

Anokhin, P. K. (1973). *Principles of systemic organization of functions.* Nauka.

Ariely, D., & Silva, J. (2002). *Payment method design: Psychological and economic aspects of payments*. MIT Press.

Arnsten, A. F. (2009). Stress signalling pathways that impair prefrontal cortex structure and function. *Nature Reviews Neuroscience, 10*(6), 410–422. https://doi.org/10.1038/nrn2648

Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7*(1), 1–15. https://doi.org/10.1207/s15327965pli0701_1

Berns, G. S., Capra, C. M., Moore, S., & Noussair, C. (2010). Neural mechanisms of the influence of popularity on adolescent ratings of music. *NeuroImage, 49*(3), 2687–2696. https://doi.org/10.1016/j.neuroimage.2009.10.070

Berridge, K. C., & Robinson, T. E. (2003). Parsing reward. *Trends in Neurosciences, 26*(9), 507–513. https://doi.org/10.1016/S0166-2236(03)00233-9

Buckner, R. L., & Carroll, D. C. (2007). Self-projection and the brain. *Trends in Cognitive Sciences, 11*(2), 49–57. https://doi.org/10.1016/j.tics.2006.11.004

Cacioppo, J. T., & Hawkley, L. C. (2009). Perceived social isolation and cognition. *Trends in Cognitive Sciences, 13*(10), 447–454. https://doi.org/10.1016/j.tics.2009.06.005

Camerer, C., Loewenstein, G., & Prelec, D. (2005). Neuroeconomics: How neuroscience can inform economics. *Journal of Economic Literature, 43*(1), 9–64. https://doi.org/10.1257/0022051053737843

Catani, M., & Mesulam, M. (2008). The arcuate fasciculus and the disconnection theme in language and aphasia: History and current state. *Cortex, 44*(8), 953–961. https://doi.org/10.1016/j.cortex.2008.04.002

Cervone, D., & Pervin, L. A. (2015). *Personality*. John Wiley & Sons.

Cialdini, R. (2006). *Influence: The Psychology of Persuasion.* Popurri.

Cialdini, R. B. (2007). *Influence: The psychology of persuasion*. Collins.

Cialdini, R. B., & Goldstein, N. J. (2004). Social influence: Compliance and conformity. *Annual Review of Psychology, 55*, 591–621. https://doi.org/10.1146/annurev.psych.55.090902.142015

Damasio, A. R. (1994). *Descartes' error: Emotion, reason, and the human brain*. Putnam.

Drozd, U. S., Frik, Ya. A., Smagin, A. V., Lanshakov, D. A. (2024). Projection neurons of the prefrontal cortex, their participation in the formation of various forms of behavior and the expression of brain neurotrophic factor in them. *Russian Journal of Physiology named after I.M. Sechenov,* 110(9), 1316–1336. https://doi.org/10.31857/S0869813924090039

Finucane, M. L., Alhakami, A., Slovic, P., & Johnson, S. M. (2000). The affect heuristic in judgments of risks and benefits. *Journal of Behavioral Decision Making, 13*(1), 1–17. https://doi.org/10.1002/(SICI)1099-0771(200001/03)13:1<1:AID-BDM333>3.0.CO;2-S

Furnell, S. (2005). *Computer insecurity: Risking the system*. Springer Science & Business Media.

Gilbert, D. T. (1991). How mental systems believe. *American Psychologist, 46*(2), 107–119. https://doi.org/10.1037/0003-066X.46.2.107

Goodale, M. A., & Milner, A. D. (1992). Separate visual pathways for perception and action. *Trends in Neurosciences, 15*(1), 20–25. https://doi.org/10.1016/0166-2236(92)90344-8

Greenspan, S., & Rogers, J. (2016). Gullibility in people with intellectual disability: An unappreciated risk factor for theorization and victimization. *International Review of Research in Developmental Disabilities, 50*, 169–211. https://doi.org/10.1016/bs.irrdd.2016.05.004

Griskevicius, V., Goldstein, N. J., Mortensen, C. R., Cialdini, R. B., & Kenrick, D. T. (2006). Going along versus going alone: When fundamental motives facilitate strategic (non) conformity. *Journal of Personality and Social Psychology, 91*(2), 281–294. https://doi.org/10.1037/0022-3514.91.2.281

Gross, J. J. (2002). Emotion regulation: Affective, cognitive, and social consequences. *Psychophysiology, 39*(3), 281–291. https://doi.org/10.1017/S0048577201393198

Hanganu-Opatz, I. L., Klausberger, T., Sigurdsson, T., Nieder, A., Jacob, S. N., Bartos, M., Sauer, J.-F., Durstewitz, D., Leibold, C., & Diester, I. (2023). Resolving the prefrontal mechanisms of adaptive cognitive behaviors: A cross-species perspective. *Neuron, 111*, 1020–1036. https://doi.org/10.1016/j.neuron.2023.03.017

House, J. S., Landis, K. R., & Umberson, D. (1988). Social relationships and health. *Science, 241*(4865), 540–545. https://doi.org/10.1126/science.3399889

Johnson-Frey, S. H. (2004). The neural bases of complex tool use in humans. *Trends in Cognitive Sciences, 8*(2), 71–78. https://doi.org/10.1016/j.tics.2003.12.002

Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist, 58*(9), 697–720. https://doi.org/10.1037/0003-066X.58.9.697

Kahneman, D. (2011). *Thinking, fast and slow*. Farrar, Straus and Giroux.

Kahneman, D., & Tversky, A. (1979). Prospect theory: An analysis of decision under risk. *Econometrica, 47*(2), 263–291. https://doi.org/10.2307/1914185

Klayman, J., & Ha, Y. W. (1987). Confirmation, disconfirmation, and information in hypothesis testing. *Psychological Review, 94*(2), 211–228. https://doi.org/10.1037/0033-295X.94.2.211

Klucharev, V., Hytönen, K., Rijpkema, M., Smidts, A., & Fernández, G. (2009). Reinforcement learning signal predicts social conformity. *Neuron, 61*(1), 140–151. https://doi.org/10.1016/j.neuron.2008.11.027

Laycock, R., Crewther, S. G., & Chouinard, P. A. (2020). Blink and you will miss it: A core role for fast and dynamic visual processing in social impairments in autism spectrum disorder. *Current Developmental Disorders Reports, 7*, 237–248. https://doi.org/10.1007/s40474-020-00220-y

LeDoux, J. E. (2000). Emotion circuits in the brain. *Annual Review of Neuroscience, 23*(1), 155–184. https://doi.org/10.1146/annurev.neuro.23.1.155

Levine, T. R. (2014). Truth-Default Theory (TDT): A theory of human deception and deception detection. *Journal of Language and Social Psychology, 33*(4), 378–392. https://doi.org/10.1177/0261927X14535910

Mazhirina, K. G., Pervushina, O. N., Fedorov, A. A., Shtark, M. B. (2021). *Neuroimaging and the phenomenon of moral choice.* Advances in Physiological Sciences.

Medyanik, O. V. (2024). Psychological strategies for protecting Russians from suggestive financial influence: cluster analysis. *Bulletin of Vyatka State University,* (1)151, 129–148. https://doi.org/10.25730/VSU.7606.24.014

Medyanik, O. V., Legostaeva, N. I. (2022). Financial behavior of Russians: factors, types, vulnerability codes. *Telescope: Journal of Sociological and Marketing Research,* (4), 50–55. https://doi.org/10.24412/1994-3776-2022-4-50-55

Polunina, A. G., Bryun, E. A. (2013). Antisocial behavior: neuropsychological correlates and the role of neurobiological factors. *Social and Clinical Psychiatry, 23*(4), 88–90.

Shoshina, I. I., Shelepin, Yu. E. (2016). *Mechanisms of global and local analysis of visual information in schizophrenia.* VVM.

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Conflict of Interest Information

The authors have no conflicts of interest to declare.