Neuroeconomics as an Appropriate Approach to Clarify the Economic Model: The Case of Russia

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Abstract

This article explores the relatively new field of neuroeconomics, which adopts an interdisciplinary approach to study economic behavior. As traditional methods of understanding human behavior become less effective, there is a need for more engaging and practical approaches. Neuroeconomics emerges as a potential solution, and this study considers its application to explaining the economic model of Russia. By employing neuroeconomics, a deeper comprehension of the economic dynamics in the country can be attained.

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Introduction

In our increasingly complex world, rapid changes, contradictions, and unexpected effects are common, often leading to devastating consequences for nations. Globalization, wars, climate change, and unresolved social and economic issues are among the contributing factors. Consequently, explaining human behavior through rationality alone has become not only challenging but also exceedingly difficult across all activities. The traditional notion of "homo economicus," which glorified economic rationality, appears outdated and unsuitable for the current situation. While it provided a solid foundation for useful economic theories (Smith, 2007), this approach relied on formal rationality assumptions.

To address the need for understanding unpredictable events, scholars and researchers are turning to interdisciplinary approaches. Neuroeconomics is one such relatively new field that integrates insights from economics and neuroscience (Glimcher, 2010). Though the relationship between psychology, sociology, and economics has a long history (Hutchins, 1995), behavioral economics, particularly behavioral finance, has gained prominence, highlighting deviations from rationality (Gilboa, 2010). Anomalies are often explained through psychological factors (Ackert, Deaves, 2010; Akerlof, Kranton, 2000). In this context, neuroeconomics emerges as an interdisciplinary field that combines principles from neuroscience, economics, and psychology to study how the brain processes economic decision-making. It seeks to comprehend the neural mechanisms underlying economic behavior and how they influence individual choices, market dynamics, and economic outcomes.

Researchers in neuroeconomics employ various techniques such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and lesion studies to investigate the neural processes involved in economic decision-making. These techniques help identify brain regions activated during specific economic tasks and track changes in brain activity in response to different economic stimuli.

A central concept in neuroeconomics is the notion of utility, which refers to the subjective value or satisfaction an individual derives from consuming goods or engaging in certain activities. Neuroeconomic studies aim to understand how the brain computes utility and how it influences decision-making. For example, researchers might investigate the neural activity associated with choices between different goods or the anticipation of rewards.

As is often the case in such situations, there is no consensus among scientists. Some researchers prioritize economics and consider neuroeconomics as a deeper exploration of behavioral attitudes (Gigerenzer, Todd, 1999; Ross, 2005). On the other hand, there are those who advocate for neuroeconomics as the primary focus (Glimcher, Kable, Louie, 2007). This group of researchers and academics emphasize the human brain as the primary driver of behavior (Parker, Newsome, 1998). The brain evaluates situations, prompts actions, and judges their effects. Some effects cannot be measured using typical economic categories, and concepts like efficiency, rationality, and utility may play a minor role or even be disregarded. Hence, it may be time to replace "homo economicus" with "homo neuroticus." As Durkheim (2011) pointed out, human behavior can change not only due to ability but also through the way the environment is evaluated.

The question arises: How does a human being truly act?

Kirchgässner (2013) highlights the concept of rationality but coins it as an irrational approach. Strong versions of rationality have been rejected by empirical examples. He argues that people do not act rationally as they tend to evaluate situations based on their desires rather than objective realities (Brennan, 2007). Reality takes a back seat to desires (Elster, 1979). Moreover, individual interpretations of utility can vary widely. While some may see it as fulfilling desires, others may view it through the lens of rational expectations. Utility also differs based on factors such as education, place of living, gender, age, and even "brain skills." Skewed outcomes may result from improper brain functioning influenced by irrational factors. These so-called "fake facts" can be internally generated based on personal utility and wishes or externally provided by others. The choice depends on the feasibility of each decision (Alós-Ferre, Granic, 2021). In certain situations, choices and access to facts may be limited and influenced by others, especially those in positions of power who may punish decision-makers if their choices are not satisfactory.

An interesting experiment conducted by Brüne et al. (2021) on people with health problems, specifically Huntington's disease, showed impairments in their understanding of more complex social exchange rules. Some of these individuals did not react to unfairness from others and solely focused on their own results without considering the counterparts' performance.

More profound insights emerged from the research by Michels et al. (2022) on a group of cocaine users. The study revealed significant brain changes, including ischaemic, haemorrhagic, and metabolic changes, using the novel technique diffusion tensor imaging (DTI). These anomalies affected decision-making, with affected individuals being more influenced by psychopathological and neuropsychological assessments than rational expectations. When certain brain diseases impact different groups within a society, predicting their behavior becomes not only challenging but also highly unusual. This issue is crucial and exists in all nations, yet it is rarely researched, particularly from an economic standpoint. Changes in certain brain areas can alter human emotional reactions and lead to surprising decisions (Seucan, 2015). Understanding emotional and cognitive aspects of the brain is critical to comprehending human behavior. While the brain is a complex mechanism, it is influenced by factors that produce significant effects (Satpathy, 2016). This viewpoint has been explored effectively from a marketing perspective, with Wierenga (2011) highlighting the importance of neurotic defiance as a significant factor influencing consumer decisions.

Soutschek and Tobler (2020) also focused on brain mapping concerning mental work and decision-making processes. They discovered that the dorsolateral prefrontal cortex (DLPFC) is responsible for successfully dealing with demanding tasks and engaging with decision-making. Other researchers have raised important issues concerning brain health and well-being (Hare et al., 2011; Heisler, Lam, 2017). Health depends on various factors, including eating habits, and the brain plays a critical role in determining eating behaviors, influenced by factors like regularity and quality. Disruptions in regularity and quality can lead to a reduction in brain functioning capacity. Serotonin, in particular, plays a significant role in the decision-making process related to food consumption (Vlaev et al., 2017).

Cubillo et al. (2022) presented interesting results from their studies, investigating memory connections with prefrontal and

striatal brain regions. Their findings suggest that attention control is the initial mechanism leading to long-term benefits from adaptive memory training.

Fehr (2009) made fascinating remarks regarding trust, emphasizing its crucial role not only in economics but also in political matters. Low levels of trust can lead to significant problems in both economic and political life. In such situations, politicians may resort to more autocratic approaches, and society experiences a decline in cooperative economic activities. Economic outcomes become less significant, and individual companies feel isolated and adopt short-term orientations. Trust is associated with a person's perception and is shaped by the brain. Core brain regions such as the subcortical, anterior insula, or prefrontal areas are activated and stimulated by trust (Baumgartner, 2016; Tzieropoulos, 2013).

Krueger and Meyer-Lindenberg (2019) developed an exciting neuropsychoeconomic model, combining methodologies from neuroscience, psychology, and economics. With this approach, researchers aim to identify specific brain regions responsible for psychological and economic behavior. If this approach is valid, it might be possible to stimulate the brain to achieve desired results. Additionally, identifying factors that influence specific brain regions could help predict human behavior.

Tusche and Bas (2021) focused on neurocomputational models of altruistic decision-making driven by social motives. People tend to behave more altruistically when motivated to achieve certain goals, even if it means violating individual or social norms. Through neuroscience, they demonstrated that specific brain regions are responsible for mentalizing, empathy, violation, and control. These brain regions can be influenced by social patterns and even be quantified using mathematical formulas.

During cooperation or competition, typical elements of the brain are involved. Léné et al. (2021) discovered changes in interbrain synchrony (IBS) during social interaction, especially during collaboration. Active interbrain synchrony was particularly prominent when success was achieved, signifying the strength of cooperation. Furthermore, the researchers identified synergistic or antagonistic brain activity during cooperation or competition (Montague et al., 2002). Synergistic effects are more desirable than antagonistic ones, and this aligns with the concept of rewarding schemes. Humans generally expect rewards for their efforts, and the absence of rewards can lead to decreased enthusiasm and motivation. Increased rewards have been shown to activate specific brain regions like the lateral frontal pole cortex (LFPC) and dorsomedial prefrontal cortex (DMPFC) more intensely (Wang et al., 2021). Delays in receiving rewards can also lead to negative emotions, such as apathy or anger, and even a breakdown in cooperation (Shackman et al., 2011). These results may lead to some interesting conclusions: firstly, the absence of rewards may prompt individuals to seek rewards through legal or illegal means, and secondly, the lack of rewards may exacerbate mental health problems, such as depression, as depressive risk is associated with negative social feedback (Hankin, 2015). Conversely, positive social feedback can mitigate depressive risk.

Some researchers have focused on automatic choices or judgments and identified specific brain regions responsible for such actions. Characteristic brain areas affecting this activity are located in the back (occipital), top (parietal), and side (temporal) regions (Lieberman et al., 2002). If we assume that skillfully influencing these areas can prompt people to act

more automatically, they may become familiar not only with known procedures but also hesitant to adopt new solutions. Moreover, they might be more inclined to follow "common" behavior rather than taking an individual approach. Therefore, it is essential for decision-makers to understand how to stimulate different parts of the brain. Economists can gain control over clients' behaviors, while politicians may seek to control their nations. It is even imaginable that during military conflicts and wars, commanders could be more effective if they can skillfully activate special parts of soldiers' brains.

Historical examples support this notion. During the Second World War, soldiers in the Russian Army were provided with alcohol not only before important battles but on a large scale. This practice was considered normal for both low-ranking soldiers and officers (Niewiński, 2018). Alcohol was used to reduce not only stress but also hunger and the fear of death, making them appear more courageous. However, alcohol often impaired logical thinking and led to significant losses during the wars. Alcohol can cause damage to the brain, resulting in altered performance for individuals affected by this condition (Damasio, 1994). Consequently, in some societies, governments have supported drinking habits, either officially or unofficially, to maintain control and cover up economic failures.

Assumptions of Social Factors Affecting Brain Function

Social factors can influence brain activity in several ways. Firstly, they activate the imagination and confront it with the brain's capacity of understanding, which is based on knowledge and experience. The more knowledge and experience an individual possesses, the higher their level of understanding. However, the capacity may change or be influenced by the timing and regularity of these factors. Secondly, the brain can be initially stimulated by harsh features that lead to both positive and negative consequences. When these features are more pronounced, they generate more active imagination and agitation. Thirdly, the brain can recognize twofold effects, starting from the perception of the biggest threat and gradually shifting towards the perception of reward.

In certain societies, the rewards may be similar, although some differences can be observed. In dictatorial regimes, the majority of the population seeks survival in safe conditions. Some individuals benefit through various forms of collaboration with such regimes. The more dictatorial the system, the more it shapes the desired pattern of people's behavior. Collaborators are rewarded, neutrals remain indifferent to authority, but antagonists are prosecuted, resulting in a change in the nation's structure. The number of antagonists decreases while more collaborators and neutrals emerge. This process is realized through dopaminergic systems. The brain generally seeks positive feelings associated with a harmless attitude (Montague, King-Casas, Cohen, 2006), while negative sensations are shielded by amygdala activation. Audi (2001) emphasizes that the amygdala is considered an essential part of rational behavior. In autocratic countries, systematic actions are taken to support the regime, including the harsh elimination of opponents. Zald and Pardo (2002) investigate this and draw interesting conclusions. They claim that the amygdala demonstrates quick adjustment during frequent exposure to incentives. If this is the case, methodical actions of autocratic regimes can tailor brain activity. These actions are not only regular but also extend to various areas such as media, religion, education, human relations, and institutional order combined with a harsh punishment system. The system is also ensured by informants, military, and security squads, who are part of the beneficiaries. Furthermore, in such societies, stress is a permanent factor fostering

human activity. People generally become familiar with universal values during their education or family tradition. Stress is described (among other definitions) as specific neurotic changes (Scherer, 2002). When people experience constant stress, their imagination, value system, and brain activity concerning the amygdala process are reorganized according to the effectiveness of the autocratic regime's performance.

Some researchers have distinguished behavior from the environment (Baker, 1963). However, I argue that behavior and brain-affecting factors are strictly connected to the environment in which they occur. An additional argument for this is the prominence of the tropism idea in various scientific disciplines, including biology, medicine, and social sciences (Bühler, 1927). Generally, the majority of people, even those with disorders, try to adapt themselves as much as possible to their environmental circumstances (Peter Christopher Kratcoski, Lucille Dunn Kratcoski, 2021). Assuming that behavior is separated from the environment would imply neglecting brain perception and imagination. Such a situation is difficult to accept, especially in regimes where authorities attempt to control the motion of the nation. Brains are under pressure to follow the established rules, and the architectures of these rules aim to arrange predictable behavior based on regularity, allowing for greater control over behavior. The more predictable the behavior, the more noticeable the influence of rules and the regime.

Furthermore, this situation can be compared to the process of learning. People in regime-controlled countries must adapt themselves to survive and succeed. Failure to adapt can lead to punishments and lack of promotion. In autocratic or totalitarian regimes, education plays a crucial role in shaping the nation's way of thinking. Education primarily provides facts and values with official explanations, while other sources like religion, international influences, and family heritage remain minor ones. Atheism was strongly promoted in communist countries, and any religious influence was practically expelled. However, the situation changed when autocratic regimes collaborated with religious leaders who demonstrated support for the authorities. Well-educated and experienced parents and priests were afraid of the consequences if they insisted on providing alternative facts and universal values. Independent thinking is under strict control, and those who adhere to official clarifications can survive. The official clarification is deeply grounded due to constant pressure. Only narrow circles of society may reject the official way of interpreting facts, but regimes often try to corrupt or isolate them, marginalizing their influence on society.

Moreover, oppressive regimes are not willing to induce and support leaders who provide alternative facts and clarifications. Such leaders can be found in various areas of social activity, including entertainment, social media, journalism, music, literature, science, and more. These leaders are skillfully promoted and often become authorities for many people, creating the mainstream of performance and supporting the official pattern of behavior. Research indicates that human memory is remarkably vulnerable to social influences, and both public and individual conformity play a role in shaping memories (Edelson et al., 2011). The brain can easily imagine the results of actions in the context of conformity (Ochsner, 2005). Although memories are often inaccurate, they tend to focus on both individual and public conformity. According to M.P. Richardson, B.A. Strange, and R.J. Dolan (2004), the amygdala is responsible for social and emotional processing and modulates memory related to hippocampal activity.

Social factors shaping brain imagination - The Russian case

Since medieval times, the ruling circles in Russia have consistently sought to preserve their power, often resorting to harsh methods. The nation experienced both fear and admiration towards the authorities. Ivan the Terrible is a classic example of this, with a prominent place in Russian history and interpretations of his behavior and its impact on society (Erusalimskij, 2015). Tsar Ivan was known for his cruelty and sophisticated methods of threatening society, using imprisonment and death sentences as tools to instill loyalty and fear. This approach to ruling was not new, as similar methods were employed during the Mongols' invasion and control of Russian territory (Christian, 1998). Even during the times of Peter the Great, when Russia was industrialized in a Western style, repression was still prevalent (Massie, 2013). Throughout Russia's history, tyranny, cruelty, fear, and the marginalization of individual rights were common features of the social mode in the country.

Analyzing the Russian nation, one could refer to the Stockholm syndrome. The more oppression was employed, the more admiration the ruling circles received. Although some studies show different views, in Russia, political violence, harsh dominations, and violations of human rights seemed to make people more willing to collaborate with authorities or at least reduce political activity. Independent ideas or attempts to initiate political change were immediately suppressed, and dissenters were imprisoned or killed. Kuran (1997) explained this behavior as a fear of facing violence if anyone demonstrated disagreement with the ruling circles. This phenomenon is particularly evident when the times of Stalin are discussed. Some Russian leaders want to present Stalin as a hero who led Russia to victory in World War II.

Zhukov and Talibova (2018) found a strong negative relationship between the number of citizens imprisoned in Gulag camps and future political participation. They observed that regions with former Gulag camps tended to have harsh state terror deeply rooted in people's memories. This attitude has been passed down through generations, influencing brain imagination and shaping characteristic national behavior. Conformism became skillfully adjusted to Russian reality.

This attitude is also reflected in the works of renowned Russian writers such as Dostoevsky, Gogol, Nabokov, Pushkin, Lermontov, Tolstoy, Herzen, Shalamov, and Solženicyn. It can be argued that the Russian nation has been conditioned to behave in a manner compatible with the expectations of the authorities. On the other hand, countries that were freed from Russian domination tend to accept democratic rules more willingly and reject autocratic defiance.

Russian society was deeply affected by the threat of imprisonment in Gulag camps. While some have compared the Gulag system to German Nazi camps, it was fundamentally different in organization and purpose. The main goal of Gulag camps was to harshly reeducate opponents of the new communist government, which began in 1919 and continued with modifications until the present day. Not only adversaries but also skeptics and even loyal individuals were sent to these camps. The government employed large-scale actions of social structure decomposition, imprisoning people from various fields, including science, the military, politics, and administration. Those sent to the Gulag were forced into hard labor, providing raw materials and creating infrastructure for the new economic model. This way, the government controlled society and secured a cheap source of labor. People lived in constant fear, knowing they could be sent to the Gulag at any time and for any reason. In 1938 alone, more than 40 thousand officers, 3 out of 5 marshals, 15 out of 16 generals, and 60

colonels were executed (Rogut, 2010). Though the Gulag system was not specifically designed for extermination, Blyth (1995) estimated that between 9.7 million to 16.7 million people were imprisoned, and many suffered and died as a result. This cruel system had a profound impact on the behavior of Russian society, instilling widespread fear of protesting or expressing any dissenting views from the official stance.

Russian Current Model of Economy and Its Main Effects

Even though Russian economics has been shaped by many factors, its unique model of economy raises both answers and questions. This model stands out as it is difficult to compare with others. Some researchers may highlight certain elements of the Russian model to argue for either a market-oriented or planned economy. However, the role of the government is predominant, and "free" market elements are used to support an inefficient way of economic functioning. Russia relies not only on energy resources but also on various other raw materials. It ranks fifth among holders of proved oil reserves (after Saudi Arabia, Canada, Iran, and Iraq) and first in total proved natural gas reserves. It also holds the highest global proved reserves of coal. The country has abundant water, solar energy, and wind potential, as well as resources for bioenergy (Mitrova, 2022). The development of Russia, both in terms of raw materials and the economy, heavily relies on the export of natural resources. There is a strong correlation between Russian GDP growth and the volume of raw materials exported. The fuel sector plays a huge role in the Russian economy, with oil, oil products, and natural gas constituting more than 60 percent of total goods exports from 2001 to 2015 (Drygalla, 2022). Thus, raw materials significantly shape the Russian model of economy.

Despite attempts by Russian leaders to modernize the country and support innovation, limited achievements have been observed (Zaini, Lyan, Rebentisch, 2015). Russia, being the largest country in the world with many federation republics and autonomous regions, operates under central coordination. While some decisions may be made by regional centers, crucial ones are consulted and sanctioned by Moscow. Local decisions can be changed by central authorities, and locals are obligated to follow the expectations of the dominant partner. Such a relationship creates ample space for corruption and shadow economy performance. Horizontal dependence has a deep historical grounding, as the central government cannot control all spheres of business activity, leading to the rise of trusted entrepreneurs known as "oligarchs" involved in large-scale business. They are fully dependent on central authorities and fulfill their expectations, with any resistance harshly dealt with through imprisonment or death sentences. The fear of high authorities is a specific feature of the economic model of Russian economy, making Russian managers and foreign private company owners unable to make decisions independently based solely on economic factors. They must always anticipate political interference. Such interference is binding for all managers who want to conduct long-term business on a larger scale. This characteristic feature of the Russian economy is hardly understood and accepted by market-oriented economies. Additionally, the manufacturing sector in Russia is characterized by low efficiency and added value (Varnavskii, 2018). Russian researches claim that the country's import dependence on raw materials varies across components and can impact the devaluation of the national currency (Kalinina, Koroteevb, Krupinb, Nefedov, 2021). Structural imbalances in the labor market have been identified as a limiting factor for sustainable economic growth (Edinak, 2021). There is a lack of well-educated people in

manufacturing, services, and farming industries, whereas well-prepared and trained staff can be found in the military, security sectors, and government-related institutions. This allows the state to easily control and modify social motion. Authorities have institutional advantages and easier access to knowledge assets. Safronov and Zotova (2021) conducted research based on different sets of data from Eurostat, Rosstat, and the Federal Tax Service, revealing that the tertiarization process in Russia has been progressing very slowly. The level of development in the tertiary sphere, which plays an important role in overcoming the negative social consequences of the transition to a market economy, is highly differentiated among federal counts. While growth in the tertiary sector has been noticed in just 15 regions, others continue to face significant challenges in achieving sustainable development. Moreover, people in less developed regions are "trapped" and living in very poor conditions. They lack the ability to improve their situation independently and predominantly rely on decisions made by authorities. Based on the research led by T. Nefedova, I. Treivisha, and V. Sheludkova (2022), the cash income shares of the wealthiest 20% increased from 32.7% to 46.4%, highlighting income inequality as a key factor contributing to the polarization of society. Low incomes are a significant issue for the central government, although they do not fear social protests. Russian society is familiar with poverty and poor living conditions and has developed coping mechanisms to deal with these challenges. O. Poluektova, M. Efremova, and S. Breugelmans (2022) found that poverty in Russia is strongly correlated with social and psychological patterns. Those living in poverty are often weakly motivated to change their status and are usually affected by social problems such as drug use, alcoholism, and criminality.

Conclusions

The Russian model of economy has been established over a long period and is officially accepted by the majority of citizens. It has been shaped by various factors, including psychological and social ones. Fear and obedience play a significant role in the motivation of Russian behavior, making neuroeconomics a suitable approach to further understanding the situation in this country. In order to improve the situation and reduce the gap between Russia and well-developed market economies, the employment of neuroeconomics is necessary. It can help overcome deeply ingrained bad habits and customs that are challenging to change in democratic economies. However, introducing neuroeconomics will take time as new rules of behavior are created. There is a concern that authorities might realize the importance of neuroeconomics and use it skillfully to consolidate their power. So far, the professional use of neuroeconomics has not been observed, despite its potential to explain the Russian model of economy in a comprehensive manner. Neuroeconomics explores the role of emotions and social factors in economic decision-making, revealing how emotions and neural mechanisms influence economic behavior. It also examines the impact of social interactions and norms on economic choices, studying brain processes related to trust, cooperation, fairness, and social influence.

The findings from neuroeconomic research have several applications in economics and related fields. They can aid policymakers in designing more effective interventions and incentives by understanding how different factors influence decision-making at a neural level. Neuroeconomic insights can also shed light on consumer behavior, marketing strategies, and investment decisions by uncovering the neural processes that drive economic choices.

Overall, neuroeconomics provides a deeper understanding of the underlying neural mechanisms that influence economic decision-making. By combining insights from neuroscience, economics, and psychology, researchers in this field aim to bridge the gap between the complexities of human cognition and behavior and the models used in traditional economic analysis.

The neuroeconomic approach can contribute to the development and refinement of economic models by providing insights into the neural mechanisms underlying economic decision-making. Here are a few ways in which the neuroeconomic perspective can inform economic models:

1. Incorporating emotions and biases: Traditional economic models often assume that individuals are purely rational decision-makers. However, neuroeconomics has shown that emotions and cognitive biases significantly impact decision-making. By integrating these insights, economic models can better account for the role of emotions and biases in shaping economic behavior.
2. Understanding risk and uncertainty: Neuroeconomic studies have examined how the brain processes and evaluates risk and uncertainty. This research can enhance economic models by providing a more nuanced understanding of how individuals make decisions in uncertain situations, such as investment choices or insurance decisions.
3. Exploring social preferences and interactions: Economic models traditionally assume that individuals are motivated solely by self-interest. However, neuroeconomics has revealed that social preferences, such as fairness and reciprocity, play a crucial role in economic decision-making. By incorporating these social preferences into economic models, researchers can better understand and predict outcomes in social and economic interactions.
4. Examining neurochemical influences: Neuroeconomics investigates the role of neurotransmitters, such as dopamine and serotonin, in economic decision-making. These neurochemicals can influence motivation, reward processing, and risk-taking behavior. By incorporating neurochemical influences into economic models, researchers can gain a deeper understanding of how these factors shape economic outcomes.
5. Identifying neural predictors of economic behavior: Neuroeconomics research aims to identify specific neural markers or patterns that can predict economic choices and behaviors. These neural predictors can be integrated into economic models to improve their predictive accuracy and capture the underlying neural processes driving economic decision-making.

By incorporating insights from neuroeconomics, economic models can move beyond the assumption of rationality and consider the complex interplay of neural processes, emotions, biases, and social factors that influence economic behavior. This integration can lead to more realistic and robust economic models that better explain and predict real-world economic phenomena.

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