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Neurobiology of the Milgram Obedience Experiment

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Abstract

This manuscript presents a comprehensive review of the neurobiology underlying the Milgram Obedience Experiment, a cornerstone in understanding human behavior under authority. Beginning with an examination of traumatic historical events, particularly the Holocaust, the manuscript delves into the psychological underpinnings of obedience. It discusses how individuals, like Adolf Eichmann, rationalized their actions as mere adherence to orders, a phenomenon later empirically studied by Stanley Milgram. Milgram's experiments, conducted at Yale University, demonstrated a startling willingness among ordinary people to inflict harm when instructed by an authority figure, with a significant proportion of participants administering what they believed were lethal electric shocks to others. The review further explores the neurobiological aspects of obedience, emphasizing the role of mirror neurons and empathetic responses. It highlights how obedience to authority can diminish empathetic responses and alter the neural processing of actions and consequences. This diminished sense of agency and responsibility when following orders is contrasted with situations where individuals act on their own volition, shedding light on the complex interplay between authority, morality, and neurobiology. In conclusion, this review not only provides a deep insight into Milgram's obedience experiments but also extends the understanding of the neurobiological mechanisms that drive human behavior in contexts of authority and obedience. It underscores the intricate balance between individual autonomy and susceptibility to external influences, a balance that is crucial in understanding both historical events and contemporary societal dynamics.

Key Words: Milgram obedience experiment, neurobiology, authority and obedience, empathy and neuroscience

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Introduction

The twentieth century was marked by traumatic events in human history, including wars, massacres, acts of violence and terrorism, migrations, and genocides that led to the death of millions and forced displacements, highlighting a period of intense human mistreatment. These behaviors of destruction were not the product of a single mind but executed by hundreds of individuals obeying authority. Particularly, the Holocaust executed by the Nazis during World War II raised questions among scholars about its occurrence (Yıldız, 2016). Post-World War II, Nazi war criminal Adolf Eichmann, captured in

Argentina and tried in Jerusalem (Kızılarslan, 2008), defended his actions by claiming he was merely following orders, demonstrating a lack of personal judgment in the face of the atrocities committed (Mercan, 2016).

Erich Fromm described this phenomenon as "irrational authority," which aligns with Weber's concept of "rational-legal" authority. Hannah Arendt, in her work "Eichmann in Jerusalem: A Report on the Banality of Evil" (Arendt, 2014), argued that the designation of such behavior as duty by individuals overrides their moral compass, even justifying evil as a form of self-defense. Eichmann's actions, while expected to be those of a good citizen, were carried out by an ordinary individual who set aside his personal conscience to execute lethal orders (Kızılarslan, 2008). As a government official, Eichmann conducted heinous crimes against humanity, rationalizing them as adherence to his duties and the dictatorial laws of Nazi Germany. These justifications influenced psychologist Stanley Milgram, who sought to understand the complicity in the persecution of Jews during World War II by those who followed orders. Milgram's experiments aimed to demonstrate how obedience to authority, without personal moral contemplation, could lead to severe consequences for others. His interest was particularly piqued by the silence and complicity of millions during the German genocide, which he attributed not just to individual deviance but to the obedience of orders. Therefore, Milgram sought to assess the likelihood of individuals performing actions outside their moral beliefs under the guise of obedience.

Stanley Milgram's experiments on obedience, triggered by the question *"Why do people obey authority?"*, are among the most famous in social psychology. These experiments, which have been viewed by many scientists as psychologically damaging and ethically questionable, aimed to understand why individuals comply with authority, even when it conflicts with their conscience. The results of Milgram's experiments, first published in the *"Journal of Abnormal and Social Psychology"* and later elaborated in his 1974 book *"Obedience to Authority: An Experimental View,"* demonstrated a significant level of obedience to authority figures. In 1963, Milgram, a psychologist at Yale University, invited volunteers for a "memory study," promising them four dollars for an hour's participation. The volunteers were assigned the role of "teacher," while a person in the experiment's other end, an accomplice of Milgram's, was the "learner." The true nature of the learner's role was unknown to the volunteers. In the experiment, the teacher was required to administer electric shocks to the learner for wrong answers, with the shock intensity supposedly increasing by 15 volts with each error. However, in reality, no shocks were administered. The learner, in coordination with Milgram's team, simulated pain responses, escalating to silence after a certain shock level. Many volunteers expressed a desire to stop the experiment and check on the learner, especially as the shock level reached 135 volts.

However, most continued after being reassured of their lack of responsibility for any harm. The experiment revealed that a considerable majority (65%) would administer the highest level of shock, showcasing a surprising level of obedience to authority. Milgram's findings indicated that while individuals have personal principles against harming others, the presence of an authoritative figure often leads them to override these principles. These findings underscore the power of authority in influencing human behavior, emphasizing the need for a deeper understanding of this phenomenon (Milgram, 1974).

In Milgram's experiment, participants, influenced solely by the commands of scientists without any coercive power, displayed obedience behaviors. This raises alarming implications when considering states with actual tools of pressure and coercion (Helm & Morelli, 1979). A key aspect of Milgram's experiments on authority and obedience is how individuals, often unconsciously, obey authorities in everyday life, such as a doctor, whose influence and credibility can lead people to blindly follow their directives. People tend to accept that authorities are more knowledgeable, experienced, and trustworthy (Ford & Bird, 2008). After the Yale University experiment, to evaluate if the university's prestige influenced the results, the experiment was replicated 200 miles away in Bridgeport. Participants in this setting, described as the *"Bridgeport Research Association"* showed a reduced compliance of 48%, compared to the 65% at Yale, still confirming the significant impact of authority on obedience. These experiments continue to study what makes individuals compliant. Participants obeying orders to administer high-voltage shocks did so with evident discomfort, emotional stress, and reluctance, suggesting a complex psychological struggle in obeying orders (Meyer, 1970).

Milgram proposed that under normal conditions, individuals have control over their actions and behave autonomously. However, under certain conditions, they act on authority without self-regulation, a consequence of living in a society where authority figures play a significant role. He highlighted that the context can transform perceptions and actions; for instance, killing a person is generally considered bad, but if that person is about to kill a hundred children, the act of killing might seem justifiable (Meyer, 1970). Milgram continued his research by varying conditions in his obedience experiments. Furthermore, Blass (1999) conducted a comparative study 35 years later, finding a consistent 65% obedience rate among participants across different implementations and institutions, confirming the robustness of Milgram's original findings.

Social conformity is an integral part of societal interaction, facilitating smooth functioning within a community. Obedience involves an individual submitting to the commands of an authority and carrying out assigned tasks. By obeying, an individual acknowledges and adapts to a superior power. Milgram's experiment

demonstrates that human behavior is not solely driven by innate impulses but is also significantly influenced by social environment and conditions. According to Milgram (1963), an individual's motives and the social structure should be considered together. When an individual perceives authority as a force, they may view themselves as an agent or carrier of that authority, finding reassurance in executing actions deemed legitimate and approved by the authority. In the Milgram experiment, participants often denied mimicking obedience while simultaneously accepting obedience as a rationale for their actions (Freeman, 1979). Milgram posits that while individuals uphold values like loyalty, discipline, and sacrifice, they can simultaneously succumb to the destructive power of authority, becoming akin to war machines.

Humanistic psychology focuses on the individual's position between obedience and freedom, emphasizing the role of free will (Yıldız, 2016). Social norms play a crucial role in regulating behavior, reflecting the values of the group to which an individual belongs and serving as indicators of group identity. When an individual conforms to group norms, they feel a sense of normalcy and security; non-conformity, however, can result in being perceived as an outsider, leading to insecurity. Acting against group or authority expectations, even with free will, can lead to a perception of unreliability by the group or authority. As individuals receive approval from the group or authority, they experience a sense of internal security, feeling protected from punishment, ostracism, and disapproval. In this context, authority provides individuals with a sense of safety and assurance.

The Milgram Experiment from a Neurobiological Perspective

Humans, like other mammalian species, have the capacity to empathize with the feelings of others (Krishnan *et al.,* 2016). When witnessing another person's physical or emotional pain, humans typically respond with empathy, a reaction influenced by mirror neurons (Carillo *et al.,* 2019). This empathetic response may be a primary deterrent against harming others. During empathy, there is an overlap of activity in brain regions responsible for feeling one's own pain, specifically the anterior insula and anterior cingulate cortex (ACC). These areas are also activated when witnessing another's pain (Fan *et al.,* 2011). Under coercion, changes occur in the empathetic brain.

Simple obedience to authority commands and inflicting harm on others can lead to a reduction in the internal empathetic response to pain (Caspar, 2016). When ordered to cause financial or physical pain to a victim, both the sense of agency and responsibility in individuals decrease. This process is accompanied by reduced activation in neural networks related to pain empathy and diminished emotional

responses (Yu *et al.,* 2020). A study by Caspar *et al.,* (2020) confirmed that obeying authority orders reduces indirect brain activity while witnessing the pain inflicted on a victim, compared to a situation where actions are freely chosen. Complying with authority in inflicting pain leads to a reduction in empathetic responses to that pain. Participants who witnessed the results of a shock they administered following an order showed decreased activity in various brain regions, including the ACC, dorsal striatum (putamen and caudate), MTG, TPJ, and insula/IFG. Experiment participants reported a reduced sense of responsibility in coerced situations, contributing to a diminished processing of the consequences of the victim's suffering. The sense of agency creates a feeling in an individual that they are the creators of the outcomes of their actions (Gallagher, 2000).

When individuals feel responsible for their actions, they experience a higher sense of responsibility and pain. However, when they do not perceive themselves as responsible for their actions, their empathetic responses change. Caspar and colleagues (2020) observed differences at the neural level between free and coerced situations. They posited that obeying an authority's commands has a stronger impact on empathetic responses to others' pain than following computer instructions. When people agree to obey authority commands, neural responses related to the perception of another person's pain, subjective pain ratings, and neural networks show less pain when responsibility lies with another. Key brain regions, including the anterior insula and cingulate cortex, dorsal striatum (including the caudate and putamen), become less active during obedience. Another study by Caspar and colleagues (2016) found that coercion leads to changes in the sense of agency in the human brain and also reduces the neural processing of the consequences of one's actions.

The study by Cheetham *et al.,* (2009) provides an innovative exploration of neural responses to perceived pain within a virtual obedience context. This research sought to determine if participant reactions were driven by empathic concern for a virtual human's well-being or by a self-oriented state of personal distress. Utilizing functional magnetic resonance imaging (fMRI), the study observed brain activity as participants interacted with a female avatar, either causing or witnessing her pain. Results indicated that observing the avatar's pain triggered a self-focused distress response, rather than affect sharing typically associated with empathy. The study also explored how various dispositional empathy traits, such as personal distress and fantasy, might influence brain activity in response to perceived pain, finding a correlation between higher trait scores in these dimensions and increased neuronal activity in specific brain regions. Blass (1999), in his extensive analysis of the Milgram obedience experiments, interrogates the nature of authority as perceived in these studies, contrasting the views of the experimenter as a legitimate authority versus an expert authority. He also addresses

the discrepancy between expected and actual obedience rates, highlighting the predictive challenge in such complex social situations. Additionally, Blass reviews gender differences in obedience, generally finding no significant differences across replicated studies. He concludes that obedience rates have remained consistent over time, suggesting a persistent pattern of obedience regardless of societal changes in attitudes towards authority. Slater et al. (2006) aimed to examine how participants would react to extreme social situations in a virtual environment. In their replication of Milgram's experiment, participants were asked to administer 'electric shocks' to a virtual human. The study, involving 34 participants, showed that those interacting with the virtual human through visual and auditory means responded as if the situation were real, despite knowing the artificial nature of the scenario. Physiological measures such as the Autonomic Perceptions Questionnaire (APQ), Skin Conductance Level (SCL), and heart rate variability indicated higher arousal and stress levels in these participants. This suggests that virtual environments can effectively simulate real-life scenarios for empirical studies in obedience, offering an ethically viable alternative to real-world settings.

The Milgram Experiment in the Context of Moral Brain

In decision-making, the brain operates two response systems. Neuropsychological research suggests that the brain can use only one system at a time for processing information (Darlow & Sloman, 2010) and that these systems are directed by different brain areas. The reflective system is logical, analytical, deliberate, and methodical, while the reactive system is quick, impulsive, and intuitive, relying on emotions or habits for cues about what to do next. The reactive system can be lifesaving in its rapid, intuitive approach. When faced with familiar situations, the brain quickly shifts to this fast, intuitive decision-making system. For instance, in the face of intense fear, an individual might react immediately without methodically considering all options and consequences, engaging in a "fight or flight" response. Strong emotions like fear trigger the limbic system, including the active amygdala and HPA axis system, pulling the individual toward rapid, reactive decision-making. The reflective system involves cooperation between the prefrontal cortex, basal ganglia, and amygdala (the more primitive parts of the brain in evolutionary terms).

In the brain's right frontal lobe, reflexive, habitual responses to external and internal stimuli reside. For example, instinctively moving aside when a car approaches is a habitual response. Habits persist and are hard to change, which makes evolutionary sense, as reacting without thinking to perceived threats can aid survival and safety. The reactive response system promotes impulsive behavior and immediate gratification, focusing on reward and approval. Submitting to authority to gain approval may give individuals a sense of validation.

When individuals say yes to someone else's authority of their own volition, they are potentially acting to protect themselves, align with their values, and avoid punishment or condemnation. Every act of obedience involves resolving some internal conflict. From the perspective of the Milgram experiment, individuals may make quicker decisions when obeying authority and trusting it, as this involves more activity in the reactive system. Questioning and making individual, autonomous, self-governing decisions require more prefrontal cortex activity.

Conscious questioning of autonomous decisions involves neural circuits related to consciousness; these include the medial prefrontal cortex, posterior cingulate cortex, precuneus, hippocampal formation, parahippocampal cortex, retrosplenial cortex, posterior inferior parietal, temporoparietal junction, and lateral temporal cortex. The anterior medial prefrontal cortex and posterior cingulate cortex are central in this neural network. Conscious awareness in an individual is centralized in the left frontal lobes.

The moral brain, responsible for values and moral decision-making, comprises a broad functional network of both cortical and subcortical anatomical structures. Since morality is complex, some of these brain structures share their neural circuits with those controlling other behavioral processes like emotions and theory of mind. Key structures associated with morality include the frontal, temporal, and cingulate cortices. The prefrontal cortex regulates activity in subcortical emotional centers, plans, and oversees moral decisions. Dysfunction in this region can lead to impulsive aggression. The temporal lobe plays a role in theory of mind and its dysfunction is often linked with severe psychopathy. The cingulate cortex mediates conflicts between emotional and rational components of moral reasoning. Other important structures contributing to moral behavior include the amygdala, hippocampus, and subcortical nuclei like basal ganglia. Brain areas involved in moral processing can be influenced by genetic, endocrine, and environmental factors. Hormones can alter moral behavior through their effects on the brain. Finally, genetic polymorphisms can suggest a genetic predisposition to morality, influencing tendencies toward aggression and violence (Fumagalli & Priori, 2012).

In an individual's actions, there are cognitive (intent + purpose) and physical components. Intentions are causal and lead to certain outcomes. The brain is wired in a network system to make decisions based on its experiences. The easier the tasks assigned to an individual and the higher the reward, the greater the motivation. Dopamine, a fundamental neurotransmitter in the brain, determines how an individual values rewards and what they pursue. Dopamine is found throughout the brain. Key brain regions form a consistent reward and motivation system: the nucleus accumbency, striatum, and ventral medial prefrontal cortex (Tarlacı, 2019).

Receiving approval and recognition from an authority can be perceived as a reward by an individual. Every threatening situation for security triggers activation in the limbic system, which frequently plays a role in instinctual responses to stimuli, whether they are repulsive or pleasurable. Therefore, when we perceive or think of something as a valuable reward, the limbic system responds by compelling us to pursue it. The limbic system adopts a more primitive approach, directing an individual towards easy solutions in challenging situations and pursuing things that feel good.

The Milgram experiment is a crucial study demonstrating how ordinary people can become perpetrators in grave processes when faced with authority, potentially transforming into monsters through actions executed in obedience to authority rather than autonomous decisions. Obedience to authority is easier for people, as it allows them to pass responsibility onto others, providing comfort. Conversely, opposing authority is much more challenging, requiring extensive reflective thinking and a multi-faceted awareness that involves voluntary responsibility.

Despite the high social relevance, the mechanisms underlying behaviors in Milgram's famous experiments, often rationalized by mere obedience to orders and thus an absence of feeling responsible, are still largely unexplored. From birth, individuals are programmed evolutionarily for survival and maintaining safety. The tendency to trust others and delegate personal responsibility, starting with attachment, protects the individual from numerous internal conflicts, especially during childhood and adolescence. Obedience for an individual can mean protection from conflict. Having someone else make decisions on behalf of an individual encompasses numerous benefits, including escaping responsibility, punishment, and gaining approval. This evolutionary program effectively protects individuals from actions fraught with danger and threats. Obedience to authority might be a limbic system's response to maintaining a sense of safety in survival, a stress-induced, primitive, and emotional brain reaction. Trusting someone, therefore, can bring along behaviors of avoiding harm and danger, while allegiance to an authority functions as a right-brain activity, part of an individual's attachment programming. Such a rewarding obedience process can lead individuals away from their sense of self, suspending conscience and empathy. Milgram's experiment serves as a key indicator of how individuals can easily surrender their autonomy and frontal lobes to authority in pursuit of a sense of protection and security.

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