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Rhetoric, Public and Academic Communication

Neurorhetoric: Rhetoric Intersection with Neuroscience

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Abstract: Neurorhetoric examines the cognitive and neurological underpinnings of successful persuasive communication. This article seeks to examine the convergence of rhetoric and neuroscience by looking at the rhetorical framework established by Aristotle, which includes ethos, pathos, and logos. The assumption is that the integration of rhetoric with neuroscience has the potential to greatly enhance the practical relevance of rhetoric approaches in fields such as education, politics, marketing, healthcare, etc. The study employs methods of desk research and critical review of foundational and contemporary scientific publications in the fields of rhetoric, neurorhetoric, and psychology. Future studies should prioritize the advancement of the theoretical and empirical foundations of neurorhetoric. Collaboration between experts in rhetoric, linguistics, and neuroscience among others, will facilitate the achievement of this goal. Collective efforts like this will enhance our comprehension of the complex interaction between the brain, language, and persuasion. Exploring the neural mechanisms of persuasion is a relatively new field of research, even though the art of persuasion and argumentation, known as rhetoric, has been practiced since ancient times. Neurorhetoric explores the intersection between different rhetorical canons, such as ethos, pathos, and logos, and specific brain functions. This investigation focuses on both real-world and virtual communication contexts.

Keywords: rhetoric, persuasion, cognitive processes, neuroscience, neurorhetoric.

Introduction

Rhetoric and communication have been intricately intertwined for centuries, with rhetoric playing a pivotal role as a foundational discipline within the field of communication (Haase 2015). [1] The study of rhetoric has expanded beyond its classical origins to include many viewpoints, such as the investigation of the cognitive and neurological basis of persuasive communication (Kaufer et al., 2005; [2] Cockcroft 2004). [3] As a result, there has been a redefinition of the basic concepts of rhetoric. The rhetorical tradition encompasses various aspects,

ranging from language, debate, and persuasion to contemporary applications in disciplines like education, psychology, neuroscience, and neurolinguistics.

Neurorhetoric, a developing discipline, seeks to explain the neurological mechanisms involved in our capacity to create and understand persuasive language (Isai et al., 2020). [4] This new field not only delves into the brain functioning and processes, that underpin rhetoric but also intersects with the philosophical and psychological search for meaning, exploring how our cognitive narratives shape and are shaped by persuasive communication.

One evolving branch of neurorhetoric involves analyzing the rhetorical framing of neuroscientific discoveries. Researchers may prioritize highlighting the accuracy of neuroimaging technology while minimizing the significance of methodological assumptions in data interpretation (Jack & Appelbaum, 2010). [5] There is a risk of oversimplifying the association between certain brain regions and cognitive functions, which may ignore the intricate and widespread nature of brain activity (Decety & Jackson 2004). [6] The act of framing might give the false impression of impartiality in neuroscientific findings.

Neuroscientists frequently employ metaphors to illustrate complex brain processes and functioning. Using metaphoric language such as comparing the brain to a “computer” or “network” can help people understand these concepts better. However, these metaphors can also oversimplify and mislead by implying a level of accuracy that may not actually exist in real brain activities (Mar 2011). [7]

One major interest of exploration in neurorhetoric is the manifestation of Aristotle’s framework of ethos (ethical persuasion), pathos (emotional persuasion), and logos (logical persuasion) that continues to serve as the fundamental basis in rhetoric. Research in neuroscience has the potential to enhance our comprehension of these rhetorical aspects and their underlying neurological mechanisms. Studying the brain localizations and regions linked to rhetorical methods provides significant knowledge about the mental processes that drive persuasive communication.

Scholars from different scientific fields are currently reexamining the rhetorical principles of ethos, pathos, and logos in relation to different scientific contexts. Their specific focus rests in determining whether persuasion predominantly depends on logical reasoning (logos) alone or if it is more impactful when supplemented with moral authority (ethos) and emotional appeal (pathos).

Ethos, referring to the credibility and character of the speaker or writer, plays a vital role in developing identification and trust. Comprehending the brain mechanisms of ethos helps unveil the methods by which individuals and organizations construct and uphold their reputations. Establishing ethos through demonstrating knowledge and moral integrity is crucial in academic, political and public

communication, particularly in an era where the quick dissemination of misinformation can undermine public confidence in scientific endeavors.

Pathos, which involves appealing to emotions and biases, is a crucial element of persuasion.

This brief overview illustrates that brain processes influence our perception, engagement, and response to persuasive communication through the interaction of ethos, pathos, and logos. The interdisciplinary approach can improve our understanding of the complex connection between the brain, perception, language, and persuasion.

Rhetoric and Neuroscience: An Intersection

Neurorhetoric is based on the assumption that the cognitive processes used in rhetorical applications may be examined through neuroscience. By analyzing neural connections related to rhetorical devices, researchers can gain understanding of the cognitive processes that influence our comprehension, production, and reception of persuasive language. This includes studying brain activation patterns involved in generating and comprehending persuasive speech in different media modalities and discourses.

Neurorhetoric examines how neurological differences are represented and argued in cognitive neuroscience, exploring rhetorical devices used to classify and understand the brain and its functions (Jack 2010). [8] One of the ways to study the cognitive brain mechanisms engaged in rhetorical discourse is by using event-related potentials (ERPs). This method highlights the capacity of brain imaging technologies to provide insightful analysis of the cognitive mechanisms underlying effective rhetoric, so bridging the disciplines of rhetoric and neuroscience.

Valente (2020) [9] says that overcoming the divide between the humanities and science requires sincere communication between them grounded in mutual respect and recognition. One exciting path for creating connections is the present explosion of interest in neuroscience among humanities academics. But depending just on neuroscience as a tool for cooperation is insufficient; a dynamic intercultural dialogue that advances respect and communication between many disciplines is indispensable.

This multidisciplinary approach has great potential to expose the complex interaction among the brain, cognitive abilities connected to language and communication, and persuasive speech. By means of insights and techniques from rhetoric, linguistics, and neuroscience, we can better understand how the brain generates and absorbs persuasive language, so enabling more exact communication strategies in the domains of education, politics, marketing, healthcare, among others.

Ethos, Pathos, and Logos: A Neuroretorical Perspective

A cornerstone of rhetorical study, Aristotle's rhetoric framework emphasizes the three modes of persuasion already mention – ethos, pathos, and logos. By means of neuroretoric application to these conventional persuasive strategies, the neurological mechanisms supporting our capacity to establish rapport and trust, induce emotional responses, and build logical arguments can be illuminated (Isai et al. 2020). [10]

Ethos, related to the credibility of a speaker, has neurological roots in social cognition and self-representation (Kaufer et al. 2005 [11]; (Cockcroft 2004). [12] Ethos in marketing shapes consumer trust in brand positioning and brand loyalty; this is seen by activation of brain areas linked with reward and social cognition (Plassmann, Ramsøy, & Milosavljevic 2012) [13]; (Yoon, Gutchess, Feinberg, & Polk 2006). [14] Within the field of politics, the idea of ethos relates to the evaluation of a candidate's ethical decision-making and motives, so triggering the prefrontal cortex of the brain (Amodio & Frith 2006) [15]; (Greene & Haidt 2002). [16]

Within the field of education, ethos helps to create a suitable environment for learning, which is related with the mechanisms of empathy and trust in the mirror neuron system (Rizzolatti & Craighero 2004) [17]; (Gallese, Keysers, & Rizzolatti 2004). [18] Since it is intimately related to the neurological paths connected with empathy and trust, the ethos in healthcare directly affects patient adherence to treatment and health outcomes (Decety & Jackson 2004) [19]; (Mercer 2004). [20] From the concise examination, it is evident that ethos associations with decision-making, motives, ethics and morality are influencing and impacting individuals' perception, including those in professional roles of orators and communicators across diverse spheres. Moreover, we should consider that the construction of ethos in digital environments – where personal and professional identities often blend – presents unique challenges and opportunities. The use of social media, for instance, requires individuals and organizations to navigate the balance between personal relatability and professional authority. Neuroscience can contribute to understanding how these digital ethos constructions influence perception and behavior, providing insights into the cognitive processes that underlie trust and credibility judgments. Thus, the study of ethos within the framework of neuroretoric not only deepens our understanding of persuasive communication but also enhances our grasp of identity and reputation management in both personal and professional domains. This intersection of rhetoric and neuroscience offers a nuanced perspective on how ethos operates, informing strategies for effective communication and influence in a rapidly evolving information landscape.

Brain areas engaged in emotional processing and empathy are connected to pathos, the emotional appeal (Isai et al. 2020). [21] In advertising, pathos creates emotional associations by activating the limbic system and amygdala (Bolls

2010) [22]; Poels & Dewitte 2006). [23] Tailor ads in marketing can activate these brain areas and appeal to the emotional preferences and experiences of a target audience. Techniques such as storytelling, emotional appeals, and imagery are carefully designed to engage the limbic system. Thus way advertisers and marketers can influence how people feel about a certain product or brand.

In literature, pathos stimulates the anterior insula and cingulate cortex (Singer et al. 2004) [24]; (Mar, 2011) [25] so increasing involvement, co-experiencing, and empathy. Within the field of theater and movies, pathos triggers the mirror neuron system, so enabling the experience of emotions by observation (Gallese 2001) [26]; Kaplan & Iacoboni, 2006). [27] Indirectly, pathos relates to the aforementioned narrative productions, particularly concerning emotions, feelings, passions, stereotypes, and audience attitudes. These elements constitute fundamental components in both rhetorical discourse and other communicative contexts.

In political speeches, leaders often use pathos – that which appeals to the collective emotions of their audience – to inspire support, sow hope, or incite wrath. This is the ventromedial prefrontal cortex, which handles moral reasoning and social emotions (Moll et al. 2005) [28]; (Bruneau, Dufour, & Saxe 2012). [29] Political communication and neuro rhetoric can be integrated into joint research, particularly in light of new processes in virtual political communication, such as the use of AI-enhanced avatars for example. Another promising research avenue involves exploring the creation of cognitive dissonance through fake news, deep fake videos, and post-truth phenomena, where neuro rhetoric can offer significant contributions, by establishing frameworks for critically filtering data and information.

In healthcare, pathos is ultimately used by doctors and therapists to establish a therapeutic relationship that might improve patient outcomes by emotionally relating to them. This interaction targets brain areas linked to empathy and compassion, including the temporoparietal junction and the anterior insula (Hsu et al. 2008) [30]; (Preston & de Waal 2002). [31] These Structures are involved in perspective-taking and understanding others' mental states, a process essential for empathy and compassion. It helps us grasp what others are thinking and feeling, which is crucial for building social connections and trust.

Logos, concerning logical and rational persuasion, activates the brain's executive functions and areas connected to reasoning and problem-solving. The brain's executive functions are associated primarily with the prefrontal cortex, which helps organize and implement rational thought processes.

In marketing, logos requires clear arguments and relevant data, which engages the dorsolateral prefrontal cortex and the posterior parietal cortex (Anderson 2008) [32]; Rademacher et al. 2010). [33] The dorsolateral prefrontal cortex is crucial for working memory, decision-making and even truth-filtering, while

the posterior parietal cortex is involved in processing and integrating sensory information and spatial awareness, helping to assess and evaluate data.

In political debates, *logos* is represented by the ability to argue logically and effectively, often stimulating the lateral prefrontal cortex (Clark et al. 2008) [34]; (Lieberman 2007). [35] The lateral prefrontal cortex plays a key role in managing complex cognitive tasks such as making coherent arguments, critical thinking, and strategic planning.

In education, *logos* relates to the cognitive mechanisms that engage in learning and understanding, related with the prefrontal cortex and hippocampus (Blair & Razza 2007) [36]; (Smith & Kosslyn 2007). [37] The hippocampus is crucial for forming and retrieving memories, which supports the learning process and understanding of new information.

Within the healthcare domain, *logos* is related with rational decision-making in patient choices and professional interactions, so engaging the dorsolateral prefrontal cortex (Gläscher et al. 2009) [38]; (Fuster 2008). [39] Additionally to the functions mentioned above the dorsolateral prefrontal cortex is involved in evaluating options, weighing evidence, and making reasoned decisions based on logical analysis of the provided medical information.

Logos, therefore, retains its place in the millennia-old rhetorical tradition while simultaneously finding new applications across diverse spheres. The principles of persuasion inherent in rhetoric have not only expanded in use but have also been adapted to specific domains. Rhetorical arguments are now being applied to various fields, such as politics, medicine, education, and marketing, by integrating them with domain-specific principles, techniques, and tools. However, the principle of information credibility and the reliance on authoritative sources remain fundamental from a scientific perspective. This also indirectly relates to *neurorhetoric*, particularly when considering cognitive processes.

Discussion and Future Directions

The ongoing development of *neurorhetoric* depends on enhancing the theoretical and empirical foundations of the field. Prioritizing this area will contribute to a better understanding of the neural mechanisms behind persuasive communication. Collaboration among experts in rhetoric, linguistics, and neuroscience among others is essential for advancing this interdisciplinary domain.

Future research should focus on the integration of neuroscientific methods with rhetorical analysis to provide deeper insights into how persuasive strategies impact the brain. Such investigations should consider diverse communicative contexts and populations to ensure comprehensive understanding and application.

One possible research direction involves identifying intersections and synergies in interdisciplinary studies between neuroscience, rhetoric, and learning.

Another research avenue could focus on neuro-rhetoric and academic communication, particularly in the context of university education. This includes examining how learning, teaching, and knowledge dissemination are evolving in contemporary contexts, where the Internet, artificial intelligence, and chatbots are increasingly more influential.

Conclusion

Based on a critical review of foundational and contemporary scientific publications on neuro-rhetoric, neuroscience, cognition, psychology and rhetoric, the assumption posits that integrating rhetoric with neuroscience has the potential to significantly enhance the practical relevance of rhetorical approaches in fields such as education, politics, marketing, and healthcare. Neuro-rhetoric is the study of persuasion and effective communication, aiming to investigate how rhetorical techniques influence cognitive and emotional processes in the brain. It seeks to elucidate how persuasive communication shapes thought and behavior. A key area of development in neuro-rhetoric is understanding how different rhetorical figures, arguments, and tools engage cognitive functions such as perception, attention, memory, and reasoning.

Logos remains a cornerstone of reasoning to diverse domains like politics, medicine, education, and marketing, emphasizing the importance of information credibility and authoritative sources.

Pathos, a fundamental rhetorical canon utilized in communication strategies, elicits emotional reactions and examines how these emotions impact attitudes and behaviors. The advent of new communication technologies like social media, virtual reality, and augmented reality intersects with neuro-rhetoric, influencing how the brain processes persuasive messages and thus expands research opportunities.

Ethos involves not just the overt presentation of credentials and moral character but also the subtler aspects of identity construction. In marketing and branding, companies utilize ethos to craft identities that resonate with consumers, leveraging aspects of authenticity, trust, and ethical behavior to foster brand loyalty and differentiate themselves in competitive markets.

Through the integration of rhetorical theory with neuroscientific research, neuro-rhetoric aims to develop more effective communication approaches, techniques and tools applicable across diverse fields including education, politics, marketing, and healthcare.

In conclusion, neuro-rhetoric offers valuable insights into how the brain processes persuasive communication. By combining the theoretical foundations of rhetoric with empirical findings from neuroscience, researchers can develop more effective communication strategies and further our understanding of the intricate interplay between language, cognition, and persuasion.

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