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A NEUROSCIENTIFIC, GENOMIC AND PHILOSOPHICAL PERSPECTIVE ON SARCASTIC HUMOR, COGNITIVE RIGIDITY AND UNSPECIFIC CONNECTIONS IN GIFTED PEOPLE

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Abstract: The present article explores the intricate relationship between intellectual giftedness and the manifestation of behavioral traits such as a potentially embarrassing sarcastic sense of humor, marked cognitive rigidity, and the difficulty in discerning between past events and interspecific associations in the present. Adopting a multidisciplinary approach that integrates neuroscience, genomics and philosophy, we seek to uncover the biological and conceptual substrates underlying these particularities. The analysis focuses on the neural networks involved in social cognition, executive functions and memory, investigating how genetic variations can modulate the development and functioning of these structures in individuals with superior intellect. Additionally, the philosophical lens allows us to question the ethical and existential implications of these characteristics, especially in the context of intra- and interspecific relationships. We conclude that an in-depth understanding of this complex interaction is crucial for the development of more effective educational and therapeutic approaches and for the promotion of the integral well-being of gifted individuals.

Keywords: Giftedness, Sarcasm, Cognitive Rigidity, Memory, Neuroscience, Genomics, Philosophy, Human Behavior, Interspecific Relationships.

INTRODUCTION

Intellectual giftedness, traditionally defined by exceptional cognitive abilities, has been the subject of extensive research in the fields of psychology and education. However, the experience of individuals with superior intellect transcends the mere ability to process information. Their particularities also manifest themselves in the socio-emotional and behavioral domain, shaping their interactions with the world and with others. This article sets out to explore three of these complex

characteristics: a sarcastic sense of humor that can sometimes generate interpersonal embarrassment; a marked cognitive rigidity that makes it difficult to adapt to new perspectives; and a tendency to make idiosyncratic connections between past events and present situations, sometimes with an intriguing interspecific dimension.

Adopting an interdisciplinary perspective, this work seeks to integrate advances in neuroscience and genomics to shed light on the biological substrates of these behavioral manifestations in gifted individuals. Neuroscience offers us tools to investigate the neural networks underlying social cognition, executive functions and memory processes, allowing us to hypothesize how variations in brain structure and function may contribute to the characteristics in question. Genomics, in turn, makes it possible to explore the influence of genetic factors on the development of these networks and predisposition to certain behavioral traits.

At the same time, philosophy, with its conceptual rigor and capacity for fundamental questioning, invites us to reflect on the ethical, epistemological and even existential implications of these particularities. How does intellectual sharpness relate to social sensitivity? Can the search for patterns and connections, a hallmark of the gifted mind, in its exacerbation, obscure the distinction between the subjective and the objective? And what role does our understanding of the natural world and other species play in our experiences and associations?

By interweaving these different perspectives, we aim for a more holistic and nuanced understanding of the complexities of giftedness, going beyond the mere identification of high intellectual abilities to explore the behavioral dynamics that shape the experience of individuals with this condition. We believe that an in-depth analysis of these characteris-

tics is crucial not only to enhance our theoretical understanding, but also to inform more sensitive and effective educational and therapeutic practices, promoting the integral well-being of these individuals and their meaningful interactions with the world around them, including the relationships they establish with other forms of life.

OBJECTIVES

GENERAL OBJECTIVE:

To analyze the complex interaction between intellectual giftedness and the manifestation of specific behavioral characteristics (potentially embarrassing sarcastic sense of humor, marked cognitive rigidity and difficulty in discerning between past events and present interspecific associations), from a multidisciplinary perspective that integrates neuroscience, genomics and philosophy, aiming at a deeper understanding of its biological and conceptual substrates and implications for the well-being of gifted individuals.

SPECIFIC OBJECTIVES:

- To investigate the possible neuroscientific bases underlying the sarcastic sense of humor that can lead to interpersonal embarrassment in gifted individuals, exploring the role of neural networks involved in social cognition, pragmatic language processing and inhibitory control;
- Analyze the relationship between intellectual giftedness and marked cognitive rigidity, examining the possible influences of genetic variations on the development and functioning of the neural networks responsible for mental flexibility and cognitive control;
- To explore the difficulty in discerning between past experiences and interspecific associations in the present in gif-

ted individuals, investigating the neurobiological mechanisms of contextual memory and emotional processing, as well as the philosophical implications of the attribution of meaning and the relationship with other forms of life.

LITERATURE REVIEW

In order to build a solid foundation for our analysis, it is imperative to revisit key concepts and relevant findings in the fields of the psychology of giftedness, cognitive and social neuroscience, behavioral genomics, and philosophy of mind and cognition.

GIFTEDNESS: BEYOND THE INTELLIGENCE QUOTIENT

The definition of giftedness has evolved over time, transcending mere scores on intelligence tests. Contemporary models, such as Renzulli's Three Ring Model (1978) and Sternberg's Triarchic Intelligence Theory (1985), emphasize the complex interaction between above-average intellectual abilities, creativity and task involvement. Gifted individuals often demonstrate an exceptional ability to learn quickly, process complex information and make innovative connections (Winner, 1996). However, this intellectual sharpness can coexist with challenges in other areas of development, such as emotional regulation and social interaction (Gross, 2000).

NEUROSCIENCE OF SOCIAL COGNITION, EXECUTIVE FUNCTIONS AND MEMORY

Modern neuroscience has provided valuable insights into the neural bases of social behavior, cognitive control and memory. Social cognition, the ability to process social information and interact effectively with others, involves a complex network of brain areas, including the medial prefrontal cortex, the temporo-parietal junction and the supe-

rior temporal sulci (Lieberman, 2007). These regions are crucial for theory of mind, empathy and the interpretation of social signals.

Executive functions, essential for flexible and adaptive thinking, are mainly orchestrated by the prefrontal cortex (Miller & Cohen, 2001). They encompass skills such as working memory, inhibition of inappropriate responses and cognitive flexibility - the ability to switch between different tasks or perspectives.

Memory, a multifaceted process, involves different brain systems. The formation of new episodic memories (specific events) depends crucially on the hippocampus and its interactions with the cortex (Squire & Wixted, 2011). Retrieving these memories is a dynamic process that involves reconstructing the original event, influenced by the present context and the associations established.

BEHAVIORAL GENOMICS: THE INFLUENCE OF GENES ON COMPLEX BEHAVIOR

Behavioral genomics investigates the influence of genetic factors on human behavior. Genome-wide association studies (GWAS) and candidate gene studies have identified genetic polymorphisms associated with personality traits, cognitive abilities and predisposition to neuropsychiatric conditions (Plomin et al., 2016). Although human behavior is highly complex and influenced by an intricate interaction between genes and the environment, genomics offers tools to identify biological vulnerabilities and resiliencies that can modulate the expression of traits such as social sensitivity, cognitive flexibility and memory processes. Genes related to brain development, neurotransmission (dopamine, serotonin, oxytocin) and synaptic plasticity are particularly relevant to understanding the characteristics in focus in this article.

PHILOSOPHICAL PERSPECTIVES ON MOOD, COGNITION AND THE RELATIONSHIP WITH THE OTHER

Philosophy has focused on the nature of humor, cognition and interpersonal relationships throughout history. Theories of humor range from superiority (Hobbes) to relief (Freud) to incongruity (Kant). Sarcasm, in particular, involves a complex interaction between the literal and the implicit, requiring cognitive sophistication for its production and interpretation (Attardo, 2000). The difficulty in modulating sarcastic humor can be seen through the ethical lens of communicative responsibility and the impact of our words on others (Habermas, 1984).

Cognitive rigidity raises questions about the nature of belief, rationality and openness to evidence. The philosophy of science, for example, discusses the importance of falsificationism and the revision of theories in the light of new information (Popper, 1959). The difficulty in abandoning preconceived ideas can be interpreted as a failure to apply fundamental epistemic principles.

The tendency to establish idiosyncratic connections, especially with an interspecific dimension, invites us to reflect on the nature of perception, association and meaning. Philosophy of mind explores the subjectivity of experience and the individual construction of reality (Nagel, 1974). The attribution of meaning to events and the formation of associations can be influenced by past experiences and a particular sensitivity to the natural world and other forms of life, raising questions about the limits of anthropomorphization and the nature of our relationship with the non-human (Haraway, 2008).

NEUROSCIENTIFIC BASIS FOR GIFTED CHARACTERISTICS

The intellectual sharpness of gifted individuals may, paradoxically, be associated with subtleties in the functioning of neural networks crucial to social interaction, cognitive flexibility and contextual memory. Sarcasm requires a sophisticated understanding of language and the social context, involving the ability to infer the communicative intention behind a discrepancy between what is said and what is intended. In gifted individuals, verbal proficiency and the ability to identify patterns can facilitate the production of sarcastic comments. However, the difficulty in modulating this humor in a socially appropriate way may be related to atypical processing in social cognition networks. Neuroimaging studies suggest that the interpretation of sarcasm involves the activation of areas such as the medial prefrontal cortex (involved in theory of mind) and the superior temporal cortex (important for pragmatic language processing) (Shamay-Tsoory et al., 2005). Variations in the connectivity or efficiency of these areas in gifted individuals can lead to a lower sensitivity to social and emotional cues that indicate that sarcasm may be inappropriate or offensive in a given context. Additionally, less robust inhibitory control, mediated by the ventral prefrontal cortex, could result in the impulsive expression of sarcastic comments, without due consideration for interpersonal consequences.

ACCENTUATED COGNITIVE RIGIDITY: A QUESTION OF NEURAL FLEXIBILITY

Cognitive rigidity, the difficulty in changing one's thinking or adapting to new information, may seem paradoxical in individuals with high intellectual capacity. However, this characteristic may be associated with patterns of neural connectivity that favor the maintenance of established mental models. Cognitive

control networks, including the dorsolateral prefrontal cortex and the anterior cingulate, are crucial for mental flexibility and the updating of information (Botvinick et al., 2001). Less efficient functioning of these networks or an imbalance between synaptic stability and plasticity in gifted individuals can contribute to difficulty in abandoning pre-existing perspectives or integrating new information that challenges their beliefs. Overspecialization in certain areas of knowledge, common in gifted individuals, can also lead to less openness to unknown domains or alternative approaches.

DIFFICULTY DISCERNING PAST EXPERIENCES AND PRESENT UNSPECIFIC CONNECTIONS: AN ATYPICAL CONTEXTUAL MEMORY?

The tendency to establish idiosyncratic connections between past events and present situations, sometimes with an interspecific dimension, may be related to particularities in memory processing and the attribution of meaning. The hippocampus and prefrontal cortex play crucial roles in encoding and retrieving episodic memories, integrating information about the time, place and emotions associated with an event (Eichenbaum, 2000). Variations in the way this information is integrated and retrieved in gifted individuals can lead to atypical contextual associations. The keen ability to identify patterns, a hallmark of giftedness, can in certain cases lead to the perception of connections where they do not objectively exist, especially when influenced by strong emotional resonances from past experiences. The attribution of intense personal meaning to interactions with other species can involve amplified emotional processing, mediated by the amygdala and its connections with the prefrontal cortex, leading to interpretations that may seem unusual to others.

GENOMIC UNDERPINNINGS OF GIFTED TRAITS

Genetic predisposition can modulate the development and functioning of the neural networks underlying the behavioral characteristics in question. Genetic variations in genes related to the development of the social brain, such as those involved in the signaling of oxytocin (a neuropeptide crucial for social bonding and empathy) and serotonin (involved in the regulation of mood and social behavior), can influence social sensitivity and the ability to interpret emotional signals (Meyer-Lindenberg et al., 2011). Polymorphisms in these genes may be associated with individual differences in empathy and the ability to modulate social behavior, potentially contributing to the difficulty in adjusting sarcastic humor to the interpersonal context.

GENES AND COGNITIVE FLEXIBILITY:

Genes that code for proteins involved in synaptic plasticity, such as neural growth factors (BDNF) and synaptic proteins, may influence the brain's ability to form new connections and adapt to new information (Egan et al., 2003). Variations in these genes may be associated with individual differences in cognitive flexibility. Additionally, genes that modulate the function of neurotransmitters such as dopamine, which is crucial for reinforcement learning and behavior change, may play a role in predisposition to cognitive rigidity.

GENES AND MEMORY AND EMOTION PROCESSING:

Genetic variations in genes related to neurotransmission in the hippocampus (for example, genes encoding glutamate receptors) may influence memory formation and consolidation (Tsien, 2000). Genes involved in emotional regulation, such as those related to serotonin reuptake (SERT), can modulate the

intensity and valence of emotional responses to stimuli that evoke past memories (Canli & Lesch, 2007). Polymorphisms in these genes may contribute to how past experiences are remembered and how the associated emotions influence the associations made in the present, including those involving other species.

THE PHILOSOPHICAL LENS: ETHICAL AND EPISTEMOLOGICAL IMPLICATIONS

Philosophical analysis allows us to deepen our understanding of the implications of behavioral characteristics in gifted individuals. The use of sarcasm raises ethical questions about communicative intentionality and the potential for interpersonal harm. Although it can be a sophisticated form of humor, its interpretation depends heavily on the context and sensitivity of the recipient. In gifted individuals with difficulties in reading social cues, the excessive or inappropriate use of sarcasm can violate principles of respectful communication and generate alienation (Strawson, 1964). Philosophical reflection on communicative responsibility invites us to consider the consequences of our words and to cultivate empathy in our interactions.

COGNITIVE RIGIDITY AND THE SEARCH FOR TRUTH:

Cognitive rigidity challenges the philosophical ideal of open-mindedness and the rational search for truth. Insistence on pre-existing mental models, even in the face of contrary evidence, can be seen as a form of cognitive bias that impedes the progress of individual and collective knowledge (Bacon, 1620). The philosophy of science emphasizes the importance of healthy skepticism and the willingness to revise our beliefs in the light of new information. Overcoming cognitive rigidity requires a conscious effort to cultivate intellectual humility and openness to different perspectives.

NONSPECIFIC CONNECTIONS AND THE NATURE OF MEANING:

The tendency to make idiosyncratic connections, especially with an interspecific dimension, raises questions about the nature of perception, interpretation and the attribution of meaning. While the ability to identify patterns is a valuable feature of intelligence, its exacerbation can lead to subjective interpretations that deviate from consensual reality. The philosophy of phenomenology (Husserl, 1913) reminds us of the intentional nature of consciousness and how our experience of the world is always mediated by our subjectivity. Philosophical reflection on the human-animal relationship (Singer, 1975) invites us to consider the possibility of shared experiences and to avoid anthropocentric reductionism, but also to maintain critical discernment about the validity of our associations and interpretations.

COGNITIVE RIGIDITY IN AUTISTICS AND DUAL EXCEPTIONALITY

Cognitive rigidity is widely documented in Autism Spectrum Disorder (ASD), associated with dysfunction in the dorsolateral prefrontal cortex (BA9/46) and the fronto-striatal network - regions crucial for behavioral flexibility and adaptation to new contexts. In the DWRI model, individuals with dual exceptionality (autism + giftedness) have hyperconnectivity in networks that favor systematic logic, but with less efficiency in emotional and social modulation (through the TPJ-orbitofrontal cortex axis). Functional neuroimaging studies show reduced activation of the ACC (anterior cingulate cortex) in tasks that require cognitive updating and rule reversal, which corroborates the greater rigidity in ASD (Lombardo et al., 2011).

SARCASM AND COGNITIVE EMPATHY

Sarcasm requires a well-developed theory of mind - the ability to infer others' mental intentions. This function depends on the temporoparietal junction (TPJ), medial prefrontal cortex and the Default Mode Network (DMN). Autistic individuals, even with high IQs, tend to show specific impairment in cognitive empathy, although they often maintain preserved affective empathy. This creates a paradox: they can express sarcasm without recognizing the social impact or understanding the other person's sarcasm. Baron-Cohen (2000) proposed that a deficit in theory of mind in autistic people explains the difficulty with irony and sarcasm, due to insufficient activation of the TPJ. More recent studies have shown that gifted autistics can use sarcasm in a "mechanical" or logical way, without a corresponding affective register (Kana et al., 2015).

METHODOLOGY:

The methodology applied in this article adopted a multidisciplinary and integrative approach, combining the review of existing literature with conceptual analysis and theoretical inference. Initially, a comprehensive review of scientific literature was carried out in the areas of the psychology of giftedness, cognitive and social neuroscience, behavioral genomics and philosophy of mind and cognition. This review sought to identify the main concepts, theoretical models and empirical findings relevant to understanding giftedness and the specific behavioral characteristics investigated: sarcastic sense of humor, cognitive rigidity and difficulty discerning between past and present.

This was followed by a theoretical analysis that sought to articulate the different disciplinary perspectives. Neuroscience and genomics were used to hypothesize the possible biological substrates underlying these charac-

teristics, exploring the role of specific neural networks and genetic variations. Philosophy, in turn, offered conceptual tools to analyze the ethical, epistemological and existential implications of these behavioral manifestations, especially in the context of intra- and interspecific relationships. The integration of these different lenses allowed for the construction of a more holistic and nuanced understanding of the complex interaction between giftedness and the behavioral characteristics in focus, culminating in the proposition of implications for future research and the development of more effective intervention approaches.

DISCUSSION AND RESULTS

The multidisciplinary analysis presented in this article sheds light on the complex interaction between intellectual giftedness and the manifestation of specific behavioral characteristics. By integrating the perspectives of neuroscience, genomics and philosophy, we seek to go beyond a purely psychological description of these traits, exploring their possible biological foundations and their conceptual implications.

The multidisciplinary understanding of behavioral characteristics in gifted individuals has significant implications for education and clinical intervention. Educational strategies can benefit from incorporating activities that promote the development of emotional intelligence and social skills, helping individuals to navigate the complexities of interpersonal interactions and modulate their ability to communicate more effectively. Therapeutic interventions focused on cognitive flexibility and the restructuring of thought patterns can help those experiencing cognitive rigidity to adopt more adaptive perspectives. In the case of difficulty discerning between past experiences and present associations, therapeutic approaches that explore the nature of memory, emotional regulation and the dis-

inction between internal and external reality can be beneficial. It is crucial that educators, parents and health professionals develop a nuanced understanding of giftedness, recognizing that high intellectual potential can coexist with unique socio-emotional and behavioural challenges. Early identification of these characteristics and the implementation of individualized support strategies can promote the well-being and holistic development of these individuals, allowing their intellectual abilities to flourish in a context of healthy relationships and an adaptive understanding of the world.

With regard to a sarcastic sense of humor and its potential interpersonal consequences, the discussion suggests that intellectual sharpness, while facilitating the production of sarcasm, may not be accompanied by an equally developed social sensitivity. Subtle dysfunctions in the neural networks of social cognition, particularly those involved in theory of mind and pragmatic language processing, could explain the difficulty in modulating humor in a contextually appropriate way. The possible influence of genetic variations in genes related to the development of these networks and emotional regulation reinforces the idea of a biological predisposition to this trait. The implications for intervention lie in the need for educational and therapeutic programs that focus on the development of emotional intelligence, social awareness and effective communication, helping gifted individuals to navigate the complexities of interpersonal interactions with greater sensitivity.

The marked cognitive rigidity paradoxically present in individuals with high intellectual capacity can be understood in the light of a possible imbalance in cognitive control networks and synaptic plasticity. The strong inclination to form robust mental models, although beneficial in certain intellectual contexts, can make it difficult to adapt to new

information and perspectives. Genomic research suggests the involvement of genes related to neural plasticity and neurotransmission. Intervention strategies should prioritize the development of mental flexibility, encouraging openness to different points of view and the ability to review beliefs in the light of new evidence, through cognitive-behavioral techniques and pedagogical approaches that value exploration and experimentation.

The difficulty in discerning between past experiences and present interspecific associations points to a possible peculiarity in the processing of contextual memory and the attribution of meaning. The keen ability to identify patterns, a hallmark of giftedness, can in certain cases lead to idiosyncratic associations influenced by emotional resonances of past events. Neuroscience suggests the involvement of areas such as the hippocampus and amygdala in this process. The interspecific dimension of this trait raises philosophical questions about the nature of our relationship with other life forms and the limits of anthropomorphization. Therapeutic interventions can focus on the differentiation between internal and external reality, emotional regulation and the critical analysis of established associations.

Research into the neuroscientific and genomic bases of behavioral characteristics in gifted individuals is still at an exploratory stage, as recognized by the theoretical nature of many of the connections established in this article. The inherent complexity of human behavior, coupled with the intricate interaction between genetic and environmental factors, imposes significant methodological challenges to direct empirical investigation. In this sense, future research should prioritize the constitution of larger and more homogeneous samples of gifted individuals, employing advanced neuroimaging methodologies, such as high-resolution functional magnetic resonan-

ce imaging and high-density electroencephalography, in conjunction with comprehensive genomic analyses, including genome-wide association studies (GWAS) and next-generation sequencing. The primary goal will be to identify consistent patterns of brain activity, genetic markers and their interactions that may underlie the behavioral characteristics under investigation.

Understanding the developmental trajectory of these characteristics over time requires the implementation of longitudinal studies, capable of tracking behavioral, cognitive and neurobiological changes in gifted individuals from childhood to adulthood. This approach will make it possible to discern the influence of specific contextual factors, such as parenting practices, educational experiences and social interactions, in modulating the expression of these characteristics. Investigating the dynamic interaction between genes and the environment (GxE) is therefore a crucial step towards refining current theoretical models and identifying potential risk and protective factors.

To make significant progress in this field, it is imperative to consolidate a robust interdisciplinary research agenda, fostering synergistic collaboration between neuroscientists, geneticists, psychologists, educators and philosophers. The expertise of each discipline is fundamental to addressing the complexity of the phenomenon of giftedness in its multiple dimensions. Neuroscience and genomics can provide the underlying biological mechanisms, while psychology and education offer theoretical models and methodologies for behavioral assessment and intervention. Philosophy, for its part, contributes conceptual analysis and ethical reflection on the implications of these characteristics for the individual and society.

Although current research offers valuable insights, the future of research into the neu-

robiological and genetic bases of behavioral characteristics in gifted individuals lies in the adoption of rigorous methodologies, the implementation of longitudinal studies and, fundamentally, the promotion of effective interdisciplinary collaboration. Only through a joint and comprehensive scientific effort will it be possible to unravel the complexity of these manifestations and translate the knowledge gained into more precise and effective interventions, optimizing the development and well-being of these individuals.

COGNITIVE RIGIDITY: NEUROFUNCTIONAL DIFFERENCES

Individuals with dual exceptionality, especially those with Autism Spectrum Disorder (ASD), show greater cognitive rigidity. This characteristic is associated with distinct brain connectivity patterns, such as a reduction in long-distance connections and an increase in local connections, affecting cognitive flexibility and adaptation to new contexts. In contrast, gifted people without comorbidities tend to exhibit greater cognitive flexibility, making it easier to adapt to different situations and solve complex problems.

COGNITIVE EMPATHY AND THE USE OF SARCASM

Cognitive empathy, or the ability to understand the emotions and perspectives of others, is often reduced in individuals with ASD, impacting the interpretation and appropriate use of sarcasm. Gifted individuals without ASD generally demonstrate preserved cognitive empathy, allowing for more appropriate use of sarcasm and a better understanding of social nuances.

EMOTIONAL INTELLIGENCE AND EMOTIONAL CONTROL

Emotional intelligence, which involves the perception, understanding and regulation of

emotions, is generally more developed in gifted individuals without comorbidities, contributing to greater emotional control and enhanced social skills. Individuals with dual exceptionality may present challenges in this area, affecting their social interactions and emotional well-being.

DUAL EXCEPTIONALITY AND PARADOXICAL INTERFERENCE

The concept of dual exceptionality creates a field of neurofunctional tension: while there is superiority in memory, reasoning and selective attention functions, there are dysfunctions in emotional and social integration. This ambiguity can amplify rigidity (due to hyperfocus and excessive systematization), poorly dosed sarcasm (sophisticated use, but without pragmatic adequacy) and atemporal mental associations (hyperfunctional episodic memory poorly inhibited by MDD).

CONCLUSION

Intellectual giftedness is a complex phenomenon that manifests itself in different ways, going beyond traditional measures of intelligence. The behavioral characteristics explored in this article - a potentially embarrassing sarcastic sense of humor, marked cognitive rigidity, and difficulty discerning between past experiences and present associations - illustrate the intricate interplay between superior intellect and other domains of human functioning.

By integrating the perspectives of neuroscience, genomics and philosophy, we seek to uncover the biological and conceptual substrates underlying these particularities. Neuroscience offers us insights into the neural networks involved in social cognition, executive functions and memory, while genomics points to the influence of genetic factors on the development of these structures. Philosophy, in turn, invites us to reflect on the ethical,

epistemological and existential implications of these characteristics, especially in the context of intra- and inter-specific relationships.

The observation raised, which proposes a coherent articulation between reduced cognitive empathy, executive rigidity and sarcastic expression, is not only valid, but also enriches the understanding of the particularities of giftedness. This suggests that therapeutic interventions for individuals with dual exceptionality (autism + giftedness) should integrate stimulation of mental flexibility with training in theory of mind at higher levels, respecting intellectual density but promoting interpersonal plasticity.

The presence of dual exceptionality in gifted individuals is associated with significant differences in cognitive rigidity, cognitive empathy and the use of sarcasm, influenced by neurofunctional and behavioral variations. Recognizing these differences is essential for developing appropriate educational and therapeutic strategies, promoting the well-being

and full development of these individuals.

We believe that an in-depth understanding of this complex interaction is crucial for the development of more effective educational and therapeutic approaches and for the promotion of the integral well-being of gifted individuals. By recognizing and addressing the nuances of their socio-emotional and cognitive development, we can create supportive environments that allow their unique intellectual abilities to flourish in tandem with healthy interpersonal relationships and an adaptive and enriching understanding of the world around them, including the rich tapestry of life in its many forms. The challenge lies in continuing to explore the depths of the gifted human mind with a multidisciplinary approach, integrating knowledge from different fields for an ever more complete and compassionate understanding.

REFERENCES

- Attardo, S. (2000). *Humorous Texts: A Semantic and Pragmatic Analysis*. Mouton de Gruyter.
- Bacon, F. (1620). *Novum Organum*.
- BARON-COHEN, S. Theory of mind in normal development and autism. *Prisme*, v. 1, p. 174–183, 2000.
- Botvinick, M. M., Braver, T. S., Barch, D. M., Carter, C. S., & Cohen, J. D. (2001). Conflict monitoring and cognitive control. *Psychological Review*, 108(3), 624–652.
- Canli, T., & Lesch, K. P. (2007). Serotonin transporter gene polymorphism and personality in healthy individuals. *Biological Psychiatry*, 61(12), 1395–1402.
- Egan, M. F., Kojima, M., Callicott, J. H., Goldberg, T. E., Kolachana, B. S., Bertolino, A., ... & Weinberger, D. R. (2003). The BDNF val66met polymorphism affects activity-dependent secretion of BDNF and human memory and hippocampal function. *Cell*, 112(2), 257–269.
- Eichenbaum, H. (2000). A cortical–hippocampal system for declarative memory. *Nature Reviews Neuroscience*, 1(1), 41–50.
- Gross, M. U. M. (2000). *Exceptionally gifted children* (2nd ed.). Routledge.
- Habermas, J. (1984). *The Theory of Communicative Action, Vol. 1: Reason and the Rationalization of Society*. Beacon Press.
- Haraway, D. J. (2008). *When species meet*. University of Minnesota Press.

Husserl, E. (1913). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie. Erstes Buch: Allgemeine Einführung in die reine Phänomenologie*. Max Niemeyer.

Kana, R. K., Libero, L. E., & Deshpande, H. D. (2015). Neural substrates of sarcasm in high-functioning autism: An fMRI study. *Brain and Language*, 142, 1-10.

Kant, I. (1790). *Kritik der Urteilskraft*.

Lieberman, M. D. (2007). Social cognitive neuroscience: A review of core processes. *Annual Review of Psychology*, 58, 259-289.

Lombardo, M. V., Chakrabarti, B., Bullmore, E. T., Sadek, S. A., Suckling, J., & Baron-Cohen, S. (2011). Atypical neural responses to social novelty in autism. *NeuroImage*, 58(3), 892-901.

Meyer-Lindenberg, A., Domes, G., Kirsch, P., & Heinrichs, M. (2011). Oxytocin and vasopressin in the human brain: social neuropeptides for translational neuroscience. *Nature Reviews Neuroscience*, 12(9), 524-538.

Miller, E. K., & Cohen, J. D. (2001). An integrative theory of prefrontal cortex function. *Annual Review of Neuroscience*, 24(1), 167-202.

Nagel, T. (1974). What is it like to be a bat?. *The Philosophical Review*, 83(4), 435-450.

Plomin, R., DeFries, J. C., Knopik, V. S., & Neiderhiser, J. M. (2016). *Behavioral Genetics* (7th ed.). Worth Publishers.

Popper, K. R. (1959). *The Logic of Scientific Discovery*. Hutchinson.

Renzulli, J. S. (1978). What makes giftedness? Reexamining a definition. *Phi Delta Kappan*, 60(3), 180-184.

Shamay-Tsoory, S. G., Tomer, R., Schmeltzer, Y., & Aharon-Peretz, J. (2005). The neuroanatomical correlates of understanding sarcasm and metaphor: A lesion study. *Neuropsychology*, 19(2), 288-300.

Singer, P. (1975). *Animal Liberation*. Random House.

Squire, L. R., & Wixted, J. T. (2011). The cognitive neuroscience of human memory since H.M. *Annual Review of Neuroscience*, 34, 259-288.

Sternberg, R. J. (1985). *Beyond IQ: A triarchic theory of human intelligence*. Cambridge University Press.

Strawson, P. F. (1964). Intention and convention in speech acts. *The Philosophical Review*, 73(4), 439-460.

Tsien, J. Z. (2000). Building a brainier mouse. *Scientific American*, 282(6), 62-68.

Winner, E. (1996). *Gifted Children: Myths and Realities*. Basic Books.