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NEUROETHICS AND CRIMINAL BEHAVIOR: PHILOSOPHICAL PERSPECTIVES ON MORAL DECISION-MAKING

NEUROÉTICA E COMPORTAMENTO CRIMINAL: PERSPECTIVAS FILOSÓFICAS SOBRE A TOMADA DE DECISÕES MORAIS

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Resumo

O objetivo deste artigo é demonstrar a importância de integrar a neuroética à doutrina da imputação, examinando as conexões entre o dano cerebral e a falta de controle na deliberação moral dos agentes. Para isso, apresentaremos as principais contribuições da neuroética para a tomada de decisão dos agentes. Isso ocorre tanto no nível da compreensão normativa da imputação quanto no nível da realidade factual do mundo empírico, de acordo com a chamada doutrina da imputação. Nesse sentido, consideramos necessário explorar o conceito de imputabilidade em relação à capacidade psicobiológica de compreender a mensagem prospectiva de uma norma proibitiva de conduta por parte dos agentes na sociedade. Assim, nessa área, a neuroética pode contribuir em um nível de segunda ordem para decisões normativo-valorativas de condutas ilícitas de acordo com as regras de conduta de um sistema penal. Por fim, refletiremos sobre como seria possível estabelecer uma ponte entre a neuroética e a falta de controle dos agentes no mundo do direito penal.

Palavras-chave: Neuroética. Imputação. Imputabilidade. Lobo Frontal.

Abstract

This paper aims to demonstrate the importance of integrating neuroethics into the doctrine of imputation. To this end, we will proceed as follows. First, we will examine the connections between brain damage and the lack of control in agents' moral deliberation. Second, with the aim of illustrating the main contributions of neuroethics to agents' decision-making, we will present its relation to the doctrine

of imputation. Third, we will explore the notion of imputability in relation to the psychobiological capacity to understand the characteristics of blameworthy behavior, showing that in this area neuroethics can contribute on a second-order level. Finally, in the fourth section, we will reflect—by way of conclusion—on how it may be possible to establish a bridge between neuroethics and the lack of control in agents, whether from the field of neuroscience or psychiatry.

Keywords: Neuroethics. Imputation. Imputability. Frontal Lobe.

Introduction

The concept of neuroethics generates controversy in criminal law and, given its recent problematization, most of these controversies are focused on how neuroethics can help us in relation to certain categories of crime. In this context, to understand in greater detail the spectrum of the discussion, it is necessary to draw some distinction with respect to what the criminal doctrine takes for granted both at the first and second level of imputation and, thus, differentiate its philosophical aspects from those that are purely structural in the cognitive field of man in society.

In this context, the concept of neuroethics appears in relation to two key elements of imputation: the absence of volition in the control of the situation and the impossibility of knowing the demeritorious nature of criminal behavior. For a long time, the discussion was focused on the contributions around the notion of intention —provided by scholasticism— in the subjective imputation (*mens rea*) to determine whether behavior is truly voluntary. However, with the study of organic damage to the brain that can affect our behavior, a series of new possibilities are opening in the field of neuroscience[1].

This is how the contributions of this branch of knowledge (neuroscience) - around the study of organic damage in the brain and its relationship with criminal behavior - seem only apprehensible through the doctrine of imputation in criminal matters[2]. This is to the extent that we respect a basic assumption of freedom in the actions of man in society. This problem, which has been called the problem of the artificial dichotomy between objective and subjective imputation, consists in how neuroscientific presuppositions permit us to establish a lack of freedom at the level of factual and legal imputation.

Certainly, the organic properties and functions of the brain could be the object of study in a criminal proceeding if they are evaluated according to the parameters of sound criticism, that is, in accordance with the principles of logic,

[1]In this regard, concerning the relevance of contributions from neuroscience to criminal law, as well as the mind-body relationship, it does not follow that adopting a neuroscientific perspective entails a deterministic stance merely because it has a materialist approach to mental states. This is a serious fallacy that hinders the progress of the discussion. A realist can be a determinist just as a materialist can believe in chance, or a behaviorist in free will. Thus, depending on how the mind-body relationship is understood, concepts such as will, freedom, and responsibility will have different implications in the field of criminal law. According to Díaz (2015, pp. 55 ff.).

[2]In this sense, neuroscientific techniques could also be applied in various treatments during the execution of a sentence, with the aim of reducing its duration while increasing its rehabilitative effectiveness. According to García-Valls (2024, p. 41). It is also important to note that the comparative literature reveals a detailed philosophical analysis of the impact of neuroscience on the law. According to Moore (2020, p. 1).

the maxims of experience and scientifically established knowledge. The presence of such elements in the process would not be centered on purely philosophical elements on human behavior; they are always available to be the object of discussion in attention to the expert evidence presented by the parties in the field of neuroscience or other medical reports that accredit organic damage to the brain in the frontal lobe to measure the specific functions of this vital organ. Thus, criminal imputability requires organic properties in the brain that are verifiable through neuroscience, and not only by means of studies related to a particular psychic system through psychiatry or psychology and, for some, these would even be fundamental to identify the basic assumptions of this concept in legal imputation (which establishes an explanatory distance with other models around the doctrine of imputation that always start from the assumption of freedom in philosophical terms).

The study of this type of organic properties of the brain, since by their nature they are present in an agent, being exclusively associated with a part of the agent's experience, demands an integral reading of the decision processes. In this sense, the neuroethical properties of the agent's decision are part of their agency, because they are analytical formulas that from the philosophy of mind allow us to operate from a conventional, preconventional or postconventional plane. Thus, the agent could not engage in criminal behavior out of fear of the norm (simply coercion), because of the balance of repercussions surrounding his decision or against the prohibitive rules of conduct of the order if there are principles that inevitably place him in such a scenario out of necessity.[3]

All criminal behavior presents subjective aspects connected to the mental (specific intent, knowledge, and others) as the deployment of concrete actions connected to a control of the situation in objective terms. For example, our actions or omissions are composed of knowledge and control of the situation. Although this action presents "physical characteristics such as the activity of C-type neurons, the

[3]In that order of ideas, it is interesting the experiment of Heinz's dilemma where he (as a desperate man) to save his wife who suffers from a terminal illness, steals a medicine that can cure her of this disease. In this case, the man raises half of the funds with his friends due to his scarce resources and, also, the pharmacist who discovers the medicine is charging ten times its market value. In this case, the dilemma was presented to jurists to see what they would decide, i.e., whether to punish Heinz for stealing the drug or whether to mitigate the penalty or exempt her from it. In this case, the conclusions that can be reached in the case is that jurists operate at three levels of reasoning: preconventional, conventional and postconventional. Now, in the preconventional level, the way to solve the case is focused on avoiding infringing the prohibitive rules of conduct norms of a society to avoid punishment. In the second, one seeks to perform an action that satisfies one's own desires; that is, to conduct an instrumental exchange recognizing that there are others who also have interests. However, in the case of post-conventional it is possible to observe that there are certain ethical principles that could be above some prohibitive behaviors in assumptions of extreme necessity such as those presented by Heinz's dilemma. According to Villalba, Hidalgo, Caviglia and Anchante (2021, pp. 410 et seq.)

action of certain nociceptors in my body, a specific type of electrical-brain processing, among many others" [4], it requires certain philosophical assumptions to attribute to an agent a certain *factum*, i.e., a relevant fact in criminal-legal terms[5]. In addition, this fact, which has certain characteristics that are relevant at a first level imputation, must be considered in relation to the rules of conduct of a given legal system. In this sense, the judge or the intervening parties in the criminal process must evaluate the facts according to the guidelines provided in a system in relation to certain rules of conduct, whether they are prohibitive, permissive or prescriptive. Hence, the difficulty regarding the possibility of "capturing the complexity of a conscious experience" (López-Silva y Madrid, 2021, p. 55) and the phenomenal character of such factum suffers a kind of reductionism according to the functions of the penal system.

In this context, the doctrine of imputation - beyond a series of neural processes inherent to a person's organism - presupposes (to a certain extent) freedom. Beyond clear assumptions of *vis absoluta* in which, certainly, there is an absence of action, the presence of a short-circuit movement (when an agent is pushed or physically used by another to commit a crime), let us —on a neurobiological basis— to exclude criminal liability. When we think about performing a particular action, a process occurs in our brain that is different from what happens when we think about performing another action. Recognizing this reality does not entail the challenge in terms of imputation for these purposes of attributing responsibility and determining exactly which brain process led to the agent's making that decision. The relationship between mind and action for these purposes does not involve an exercise in neuroethics.

However, neuroethics can be involved in the presence of organic damage to the brain that affects decision-making due to an absence of the psychobiological capacity that allows us to affirm that we are in the presence of imputability. The latter concept is a presupposition for culpability under the judgment of guilt[6]. These positions seem to us to be consistent with our first intuitions about the difficulty of how neuroethics can have repercussions on the substantive and procedural level in the attribution of criminal behavior. While for those who consider that imputability is a prerequisite of guilt, there are at least two ways of talking about it, physical form, and mental form. For us, the key issue is that it is possible that mental

[4] According to López-Silva y Madrid (2021, p. 55)

[5] According to Sánchez-Ostiz (2014, p. 39).

[6] In this regard, a normative concept of culpability cannot disregard the principle that a violation of a legal norm or rule of conduct cannot be imputed to an individual who, due to certain mental disorders, is unable to recognize such imputability. According to Rodríguez (2017, p. 117).

statements can be considered in the process by means of the concept of intention without this assessment being reduced to the search for a strict intention to identify the mental. In this line, it is possible to pose a spectrum of intentions according to the factual presuppositions of the case to proceed to evaluate them according to the rules of conduct of the system (*actus reus*)[7].

Hence, our purpose in this article is not to provide a definitive answer to how neuroethics can operate in substantive or procedural terms in criminal-legal terms, but rather an alternative approach to the concept of imputability. Thus, our objectives are on two main points. The first point is that the explanatory challenge of neuroethics is to establish by means of sound criticism a causal relationship between possible organic brain damage and mental damage that could exclude the knowledge of demeritorious behavior in the field of legal imputation, and this area of application should be weighed in the development of a criminal proceeding as a ground for exculpation or incomplete exoneration but not as a presupposition of imputability, at least in principle.

The second point, and more relevant to our study, is that the relationship between organic-brain damage and the attribution of liability through neuroethics operates on a second-order plane. For different authors, it is possible to observe in the concept of imputability a mixed criterion that operates on a plane of subordination to the legal reasoning present in a sentence. Thus, according to a mixed criterion of imputability, a greater clarification of the facts is possible according to the neuroethical contributions of the mental states of the agents and, consequently, it would be plausible to assess different alterations in the brain functions that could affect the assessment of the prescriptive and prohibitive rules of the criminal legal system.

Therefore, neuroethics contributes to the mind-body relationship but constitutes a challenge in relation to its effects in the legal-criminal field. Thus, in the first section, we will study how organic brain damage affects the lack of control in the behavior of people in society. In the second section, we will focus on the neuroethical concern for the moral decisions of agents in the criminal-legal field. In the third section, we will examine the psychobiological capacity of agents as the content

[7]In this context, it is worth noting—particularly with respect to the actus reus/mens rea distinction—that neuroscience has made significant contributions to the detection and classification of mental states. In criminal law, the ability to distinguish between the commission of a criminal act (*actus reus*) and the mental awareness or intent of the individual performing the act (*mens rea*) is essential for establishing criminal responsibility. Recent neuroscientific research has demonstrated that, under laboratory conditions, it is possible to determine whether a subject is acting knowingly or negligently using functional magnetic resonance imaging in combination with machine learning algorithms. According to Camargo and Ried (2021, p. 112).

of imputability. Finally, in the fourth section, we will provide reflections on the concept of freedom in relation to certain borderline behaviors.

Connections between prefrontal cortex brain damage and lack of behavioral control

Early connections between brain damage to the prefrontal cortex and lack of behavioral control are present in the case of the laborer Phineas Gage. In this 1848 case, a work accident occurred that almost ended the life of Phineas Gage, who led a team in charge of rock blasting in the construction of the Rutland Burlington railroad in Vermont, USA. As reported in the case, the explosion ejected a metal bar (3 centimeters in radius and one meter long) that pierced Cage's skull at the age of twenty-five.[8]

Thus, "the iron bar was ejected at great speed and struck Gage's face, penetrating the left cheek and piercing the front of his skull" (García-Molina, 2012, p. 371). On November 18, 1848, that is, sixty-five days after the accident, Gage showed evident signs of improvement. Dr. Harlow initially visited him in April 1849. This doctor noted that Gage was in good health and subsequently discharged him. Then, more than 17 years after the accident, Dr. Harlow had contact with Gage and was able to reconstruct the events between the spring of 1849 and Gage's death[9].

According to information provided to Harlow and Gage's mother, Gage would live and work for 8 years in Valparaiso, Chile. Then, Gage decided in June 1859 to return to the United States to the city of San Francisco. In February 1860, Gage suffered the first of a series of severe convulsions that would end his life on May 21, 1860. On Wednesday, June 3, 1868, Dr. Harlow presented Gage's case at the annual meeting of the Massachusetts Medical Society. The case presentation was entitled *Recovery from the passage of an iron bar through the head*. In this conference, according to what we can observe in Garcia-Medina's study, "Harlow describes the accident and its circumstances, the medical treatment provided to the patient and the subsequent recovery" (García-Molina, 2012, p. 372).

Harlow gives details of the dynamics of Gage's existence after the incident with the explosives in the mine until his death[10]. In this presentation, Harlow also recounted the various alterations in Gage's behavior[11]. In this context, Harlow

[8] According to Figueroa (2022) p. 184.
[9] According to Muci-Mendoza (2007, pp.17-28).
[10] According to Harlow (1848) pp. 339-340.
[11] According to Harlow (1848) pp. 339-340.

argued that Gage suffered from an imbalance between rational capacity and primal instincts. He described Gage as an abnormal person after the accident, disrespectful, easily yielding to the use of obscene words, presenting a lack of prudence among his colleagues, being unable to restrain himself before those of third parties when his interests were at risk. Also, Gage at times presented himself incorrigibly stubborn, whimsical, and indecisive.[12]

Certainly, the Gage case is a key case to observe how structural damage in the brain, or specifically in the prefrontal cortex, can have an impact on the behavior of agents in society[13]. Thus, neuroscience continues to analyze this and other cases related to specific brain damage that may affect the execution of certain borderline behaviors. Since the description of the Phineas Gage case, scientists have tried to solve the mysteries of the prefrontal cortex. Because of the complex characteristics of this mysterious area of the brain, its study has been full of obstacles[14]. As some authors point out in comparative literature, in relation to the functions of the frontal lobe, this brain area presents a challenge that exceeds the discoveries that have been made in other areas of the brain[15].

Finally, it is thus possible to argue that lesions in the frontal lobe brain structure generate a wide range of symptoms, from severe alterations in character to mild changes in mood that may be undetectable from the lesion. However, advances in neuroscience in recent decades have expanded our knowledge of the structural diversity of the prefrontal cortex and the role it plays in modulating behavior. Thus, understanding the relationship between the structure and its processes has allowed us to clarify to some extent the mystery surrounding the prefrontal cortex. Finally, it can be argued that lesions in the frontal lobe of the brain generate a wide range of symptoms, from severe personality changes to mild mood swings that may be undetectable at the time of the injury.[16]

[12]According to Harlow (1848, pp. 339-340).

[13]In this sense, Neuroscience, at present, has proven that the brain continues its evolution until the age of twenty-one, where the frontal regions mature in the last stage. These frontal regions are fundamental in decision making, so a 17-year-old person does not have this brain region fully developed, which makes it difficult to control impulses. According to Pozo (2010, pp. 53-54).

[14]For further cases of frontal lobe lesions and their associated behavioral alterations within the framework of neuroscience, refer to the classical case of Phineas Gage, as well as to contemporary research on executive dysfunction resulting from damage to the prefrontal cortex. According to Ramos (2019, pp. 266 and ff).

[15]According to Teuber (1964, pp. 25-26).

[16]According to García-Molina (2012) p. 374.

Neuroethical concern in the moral decision of agents

Neuroethics is a branch of knowledge that considers elements of neuroscience in the field of ethics. Thus, neuroethics as a discipline aims to examine the legal, moral AND social implications in relation to the study of the brain organ and its effects on the nervous system of the agents. Thus, neuroethics studies ethical issues related to the knowledge of different areas of the brain that can be perfectly connected with moral responsibility in view of the contributions of neuroscience.[17] The implications of neuroscience may be interesting for criminal dogmatics. However, it is difficult to maintain at this point that they can completely predict the decisions of agents in society or completely rule out the notion of freedom that criminal literature proposes at the level of factual imputation from a philosophical level based on Aristotelian, Kantian or Thomistic assumptions.[18]

Thus, when we allude to the notion of intention, it is key to pay attention to a scholastic and phenomenological notion of intention. In this context, intention can be described as a projection of consciousness towards the object. This projection is the result of an axiomatic reading that, as a fundamental truth, recognizes the existence of a consciousness that separates us from the world and its projection towards a real or fictitious object. This by means of an act of perception (hetero-referential) or imaginary (self-referential plane). Thus, when we refer to the notion of intention, it is essential to focus on a scholastic and phenomenological notion of intention.[19]

In a hetero-referential act an agent can observe a real object about which they are not fully certain of its meaning, and which can be observed by other agents on an intersubjective plane. However, this heteroreferentiality allows us to evaluate an action or omission in society. On the other hand, an imaginary act entails full certainty of meaning because the consciousness is projected towards an imaginary object that is only the result of our cognitive system on a self-referential plane. This type of perceptual and imaginary act allows us to affirm that it is possible to

[17] In this sense, neuroethics since 2002 consists of the study of ethical, legal, and social problems arising from scientific discoveries about the brain that are applied in the legal field. Even more so since the case of Phineas Gage in 1848 who changed his behavior due to the brain lesions, he suffered caused neuroethics "a socio-cultural revolution becoming a paradigm of the 'neuroculture' movement that, with vertiginousness, dominated the intellectual and scientific field" (Figueroa, 2022, p. 184).

[18] In this order of ideas, it is interesting to observe the possibility of a conception that manages to make compatible the recognition of personal autonomy in the classical terminology of freedom of will and, likewise, with the possible truth of a deterministic thesis. According to Mañalich (2012, p. 679 note 84).

[19] In detail on the point, see Guerra (2019, *passim*).

differentiate between what is real and what is unreal.

Now, this philosophical differentiation (between perceptual and imaginary acts) on the moral behavior of the agents can operate at the level of the doctrine of imputation, i.e., in the well-known phase of valuation of the fact in accordance with the norm. This is according to a *factum* (relevant fact in criminal legal terms) over which the agent has control of the situation and knowledge. Thus, the judge or the intervening parties in a criminal proceeding (defense, public prosecutor, or plaintiff) in relation to the principle of reality can assess human behavior according to the rules of conduct of a system. Otherwise, every fact would be considered according to our own intention in a strict sense[20]. Thus, for example, we could argue that wanting to dissolve a person in particles could be an action not constituting homicide, if our intention (consciousness in its pure state) only intends to free the entrance of a cave in which we are trapped by the presence of a fat man who obstructs the exit.

However, the differentiation between a perceptual and an imaginary act could operate from a neuroscientific or psychiatric level to the extent that it is possible to accept that there may be hypotheses of insanity or unaccountability, that is, cases in which such alterations prevent the person who executes a criminal action at the time of executing the action from distinguishing between such acts. In this sense, it would not be plausible for the agent to differentiate an imaginary object from a real one. Well, the superposition would be complete in the cognitive field of the agent. Thus, it seems to us, in opposition to other authors in the literature, that it is necessary to prove that this overlap between perceptive and imaginary act is due to organic damage in the brain or even beyond this (psychic disorders not related to organic damage in the brain or body) and that, likewise, they operate at the time of executing the criminal action or omission.

Thus, in conceptual terms, although freedom requires a minimum in terms of psychobiological capacity to identify the knowledge in an agent who executes demeritorious behavior, it is possible to argue that the contributions of neuroethics could have an impact from the parameters of sound criticism, i.e., scientifically established knowledge. In other words, the neuroscientific reports or neuroethical perspectives presented to disprove the imputability of the agent for others in the criminal process, will only have weight on a second-order level.

Although we cannot deny the contributions of neuroscience in the scientific field, they still cannot determine with absolute certainty the mysteries of the prefrontal cortex of an organ as complex as the brain. It is also necessary to consider

[20]In that sense, on the problems of an understanding along those lines in the attribution of criminal liability. According to Simester *et al.* (2016, p. 140).

that the neuroplasticity of the brain in other cases has managed in the case of brain lesions to reorganize itself to fulfill its functions. Therefore, like psychology and psychiatry, the contributions of neuroscience and neuroethics are constantly in a circle of skepticism, which, although it does not imply its rejection of the penal system, does not imply an all-embracing, omnipotent, or omniscient knowledge of human freedom.

Hence, the fact of presenting a lesion in the brain or suffering from a disorder or disorder of the judgment of reality as reported by a neuroscientist in the criminal process is sufficient to exempt criminal liability. Well, it requires legal reasoning to exam these reports in the process in lines of defense linked to insanity or unimputable. In short, neuroscientific reports may be subject to counter-examination in the process and even the parties may present meta-expertise related to the behavior of the agents. Therefore, scientific reports do not in themselves constitute an irrefutable argument in favor of the exclusion of criminal liability.

Psychobiological capacity as a presupposition of legal imputation

The concept of imputability, conceived as a conceptual characterization that allows us to speak of a psychobiology that allows us to identify a knowledge in the agent about the execution of a criminal conduct, has had a fundamental repercussion as one of the pillars of the concept of guilt or a conceptual presupposition of this in the doctrine of imputation. Additionally, dogmatic studies on imputability show the conceptual tension that arises between different currents of thought in relation to whether imputability is a presupposition of guilt or part of its judgment. [21] The results of these studies are a range of considerations focused on the recognition of psychobiological aspects that are not thematized in scientific terms from the pillars of neuroscience or neuroethics but rather from anthropological, philosophical, psychological, or psychiatric parameters in the field of the science of criminal law.

Thus, for a substantial segment of comparative criminal theory, the precise role that neuroscience plays within the framework of criminal law remains unclear. The potential intersection between neuroethics and certain categories of criminal theory appears to reside primarily in the concept of culpability and the absence of action in instances of *vis absoluta* resulting from involuntary, short-circuit-like

[21] Regarding the problem of determining the imputability or lack thereof at the time of execution of the criminal action in detail. According to Guerra (2019, pp. 71-72).

movements caused by neurological dysfunctions. Expanding on this issue, within the realm of culpability, the notion of imputability entails acknowledging organic factors that are intrinsically linked to biological premises concerning an individual's moral agency.

Fortunately, it is difficult to argue that moral agency is solely the result of a disorganized set of neurons connected through electrical impulses. Nor is it plausible that scientific knowledge can predict with absolute certainty our future criminal behaviors, given the variations permeated by our brain structure. Thus, our perspective on neuroscience focuses on those aspects that resonate with the doctrine of imputation at its first and second levels of a criminal act. The identification between neuroethics and criminal theory does not occur, then, as some claim in their rejection of the notion of freedom in factual imputation (centered on knowledge and control of the situation) and legal imputation (focused on the awareness of committing a blameworthy or unlawful act that is not within the framework of *vis compulsiva*).[22] It is striking that a purely psychological and neuroscientific characterization of the notion of imputability is untenable. Indeed, the jurist is the key figure in the evaluation of a fact according to the rule of conduct of a legal system; only some scientists recognize these neuroscientific traits as predominant in imputability. However, it is certainly not possible to assert that the entire notion of freedom is conditioned solely by the functions of the human brain[23].

The jurist, then, is the agent who determines whether we are dealing with a perpetrator or author who is aware of the blameworthiness of their criminal behavior. It is evident that the neuroscientific characterization of imputability corresponds to a mixed criterion in the study of criminal behavior. Nevertheless, beyond this field of interactions between criminal law and neuroscience, there are paradigmatic cases such as psychopaths who exhibit brain conditions that determine their lack of empathy and who, on more than one occasion (though not always), engage in antisocial or criminal behaviors. This final issue clearly exceeds the scope of this work, and we do not intend to address it due to its breadth.

[22]Cases of *vis compulsiva* or *vis et metus* involve situations of extreme danger in which one may invoke the concept of exculpating necessity and duress, which exclude culpability or the second level of imputation. According to Guerra (2022, pp. 325–327 and p. 325, footnote 3).

[23]From an epistemological and scientific standpoint, it is evident that a category mistake is often made—commonly by both biologists and certain criminal law theorists who are apprehensive about the implications of neuroscientific advances. Specifically, some of these scholars, based on findings in neuroscience, reject the notions of free will and individual responsibility. Consequently, they advocate for a restructuring of criminal law in accordance with the internal logic and dynamics of the criminal process, as influenced by neuroscientific perspectives. According to Hassemer (2011, p. 6).

Conclusions

One might observe that there are cases in which certain bodily movements respond to the presence of damage in the nervous system. Likewise, causes associated with the presence of foreign bodies in the brain may arise, which can affect impulse control. There are also other scenarios in which certain mental disorders—without the presence of organic damage—can influence an individual's behavior within society. For example, borderline behaviors in cases of borderline personality disorder or others in which it would be difficult to appreciate a psychotic state.

Now, focusing on the presence of brain tumors or organic damage to the brain that may influence criminal behavior, freedom is an abstraction difficult to consider when attributing responsibility. However, it is wrong to assert that the mere presence of brain damage or a tumor is sufficient to irrefutably establish a case of non-imputability. This often leads to confusion due to the potential contributions of neuroscience in understanding how such damage can affect human behavior within an extraordinarily complex environment.

The point, in our view, is of utmost importance, since when the concept of intention is accepted, there is a risk of mistakenly attributing to it an exclusively psychological identity or giving such primacy to neuroscientific contributions as if we were faced with an unquestionable truth to determine—beyond the legal framework—whether criminal responsibility can be attributed. For example, regarding contributions from psychology, borderline mental disorder can lead to the commission of a hate crime, yet this does not qualify as a disorder affecting the sense of reality to exclude criminal responsibility.

Thus, even in the case of the mitigating circumstance of passion and obsession, it only applies in cases of profound psychological disorders; nor could responsibility be mitigated merely for exhibiting a paraphilia (fetishism, sadomasochism, among others) or lack of impulse control in cases of rape or attempted femicide.[24] Therefore, just as in the case of expert reports that establish the presence of a reality disorder in the agent, neuroscientific contributions require a legal evaluation.

Here, the need for contributions from neuroscience becomes evident to partially understand the real perception disorders that may affect the behavior of individuals. Therefore, the fact that scientific contributions in the fields of psychology, psychiatry, and neuroscience do not fully encompass the notion of imputability does

[24]It has even been recently argued that applying the mitigating factor of sudden passion or obsession in cases of attempted femicide due to infidelity would be inappropriate in Chilean literature for socio-cultural reasons. According to Guerra and Sierra (2022, pp. 130 *et seq*).

not imply that they are useless in criminal proceedings. This point becomes clear when we consider the evidentiary freedom of the process in question and its assessment according to the standards of sound judgment: principles of logic, maxims of experience, and scientifically established knowledge.

Additionally, we can argue that while in philosophical terms pertaining to the notion of freedom, usually present in Kantian or Thomistic thought, could we seriously maintain today that every neuroscientific report is junk science in the legal process? Certainly, an affirmative answer could lead us to reject all neuroscientific contributions in the exclusion or attribution of criminal responsibility. Thus, we can conclude that it is not possible to construct the idea of freedom solely from a purely ontological perspective, as if it belonged to a realm inaccessible to science.

Therefore, finally, it is a crucial point that neuroscience acknowledges its subordination to a legal evaluation. Although neuroscience is not capable of encompassing the notion of freedom in its entirety, it offers a complementary argument whereby we can recognize its contributions based on the principle of contradiction: we would be fanatics of a purely Thomistic philosophy if we imposed solely an anthropological understanding of freedom, which would consequently entail disregarding the contributions of neuroscience regarding the presence of neuromotor damage or damage to the frontal lobe of the brain that could be correlated with borderline behavior. In any case, science will eventually determine its position on the matter, and it will be the jurist who decides how to resolve the issue in the criminal process.

References

CAMARGO BRITO, R.; RIED SOTO, N. Neurociencia y derecho. **Revista Chilena de Derecho**, vol. 48, n º 3, pp. 107 – 129, 2021. Available at: https://www.scielo.cl/pdf/rchilder/v48n3/0718-3437-rchilder-48-03-107.pdf. Accessed on: 20 feb. 2023.

DÍAZ ARANA, A. F. Neurociencias y derecho penal desde una perspectiva funcional de la mente. **Revista Nuevo Foro Penal**, vol. 11, n ° 84, pp. 47-89, 2015. Available at: https://dialnet.unirioja.es/servlet/articulo?codigo=5235004. Accessed on: 10 apr. 2021.

FIGUEROA, G. (2022). Neuroética: comienza el reinado de las neurociencias en la fundamentación de la ética. **Acta Bioethica**, 28(2), pp. 183–195, 2022. Available at: https://actabioethica.uchile.cl/index.php/AB/article/view/68980. Accessed on: 15 feb. 2023.

García-Molina, A. Phineas Gage y el enigma del córtex prefrontal. **Neurología**, 27 (6), pp. 370-375, 2012. Available at: https://www.elsevier.es/es-revista-neurologia-295-pdf-S0213485310001581. Accessed on: 10 apr. 2022.

GUERRA ESPINOSA, R. Interferencia del miedo insuperable en el estado de necesidad. **Revista de Derecho (Valdivia),** vol.35, n.1, pp.323-343, 2022. Available at: https://www.scielo.cl/scielo.php?script=sci_arttext&pid=S0718-09502022000100323&lng=es&nrm=iso . Accessed on: 10 apr. 2021.

GUERRA ESPINOSA, R.; SIERRA CAMPOS, C.A. Delito de femicidio en Chile: aspectos político-criminales de la nueva regulación de la atenuante de arrebato y obcecación. **Revista CES Derecho**, vol. 13. No. 3, pp. 128-150, 2022. Available at: https://doi.org/10.21615/cesder.6374 . Accessed on: 10 apr. 2021.

GUERRA, R. Impulso irresistible en el miedo insuperable. **Política Criminal**, vol. 14, nº 28, Art. 2, pp. 54-94, 2019. Available at: http://politcrim.com/wp-content/uploads/2019/10/Vol14N28A2.pdf. Accessed on: 10 apr. 2021.

HARLOW, JM. Passage of an iron rod through the head. 1848. **J Neuropsychiatry Clin Neurosci**, 11(2):281-3, 1999. Available at: https://psychiatryonline.org/doi/full/10.1176/jnp.11.2.281. Accessed on: 10 apr. 2022

HASSEMER, W. Neurociencias y culpabilidad en Derecho penal. **Indret,** 2, 2011. Available at: https://indret.com/wp-content/themes/indret/pdf/821.pdf. Accessed on: 10 apr. 2021.

LÓPEZ-SILVA, P.; MADRID, R. (2021). Sobre la conveniencia de incluir los neuroderechos en la Constitución o en la ley. **Revista Chilena De Derecho Y Tecnología**, 10(1), pp. 53–76, 2021. Available at: https://doi.org/10.5354/07

19-2584.2021.56317. Accessed on: 15 feb. 2023.

MAÑALICH R, J.P. El concepto de acción y el lenguaje de la imputación. **DOXA. Cuadernos de Filosofía del Derecho**, 35, pp. 663-690, 2012. Available at: https://rua.ua.es/dspace/bitstream/10045/47453/1/Doxa_35_29.pdf. Accessed on: 10 apr. 2021.

Moore, M.S. **Mechanical Choices**. Oxford: Oxford University Press, 2020.

MUCI-MENDOZA, R.. El accidente de Phineas Gage: su legado a la neurobiología. Gac Méd Caracas [online]. 2007, vol.115, n.1 [citado 2025-06-12], pp.17-28, 2007. Available at: en: https://ve.scielo.org/scielo.php?script=sci_arttext&pid=S0367-47622007000100003&lng=es&nrm=iso . Accessed on: 10 feb. 2024.

Pozo Silva, N. **Imputabilidad penal y mente**. Santiago: Editorial ARCIS, 2010.

RAMOS, C. El pensamiento moral después del daño cerebral adquirido Moral thought after acquired cerebral damage. **Revista Chilena de Neuro-Psiquiat**, 57 (3): 264-271, 2019. Available at: https://www.scielo.cl/pdf/rchnp/v57n3/0717-9227-rchnp-57-03-0264.pdf. Accessed on: 9 mar. 2023.

Rocamora García-Valls, P. **Neurociencia y Derecho Penal**. Barcelona: Real Academia Europea de Doctores.

RODRÍGUEZ FERRÁNDEZ, S. Neurociencias y derecho penal: una visión compatibilista actualizada. **Revista Justiça e Sistema Criminal**, v. 9, n. 17, p. 111-134, 2017. Available at: https://revistajusticaesistemacriminal.fae.edu/direito/article/view/114/100. Accessed on: 10 apr. 2021.

Sánchez-Ostiz, P. **La libertad del Derecho penal. Estudios sobre la doctrina de la imputación.** Barcelona: Atelier, 2012.

Simester, A.; Spencer, J.R.; Stark, F.; Sullivan, B.; Virgo, G. **Simester and Sullivan's Criminal Law. Theory and Doctrine**. 6th ed. Great Britan: Hart Publishing, 2016.

Teuber, H.L. The riddle of frontal lobe function in man. In: Warren JM, Akert K. **The frontal granular cortex and behavior**. New York: McGraw Hill, 1964, pp. 410-477.

VILLALBA GARCES, J.; FRISANCHO HIDALGO, S.; CAVIGLIA MARCONI, A. y ANCHANTE RULLE, M. Razonamiento moral e identidad moral en abogados dedicados al arbitraje**. Derecho [online]**, n.86, pp.397-426, 2021. Available at: http://dx.doi.org/10.18800/derechopucp.202101.012 . Accessed on: 20 feb. 2023.

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