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Teoria neuromorale – un nuovo lombrosianesimo basato su recenti scoperte delle neuroscienze

La théorie neuro-morale – un nouveau lombrosionisme soutenu par les récentes découvertes des neurosciences

Neuromoral Theory – A new Lombrosionism supported by the recent findings of neuroscience

Antonio Carlos Fontes Cintra[•]

Riassunto
La teoria di Cesare Lombroso ebbe grande risonanza alla fine del XIX secolo, ma di fronte al suo evidente riduzionismo presto cadde in discredito. Negli ultimi due decenni, tuttavia, studi approfonditi nell'ambito delle neuroscienze hanno fornito evidenze circa alcune predisposizioni al crimine di tipo genetico o congenito. Analogamente, sono stati segnalati casi di persone che nel corso della propria vita avevano tenuto un comportamento socialmente adeguato e che, a causa di lesioni cerebrali o tumori, avevano sviluppato impulsi che le avevano portate a commettere crimini efferati. I principali studi citati mettono in evidenza le anomalie presenti nella regione della corteccia pre-frontale del cervello. La teoria neuromorale viene presentata con la sua solida struttura scientifica, basi teoriche e conclusioni, in contrasto con le asserzioni di Lombroso che, tuttavia, rivelerà coincidenze sorprendenti nelle conclusioni, malgrado i riferimenti teorici, la metodologia e i principi fondamentali siano completamente differenti. Le ipotesi e le asserzioni sono, poi, analizzate alla luce delle continue discussioni di lungo termine tra la prospettiva filosofica del determinismo e quella del libero arbitrio e delle imprescindibili conseguenze che ne derivano a livello di politiche criminali. Infine, saranno esaminate le ripercussioni e le alternative relative alla definizione di imputabilità, all'attribuzione delle responsabilità, alla punizione e alla rieducazione.

Résumé
La théorie de Lombroso eut un grand impact à la fin du XIXe siècle, mais face à son réductionnisme évident, elle vite tomba en discrédit. Cependant, au cours des deux dernières décennies, des études approfondies en neuroscience ont fourni des preuves concernant les prédispositions génétiques ou congénitales au crime. Également, certaines études ont reporté de cas emblématiques de personnes qui tout au long de leur vie ont eu un comportement social adéquat et qui, en raison de lésions cérébrales ou de tumeurs, ont développé des impulsions qui les ont amenées à commettre de crimes barbares. Les nombreux travaux cités signalent des anomalies dans la région du cortex pré-frontal du cerveau. La théorie neuro-morale est présentée dans sa solide structure scientifique, cadre théorique et conclusions, par contraste avec les affirmations de Lombroso, qui révélera une coïncidence surprenante dans les résultats, en dépit du fait que les références théoriques, la méthodologie et les principes de base soient totalement différents. Les hypothèses et les assertions sont alors analysées sur la base du débat de longue date entre la perspective philosophique du déterminisme et celle du libre-arbitre et des conséquences nécessaires qui en découleront en terme de politique criminelle. Enfin, l'article examine les répercussions et les solutions alternatives pour le processus d'imputation des responsabilités, la peine et la rééducation.

Abstract
Cesare Lombroso's theory had a great impact at the end of the nineteenth century, but in the face of its evident reductionism, soon fell into disrepute. In the last two decades, however, in-depth studies in neuroscience have provided evidence of genetic or congenital predispositions to crime. Likewise, it is reported emblematic cases of individuals who throughout social life have had socially adequate behavior and who, due to brain lesions or tumors, have developed impulses that have led them to commit barbarous crimes. The many studies cited point out to abnormalities in the pre-frontal cortex region of the brain. The neuromoral theory is presented in its solid scientific structure, theoretical bases and conclusions, contrasting it with the statements made by Lombroso, which will reveal surprising coincidence in the findings, despite the theoretical references, methodology and fundamentals being completely different. The assumptions and assertions are then placed in the light of the long-time continuous discussion amid the philosophical perspective of determinists and libertarians and the necessary consequences that will fall upon criminal policy. At the end, the repercussions and alternatives for the imputation process of responsibilities, punishment and rehabilitation are discussed.

[•] Post Doc at Regent College (Canada), Ph.D at University of Lisbon. Public Defender of Brazilian Federal District. Law Professor at Mackenzie University (Sao Paolo) and at Superior School of Judges (Brasilia), Brazil.

Key words: neuromoral theory; Cesare Lombroso; crime; responsibility; punishment; rehabilitation.

1. Introduction.

As early as the late-19th century, when understanding human DNA and brain anatomy was still a long way from any scientific construct, the Italian psychiatrist, criminologist and anthropologist Cesare Lombroso sought to catalog physical and psychological characteristics of criminals, building the foundations of an evolutionist positivism that supported the idea that the acts considered by us as criminals are, in reality, a consequence of nature, expressions of human atavistic features[1]. Although the Italian thinker did not rule out the relevant role of the social environment[2] in which the criminal was inserted, his studies were essentially based on hereditary or congenital characteristics, considering the criminal simultaneously as a sick person incapable of controlling his basic instincts.

Lombroso's theories had a major impact on his time and sparked numerous discussions about the origins of crime. However, due to lack of methodological rigor, they were object of many criticisms and, as early as the beginning of the last century, they had come into disrepute, especially because of its simplistic reductionism.

In recent years, however, numerous studies of neuroscience, especially with the use of brain imaging, have shed new light on the debate and demonstrated correlations between certain morphological formations with criminal behavior. A new lombrosionism emerges, today with the necessary scientific clothing to be credible.

Hundreds of criminal cases in the United States have had, as the main argument of defense, studies that pointed to defects in specific brain regions capable of modifying behaviors and lead to certain acts, thus removing the existence of a free will and, therefore, the possibility of guilt imputation in conducts classified as criminal. In 2012 alone, there were 250 cases (more than double the number of 2007) in which defense arguments were presented based on scientific bias that somehow asserted the thesis that "the defendant's brain made him act in that way". Approximately 5% of the homicide cases and 25% of the cases related to death sentences presented defendants betting on exclusionary causes of liability due to neurobiological data[3].

This is not an exclusively American reality. In Italy, 2009, Stefania Albertani killed her older sister, segregating her at home and forcing her to take large doses of psychiatric drugs causing her death. Later she burned the corpse. Indicted in the investigation of her sister disappearance and kept under control by the police, she tried to strangle her mother with a belt during an altercation. The arrival of the police saved her mother and led to Stefania's arrest. Later a complex criminal design emerged, and the magistrate end up reducing the penalty, considering a partial defect of mind for the presence of "alterations" in "an area of the brain that has the function" to regulate "aggressive actions" and, from the genetic point of view, of factors "significantly associated with a greater risk of impulsive, aggressive and violent behavior"[4].

In the following lines will be presented studies in neuroscience based on evidences brought by cerebral images that give the theoretical bases for the formation of the neuromoral theory and its

[1] Lombroso C., *O homem delinquent*, São Paulo, Ícone, 2016, pag. 22.
[2] *Ibidem*, pp. 85-86.
[3] Farahany N.A., "Neuroscience and behavioral genetics in US criminal law: an empirical analysis", *Journal of Law and the Biosciences*, Vol. 2, n. 3, 2015, pp. 485–487.
[4] Sentenza Albertani, Gip di Como, 20/5/2011.

many coincidences with the conclusions obtained by César Lombroso over a hundred years ago. It is a perspective of the brain not as an instrument of decision-making but as the cause of these. Like a pre-programmed machine, there would be a framework that defines the path of decisions, either because originally born this way or due to accidents or diseases that would alter the initial design.

2. Cerebral morphology identified in criminals through neuroscience studies.

The foundations used by Lombroso, based on the physical characteristics of individuals, to substantiate his conclusions were in some parts burlesque, especially when put in perspective of what is known nowadays about criminology. Faced with the limitations of his time, his studies led him to the construction of a criminal phenotype with features such as massive jaws, facial asymmetry, uneven ears, lack of beard in men, manly physiognomy in women, low facial angle[5]. In this context, for long, any argument that identified origins of criminality in genetic or morphological factors was promptly rejected.

However, a new guise presents itself today to the old deterministic ideas of the positive school. Now, with scientific rigor, neuroscientists seek to map the cerebral morphology of individuals with a history of aggression, mainly found among the prison population, in order to find characteristics and elements that indicate a mechanism of propensity for socially unwanted behaviors.

Functional neuroimaging studies in anti-social individuals have suggested dysfunction of the frontal and temporal lobes. Positron emission tomography (PET) studies have shown associations between reduced metabolism in the frontal cortex and history of repetitive violent behavior, history of aggression and homicide. Reduction of frontal perfusion has been described in anti-social individuals studied by single photon emission computed tomography (SPECT) and frontal activation abnormalities, by means of functional MR (MR) during tasks that evaluate the inhibition of the response and the processing of emotional stimuli. Differences in activation in the temporal lobes of control criminal psychopaths have also been demonstrated using functional magnetic resonance imaging during tasks that evaluate the processing of emotional words and emotionally charged images[6].

In a study conducted in Denmark, violent offenders who had documented history of convictions for violent crimes were recruited from the prison population, while healthy control non-offenders were also recruited via advertisements to volunteer, conducting behavioral and past-conduct research. All participants were selected according to the following criteria: 1) absence of history of psychiatric disorder; 2) absence of symptomatic medical or neurological illness or head trauma; 3) no use psychotropic medications within 4 weeks before scanning; and, 4) absence of current substance or alcohol abuse. After filtering, the final group consisted of 19 violent offenders with a history of crimes including murder, rape, attempted murder, or aggravated assault and 24 healthy control non-offenders. Fourteen violent offenders had previously used some kind of drug, but all were currently in remission for at least 6 months up to several years (with a 24 months as median number of months under deprivation of liberty at time of inclusion) and they were all tested negative on urine

[5] Lombroso C., *op. cit.*, pag. 197.

[6] Eastman N., Campbell C., "Neuroscience and determination of criminal responsibility", *Nature reviews Neuroscience,* 2006. Doi: 10.1038/nrn1887

drug screen on the day of scanning. The study focused on three brain regions of interest, the anterior cingulate cortex (ACC), orbitofrontal cortex (OFC), and striatum—since they have consistently shown structural and/or functional abnormalities in violent and aggressive individuals.

In conclusion, it was demonstrated for the first time that, in humans, there is a binding between high striatal 5-HT1BR (a protein serving as receptor and is found throughout the central nervous system with the highest concentrations in the frontal cortex, basal ganglia, striatum, and the hippocampus) to high levels of trait anger and psychopathy in violent offenders and that the same does not occur with the group of non-aggressors. The results strongly support the involvement of serotonin in the aggression and suggest that the binding of 5-HT1BR from the striatum reflects the severity of the symptoms in individuals with pathological aggression. It is suggested at the end that 5-HT 1BRs may putatively represent a molecular target for development of pharmacologic anti-aggressive treatments[7].

The most common term to designate individuals with a propensity to commit violent crimes is ASPD, anti-social personality disorder, and it is stated that most violent crimes are perpetrated by their sufferers. In a study that sampled 22,790 prisoners from 12 different countries, it was concluded that 47% of them would have this diagnosis[8]. It should be noted that ASPD is not the same as psychopathy. It is estimated that most psychopaths fit the criteria for ASPD, but only 10% of ASPD patients have psychopathy[9].

In the Raine and Yang studies, brain regions involved in anti-social, violent or psychopathic individuals include both the dorsal and ventral PFC, amygdala, hippocampus, angular gyrus, anterior cingulate and temporal cortex including the superior temporal gyrus[10]. In fact, several clinical paradigms in neuroscience converge to the conclusion that prefrontal cortical impairment is a significant risk factor for the development of anti-social conducts[11]. Considering the strong evidence that the prefrontal cortex region is associated with violent behaviors, a study conducted transcranial direct current stimulation (CTEC) in order to investigate the possible reduction of aggressive impulses and changes in the mechanisms underlying this relationship. In a double-blind, stratified, placebo-controlled, randomized study, 81 human adults (36 males, 45 females) were randomly assigned to either an active (N = 39) or placebo (N = 42), and followed one day after the experiment session. There was a decrease in intentions to commit aggressive acts, evaluated through hypothetical vignettes and a behavioral task. The results provided experimental evidence that increased activity in the prefrontal cortex may reduce intentions to commit aggression and increase perceptions of moral judgment. The findings provide further experimental evidence regarding the function of the prefrontal cortex, in both physical and sexual aggression, and suggest how the brain may, in theory, be able to switch using a non-invasive tool

[7] Da Cunha-Bang S., Hjordt L.V., Perfalk E., Beliveau V., Bock C., Lehel S., Thomsen C., Sestoft D., Svarer C., Knudsen G.M., "Serotonin 1B Receptor Binding Is Associated With Trait Anger and Level of Psychopathy in Violent Offenders", *Biological Psychiatry*, 82(4), 2017, pp. 267-274.

[8] Fazel S., Danesh J., "Serious mental disorder in 23000 prisoners: a systematic review of 62 surveys", *The Lancet*, vol 359, 2002.

[9] Kolla N.J., Houle S., "Single-Photon Emission Computed Tomography and Positron Emission Tomography Studies of Antisocial Personality Disorder and Aggression: a Targeted Review", *Personality Disorders*, 2019, pp. 21-24.

[10] Raine A., Yang Y., "Neural foundations to moral reasoning and antisocial behavior", *Social Cognitive Affective Neuroscience*, 1(3) 2006, pp. 203-213.

[11] *Ibidem*, pag. 206.

with relatively minor and transient adverse effects. There is still a shortage of documentation of long-term beneficial effects and side effects so that the technique can be employed in state policies[12].

Despite the growing number of studies that point to characteristics of cerebral morphology with the power to create behavioral propensities, it is always important to remember that studies on the brain structure through images are, of course, just another window among multiple social, cultural, economic, genetic, endocrinological, physical or psychologically acquired factors, and economic behavioral influences existent and equally relevant to understand why a person acted in an anti-social way. A pixel in a brain will never be able to show culpability. Interpretation of brain exams is admittedly subjective. Anatomical frames in the form of spins and grooves differ greatly from individual to individual, and even in adulthood the brain is not fixed but shows plasticity and change in response to an injury that also varies from individual to individual. Thus, even if brain anomalies are found, individual differences in the extent and location of the lesion, and recovery and plasticity present great problem for the interpretation of brain images in the legal context[13].

3. Brain changes capable of altering behavior.

On the evening of September 13th, 1848, Phineas Gage, an American worker, was executing a gang blasting rock, preparing a roadbed. Getting distracted, brought his head into the line of the blast hole, and just when he opened his mouth to speak, the powder exploded. A tamping iron ¼ inches (3.2 cm) in diameter, three feet seven inches (1.1 m) long, and weighing13 ¼pounds (6.0 kg)—the left side of his lower jaw, passed behind his left eye, his left side of the brain and got out from the top of the skull through the frontal bone. The tamping iron ended up 80 feet (25m) away, covered around with blood and brain[14]. Gage was treated and ten weeks later he was strong enough to go to his parents house and an year later came back to work. Twelve years after the accident, he began to have epileptic seizures and died a month later.

Gage's survival story would be sufficient to become a mark in medical history, but his case became a paradigm for other reasons. It is said that the injury, which happened to be in the frontal lobe of the brain, transformed Gage's personality completely in such a manner that his friends would accustom to say: "Gage is not Gage anymore"[15].

The case gave rise to a several brain functions investigations and studies have been linking trauma to the right frontal region, including the

[12] Choy O., Raine A., Hamilton R., "Stimulation of the Prefrontal Cortex Reduces Intentions to Commit Aggression: A Randomized, Double-Blind, Placebo-Controlled, Stratified, Parallel-Group Trial", *Journal of Neuroscience*, 38, 9, 2018, pp. 6505-6512.

[13] Mobbs D., Lau H.C., Jones O.D., Frith C.D., "Law, Responsibility, and the Brain", in Murphy N., Ellis G., Connor T.O. (Orgs), *Downward Causation and the neurobiology of free will,* Heildelberg, Springer, 2009, pag. 253.

[14] Bigelow H.J., "Dr. Harlow's Case of Recovery from the Passage of an Iron Bar through the Head", *American Journal of the Medical Sciences*, 39, 1850, pp. 13–22.

[15] In a paper published by Dr. Harlow, he described the change under those words: The equilibrium or balance, so to speak, between his intellectual faculties and animal propensities, seems to have been destroyed. He is fitful, irreverent, indulging at times in the grossest profanity (which was not previously his custom), manifesting but little deference for his fellows, impatient of restraint or advice when it conflicts with his desires, at times pertinaciously obstinate, yet capricious and vacillating, devising many plans of future operations, which are no sooner arranged than they are abandoned in turn for others appearing more feasible. A child in his intellectual capacity and manifestations, he has the animal passions of a strong man. Previous to his injury, although untrained in the schools, he possessed a well-balanced mind, and was looked upon by those who knew him as a shrewd, smart business man, very energetic and persistent in executing all his plans of operation. In this regard his mind was radically changed, so decidedly that his friends and acquaintances said he was 'no longer Gage'" (Harlow J.M., *Recovery from the Passage of an Iron Bar through the Head,* Publications of the Massachusetts Medical Society, 1868, 2 (3), pp. 327-347).

orbitofrontal cortex, with "acquired sociopathy"[16]. In one of the largest studies of patients with brain damage to date, Grafman *et all* found that increased aggressive/violent scale scores were most strongly associated with similarly localized PFC lesions in a sample of 279 veterans of the Vietnam War[17].

Charles Whitman, an American engineering student at the University of Texas, 25, married, former Marine, killed in a single day 16 people and wounded more than 30 in a cold and calculated manner. After autopsy, it was found a tumor in the size of a walnut, erupting from beneath the thalamus, impacting the hypothalamus, extending into the temporal lobe and compressing the amygdaloid nucleus[18]. Whitman left a suicide note, composed in the day before, that stated: "lately (I can't recall when it started) I have been a victim of many unusual and irrational thoughts." When the police went to his house do seek for clues, found out that he had killed his mother and wife. About his wife, he had to say in his note: "It was after much thought that I decided to kill my wife, Kathy, tonight … I love her dearly, and she has been as fine a wife to me as any man could ever hope to have. I cannot rationa[l]ly pinpoint any specific reason for doing this…" Whitman knew something was wrong with him. He also wrote: "I talked with a Doctor once for about two hours and tried to convey to him my fears that I felt [overcome by] overwhelming violent impulses […]I have been fighting my mental turmoil alone, and seemingly to no avail" (SIC)[19].

In another case, a 40 years old man, well married, good father and a respected teacher, was found guilty of molesting his 12-year-old step daughter. After having his brain scanned, he was diagnosed with a brain tumor in the frontal lobe of his brain. He confessed that in the past months he had acquired a large number of pornography magazines and looked after prostitutes. It was taken as a result of the brain tumor and after surgery was conducted, he found himself free from those desires. But years later the desires came back. The brain was scanned again and discovered that the tumor had resurfaced[20].

In the case People v. Calderon[21], the defendant was charged with committing several violent sexual crimes and eventually sentenced to 15 years in prison. His penalty turned out to be a kind of security measure and sent to a state hospital for treatment as a mentally disordered sex offender, where treatment did not progress, in the face of persistent attacks on hospital employees. Subsequently, the court weighed the fact that he had been severely wounded by the butt of a shotgun. It remained demonstrated that a year and a half after the injury, his behavior became more aggressive and experts concluded that brain injury was probably a factor in the commission of his crimes. Based on such findings, the court concluded that the injury had rendered him unable to control his impulses and unable to socialize and sentenced him to confinement in an institution.

These are just a few known cases which illustrate radical changes in behavior, culminating in the

16 Meyers C.A., Berman S.A., Scheibel R.S., Hayman A., "Case report: Acquired antisocial personality disorder associated with unilateral left orbital frontal lobe damage", *J Psychiatry Neurosci*., 3, 1992, pp. 121-125.

17 Grafman J., Schwab K., Warden D., Pridgen A., Brown H.R. et al., "Frontal lobe injuries, violence, and aggression: A report of the Vietnam Head Injury Study", *Neurology*, 46, 1996, pp. 1231-1238.

18 Whitman C.J., *Catastrophe, Medical Aspects*, Report to Governor, 9/8/1966.

19 Eagleman D., "The brian on trial", *The Atlantic Magazine*, July/August 2011.

20 Raine A., *The Anatomy of Violence: the Biological Roots of Crime*, Vintage Books, 2014, pag. 303.

21 People v. Calderon, 2009 WL 428911 (Cal. App. 2009).

commission of crimes, associated with the development of brain injuries, whether due to accidents or due to illness.

In a systematic literature search, seventeen patients were identified with documented brain injury that turned out to be related to the development of criminal behavior. Even though there were among them "white collar" crimes such as fraud or theft, most patients (12 of 17) committed violent crimes such as assault, rape and murder. In 15 of the cases there was no documented criminal behavior before the injury and in two of them there was resolution of the criminal behavior after the treatment of the injury. The 17 lesions were spatially diverse, including nine in the medial or orbitofrontal structures, three in the medial temporal lobe/amygdala, three in the anterior lateral temporal lobe, one in the dorsomedial prefrontal cortex and one involving the ventral striatum and parts of the orbitofrontal cortex. The most common location of the lesions was the ventromedial prefrontal cortex (vmPFC)/orbitofrontal cortex, although seven lesions did not reach such area. All 17 temporally associated lesions were functionally connected (positively correlated) with the inferior orbitofrontal cortex and anterior temporal lobes, and most (16 of 17) were connected to vmPFC and nucleus accumbens[22].

Thus, it is possible to realize that it is not only congenital or genetic formations in the cerebral cortex that have been related to criminal behavior, but also deformations caused by accidents, tumors or other external factors have equally been identified as determinants of the behavioral change of individuals who until then presented socially appropriate one.

It is equally important to note that it is also in the cerebral prefrontal cortex that the lesions associated with the radical behavior change were found.

4. The Neuromoral Theory.

Adrian Raine, professor of criminology and psychiatry at the University of Pennsylvania, based on several studies conducted in neuroscience, laid the groundwork for what it is called Neuromoral Theory of Anti-social, Violent, and Psychopathic Behavior. Essentially it asserts the predominance of a lack of *feeling* what is moral, found in anti-social groups, rather than lack of *knowledge* of what is moral. Moral sentiment, present in the PFC (cerebral prefrontal cortex) and amygdale[23], is the factor responsible for translating cognitive recognition that an act is socially unwanted in impulse-inhibiting behavior and is this factor that functions inappropriately in anti-social individuals, violent or psychopathic.

The very understanding of morality or unlawfulness of the act, according to this theory, is hampered by three factors. First, both polar/medial PFC and posterior cingulate have already proved important for self-appraisal and self-reflection, whereas the OFC (orbitofrontal cerebral cortex) is also involved in the process of self-perception and insight. Individuals unable to realize how harmful an act would be to themselves and how much they would not like to be victims of something similar are predisposed to set rules, even though they have preserved the emotional process. Second, the cognitive and emotional processes, although they

[22] Darbya R., Horn A., Cushmang F., Fox M.D., "Lesion network localization of criminal behavior", *Proceedings of the National Academy of Sciences*, vol. 115, no. 3, 2018, pp. 601–606.

[23] Amygdala - The amygdala is a region at the back of the brain involved in emotional regulation and regulation of responses such as fear and aggression.

are diverse things, cannot be completely disassociated. The medial prefrontal cortex is activated during the suppression of moral emotions. If an individual is deficient in regulatory control, there will also be an inability to weigh the right reaction when he or she is the victim of immoral or illicit action from a third party, resulting in a disproportionate or unplanned reaction. Finally, the angular cerebral gyrus has been associated with the sense of responsibility of one's own actions, so that while stable moral emotions are capable of inhibiting impulses for rule-breaking, a lack of a sense of responsibility may lead an individual to commit the offense if the reward is sufficient[24].

In all its complexity and scientific detailing of brain functioning, the Neuromoral Theory holds that what differentiates an anti-social group is deficiency of *feeling* morality, *feeling* what is wrong, and not the *knowledge* of it. And that is precisely what Lombroso claimed 150 years ago, at a time when studies of brain images were not even imagined.

Lombroso argued for the existence of a moral dementia, an inability to discern morality[25], so that the instincts latent in the nature of every man overlap[26]. For him, the moral demented does not lack the notion of guilt in many cases, but it is an abstract and almost mechanical understanding of the law. They talk about order, justice, morality, religion, honor, patriotism, philanthropy, but what they lack is exactly the *feeling* about those words. It is in this absence that one finds the explanation of such strange and contradictory thoughts on the same facts, and this is why in vain one tries to convince them of their errors, of the immorality of their acts. They are individuals susceptible to a superficial intellectual education, but resolutely rebellious to a true moral education, whose primary base is exactly that of *feeling*[27]. They speak of virtue and vice, but they are phrases that repeat, for they *know* the meaning, but they do not *feel* it[28].

The Anthropological School of Culture and Personality, with important psychoanalysis' influences, presents in its theoretical basis the structural importance of culture in the configuration of the personality of the individuals that compose it and investigates the extent to which these social instances dialogue with each other and how the structures of the psyche and the stages of human development could be considered. Although, in its bases, personality formation is directly associated with the culture in which the individual is inserted, the biological aspects are not ignored when studying deviant individuals. Margareth Mead, one of its exponents, considers that: "Among the deviants in any society, it is possible to distinguish those who are physiologically inadequate. They may have weak intellects or defective glands; any one of a number of possible organic weaknesses may predetermine them to failure"[29].

Ruth Benedict, another representative of the same school, states that it is likely that the same variety of individual temperaments will be found in any social group, but the group makes cultural choice of what human gifts and quirks it will use. That is why most fortunate are those whose innate dispositions are in keeping with the culture in which they happen to be born. On the other hand, the deviant is the person whose disposition is not capitalized by his culture when it is incongruous with the innate

[24] Raine A., Yang Y., "Neural foundations to moral reasoning and antisocial behavior", *Social Cognitive Affective Neuroscience*, 1(3) 2006, pag. 209.
[25] Lombroso C., *op. cit.*, pag. 195.
[26] *Ibidem,* pag. 200.
[27] *Ibidem*, pag. 201.
[28] *Ibidem*, pag. 202.
[29] Mead M., *Sex and Temperament,* New York, William Morrow and Company, 1935, pag. 291.

characteristics of the individual or resulting from family conditioning in the early years[30].

A recent review of the Neuromoral Theory[31] exposes a series of experiments conducted after the original publication that reinforce their assumptions and fundamentals, while casting new light on other areas of the brain and factors not considered. Doctor Raine concludes:

Finally, grand theories of criminal behavior which claim for one predominating cause must be humbled by the empirical reality that offending is a complex jigsaw puzzle made up of many different causal pieces that do not fit neatly together. The neuromoral theory is but one piece, consisting at best of a limited number of inter-related neural elements in a much larger cortical and subcortical space. It is however a testable model that generates clear predictions and raises a significant question on criminal responsibility that requires resolution. Whether this theoretical perspective on disparate antisocial behaviors can be translated into meaningful empirical advances that can be instantiated into future clinical and legal practice remains to be seen.

5. The Neuromoral Theory put into philosophical perspective.

For classical determinism, the human being is understood in terms of cause and effect, matter and movement, there is an account of human nature in terms of rules of legal regularities, especially psychological laws[32]. As the human being has no control over natural laws, which cannot be altered, his action, in the deterministic conception, is completely conditioned by laws which are outside his sphere of decision. If an action is not an agent's decision, it is not free (in the moral sense). In this way, to act or not to act is not a choice[33].

In that sense, Lombroso sets out. For him, the will is free for sane people, as when the determining motives contrast with social welfare, they end up being restrained by other reasons such as the pleasure of praise, the fear of sanction, fear of infamy, fear of the Church or even by good manners imposed by continued mental gymnastics. The same does not occur to the moral demented or to natural delinquents, who soon fall in the recidivism[34].

For libertarians, who claim the existence of free will, the human being is a causative agent who acts intentionally without being completely caused by anything related to what he does and is therefore morally responsible for his actions[35].

The admission of the existence of conscious choices does not prevent the recognition of genetic or congenital predispositions, neither the influences of the sociocultural environment. It is possible to argue, although a little manipulative with the libertarian argument, that voluntary actions present a causal ancestor that contains as a cause-factor the result of an effort that is not completely determined in direction and intensity by the cause. In this sense, there would not be a complete exclusion of determining factors, since the direction and intensity of the effort are completely determined by the first cause. Thus, despite the ability to decide, the reasons for it could, in a sense, be considered

[30] Benedict R., "Configuração de cultura na América do Norte", in Mead M., Benedict R., Sapir E., *Cultura e Personalidade,* Rio de Janeiro, Zahar, 2015, pp. 105-106.
[31] Raine A., "The neuromoral theory of antisocial, violent, and psychopathic behavior", *Psychiatry Research*, 2018, pp. 64-69.
[32] Cfr. Holbach P-H. Thiry, barão d', *Sistema da natureza*, São Paulo, M. Fontes, 2010.
[33] Dennet D.C., *Freedom Evolves*, Nova York, Penguin group, 2004, pag. 134.
[34] Lombroso C., *op. cit.*, pag. 223.
[35] Swinburne R., *Mind, brain & free will,* Oxford, Oxford University Press, 2013, pag. 229.

the true cause of action. Hence the naivety of the term "free will"[36].

On the other hand, in the compatibilist perspective (which affirms the possibility of conciliation between determinist ideas and free will), although at one point a reprehensible act has been committed without the possibility of acting otherwise, there will be responsibility of the subject when it is possible to affirm that the situation of impossibility of acting otherwise was created by the agent himself. According to Inwagen, socially inappropriate behaviors are conditioned, but at the same time acquired by previous choices. He illustrates his statement with the example of a professional assassin who kills victims in cold blood because he has been accustomed to the practice of his profession, and is now linked to the risks of being against the mafia. It would be possible to say that the killer today will not act otherwise, but argues that his own character was shaped by the first choices: "It is an old, ad very plausible, philosophical idea that, by our acts, we make ourselves into the sorts of people we eventually become. Or, at least, it is possible to suppose that our acts are among the factors that determine what we eventually become"[37].

Criminal liability, as it was classically structured, depends on the existence of a will and the possibility of the agent, to whom the wrongful act is imputed, to have acted otherwise. In the words of Lombroso, "we are among the generations accustomed to consider the defendant more responsible, the greater his fault"[38]. This imposes the understanding that the will, although influenced by many factors (genetic, social, inherited or acquired, material or immaterial), is able to change the course of its history. It is to recognize to man the ability to repent, whether of socially inappropriate behavior or of a life of righteousness, is essentially to recognize to man the ability to make choices that run counter to his natural conditioning.

The medical literature has described several experiments that point to genetic factors that predispose individuals to alcoholism[39]. Despite all predisposition, it is common knowledge that alcoholics can, with proper treatment, abstention and follow up, control the impulse and live a life without falling into addiction. There is a predisposition, but it does not determine the fate of the gene carrier. Perhaps the same reflection should be applied to the treatment of potential bearers of predispositions to criminal conduct.

The recognition of the assumptions and affirmations of Neuromoral Theory imposes a new model of criminal accountability, as well as the search for alternatives of re-socialization of the criminal, when this happens to be biologically determined to crime.

6. Conclusions, remaining questions, and future directions.

According to the Neuromoral Theory, individuals with *antisocial personality disorder* or, in Lombroso's words, *moral demented*, are not insane in the strict sense of the term. On the contrary, they have intellectual capacity, often high, and are able to differentiate right from wrong, socially adequate and

[36] Broad C.D., *Ética e a história da filosofia*, London & Kegan Paul Ltd, 1952, pp. 195-217.

[37] van Inwagen P., "Critical Study of Dennet´s Elbow Room", In *Thinking about free will*, Cambridge, Cambridge University Press, 2017, pp. 78-79.

[38] Lombroso C., *op. cit.*, pag. 194.

[39] Cfr. Wilhelm C.J., Hashimoto, J.G., Roberts M.L., Sonmez M.K., Wiren K.M., "Understanding the addiction cycle: a complex biology with distinct contributions of genotype vs. sex at each stage", *Neuroscience*, 279, 2014, pp. 168–186. Also Jenkins W.J., Thomas H.C., "Genetic factors in determining susceptibility to alcohol dependence and development of alcohol-induced liver disease", *Clin Gastroenterol*., 10(2), 1981, pp. 307-314

inadequate. Despite the ability to *know* what is moral, they are unable to *feel* what is moral due to neurobiological impairments beyond their control. The moral feeling, centered on the PFC and amygdala, is the mechanism capable of creating the necessary inhibition to the impulse, when understood the reprehensibility of the act. Anti-social, violent and psychopathic individuals have deficiencies in such engine. So, in that sense, the questions that must inevitably be addressed are: how is it possible to make them entirely responsible for their actions? On the other hand, what should the criminal justice system do in order to punish, repay and repair the acts practiced? How is it possible to prevent those who are deprived of their natural inhibitory capacity from returning to the same acts?

Perhaps a good starting point is the experience of alcoholics, which, despite the proven genetic predisposition to addiction, reveals the successful possibility of impulse restraint and reversal of condition, demonstrating that they are not determined to the conduct to which they are predisposed.

The new findings of neuroscience will soon revolutionize what has hitherto been thought about criminal accountability, punishment, prevention and resocialization. Ignoring the scientific evidence would not, of course, be more rational. A deeper understanding of the genetic, endocrinological, and structural factors of the cerebral anatomy can lead to a more effective system of prevention and treatment and a more morally appropriate judgment. It would be manifestly unjust to condemn someone who is prone (or "determined", according to supporters of determinism) to a certain behavior to the same penalty as another who freely (or at least without genetic or physically acquired propensities) chose to do so. Similarly, it would be manifestly irresponsible to confer the same legal treatment between an individual without genetic or acquired propensity for certain anti-social behavior and another who, by his predisposition, will most likely recur in the same anti-social behavior, presenting himself as a risk to society.

It is also necessary to take care of the risks that the vivacity and technological sophistication of the images can bring to a body of jurors, giving the impression that there is a scientific acuity similar to the precision of a diagnosis of a cancer done through an examination of images, overestimating the proof beyond the content of truthfulness that it can actually offer. Phrases such as "it is scientifically proven that..." are used in a trivial way, without knowledge of the cause or investigation of the existing criticisms. The mere assertion of "scientific evidence", with the allusion to some study that gives some verisimilitude or even a scientific statement, is enough, in popular opinion, not only to convince about its acuity, but to establish a certain level of pressure that denying would be to succumb to ignorance or superstition. It should be remembered that the juror's body consists of people from the most diverse social classes, undergraduate level or profession.

Any neuroscientific study must be weighed together with the analysis of the social aspects and social environment in which the defendant is inserted, possible treatments and particularities of the concrete case. It is necessary to remember that the sentence is a normative analysis of the facts and not a diagnosis. Criminal law aims at the punishment, prevention and social recovery of the defendant and the sentence is not a mere act of criminal policy.

Future research should focus no more on the simple identification of genetic, organic, metabolic

or structural factors that are associated to groups of individuals with anti-social behavior, but in identifying possible causes and seeking possible treatments that may serve to contain the impulses.

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