"Humanist Compatibilism" A Proposal for Reconciliation Between Neuroscience and Criminal Law**

Eduardo Demetrio Crespo
University of Castilla-La Mancha

This article claims that neither indeterminism nor the so-called neuro-determinism provides an adequate response to the problem of criminal responsibility, highlighting the non-apprehensibility of the problem of freedom and the non-dehumanized image of man. At the same time this contribution proposes a solution from the point of view of humanist compatibilism based on some key assumptions and methodological anchors, such us the rejection of retributivism and the search for unified scientific responses.

Keywords: determinism, free will, compatibilism, neuroscience, excuses

INTRODUCTION

This humble work is emotionally and gratefully dedicated to Professor Dr. José Ramón Serrano-Piedecasas, on occasion of his retirement as a Professor of Criminal Law, but not as an active scientist and thinker.

As he highlighted in his article on "Complex thinking and Criminal Law", the courtroom practice is full of apriorisms that we would like to dilute with the methods provided by the legal-judicial technique. One of these is largely based on the sacred idea of "freedom of action" and the preceding "free of will".

Everything seems to indicate that the dogmatic technique by itself would not have the desired effects although we reach the boundaries of reasoning. It will be always necessary to look further and analyze the problems from a greater perspective, not passively from a comfortable watchtower, but with the indispensable assistance offered by Philosophy. As I will try to prove in this work, neither Neuroscience, as an empirical science, nor Criminal law as a Social Science, cannot overlook each other making their mutual understanding a real necessity.

To underestimate or, even worse, ignore the influence of Neuroscience on the law (not only Criminal law) seems like avoiding something because we do not really feel comfortable with their claims. It does not mean that those new claims must be accepted uncritically, but at least it should be taken into account as a new scenario (Schleim, 2011) to be analyzed through the lens of critical thinking as Critical Neuroscience is currently doing (Slaby, 2010; Choudhury / Slaby, 2012[1]). *Neurolaw* has landed in the legal world with the aim of transforming the principles of law profoundly, what is also regarded as of great interest for the economic world (Gazzaniga, 2008). The way Neuroscience influences on the law is quite broad and affects different types of knowledge, such as neuro-scientific research and its empirical limits, the crucial problem of how to reconcile this new research with the state of knowledge in Legal Science, or the transversal questions regarding ethical foundations and criminal process (Pardo & Patterson, 2011, p. 4).

It is unlikely that the so-called "neuroscientific revolution" will lead to a cultural "paradigm shift" on the scientific development in Kuhn´s terms (Kuhn, 1976) that could shake the fundamental legal principles. However, this does not mean to overlook it, but to be vigilant on the evolution of Neuroscience research because even eventual positive effects may also become quite pernicious if we fail to learn from the past.

In a previous article, the main points of view provided by some of the most renowned German neurobiologists were systematized, as well as the defensive reply from some very significant voices in the field of Criminal law due to the challenges posed by the current research conducted in Neuroscience. The aim would be to focus on the way brain research could influence on the justification of criminal punishment and the legal concept of guilt. (Demetrio, 2011a)[2] My proposal, which will be developed below, claims that neither the strong views on determinism, one of them is the so-called neuro-determinism, nor free will-based pure indeterminism, can provide an appropriate response to the "criminal problem". The first one because it rejects free will and the second one because it takes free will as the cornerstone to justify criminal punishment.

ABOUT "NEURO-DETERMINISM"

Attempts to Overcome "Cartesian Dualism"

Every approximation to the foundations of neuro-philosophy cannot avoid the reference to the ancient *Cartesian dualism*, based on the differentiation between body and mind. Against the Cartesian dualism can be found the so-called materialism or unequivocal conception of both things suggesting that the mind should be analyzed within the brain (Levy, 2008; Greene / Cohen, 2004; Damasio, 2009). That approach highlights the dogma of eliminative reductionism in the so-called "folk psychology" and it claims that our beliefs, desires and intentions are causally inefficient (Churchland, 1981; Lelling, 1992).

Under these circumstances, any quick and peaceful settlement regards this complex issue must be discarded. In fact, this dichotomy between dualism and mind equated to brain, has been considered incorrect. For example, Pardo & Patterson (2011, pp.6-7) understand that those materialists, such as Goodenough, as well as many other neuroscientists and academic neuro-jurists, have inconsistently accepted the Cartesian structure by placing the mind within the brain. Those authors, for example, propose the analysis of the problem in an alternative way: it isn't about placing the mind in the brain, but rather rejecting the mind as "something" that must be placed in a specific physical space, that is, the mind should be regarded as a set of diverse abilities exercised by an individual, such as sensations, perceptions, cognition, thought and volition. According to this conception, the issue regarding the place in which the mind has to be located does not make any sense, since this is not an *empirical question* that can be subject to verification through experimentation, but rather it should be analyzed as a *conceptual issue* that affects the logical relationship between concepts (Pardo & Patterson, 2011, p.8).

Another possible way to overcome this dichotomy could be through the *distinction between empirical and conceptual issues*. The conceptual issues are produced according to the logical relationship between concepts in which meaning is attributed through language games. This has been a research field of great interest for the neuroscientist Maxwell Bennett, as well as for the philosopher Peter Hacker (2003, 2008a, 2008b). While the initial generations of neuroscientists, according to Descartes' metaphysics, distinguished between mind and brain, the third generation have rejected that dualism and moved from analyzing the psychological attributes in the mind to consider those attributes within the brain in a sort of mutating Cartesianism. This way of thinking is known as "*mereological fallacy*" in Neuroscience, that is, the neuroscientific mistake to analyze the constituent parts of an animal as attributes that may be only applied logically to the whole animal. At the same time, in Neuroscience the "*mereological principle*" claims that psychological features applicable to only one individual (or other animal) as a whole, cannot be applied to its parts in an intelligible way, for example, to the brain (Bennett& Hacker, 2008a, p. 38).

These authors follow the idea proposed by Wittgenstein in his *Philosophical Investigations,* according to which: "but what you say is not that, for example, there is not pain without pain behavior, but that only human beings (and those similar to them) have feelings, can see or they are blind, can hear or they are

deaf, they are conscious or unconscious (Wittgenstein, 1958, p. 97, § 281). In other words, for Bennett & Hacker (2008a) the brain should be regarded as a subject with the ability to be logically representative of psychological predicates and therefore, it does not make any sense to attach them. At the same time, they also reject the argumentative construction, which is supported by the above mentioned neuroscientists, that those psychological predicates used in that way are only simple homonyms of the current psychological predicates (Ullmann), analogical extensions of the current psychological predicates (Gregory), or they have a figurative or metaphorical character (Blakemore) (pp. 39*et seq*.).

However, the monumental work from Bennett & Hacker*, Philosophical foundations of neuroscience,* has been strongly criticized by Daniel Dennett & John Searle.

The former claims that it is not possible to attribute psychological predicates to the brain, referring to the distinction between *personal and subpersonal level of the explanation* ("*I* feel pain; my brain doesn´t", "*I* see things; my eyes don´t"), leading to the affirmation that the mentioned authors are utterly dismissive of his work (Dennett, 2007, 76). According to Dennett (2008), it is not true that conceptual questions are not amenable to scientific investigation or experimentation, since «even if conceptual questions do precede the problem of truth and falsity, it is possible that every person who wishes to clarify what type of answers are good must investigate the relevant inquiries assiduously (p. 80)[3]. Secondly, the proposition according to which "what truth and falsity means to Science, sense and no sense means to Philosophy" is simply not correct. Even when it is accepted that empirical research cannot resolve any philosophical problem, the key thing is not to resolve it, but to inform it, to adjust or review it. According to this, << those problems are sometimes dissolved and can be sometimes resolved through a further philosophical reflection>> (p.80)

Dennett's reasoning logically leads us to examine certain aspects that points to the *philosophy of language and the nature of consciousness*[4]. Specifically, Dennett (2007, pp. 83*et seq*.) rejects the philosophical subterfuge that affirms that the limits of sense results from testing usage words. Nonsense would arise when an expression is used against the usage rules, which should have been proscribed long time ago.

On the other hand, John Searle (2007) defends the idea of consciousness as a biological phenomenon: "Pathologies apart, the conscious states only happen as part of a *single unified consciousness field*" (p.98). This unified field of consciousness consists of qualitative-subjective aspects of behavior (the so-called *qualia*), which are fully caused by cerebral processes even we are still unable to precisely explain them. According to Searle (2007), Bennett& Hacker make a serious mistake. They confuse «the behavioral criteria for the *ascription* of psychological predicates with the facts ascribed by these psychological predicates» (p. 103). Along these lines, Searle (2007) wishes to refute the idea that the consciousness may not be located within the brain. In his opinion, "the requirement that the system, the whole person, is the only one capable of behavior does not necessarily mean that there cannot be an element of the system (the brain) in which the conscious processes take place" (p. 105). He accuses them of confusing the rules of the word usage with ontology, applying a sort of logical Wittgensteinian behaviorism (p. 105). What Bennett and Hacker would call "mereological fallacy", it would rather be a "categorical mistake" in Ryle's terms according to Searle[5].

The Foundations of "Neuro-Determinism"

Firstly, it is important to delimit the meaning of "neuro-determinism" as a type of scientific determinism as it is not regarded as a unitary trend of though. Those who support it have created a specific image of the human being based on some common characteristics that contradict the traditional idea of free will. However, that approach does not derive the same consequences about personal liability in society. Here are some examples.

For Gerhard Roth (2003), the traditional approach in which human will is transformed into specific behavior through voluntary actions controlled by a conscious self is no more than an illusion. Due to the concatenation of the amygdala, hippocampus and ventral and dorsal nodes, the emotional intelligence (which works on an unconscious level) has the final word regarding the formation of desires and intentions. According to it, the decisions adopted by a human being are produced in the limbic system one

or two seconds before they are perceived consciously. This system would work like an organized power system in which the human being would feel free due to self-delusion, that is, only in an apparent way (p. 553).

On the other hand, Wolfgang Prinz (2004) claims that free will is just a social institution that does not correspond with the scientifically demonstrable reality from a psychological point of view. According to the Director of the Max Planck Institute for Human Cognitive and Brain Sciences of Munich, speaking about free will from a psychological perspective is like discussing about the existence of the unicorn in zoology, that is to say, it does not exist in the ontology of this discipline. Both the unicorn and the idea of the unicorn are merely a theoretical construct, a cultural production. And the same should be applied to free will (p. 198). According to this author, the answer to the questions about how it is possible for human beings to feel and believe that they are free, even when they are not or under what type of premises freedom intuitions may arise and what consequences they may have from a psychological, social and cultural point of view, require to look beyond the research on cognitive and volitional functions in order to consider the perception of these functions as it happens in the fields of Social Psychology, Developmental Psychology or Psychohistory (the study of psychological causes of historical events).

Wolf Singer (2004) suggests that the perceptions that we experience are no more than the result of *constructive processes* (p. 31). This premise should be accepted in the same way as it is recognized undoubtedly that animal behavior is determined completely and every action is the result of the combination between the constellation that originates the current stimulus and the immediate previous cerebral states. At the same time, these cerebral states are conditioned by the genetic organization that results from the respective nervous system, as well as from a multitude of epigenetic factors and educational processes that modify the architecture of the nervous system chains and finally, by the immediately previous history that "resonates" in the neuron interaction dynamics (p. 35).

In Spain, Francisco Rubia is a faithful representative of this line of thought. According to Rubia (2009b), the "neuroscientific revolution" discovering the inexistence of the self and freedom of will is the fourth great humiliation for humanity, after the three previously described by Sigmund Freud (1856-1939) in his work "Difficulties in the path of psychoanalysis". The first one by Nicolaus Copernicus (1473-1534) regarding geo-centrism. The second one by Charles Darwin (1809-1882) with his theory of evolution and the third one by Freud himself, discovering the unconsciousness (p. 98). In his opinion, the brain would have the ability to mislead us (2007), the existence of freedom of will could only be a subjective impression and free will only an illusion that only can be explained thanks to the Cartesian dualism that neuroscience cannot accept. According to this, there is not an immaterial entity ("the soul or the mind") that is free from the deterministic laws governing the universe and it has never been possible to explain how this entity interacts with the physical matter ("the body or the brain", respectively). On the other hand, this interaction would violate the laws of thermodynamics, as well as the causal unity of the material world. This is all in accordance with the idea that "from a scientific-natural point of view, the cause of a physical phenomenon is always another physical phenomenon" (2009a, p. 13). At the same time, Rubia claims that the inexistence of free will becomes a heavy burden for the "human pride" as "it violates the same foundations of our civilization, based on responsibility, accountability, sin and guilt" (2009a, p. 15).

Criticism of "Neuro-Determinism" as a Form of Scientific "Determinism"

According to the reflections developed above, it is possible to analyze the potential excesses incurred by this new "determinism", both from a general point of view and especially regarding the consequences on responsibility.

We have already seen that *on a philosophical level* it is discussed about the so-called "mereological fallacy", in which the empirical level may be confused with the conceptual one, assigning psychological attributes to the brain and not to the whole individual.

In the field of *criminal responsibility*, and taking into account the well-known research developed by Libet (1985,1987), that approach could dilute the distinction between voluntary and involuntary acts, or at least, to modify our current understanding of some concepts so important for the criminal responsibility

schema as knowledge and intention. For example, Professor Denno (2002) suggests that in an unconscious way the brains and bodies of human beings can detect information that the conscious brain is not able to recognize, that is, the conscious brain do not exercise plain control on the individual actions and perceptions. For Criminal Justice, such empirical evidence would mean to question the clear distinction between conscious and unconscious actions laid down by the Model Penal Code and its simplified list (according to Prof. Denno) of mental states to face the problem of unconsciousness. On the contrary, what must be regarded as consciousness would be something much more complex and subjective (p.325)

In the above-mentioned research conducted by Libet, which has been developed numerous studies afterwards (Sinnot-Armstrong, W. / Nadel, L. (Eds), 2010), the author asked the participants to move their hand meanwhile he measured the electric activity of the brain. In this experiment he discovered that the brain impulses of the participants associated with the movement began approximately one-third of a second before they were conscious of their intention to make that movement[6]. In addition to these pioneering experiments conducted by Benjamin Libet in California, other similar were subsequently developed in the United Kingdom by Patrick Haggard and Martin Eimer, and more recently by John-Dylan Haynes in Berlin, verifying the results obtained by Libet.

However, and beyond the logical and philosophical substantive issues about whether it makes sense to attribute voluntary actions to the brain analyzed as a subject or if it is possible to defend that it is the brain, as part of the whole organism, the place in which the conscious actions are taken by several sub-personal processes of representation, it has been questioned that those experiments are really not very representative to derive general and definite consequences (among others, Habermass, 2004, p. 873; Hillenkamp, 2005, pp. 318 *et seq.*).

REGARDING INDETERMINISM

The Inadequacy of the "Subjective Perception of Freedom"

Despite the extended agreement that the "subjective perception of freedom" and our self-understanding as free individuals means that we are free for the purposes of criminal liability (Hirsch, 2010) regardless of what we really are, this argument fails to be convincing (Demetrio, 2011a, p. 15).

Many criminal jurists have defended this idea that is against the empirical evidence found by the neuroscientists. For example, Francisco Rubia, in his contribution to this collective work, highlights that one thing is to accept the experience of consciousness but this is quite different from the actions caused by this conscious will.

Björn Burkhardt (2007) goes even further when he claims that for Criminal law, the first person perspective "is not only the basis for individual liability, but in addition, Criminal law stabilizes this basis through the first person perspective as the decisive object of evaluation" (p.32). In the dilemma to accept counter-causal freedom as a previous requisite of personal culpability and, at the same time, that the criminal trial is not able to prove it retrospectively, that is, faced with two choices between that proof is not necessary or it is necessary to avoid the culpability principle, Burkhardt thinks that what is decisive is if the person acted thinking he had an alternative (the possibility to act in an different way), that is to say, what is decisive is not the objective freedom, but the subjective freedom or experience of freedom.(p. 45).

However, as Merkel and Roth (2008) highlights, even if a schizophrenic person would affirm several times that during the criminal act, he voluntarily followed the voice that told him to kill another person, the judge would find him non-guilty(p. 65). In other words, subjective perception is important but not sufficient for legal hetero-imputation. This opinion is defended in Spain by Feijoo Sánchez (2011) questioning if freedom is really a widespread feeling and affirming that there is no link between truth and subjective feelings (p. 25).

Freedom as "Self-Determination"

For many years, philosophers have questioned if it is possible to believe in pure indeterminism in which decisions are regarded as free in an ideal sense, not determined by "causes" and prior conditions.

Kant's view of freedom of will is based on the so-called "mental motivation" claiming that the individual's will may initiate a causal chain of events in which the human will is not conditioned, but rather free. This concept has currently been seriously objected in the field of Philosophy of Mind. According to Merkel & Roth (2008), it is not clear how consequences can be generated in a completely unconditional way from a non-divine being as any reasonable explanation requires enough reason of being, whether material or spiritual (p.57).

Nowadays it is well known that the formation of human will, from a psychological and neurological point of view, depends on multiple factors that play a decisive role in the selection, preparation and management of actions, and therefore, it is not possible to speak of a fixed correlation between "state of will" and "determined action". It is also known that the formation of human will is never purely spiritual, but rather it is influenced by unconscious motivations derived from the limbic system. This does not mean that conscious acts are completely conditioned by unconscious processes since it would transform the former ones into mere epiphenomena of the latter ones. (Merkel / Roth, 2008, p. 62). These reflections lead us to the so-called "current determinism", which claims that our behavior is determined step by step since in every moment new causal lines overlap each other.

Against indeterminism it is possible to justify a minimum concept of freedom defined as intersubjective self-determination. This concept would be compatible with the determinist hypothesis, even if some day voluntary acts could be explained in a bio-physical way. This approach, for example, has been defended by the philosopher Michael Pauen (2009). According to him, self-determination can be explained from two starting points, the principle of autonomy and principle of authorship. The principle of autonomy would allow to distinguish between free acts and those acts committed under compulsion and the principle of authorship would allow to attribute some facts to the person who performs it. According to that approach, for any person who is able to perform and execute a free will act it is necessary to take into account several rational and emotional wishes, dispositions and beliefs that without them it would not make any sense to talk about an actor (p. 140).

Pauen calls them author´s preferences. However, in the context of criminal liability, it is not very helpful since it leaves the problem in the same way as it is already known, that is, the difficulty lies in how to distinguish between the preferences that can be attributed to an actor from those that can cannot be because there is, for example, some pathology. In any case, self-determination understood in that way (not in the strong sense of alternativism) allows us to affirm that an act is free in that minimum sense if that act can be explained by reference to the author´s preferences. According to Pauen, if the author´s act is explained by his own preferences, it would be regarded as self-determined in which determination would not interfere in the ability to develop self-determined acts (p. 142). The decisive thing, consequently, would not be if our acts are determined (in fact, they are), but how determination has been produced.

There is nothing strange, however, in this view of criminal liability. It is not easy or even possible to use a strong concept of free will in terms of "being able to act in another way". As it was already expressed by Engisch (1965), it is impossible to prove empirically that a specific person in a specific situation could have acted in another way as it happened. It meant to go back to that previous situation and to observe if this possibility exists, but that experiment is unrealistic since that person would be a different one since it could not avoid that vivid memory in a future moment (p.23)

Even for a strong defender of free will, such as Hans Welzel (1997), indeterminism was not the key point. In his work, Welzel questioned how it was possible for human beings to shape causal coercion based on a direction guided by sense under which it can only make them responsible for having made an incorrect decision as opposed to the correct one? (p.174). The author clarifies: " the response is not found in traditional indeterminism, since it would destroy precisely the idea of responsible subject: if nothing determined the human being act of will, then the subsequent act of will could not have any relationship with the previous one, either immediately or via an identical subject, since any other way would be already determined by something" (p. 174). "Free will is the ability to act in accordance with sense. It is freedom with respect to causal coercion, blind and indifferent to sense. It is not –as indeterminism believes- the freedom to be able to act in another way (…), but rather it is freedom to act according to

sense" (p. 176). Guilt, according to Welzel, would be defined in a negative manner: not as a state, but rather, as an act; not as a choice to do evil, but as "the lack of self-determination according to sense in a subject who was capable of it"; not as an act of free self-determination, but rather as "the lack of determination according to sense in a responsible subject" (p. 177).

HUMANIST COMPATIBILISM AND CRIMINAL RESPONSIBILITY

Overcoming Free Will-Based Indeterminism and Mechanical Determinism

In my opinion, neither "neuro-determinism" nor "free will-based indeterminism" can provide an appropriate response in the field of criminal law. As an alternative, "compatibilism" could be a good "way out" for that dichotomy[7]. Because of its nature, compatibilism is to be found in an intermediate point between indeterminism, as it supports some minimum degree of freedom, and strong determinism, as it accepts that our acts are determined previously (or at least conditioned by many factors that, in large part, determine them)[8]. In addition, compatibilism is also known as relative determinism or indeterminism.

It may also be seen like a compromise solution, which is not necessarily a bad solution or the easy way to elude any of the major issues. On the one side, compatibilism means the overcoming of free will-based pure indeterminism as it leads to a kind of empty space free from motivations and constrains, which has been proved false. On the other side, compatibilism looks like a perfect match for the overcoming of pure mechanical determinism since it has been replaced by the "uncertainty principle" in the field of Science Philosophy and Quantum Physics. At the same time, this principle has been used to explain the decision processes stemming from the recurrent cerebral neural network functioning (Romeo, 2009, p. 411).

"Free Will Syllogism" and the "Burden of Proof" on Freedom

I am convinced that it is not the same to have a pure philosophical discussion on freedom of will (it has always been a never-ending story and it will be) as having a specific discussion based on Philosophy and Criminal law. In Criminal law, "free will" is very greatly simplified to include all doubtful cases in the area of guilt, because the "burden of proof" falls on the side of determinism (Hirsch, 2010, 62), while its rejection would justly lead to their exclusion ("*in dubio pro reo*").

The resulting syllogisms are quite distinct. The "*free will syllogism*" states as follows: (a) the offender could have acted in another way, therefore the punishment is legitimate, except when there is some pathology; (b) punishment was justified in the past as it is also in the present, since it is uncertain that the subject could not act in another way. Finally, in accordance with its retributivist nature, it establishes (c) as long as the offender is found guilty it is necessary to punish them since guilt is understood as a mandate to treat individuals in accordance with their voluntary actions despite the "costs" on the principle of freedom (illustrative, Sánchez Lázaro, 2011, p. 13).

The "*non-free will syllogism*" operates in the opposite way: (a) punishment is justified to protect legal interests(preventatively) in accordance with a challengeable procedure of rule and exception in which normality is assumed but not as the starting point; (b) in all difficult cases it must not be punished since the starting point is not normality but rather, the assumption of normality; and furthermore, in accordance with its preventive nature, it establishes (c) that not in all cases when the offender is found guilty it is necessary to punish him (about unilateralism, see Roxin, 1981, pp. 187*et seq*.).

Risks of the Determinist Parameter

Criminal Law Based on Security Measures?

Many authors have criticized the consequences that strong determinism would have on Criminal law as it could abolish every reference to voluntary acts and the notion of responsibility[9]. Although these comments are not always precise or appropriate, they do derive a conclusion that is hard to deny: criminal liability without human freedom is the same as the law without guilt, which would lead to a type of Criminal justice based on security measures (see Hirsch, 2010, p. 61). However, the question if a single

system of criminal sanctions is better or worse than a dualist system in which punishment and security measures coexist, with different and increasingly less clear modalities of criminal sanctions or a combination of both, is a very different issue.

"Totalitarian" Criminal Law?

If this is the case, I think the drift towards a eugenic apocalyptic scenario goes distinctively too far. Firstly, because the neuroscientists who have considered those borderline issues have not suggested such ideas in any way. And secondly, because it has never been defended the idea of removing offenders responsibility and treat them as they were sick people[10].

What these neuroscientists has really questioned is the justification of punishment based on the alternativist principle of "being able to act in an alternative way" in which the concept of imputability would be the key thing. However, it has been many years since Criminal Science has been working on the replacement of free will as starting point to delimit the concept of legal guilt[11].

Another thing, of course, is the pernicious use (and/or manipulation) of this kind of approaches. Unfortunately, as the 20th Century History and the most recent one have revealed, biopolitics is enough for these purposes (Portilla, 2010, pp. 227*et seq*.) In any case, it must not be overlooked the Socio-biology developments and a type of biological and/or etiological determinism that could lead to fatal consequences in the political arena (Aniyar, 2008, p.23)

As Romeo (2009) has highlighted, the genetics and biotechnology fields must not overlook that the justification of Criminal law is delimited by some basic principles (such as, minimal intervention, subsidiarity and *ultima ratio*) which simultaneously limits and justify the enforcement of criminal sanctions (p. 53). At the same time, the legitimization of criminal law is based on the protection of essential legally interests against the most intolerable attacks when it is strictly necessary and other less harmful measures on human rights are not sufficient (p.53)

Within the same general framework, further interventions may be used(it can be genetic, optogenetic, pharmacological or surgical), in the brain (some of them quite close science fiction if those experiments had not already been carried out) with the aim of curing or treating it ("*Neuroenhancement*"), which has logically decisive ethical implications[12].

Impracticable Criminal Law?

The existence of voluntary actions is not denied since it would make criminal justice unworkable. The accent, however, should be put on something that is complicated to be understood, that is, the unconscious conditioning (or even gestation) of actions (in the limbic system).

Once again, and as far as I can see, neuroscientists have not denied the ability to follow intentions in the long term as well as of some certain control over impulses, delimiting indirectly a narrow and socially inevitable "degree of freedom". In my opinion, this is not more than a minimal capacity of self-determination, which should be understood in an inter-subjective way (Feijoo, 2011, p.42). This degree of freedom does not prove "freedom of will" but it is all what is needed for Criminal law. What must be understood clearly, paraphrasing Günter (2006), is that if this degree of freedom becomes an "eye of a needle" or an "entry gate" not only depends on the state of the art regarding metal deficits shown by medical Sciences, but it will depend greatly on the legally guided political criminal (p.120)

In other words, in any criminal trial it should not be on the table neither the dilemma between determinism or indeterminism nor the labyrinthine problem of freedom of will as a metaphysical premise which, on the other hand, has come to a true dialectic deadlock (Chiesa, 2011, pp. 51*et seq*.). More specific issues are at stake, such as the scope of criminal excuses laid down in art. 20 of the Spanish Criminal Code, as well as the blurred line between guilt and dangerousness (Looney, 2009/2010).

Basic Postulates

The "Un-Apprehensibility" of the Problem of Freedom

> *The problem with freedom is too large to be dealt exclusively by criminal law or neuroscience*.

Criminal law is not enough prepared to deal exclusively with the problem of freedom. For that reason, it is well known that the aim has been much more modest and less metaphysical since many years ago. Choosing the best criminal law model (or something better than Criminal law) to make social convivence possible through the enforcement of the most important legally protected interest against the most intolerable attacks should not rely on a metaphysical premise, such as, freedom of will.

On the other hand, a model of Criminal law that excludes freedom of will as basis to justify it is not necessarily a bad option, but it all depends on the model proposed to replace it. In example, Chiesa (2011) makes a strong argument claiming that a system of criminal justice that accepts determinism as true is not necessarily less attractive or provides less guarantees (p.13, pp.77 ss). At the same time, it should be questioned where the retribution-based criminal justice has left us and why the concept of culpability has been so little operative (G. Merkel, 2008, p.29)

It seems, however, that Neuroscience is not able to deal with the whole problem of freedom as the methods used are exclusively empirical and probably will never provide definite or sufficiently compelling results if it is constantly overlooked fundamental philosophical, cultural and socio-historical premises. There is not a test tube that clearly reveals if freedom exists or does not. But that affirmation does not mean that the new knowledge provided by Neuroscience is not useful for a better understanding of the human nature and the key characteristics of its behavior as it has been doing in the recent years.

The Humanity of Punishment

> *It is not about denying the possibility of voluntary actions or the enforcement of criminal sanctions, but to apply criminal sanctions only when they are necessary and in a different way (paraphrasing Radbruch, on "more humane and intelligent way")*

In my opinion, a more human and intelligent way is not a system of criminal sanctions based on security measures, but rather one less invasive and more able to consider the great diversity of situations faced by human beings.

Particularly, I consider that an approach to criminal sanctions justified on treatment instead of punishment, even being well-intentioned, may be quite naïve without certain underlying details. Since some time ago, it is evident that criminal justice does not rely any longer on the good and old liberal criminal principles and it has been transformed into one that is increasingly harmful on the individual´s sphere (Demetrio, 2004). In the current expansion of the notion of dangerousness, which has become as a vague and imprecise instrument for the "extension of punishment", trusting in the therapeutic use of criminal sanctions in the most humanistic and communicative way in the context of positive special prevention of re-socialization is probably not very realistic.

In Europe, it may be seen nowadays how legal regulations on control inoculators proliferate in the name of dangerousness, such as the German *Sicherungsverwahrung*, which had to be amended following the judgment of the European Court of Human Rights on July12, 2009 (Demetrio, 2010, pp. 386*et seq.*; G. Merkel, 2010). What is evident is that in all this process of "reconstruction", we need to work on a deep review of the dualist architecture of criminal sanctions in our legal system.

On the other hand, since some decades ago Criminal Science has focused on developing a principle/concept of guilt free from metaphysical connotations to be useful for a double purpose, both systematic and protectionist. In my view, it can be defended a concept of "factual culpability" which complies with that purpose without any need to take the indeterminist premises as the cornerstone. Paradoxically, the lack of proof on " being able to act in another way" has become a powerful ally for the

reappearance of concepts, such as "character-based culpability" (see Herzberg, 2010, pp. 95*et seq*.; specifically, R. Merkel, 2011, pp. 737*et seq*.), which is completely reprehensible for a Criminal Justice in which guilt is found on factual evidences according to the Rule of Law[13].

The Ideal of Freedom and the Non-Deprivation of Freedom in the Name of Liberty

When it is claimed that indeterminism requires freedom to be considered as an ideal and fundamental principle for social convivence or as the cornerstone for the legal system, it does not mean that this requirement is not compatible with those who reject free will as a metaphysical premise (or merely linguistic) to justify criminal punishment.

What is more, it is precisely the analysis of freedom as a key part of the human dignity what would avoid to take freedom as a starting point to justify criminal punishment, that is to say, because the idea of freedom is absolutely respected it is not possible to justify criminal punishment based on free will.

Those who defend the necessity of free will as the cornerstone to justify criminal sanctions, at the same time they believe (if they are coherent) that punishment should have a retributive purpose that is morally legitimate because of the existence of human freedom. From this point of view, claiming that overlooking freedom to legitimize criminal sanctions would mean to reject freedom as an ideal and the human rights linked to them in democratic societies implies a logical reasoning that is difficult to be accepted.

A "Non-Dehumanized" View of Human Being

> *Only from a profoundly humanist consideration any scientific development, including Neuroscience, can have a place in Criminal law.*

Any claim that biological sciences can say about human behavior or the normative criteria to be used on the justification of criminal responsibility must be respectful and interpreted according to human dignity.

Otherwise, we were paradoxically looking at an image of the human being very similar to the widely disputed concept of "criminal law of the enemy" (Demetrio, 2006)[14]. In fact, any scientific paradigm of mankind, as explanatory and rational as it may be, should not discard the concept of human dignity. As Günther (2006)[15] suggested, it would be tragically ironic to defend the idea of human being as a set of causes and consequences in which the State would be legitimized to impact through a causal way to reach specific effects and to defend, at the same time, this idea in the name of a more humane treatment on offenders (p. 133).

This type of approach implies obviously to defocus the problem as it would make impossible any type of understanding. It meant, in other words, no more than a step backwards in the philosophical and social evolution of mankind. At the same time, it would justify the current belief about a new social Darwinism that is arising triumphantly through the "resurrection and glorious Ascension" of Lombroso as it has been noted with great concern by Aniyar de Castro in the field of Anglo-Saxon Criminology (2008, 11).

The Limited Nature of Neuroscientific Influence

From the point of view of "humanist compatibilism", the neuroscience contribution about how the brain functions in order to explain human behavior has a limited scope. Human compatibilism means to explore the reasons why there have been proposals for the achievement of a more democratic Criminal Justice since some time ago. Humanist compatibilism, therefore, is not isolated in an "ivory tower" of a metaphysical foundation contrary to what other sciences have to say about the increasing evidence of conditioned/determined character of human behavior.

Methodological Anchors

The Rejection of Retributivism

The described perspective is based on a *theory of punishment* that rejects retribution as basis to justify punishment in a democratic criminal justice and claims that rehabilitation is not the only alternative way to retribution (see Feijoo Sánchez, 2007).

Pérez Manzano (2011) has warned about this point and suggested that the incomplete nature of the neuroscientific analysis only considers the weakness of the retributivist justification of punishment, overlooking the deterrence justification. As this author clarifies, there are enough arguments to defend the compatibility of deterrence with the determinist model although this is not so evident in the case of "positive general prevention", both in the integrative or stabilization of legal expectation approaches (p.51)

It should be noted furthermore that whatever the scope of the future neurological treatment used for preventive or therapeutic reasons, this should be "legitimate", and the analysis of *legitimacy shall be one of an evaluative-constitutional nature that protects human dignity above all*. Criminal punishment, whatever form may be implemented if the Rule Law is respected, should be one limited externally by some axiological parameters or fundamental principles that cannot be overlooked or disrupted by any scientific advance.

A Permeable Model of Criminal Science

In this work it is not proposed a criminal model based only on normative rules to be applied by their own criteria, but one that is permeable, open to new knowledge on human behavior and with the sufficient flexibility to be adapted to the required changes suggested by the new knowledge.

Following the first option, things would be quite different as the entire problem could be removed all at once. This option allows Günther Jakobs (2007) to claim: "A person is competent to offer sufficient legal allegiance. For this hermetic-regulatory relationship, there is no need for free will. It is also unaltered by psychical causation by the brain waves or by the psychic determination based on satisfaction and non-satisfaction, that is, it would compare to a game with its own rules" (p. 154).

However, as Romeo (2009) has highlighted, "it cannot be forgotten the influence of the empirical sciences on social sciences along the centuries, specifically on legal sciences, despite their limited knowledge and even the rejection expressed by legal theorists" (p. 408).

The Search for Scientific Unified Responses and The Knowledge Subject

As it has been stated previously, it would be enough to turn to normativism in order to overlook the problem, but not to solve it, since the question if our rules should be followed or not remains unanswered.

It is here where it lies my dissatisfaction with the argument of "categorical mistake" as argued by Hassemer (2009). It would include the infringement of a basic principle of the theory of knowledge in which each field of science should only analyze what its tools allow to consider in the search for answers. The tools used in a specific field of science are delimited by its formal object and this is the categorical mistake that neuroscience has made, creating the resulting chaos as it extends beyond the field to which it should have access (p. 846).

Explained from the perspective of the *knowledge-responsibility vector*, this means that many fields of Science have a concept of freedom that has been created in accordance with their structure (based on their formal object and on specific functions, paradigms, methods, and tools) and these concepts do not coincide with one another. More specifically, the categorical mistake consists of supposing that those sciences working with empirical methods are in the position to decide if freedom exists or does not and therefore if other sciences should be able to develop their own concept of freedom (p. 847). It goes even further, suggesting that the true problem lies in hearing these sciences and making a dialogue with them, instead of "putting them in their place over time", taking into account the great prestige and power that they currently have, given that "its methodology of observation completely and overwhelmingly dominates our everyday culture" (Hassemer, 2011, pp. 6-7).

In my opinion, this methodological approach is not convincing. As Hirsch warned (2010), it would require the delimitation of *the relevant subject of scientific study*, which it would not be a mere diversification according to the disciplines (p. 62). It is useful to note that criminal law should always consider the phenomena behind its regulations and these do not only consist of the supposed "convention" of freedom of will.

Beyond what may be considered "categorical mistake" as described by Hassemer, all his reasoning has led to a profound sense of uneasiness because of the questioning from other scientific sectors, which from the point of view of knowledge, results to be less counterintuitive. This has been confirmed by his own words as he explicitly states that "neuroscientists, with their work, have reached knowledge, which in case are correct or convenient, remove many of the foundations of criminal law and its world" (2011, p. 4). It is quite another thing to decide if the current reactions from Criminal Science, more and more numerous[16] are appropriate or not[17].

In fact, I think the debate has not been totally useless as it has revived constant problems regarding the legitimation of criminal punishment. It can be seen interesting collaborations between criminologists or philosophers that are perfectly in line with consolidated results obtained by criminal punishment theories. (Merkel / Roth, 2008; Pauen / Roth, 2008)[18].

In other words, why should Neuroscience have nothing to say on the foundations of criminal liability? What makes us think that Neuroscience should only care about their "business" and Criminal Law about theirs? I do not feel it is enough to argue that our research methods are different, but regardless, we should review our approaches if it is necessary and to provide better responses according to the new challenges. Logically, this is not an obstacle but just the opposite, emphasizing above all, as Hassemer (2011) does, that human dignity should play a key role for "any reflection on the human being, society and the State which is worth the current moment we are living" (p. 8).

CONCLUSIONS

1. Nowadays neither free will-based indeterminism nor mechanical neuro-determinism are sustainable. The first one is based on a metaphysical assumption that cannot be reconciled with the new discoveries found by empirical sciences regarding human behavior. The second one defends an image of human being without considering the ideal of freedom, which would mean a deplorable step back in the philosophical and political evolution of modernity. Adopting any of them would mean the absolute impossibility of any type of dialogue and knowledge transfer between Neuroscience and Criminal law.
2. Neuroscience and criminal law should consider the human being at the very center of their reflections. Specifically, *a post-metaphysical understanding of criminal law* requires that free will must not be the cornerstone to justify criminal punishment. Thus, the introspective first-person perspective based on the subjective perception of freedom and the self-awareness of the human being as a free person is not enough for the legal hetero-imputation requirements. According to it, the third person perspective is not only legally more operational but also more coherent with the rest of fields in Social Sciences.
3. A *conciliatory solution* has been proposed between Biological Sciences, particularly Neuroscience, and Criminal law under the name of "humanist compatibilism". "Compatibilism" as it claims that an understanding between the empirical (and biological) Sciences and the law (especially Criminal law) is perfectly possible. "Humanist" as the sole rationale is human dignity and relies on it.
4. The *consequences of humanist compatibilism* on guilt, and without prejudice of the subsequent reviews of the subjective aspects of internal participation in the dogmatic building would be as follows:
    a) If new empirical knowledge, which can be obtained, for example, from modern techniques of neuroimaging, revealed that a criminal sanction was to be imposed in cases where criminal behavior was caused due to cerebral deficits, this evidence should be

taken into consideration in favor of the offender. Specifically, it is quite likely that the new discoveries lead to the increasing of excuses in criminal liability (Feijoo, 2011, 39).

b) Any security measure to be imposed on the offender as an alternative way to traditional punishment should be respectful with the right to a fair trial, with the same material and procedural guarantees as those offenders who has been found guilty according to the Rule of Law.

5. At the same time, the proposed approach is based on certain *methodological anchors*. Firstly, it rejects the "retributivist syllogism" (which places the "burden of proof" on the side of determinism and therefore considers criminal punishment to be justified in difficult cases). Secondly, it supports a permeable, non-functionalist conception of Criminal Science and the search for unified scientific responses (provided those responses are not contradictory) on the same object of knowledge.

ACKNOWLEDGEMENT

For Prof. Dr. José Ramón Serrano-Piedecasas Fernández

ENDNOTES

** Article created within the framework of the research project "*Neurociencia y Derecho penal: nuevas perspectivas en el ámbito de la culpabilidad y tratamiento jurídico-penal de la peligrosidad*" ("Neuroscience and Criminal Law: new perspectives in the field of culpability and the legal treatment of dangerousness" (DER2009-09868), funded by the *Ministry of Science and Innovation*, where I serve as a principal investigator. He was published first in Spanish in the following book Demetrio Crespo (Dir.) & Maroto Calatayud (Coord.), *Neurociencias y Derecho penal. Nuevas perspectivas en el ámbito de la culpabilidad y tratamiento jurídico-penal de la peligrosidad*, Madrid: Edisofer, Buenos Aires-Montevideo: BdeF, 2013, pp. 17-42; and a summarized German version in *Goltdammer´s Archiv*, Heidelberg: R.v.Decker, nº1, 160. Jahrgang, 2013, pp. 15-25. I thank Dr. Jesús I. Mora González (University of Granada) for his help in revising the initial translation.

The main ideas upon which it is based were introduced in the presentation "Opciones ante la libertad de voluntad y la investigación sobre el cerebro" at the *International Conference on Neuroscience and Criminal Law,* held in the Faculty of Legal and Social Sciences of the University of Castilla-La Mancha in Toledo on the 29th and 30th of September of 2011. This resulted in enormous growth of my perspective thanks to the magnificent debate held between the participants who came from areas of Philosophy, Criminal Law and Neuroscience, and I thank them sincerely for their contributions. Similarly, I wish to recognize two previous presentations in the preparatory seminars organized within the framework of the project: "Auf dem Weg zu einer Kompatibilitätstheorie zwischen Determinismus und Schuld im Strafrecht**"** at the *Symposium Strafrecht und Neurowissenschaften*- Hanse-Wissenschaftskolleg held in Delmenhorst (Bremen) ont the 05.06.2010, to which I wish to thank the grant awarded in order to carry out a research stay, and "*La duda determinista y el concepto de culpabilidad"* at the International Seminar on Criminal Law and Neuroscience –University of Barcelona- on the 09.30.2010).

1. See also, the special monographic edition of "Kritische Philosophie der Neurowissenschaften", *Deutsche Zeitschrift für Philosophie* (59) 2011 (3), 345-480.
2. See the bibliographic references contained here, especially those referred to in notes 2, 9 and 17, as well as the respective monographic issues of the *Revista de Occidente*, nº 356 ("Libertad y cerebro") and *InDret* (2) 2011 (http://www.indret.com/es/derecho_penal/8/). Basic *Detlefsen* (now G Merkel) (2006) and R. Merkel (2008).
3. According to *Hacker* this approach should be qualified as "Quinean naturalism" in reference to the North American philosopher and mathematician *Willard V. O. Quine*, who questioned the existence of conceptual and not empirical truths.
4. See, among others, *Dennett* (1991, 2005), *Ramos Vázquez* (2008, 83 *et seq.*), *Serrano-Piedecasas/Demetrio Crespo* (2009), *Vives Antón* (2011, 161 *et seq.*).
5. In this "categorical mistake" Cartesian dualism would incur as it would combine terms that belong to two distinct categories (Ryle, 2005, pp. 22 *et seq.*).

6. See the interesting observations developed by *Serrano-Piedecasas* (2013), according to which the consciousness may, in some cases, "think" algorithmically, following the rules of logical deduction based on a finite set of premises, and "think" non-algorithmically, directly visualizing the final conclusion. The author suggests that the functioning of the conscience, although still unknown, must have a future biophysically explanation (p. 215)
7. In favor of the compatibility between "determinism" and "freedom of action" already in *Serrano-Piedecasas / Demetrio*, 2009, p. 1788; and in *Demetrio*, 2011a, pp. 4, 31.
8. For a more detailed description of the different basic positions, see Molina (2000); Merkel, R. (2008), Chiesa (2011).
9. Regarding this point, I refer to that which was previously described in Demetrio Crespo (2011, pp. 20 *et seq*., esp. pp. 23-24).
10. Of great significance in regards to this, e.g., the reasoning of *Prinz* (2004) who first *denied* the idea of freedom of will, which is not included in scientific Psychology, later *explained* freedom as the result of interaction and social communication, and finally, *praised* freedom for carrying out major social functions, acting via sub-personal mechanisms of individual recognition within the structure of community in which they socialize, in which the true psycho-historic *raison d'etre* lies (pp. 199 *et seq*.).
11. As *Romeo Casabona* (2009) recalled, the first to do so was Lombroso (1876), whose theory of the born offender, despite being quickly rejected and abandoned, "had the importance of allowing us to question absolute indeterminism (free will) for the first time as well as guilt as fundamental basis for criminal law" (p. 401).
12. Regarding this latter and the eventual legal consequences of such interventions, which may potentially affect everything from cognitive functions to emotional and motivational states, (e.g. the neuro-pharmacological reduction of aggressive states), see the disturbing article by Reinhard Merkel (2009).
13. Here I once again refer to the previously detailed position that is based on how to deal with this complex issue in the *interrelationship between the concept, structure concerning the unjust and function of guilt as interconnected problems* (Demetrio, 1999, pp. 125 *et seq*.; 2008, pp. 59 *et seq*.; 2011b, pp. 693 *et seq*.). More specifically, guilt presupposes the unjust, and criminal laws neither prohibit nor order a specific nature or way of living.
14. Regarding this, in addition to the bibliographic references, see the two volumes edited by *Cancio Meliá* y *Gómez Jara* (2006).
15. With more detail on the position of *Klaus Günther* regarding guilt in *Demetrio* (2011a, pp. 25 *et seq*.).
16. Of the vast bibliography, the collective work edited by *Duttge* (2009).
17. *Hassemer* determined reactions in Germany that range from distanced ludic in the area of scientific theory to profound alternative programs establishing a rescuing firewall between the "siren songs" and the legal dogmatic of guilt, as well as desperate attempts to keep the criminal law of guilt alive even under the impact of human biology, up to the candid calls to the science of criminal law not to ignore this problem (2011, p. 4).
18. *Hassemer* offered significant contributions to this interdisciplinary methodology in another era, when the aim consisted not to isolate criminal law from the context of the social sciences (Hassemer, 1984).

REFERENCES

Aniyar De Castro, L. (2008). El regreso triunfal de Darwin y Lombroso: las diferencias humanas en la Criminología angloparlante presente en los simposios internacionales de Criminología de Estocolmo. *Cap. Crim*., 36(4), 5-25.

Bennett, M., & Hacker, P. (2003). *Philosophical foundations of neuroscience*. Oxford: Blackwell.

Bennett, M., & Hacker, P. (2007a). Selections from *Philosophical foundations of neuroscience*. In Bennett, Dennett, Hacker, & Searle, *Neuroscience and Philosophy: Brain, Mind, and Language* (pp. 3-48). New York: Columbia University Press.

Bennett, M., & Hacker, P. (2007b). The Conceptual Presuppositions of Cognitive Neuroscience: A Reply to Critics. In M. Bennett, D. Dennett, P. Hacker, & J. Searle. *Neuroscience and Philosophy: Brain, Mind, and Language* (pp. 127-162). New York: Columbia University Press.

Burkhardt, B. (2007). La comprensión de la acción desde la perspectiva del agente en el derecho penal. In B. Burkhardt, K. Günther, & G. Jakobs, *El problema de la libertad de acción en el Derecho penal* (pp. 29-93). Buenos Aires: Ad.Hoc.

Cancio M., & Díez, G. J. (Ed). (n.d.). *Derecho Penal del enemigo. El discurso penal de la exclusión* (Vol. 1 y 2). Montevideo-Buenos Aires: Edisofer.

Chiesa, L.E. (2011). Punishing without free will. *Utah Law Revie*, 6. Retrieved from http://ssrn.com/abstract=1804468

Choudhury, S., & Slaby, J. (Ed). (2012). *Critical neuroscience: a handbook of the social and cultural contexts of neuroscience*. Oxford: Wiley-Blackwell.

Churchland, P.M. (1981). Eliminative Materialism and the Propositional Attitudes. *The Journal of Philosophy*, 78, 67-90.

Damasio, A. (2009). *El error de Descartes* (6ª impr.). Barcelona: Crítica.

Demetrio Crespo, E. (1999). *Prevención general e individualización judicial de la pena.* Salamanca: Universidad de Salamanca.

Demetrio Crespo, E. (2004). Del Derecho Penal liberal al Derecho penal del enemigo. *Revista de Derecho Penal y Criminología*, 14, 87-115.

Demetrio Crespo, E. (2006). El derecho penal del enemigo *darf nicht sein!* Sobre la ilegitimidad del llamado "derecho penal del enemigo" y la idea de seguridad. *ZIS*, 9, 428-442. Retrieved from http://www.zis-online.com/dat/artikel/2006_9_67.pdf

Demetrio Crespo, E. (2008). *Culpabilidad y fines de la pena: con especial referencia al pensamiento de Claus Roxin*. Lima: Grijley.

Demetrio Crespo, E. (2010). El principio de culpabilidad: ¿un Derecho Fundamental en la Unión Europea. In D. Picazo & N. Martín (Coord.), *Los Derechos Fundamentales en el Derecho penal europeo* (pp. 371-388). Navarra: Aranzadi.

Demetrio Crespo, E. (2011a). Libertad de voluntad, investigación sobre el cerebro y responsabilidad penal. *InDret*, 2, 1-38. Retrieved from http://www.indret.com/pdf/807.pdf

Demetrio Crespo, E. (2011b) Schuld und Strafzwecke. In M. Heinrich, C. Jäger, B. Schünemann, W. de Gruyter, H. Achenbach, K. Amelung, . . . & J. Wolter (Hrsg.), *Strafrecht als Scientia Universalis. Festschrift für Claus Roxin zum 80* (pp. 689-703). Geburtstag.

Dennett, D. (1991). *Consciousness explained*. New York et al.: Back Bay Books.

Dennett, D. (2005). *Sweet Dreams. Philosophical Obstacles to a Science of Consciousness*. Cambridgeet al: The MIT Press.

Dennett, D. (2007). Philosophy as naive anthropology. In D. Dennett, P. Hacker, & J. Searle, *Neuroscience, and Philosophy: Brain, Mind, and Language* (pp. 73-95). New York: Columbia University Press.

Denno, D.W. (2002). Crime and Consciousness: Science and Involuntary. *Minesota Law Review*, 87, 269-399.

Detlefsen, G. (ahora G. Merkel). (2006). *Grenzen der Freiheit – Bedingungen des Handels – Perspektive des Schuldprinzips. Konsequenzen neurobiologischer Forschung für das Strafrecht*. Berlin: Duncker & Humblot.

Duttge, G. (Hg.). (2009). *Das Ich und sein Gehirn. Die Herausforderung der neurobiologischen Forschung für das (Straf-)Recht.* Göttingen: Universitätsverlag.

Engisch, K. (1965). *Die Lehre von der Willensfreiheit in der strafrechtsphilosophischen Doktrin der Gegenwart* (2ª ed.). Berlin: De Gruyter.

Feijoo Sánchez, B. (2007). *Retribución y prevención general*. Montevideo-Buenos Aires: Bdf.

Feijoo Sánchez, B. (2011). Derecho Penal y Neurociencias. ¿Una relación tormentosa? *InDret*, 2, 1-58. Retrieved from http://www.indret.com/pdf/806.pdf

Gazzaniga, M.S. (2008). The Law and Neuroscience. *Neuron*, 60, 412-415.

Greene, J., & Cohen, J. (2004). For the law, neuroscience changes Nothing and Everything. Philosophical Transactions: Biological Sciences, 359, nº 1451. *Law and the Brain*, 1775-1785.

Günther, K. (2006). Hirnsforschung und strafrechtlicher Schuldbegriff. *KJ*, 39, 116-133.
Habermass, J. (2004). Freiheit und Determinismus. *DZPhil*, 52(6), 871-890.
Hassemer, W. (1984). *Fundamentos del Derecho penal*. Barcelona: Bosch.
Hassemer, W. (2009). Grenzen des Wissens im Sfrafprozess. *ZStW*, 121, 829-859.
Hassemer, W. (2011). Neurociencias y culpabilidad en Derecho penal. *InDret*, 2, 1-15.
Herzberg, R. D. (2010). *Willensunfreiheit und Schuldvorwurf*. Tübingen: Mohr Siebeck.
Hillenkamp, T. (2005). Strafrecht ohne Willensfreiheit? Eine Antwort auf die Hirnforschung. *Juristen Zeitung*, 7, 313-320.
Hirsch, H. J. (2010). Zur gegenwärtigen Diskussion über Willensfreiheit und Strafrecht. *ZIS*, 2, 59-65.
Kuhn, T. S. (1976). *Die Struktur wissenschaftlicher Revolutionen*. Frankfurt am Main: Suhrkamp.
Jakobs, G. (2007). Individuo y persona. Sobre la imputación jurídico-penal y los resultados de la moderna investigación neurológica. In B. Burkhardt, K. Günther, & G. Jakobs, *El problema de la libertad de acción en el Derecho penal* (pp. 131-157). Buenos Aires: Ad.Hoc.
Lelling, A.E. (1992/1993). Eliminative materialism, neuroscience and the criminal law. *University of Pennsylvania Law Review*, 141, 1471-1564.
Levy, N (2008). Introducing Neuroethics. *Neuroethics*, 1, 69-81.
Libet, B. (1985). Unconscious Cerebral Initiative and the Role of Conscious Will in Voluntary Action. *Behavioral and Brain Sciences*, (8), 529-539.
Libet, B. (1987). Are the Mental Experiences of Will and Self-Control Significant for the Performance of a Voluntary Act? *Behavioral and Brain Sciences,* 10, 783-786.
Lombroso, C. (1876). *L´Uomo delinquente* (1ª ed.). Milano: Hoepli.
Looney, J.W. (2009/2010). Neuroscience's new techniques for evaluating future dangerousness: are we returning toLombroso's biological criminality? *UALR L.Rev*., 32, 301-314.
Merkel, G. (2008). Hirnforschung, Sprache und Recht. H. Putzke, B. Hardtung, T. Hörnle, R. Merkel, J. Scheinfel, H. Schlehofer, J. Seier (Edts.), *Strafrecht zwsichen System und Telos. Festchrift für Rolf Dietrich Herzberg* (pp. 3-37). Tübingen: Mohr Siebeck.
Merkel, G. (2010). Incompatible Contrast? – Preventive Detention in Germany and the European Convention on Human Rights. *GLJ*, 11, 1046-1066.
Merkel, G., & Roth, G. (2008). Freiheitsgefühl, Schuld und Strafe. In K-J. Grün, M. Friedman, & G. Roth (Edts.), *Entmoralisierung des Rechts. Maßstäbe der Hirnforschung für das Strafrecht* (pp. 54-95). Göttingen: Vandenhoeck & Ruprecht.
Merkel, R. (2008). *Willensfreiheit und rechtliche Schuld*. Baden-Baden: Nomos.
Merkel, R. (2009). Neuartige Eingriffe ins Gehirn. Verbesserung der mentalen condicio humana und strafrechtliche Grenzen. *ZStW*, 121, 919-953.
Merkel, R. (2011). Schuld, Charakter und normative Ansprechbarkeit. Zu den Grundlagen der Schuldlehre Claus Roxins. In M. Heinrich, C. Jäger, B. Schünemann, & W. de Gruyter (Hrsg.), *Strafrecht als Scientia Universalis. Festschrift für Claus Roxin zum 80. Geburtstag* (pp. 737-761).
Molina Fernández, F. (2000). Presupuestos de la responsabilidad jurídica. Análisis de la relación entre libertad y responsabilidad. *Anuario de la Facultad de Derecho de la Universidad Autónoma de Madrid*, 4, 57-137.
Pardo, M.S., & Patterson, D. (2011). Fundamentos filosóficos del Derecho y la Neurociencia. *InDret*, (2), 1-50. Retrieved from http://www.indret.com/pdf/819.pdf
Pauen, M. (2009). Autocomprensión humana, neurociencia y libre albedrío: ¿se anticipa una revolución? In F.J. Rubia. (Ed.), *El cerebro: avances en neurociencia* (pp. 135-152). Madrid: Editorial Complutense.
Pauen, M., & Roth, G. (2008). *Freiheit, Schuld und Verantwortung. Grundzüge einer naturalistischen Theorie der Willensfreiheit*. Frankfurt am Main: Suhrkamp.
Pérez Manzano, M. (2011). Fundamento y fines del derecho penal: una revisión a la luz de las aportaciones de la neurociencia. *Revista de Occidente*, 356, 41-64. ≅*InDret*, 2, 1-40. Retrieved from http://www.indret.com/pdf/818.pdf

Portilla Contreras, G. (2010). La legalización de la violencia fundadora del Derecho: la exclusión del Derecho al amparo del propio Derecho. Serrano-Piedecasas / Demetrio Crespo (Dir.), *Terrorismo y Estado de Derecho* (pp. 227-239). Iustel: Madrid.

Prinz, W. (2004). Kritik des freien Willens: Bemerkungen über eine soziale Institution. *Psychologische Rundschau*, 55/4, 198-206.

Ramos Vázquez, J. A. (2008). *Concepción significativa de la acción y teoría jurídica del delito*. Valencia: Tirant lo Blanch.

Romeo Casabona, C. (2009). *Genética, Biotecnología y Ciencias Penales*. Bogotá: Ibáñez & Pontificia Universidad Javeriana.

Roth, G.(2003). *Fühlen, Denken, Handeln. Wie das Gehirn unser Verhalten steuert*. Frankfurt am Main: Suhrkamp.

Roxin, C. (1981). *Culpabilidad y prevención en Derecho penal*. Madrid: Reus.

Rubia, F.J. (2007). *El cerebro nos engaña*. Madrid: Temas de hoy.

Rubia, F.J. (2009a). *El fantasma de la libertad*. Barcelona: Crítica.

Rubia, F.J. (2009b). Comentarios introductorios. In F.J. Rubia (Ed.), *El cerebro: avances en neurociencia* (pp. 97-102). Madrid: Editorial Complutense.

Rubia, F. J. (2011). El controvertido tema de la libertad. *Revista de Occidente*, 356, 5-17.

Ryle, G. (2005). *El concepto de lo mental*. Barcelona: Paidós.

Sánchez Lázaro, F. G. (2011). El principio de culpabilidad como mandato de optimización. *InDret*, 4, 1-26. Retrieved from http://www.indret.com/pdf/848.pdf

Schleim, S. (2011). *Die Neurogesellschaft. Wie die Hirnforschung Recht und Moral herausfordert*. Hannover: Heise.

Searle, J. (2008). Putting consciousness back in the brain. In Bennett, Dennett, Hacker & Searle, *Neuroscience, and Philosophy: Brain, Mind, and Language*. New York: Columbia University Press, 97-124.

Serrano-Piedecasas, J.R. (2013). Pensamiento complejo y Derecho penal. In E. Demetrio Crespo (Dir.) & Maroto Calatayud (Coord.), *Neurociencias y Derecho penal. Nuevas perspectivas en el ámbito de la culpabilidad y tratamiento jurídico-penal de la peligrosidad* (pp. 201-218). Madrid: Edisofer, Buenos Aires-Montevideo: BdeF.

Serrano-Piedecasas, J. R., & Demetrio Crespo, E. (2009). Reflexiones sobre filosofía del lenguaje, diversidad cultural, y su influencia en el derecho penal. J.C. Carbonell Mateu, J.L. González Cussac, E. Orts Berenguer, M.L. Cuerda Arnau y Otros (Drt.), *Constitución, Derechos Fundamentales y Sistema penal* (pp. 1771-1792). Valencia: Tirant lo Blanch.

Singer, W. (2004). Veranschaltungen legen uns fest: Wir sollten aufhören von Freiheit zu sprechen. C. Geyer (Ed.), *Hirnforschung und Willensfreiheit* (pp. 30-65). Frankfurt am Main, Suhrkamp.

Sinnott-Armstrong, W., & Nadel, L. (Eds.). (2010). *Conscious Will and Responsibility. A Tribute to Benjamin Libet*. Oxford: University Press.

Slaby, J. (2010). Steps towards a Critical Neuroscience. *Phenom Cogn Sci*, (9), 397-416. Retrieved from http://www.janslaby.com/pubs/Slaby_StepsTowardsCNS_2010.pdf

Vives Antón, T.S. (2011). *Fundamentos del sistema penal* (2ª ed.). Valencia: Tirant lo Blanch.

Welzel, H. (1997). *Derecho penal alemán. Parte General* (11ª ed.). (4ª ed. castellana), traducción de J. Bustos Ramírez y S. Yáñez Pérez, Santiago de Chile: Editorial Jurídica de Chile.