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Cognitive neuroscience applied to law. A neurolaw introduction

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ABSTRACT

Legal reasoning, from the decision of United Chambers of Supreme Court, through the legal assistance activity carried out by a lawyer, to the purchase of an object on Amazon by a common citizen (which integrates a contractual constraint), contains in itself assessments of opportunity and moral evaluation, problem solving, decision making and, in general, a cognitive activation very wide ranging. Thanks to the multidisciplinary vocation of neuroscience, in particular focused at the cognitive field in legal practice, the aim of the research in cognitive neuroscience applied to law is to help to bridge the lack of in-depth analysis in the decision-making processes that the main players of the law, such as judges and lawyers, are informed. And all this, taking into account the ethical issues that occur above all in the comparative analysis of neuroscience-law interaction.

Keywords: cognitive neuroscience; legal reasoning; legal decision; neurolaw

1. Introduction

Historically, the *vexata quaestio* if a prescriptive science, such as law, could dialogue with a descriptive-application science, such as psychology, has found its place in every introduction and premises to many texts of legal and forensic psychology; how, in fact, a discipline characterized by the certainty of norms can dialogue with another that is characterized by probabilism in terms of analysis and solution of psychological problems is what informed from the beginning of his epistemological efforts also the precursor of Italian forensic psychologists, namely Agostino Gemelli.

For the founder of the Catholic University, psychological skills, especially in the criminal field, could radically innovate the concept of criminality and crime, providing the assumption that the person guilty of a crime was no different, psychologically and biologically, from other human beings, except for the fact that he violated a legal norm with his behavior (Gemelli, 1946).

The interaction between the two disciplines is therefore desirable in certain cases, and, if allowed here, absolutely necessary in others.

Many thinkers trace normative judgment and legal reasoning to a rational thought devoid of emotional influences, think of Kant's philosophical vision or Kohlberg's neuro-evolutionary one (Kohlberg, 1969), where, thanks in part to the investigations of Damasio (1994) and Haidt (2001), regulatory and moral reasoning tend to be increasingly traced back to automatic and emotional responses.

Probably the extremes of rationalism and emotion find a correct balance in the reality of decision-making processes, competing and insisting at the same time in the legal reasoning and moral decision-making, especially of those who are called institutionally to implement the legal rules in real situations.

2. Appling neuroscience to legal field

While investigations into moral, regulatory and decision-making judgments regarding persons involved in judicial proceedings are becoming more and more common in literature, there is almost no investigation regarding the main actors of justice and law, such as judges and lawyers.

It would seem that the law, as a discipline, is generally less interested in metacognitive knowledge, that refers to awareness of one's own knowledge - what one does and doesn't know - and one's ability to understand, control, and manipulate one's cognitive processes (Meichenbaum, 1985), in particular involved in legal matters, and more in solving very specific problems and

finding the remedy to a critical issue. This is clearly a key point of the legal analysis.

There is no doubt, however, that, relying on cognitive neuroscience, the understanding of decision-making processes, even in the light of the underlying ethical and moral convictions, can offer very useful aspects in discussing the concrete findings of legal doctrine and administration, with clear implications in the practical field.

What is to be paid attention is an innovative object of study that cannot be overlooked, considering the important consequences, whether theoretical or practical, in the different cultural areas involved.

In fact, the analysis of the components of cognitive processes that lead to regulatory and legal reasoning by legal professionals has a fundamental importance.

And it is precisely the neuroscientific approach that suggests a model for applied law that involves the extensive recruitment and use of different mental skills systems and sources of information.

This field of research has all the characteristics in order to become a well-developed branch of neuroscientific studies.

3. RESEARCH APPROACHES AND METHODOLOGICAL ISSUES

Two main methods of investigation are principally carried out by the researchers in the field of neuroscience and law: theoretical and practical.

The theoretical approach is focused on the brain and its functions: what it is under evaluation regards the impact of the brain on legal behavior.

Theoretical researchers examine the arguments favoring the increased use of neuroscience in law and the main endeavor is to integrate neuroscientific research into substantive legal doctrines (Petoft, 2015).

The main topics analyzed in theoretical researches are: feasibility of applying neuroscience results in legal system, concept of brain and law, relationship between brain and law, development and technologies of neuroscience in legal system and future, brain disease and disordering legal orders, mental illness and brain injury affection on legal responsibility, right to privacy and brain-imaging, free will on third-party punishment, neuroscience and legal rights, neuroscience and legal freedoms, brain injury citizenship rights, individuals' right to security towards people with neurological disease, revolution of legal rules by neurolaw theories.

The practical approach is focused on applying new criminal procedural law standards in courtroom by judges and lawyers (Morse & Roskies, 2013).

The practical researchers in this particular field are emphasizing on civil and criminal responsibility litigation and its practical challenges such as documenting neuroscientific data as evidence in the court room or litigation problems (Petoft, 2015).

The main topics analyzed in practical researches are: neurolitigation challenges, neuroscientific instruments for proving legal responsibility, neurocriminology in procedural law, neuroscience and judgment, brain injury rights, lie detection, addiction.

4. A NEW RESEARCH APPROACH: LEGAL REASONING AND NORMATIVE
   JUDGEMENT

The insights provided by the abovementioned researches and the recent developments in cognitive neuroscience permit to expand the field of research to the investigation of legal reasoning and normative judgement.

In relation to this, it is not an immediate task with a quick solution to qualify what legal reasoning and normative judgement are.

Cognitive psychology and neurobiology provide new tools and methods for studying questions of normative judgment. Recently, a consensus view has emerged, which recognizes important roles for emotion and intuition, and which suggests that normative judgment is a distributed process in the brain (Goodenough, 2004).

Emotional and cognitive aspects contribute and constitute simultaneously the normative and moral decision making.

Kahneman's theoretical framework is reflected in neurophysiological studies and, thanks to modern *brain imaging* tools, in neuroscientific analyses and studies of areas of the brain that allow fine reasoning and decisions, which cannot be defined intuitive *tout court* or rational *tout court* (Kahneman, 2013).

What is being analyzed in this field of research is the cognitive system that underpin the assessment of the facts and subjects involved in the legal decision.

In particular it would be analyzed the subjects, along with their rational behavior, not object of a legal decision, but as subjects that those decisions contribute to form.

In particular, it is assumed that decision-making informed to the legal norm, as an expression of normative morality within a given culture, must necessarily be informed to cognitive processes strongly influenced by emotional components.

It is generally assumed that the particular cultural environment and the

type of reasoning to which the decision-making process of legal professionals is informed has an impact on legal and moral assessments that is qualitatively and quantitatively different respect to the decision-making process of laypersons.

From a neuro-physiological point of view it is expected that information useful to legal reasoning will be processed and spread in various areas of the brain, involving various structures starting from the oldest ones, namely the limbic ones, such as, for example, the hippocampus for memory, the amygdala for emotions, the hypothalamus for motivation, spreading their activations practically in every structure of the telecephalus, particularly to the fine reasoning areas in the prefrontal and orbitofrontal cortex (Buckholtz, 2012).

In fact, those results could help the activities of lawyers, jurors and judges.

For a fair and just legal system relies on the sound judgment of impartial third parties, for example as they decide the culpability of defendants and assign appropriate punishments. Notwithstanding the often-high stakes, legal decision-making is prone to the same influences and vagaries as are other decision-making processes (Owen & al., 2013).

Biases, trustworthiness, emotions, particular contingent events are just few examples of legal reasoning constraints that should impact on the fairness and effectiveness of the justice system and its actors.

The intersection between law and neuroscience is an increasing and powerful instrument not only for judges and law professionals to better solve certain questions, but also it should permit a better decision-making procedure in judging.

As abovementioned, the experience in the court is not sufficient to avoid certain decisions that are biased by our innate brain system.

We should therefore assume that judicial rulings are based not only on laws and facts in a rational, mechanical, and deliberative manner.

A study of Danziger et al. (2011) shown that judicial rulings can be affected by extraneous variables not related to legal decision.

The researchers assumed that making repeated judgments or decisions depletes individuals' executive function and mental resources, and in particular they highlight that making repeated rulings can increase the likelihood of judges to simplify their decisions.

The study speculates that as judges advance through the sequence of cases, they will be more likely to accept the default, status quo outcome: deny a prisoner's request.

The authors recorded the judges' two daily food breaks, which result in segmenting the deliberations of the day into three distinct "decision sessions".

They found find that the percentage of favorable rulings drops gradually from ≈65% to nearly zero within each decision session and returns abruptly to ≈65% after a break, as shown in Figure 1.
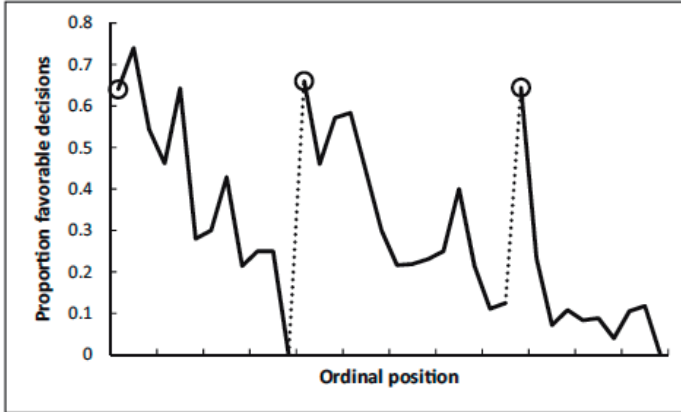
Figure 1. The records were used to highlight the proportion of rulings in favor of the prisoners by ordinal position, where circled points indicate the first decision in each of the three decision sessions; tick marks on x axis denote every third case; dotted line denotes food break. Because unequal session lengths resulted in a low number of cases for some of the later ordinal positions, the graph is based on the first 95% of the data from each session

All the findings in those researches revealed that certain biases affect the decision-making process in the legal field, no matter if judge, juror, or lawyer, despite the fact that they are *expert* in such a task.

Thanks to innovative instruments in psychological research, the legal system, especially in the legal court, i.e. in the application of the law in practice, has the opportunity to avoid several basic mistakes in order to better elude wrong decisions, with dire consequences.

Understanding the neural correlation to legal reasoning should improve the efficiency of the legal system and its actors.

Therefore, the integration of theoretical models and scientific methods of cognitive and experimental psychology, through the neuroscientific evidences, would allow to consider the cognitive models adopted to analyze the behavior following mental activation effective, also with regard to legal reasoning.

5. Neuroethics

All the aforesaid researches and studies raise new normative questions and entail normative conclusions for ethical and legal theory and practice, given the unequivocal implications that arise from the qualification of a subject in the light of his ability to be responsible for a conduct relevant to the rules governing human actions and behaviors.

After reviewing the source of optimism about neuroscientific contributions and the current scientific status of neuroscience, it addresses a radical challenge neuroscience allegedly presents whether neuroscience proves persons do not have agency. It then considers a series of discrete topics in neuroethics and neurolaw, including the "problem" of responsibility, enhancement of normal functioning, threats to civil liberty, competence, informed consent, end of life issues, and the ethics of caution. It suggests that the ethical and legal resources to respond to the findings of neuroscience already exist and will do so for the foreseeable future (Morse, 2016).

The first definition of neuroethics has been provided in 2002 during the Lecture *Neuroethics: Mapping the Field* held in San Francisco by the Stanford University and the University of California.

Neuroethics is driven by neurotechnologies: it is concerned with the ethical questions that attend the development and effects of novel neurotechnologies, as well as other ethical and philosophical issues that arise from our growing understanding of how brains give rise to the people that we are and the social structures that we inhabit and create (Marcus, 2002).

Looking in the matter more deeply means also considering the impact of ethical aspects that should arise from the analysis of legal reasoning from a neuroscientific point of view.

What is to be considered is the ethical, legal, and social impact of neuroscience and its use in this particular field of the decision-making process.

In fact, thanks to the advances in the use of brain imaging procedures, there is an increase of the ethical problems raised by our growing understanding of the neural bases of behavior, personality, consciousness, and states of spiritual transcendence.

Current ethical and legal theory consider people as we understand them today and there is no radical shift yet in our understanding of the person despite the astonishing advances in neuroscience and other sciences. Thus, current theory seems adequate to consider the issues that new technologies produce. If a profound revolution in our understanding of ourselves and

biological processes occurs, however, there is no guarantee that current theories will be sufficient to help consider and resolve new quandaries. Let us hope that if this scenario should ever arise, new ethical and legal theory will be adequate to the task (Morse, 2016).

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