

# Letter to the Editor

## Neuroscience and law: revolutionizing criminal proceedings, despite a few pitfalls

Dear Editor,

The association between law and neuroscience has been gaining ever growing relevance the past years, and so has the importance of neuroscientific evidence. Indeed, the degree of reliability and effectiveness of legal systems in assessing human behavior and imposing punishment is closely connected to the evaluation of evidence on why and how individuals acted as they did. Neuroscience can often be instrumental in shedding a light on those aspects. Furthermore, attorneys have an ethical obligation to act in their clients' best interests, thus they are understandably interested in any new means that could provide additional valuable information, for the purpose of rationalizing and/or contextualizing a defendant's conduct. The same would apply to judges, whose ultimate professional and ethical goal is to serve truth and justice.

A new, unique field has therefore been developing, which goes in lockstep with neuroscientific research: *neurolaw*, which over the past fifteen years has drawn a great deal of attention. Several studies<sup>1,2</sup> have shown the ever-growing interest in the neuroscientific explanation and interpretation of criminal, aggressive, and antisocial behaviors, as well as its controversial nature when determining the culpability of a particular criminal defendant. It is generally assumed, according to the rule of law, that individuals are responsible for their deeds. Some exceptions are admitted, however, through the application of sensible psychological criteria: the evaluation of a defendant's understanding, their intentions, the capability for rational thinking and self-control at the time when the alleged crime was committed<sup>3</sup>. Within such a framework, one more source of evidence regarding these psychological states and traits can be provided by neuroscience and the evidence obtained from it. A worldwide legal debate is ongoing, largely focused on the applications and uses of *neurolaw*-related methodologies for forensic purposes. The United States has been leading the way: extensive case law has already developed and significant targeted initiatives (see the Law and Neuroscience Project funded by the Mc Arthur Foundation) have been initiated. In US legal proceedings, the way that scientific evidence is acquired may appear quite peculiar. Indeed, it is up to the parties to bring scientific evidence before the courts, and that may be one of the reasons why the United States is at the forefront. In Europe, the European Association for Neuroscience and Law (EANL), spearheaded by the Italian University of Pavia (which also comprises neuroscientists, jurists, and ethicists from Britain, Italy, Belgium, Germany, France, The Netherlands, Spain, and partnerships with US, Canada and Australia) proves that the interest in the legal ramifications of neuroscience is well-developed and growing. These projects are primarily aimed at clarifying and expounding upon the implications of new neuroscientific findings on different legal systems from a comparative, interdisciplinary and international perspective.

Neuroscience may help substantiate and ascertain a defendant's or a plaintiff's current mental state, which could prove essential when trying to determine, for instance, whether an individual is actually experiencing the feelings that they claim (such as pain, anguish, distress). It is worth pointing out that legal systems worldwide make millions of such determinations every year, often relying on little proof, aside from self-reports from claimants themselves. Neuroimaging results, although not perfect, may be much more reliable than the current tools, in this regard<sup>4</sup>. Other aspects that may be clarified and detected through neuroscience are whether an individual has a particular emotional response to something, or actually recognizes something or whether he or she is being untruthful or attempting to deceive. Such "mind-reading" techniques, once fully developed, may turn out to be invaluable tools in a court of law.

It is also worth noting that neurotechniques may offer another potentially wide-ranging opportunity in the legal realm: the identification of biomarkers indicating anxiety disorders (such as post-traumatic stress disorder), which might not only lead to more effective therapeutic options, but also to a better and more accurate assessment of such psychological disorders; that ability would have clear implications for the calculation of compensatory damages, in tort as well as in criminal cases<sup>5</sup>.

Neuroscience is potentially valuable in three major subfields of criminal justice proceedings:

- The evaluation of credibility, i.e., the effort to detect fabrications, manipulations, and lies or the very knowledge associated with a crime
- Assessment of brain capacity through neuroscientific tools to establish culpability, especially among adolescent suspects
- Estimation of the risk for future recidivism<sup>6</sup>.

Furthermore, neuroscience could result in new means and methods for enhancing mental abilities. This might have a ripple effect in the legal realm as well. The non-medical use of therapeutic drugs such as Adderall or Ritalin, among many other nootropics (or “smart drugs”<sup>8,9</sup>), for their supposedly cognitive enhancing capabilities, has been controversial, and there is still no consensus on whether or not, or to what extent, such drugs are actually effective<sup>10</sup>. Besides, a renewed interest in “older” prescription drugs has been observed (e.g., beta blockers used to allay performance anxiety) or illicit psychostimulants, such as cocaine or amphetamines, sometimes in different forms or doses<sup>11,12</sup>. In a general way, the application of such methods in legal settings may cause the risk of encouraging the excessive prescription of psychotropic drugs, and a higher degree of misuse of cognitive enhancers<sup>13</sup>. New drugs meant to improve cognition in healthy users clearly present thorny public policy challenges. We believe that their use is not inherently unethical, yet steps should be taken to ensure that they are harmless when used properly, widely available (so as to promote equal opportunities for all, whether students or professionals), and that individuals are free to choose whether or not to use them; the use of such drugs to enhance the level of performance in specific workplaces has been reported by several sources<sup>14,15</sup>. Nonetheless, if drugs or devices effective in “enhancing” the mental and cognitive capabilities were indeed available, what role should they play within society as a whole, and in the legal system in particular? Would it be desirable and justifiable, for instance, to “enhance” the memories and recollections of witnesses in a trial? Would pharmacological interventions be justifiable to achieve legal goals (e.g., administering drugs that would help to reduce recidivism)<sup>16</sup>? In that respect, the Italian Code of Criminal Procedure, under article 188, unequivocally states that “the use of methods and techniques aimed at affecting self-determination or altering someone’s ability to recall events or assess facts” are banned, irrespective of the individual’s consent<sup>17</sup>. The prohibition also includes pharmacological tools (e.g., the so-called “truth serum”), in addition to polygraphs (lying-detector tests), hypnosis, and brain-imaging.

Such “atypical” forms of evidence shall, therefore, be deemed inadmissible by the judge, according to article 189 of the same statutes<sup>18</sup>.

Such an interpretation begs the questions: are individual liberties threatened by the incursion of neuroscience into the legal sphere? And just as importantly: what legal protections are there (or should be crafted) to counter such threats<sup>19</sup>?

There is no denying that neuroscience is a powerful tool, whether it is used to achieve medical or legal objectives. Hence, should the law view the rise of these new technologies as a new challenge for regulators? We believe that it should<sup>20</sup>. New policy implications are likely to come to the fore, as far as neuroscience is concerned. Legal frameworks usually have a distinct national, jurisdiction-based connotation, yet science arguably has a transnational scope dimension; legal solutions should, therefore, be less jurisdiction-bound than ever before, since they are confronted with issues brought about by scientific advances in a global era. Research on the courts’ use of evidence derived from neuroscience will become increasingly relevant as the field expands worldwide. In conclusion, we feel that it will be of utmost importance to foster an international, broad-ranging collaboration between jurists and neuroscientists, for the sake of justice and equality worldwide. Neuroscience has the potential to change the way the judicial system operates. A fruitful, constructive cooperation between neurological scientists and the criminal justice system would yield significant benefits for society as a whole. Neuroscience researchers are outlining and mapping neural circuits, thus clarifying the changes involved in violence, addiction, and mental disorders. Neuro-

logical devices are now being developed, designed to help mental patients or substance abusers when traditional pharmaceutical therapeutic methods fail. It is therefore necessary to bring modern neuroscience into the criminal justice system<sup>21</sup>.

### Conflict of Interest

The Author declares that she has no conflict of interests.

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- 17) THE ITALIAN CODE OF CRIMINAL PROCEDURE, Art. 188: «Methods or techniques which may influence the freedom of self-determination or alter the capacity to recall and evaluate facts shall not be used, not even with the consent of the person concerned».
- 18) THE ITALIAN CODE OF CRIMINAL PROCEDURE, Art. 189: «If evidence not regulated by law is requested, the court may introduce it if it is deemed suitable to determine the facts and does not compromise the moral freedom of the person. After hearing the parties on the methods for gathering evidence, the court shall order the admission of evidence».
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