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Neuroprevention: Developing Legal Policies in Risk Assessment Without Aspiring to Predict Crime

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What should be the ultimate purpose of punishment in criminal law? Is it possible to apply measures that do not only pursue a simple retributive punishment but, at the same time, can help to: (a) reduce the risk of recidivism by serving as complementary measures to the penalty and (b) reduce incarceration rates without endangering public safety? Our proposal is to conceptualize the risk assessment of recidivism, and of criminal acts in general, from what we call "neuroprevention."

We argue that the commonly used term of *neuroprediction* implies a deeply deterministic, even fatalistic interpretation, of individual behavior, that may lead to a stigmatization of the prisoner or probationer. Furthermore, this can lead to a paradoxical, even dangerous interpretation of the legal policies related to recidivism and criminal acts. Neuroprediction becomes paradoxical when it implies that the system gives itself the power to change the course of future events that, at the same time, it considers to be largely inevitable. This is also a dangerous idea because it could be exploited in certain circumstances to legitimize dictatorial practices.

However, we are convinced that neuroscientific tools and evidence can contribute to reducing crime rates and to a more efficient use of resources destined for risk assessment and criminal prosecutions. This can be accomplished by renouncing the aspiration to predict crime and replacing it with the intention to *prevent* it, which we consider more realistic and fair. There is no implicit acceptance of the inevitable here. Rather, the emphasis is placed on anticipating the possible or probable, but never conclusively determining it. The double objective pursued by the neuroprevention paradigm is that measures and strategies can be adopted for not only improving public safety, but also for offering the prisoner or probationer a real, scientifically-based opportunity to reintegrate into society by providing adequate intervention and training.

We are convinced that our approach would make it easier for policy-makers and citizens to realize that the advances in neuroscience suggest exciting paths toward a more beneficial, flexible, and humane justice system, one with a more complete and in-depth view of criminal behavior.

Keywords: neuroprevention, neuroprediction, risk assessment, criminal recidivism, criminal punishment

Introduction

The fact that you prevent it from happening doesn't change the fact that it was going to happen.
- *Minority Report*

What should be the ultimate purpose of punishment in criminal law? If we consider retributive (i.e., absolute) theories, penalty must be understood as an end in itself, justifying the administration of a punishment proportional to the damage caused. If, on the other hand, we look at utilitarian (i.e., relative) theories, punishment should serve to prevent the repetition of criminal acts, either through imprisonment, confiscation of property or even capital punishment, as is the case for many states in the US, among other measures. However, as Foucault pointed out, prisons alone do not serve to reduce crime rates.[1] This has been recently shown, for example, by David J. Harding and his colleagues. In their study,

> [d]rawing on data from a population-based cohort of individuals convicted of a felony in Michigan between 2003 and 2006 (n = 111,110) and followed through June 2015, [these researchers] compared the rates of commission of violent crime committed by individuals sentenced to prison with those of individuals sentenced to probation using a natural experiment based on the random assignment of

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> judges to criminal cases. Being sentenced to prison had no significant effects on arrests or convictions for violent crimes after release from prison, but imprisonment modestly reduced the probability of violence if comparisons included the effects of incapacitation during imprisonment. These results suggest that for individuals on the current policy margin between prison and probation, imprisonment is an ineffective long-term intervention for violence prevention, as it has, on balance, no rehabilitative or deterrent effects after release.[2]

In this sense, we may ask: Is it possible to apply measures that do not only pursue a simple retributive punishment but, at the same time, can help to: (a) reduce the risk of recidivism by serving as complementary measures to the penalty and (b) reduce incarceration rates without endangering public safety? Our proposal, as we have expressed elsewhere,[3–4] is to conceptualize the risk assessment of recidivism, and of criminal acts in general, from what we call "neuroprevention." This is a paradigm that, although based on assumptions related to the use of neuroscientific instruments for the prediction of crime, introduces different conceptual and philosophical nuances that we believe may be useful for the implementation of public policies that aim to fairly balance security with a respect for the rights of the prisoner or probationer.

Neuroprevention vs. neuroprediction

In recent times, criminologists and psychologists have been carrying out the important but controversial task of attempting to predict criminal behavior by hypothesizing about a person's future patterns of behavior or about particular actions based on the presence or absence of risk factors. While the goal of any such prediction is to be able to correctly identify "future criminals," prediction is not new in the criminological area. There are three milestones that mark its use:

> (1) In the legal and forensic contexts, with the aim of proposing a pre- and post-penitentiary treatment, it was necessary to carry out a diagnosis of "dangerousness" in the individual, whether he or she was judged to be a criminal or a mentally ill person.
>
> (2) The concept and practice of dangerousness began to be superseded, often replaced by an assessment of the risk of violence through an analysis of the probability of future criminal acts. While it is true that both approaches pursue the same purpose, they differ in their justification, effectiveness, and advantages for professionals. The main goal was to provide more specific, concrete, and reliable answers in the communication of three elementary factors: identification, estimation, and assessment of consequences.
>
> (3) The current research being developed with the introduction of neuroscience and more sophisticated methods to understand the structure and functioning of the brain has generated wide interest in the scientific, legal, and forensic realms for the optimization of concepts and processes such as responsibility, guilt, and punishment. What is intended in such legal tasks is, in short, to properly apply the "power of brain science" and the various possibilities that it offers. Among these possibilities is the neuroprediction of crime, which involves the search for possible markers of delinquency or recidivism through several neuroscientific methods (predominantly imaging-based), such as the following:[5–6]
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> - Study of the degree of activation in certain brain areas (i.e., amygdala, anterior temporal cortex, cingulate gyrus, left inferior frontal gyrus, ventral striatum, ventromedial prefrontal cortex).
> - Multi-voxel pattern analysis (MVPA): a statistical model applied to fMRI images obtained from cognitive tasks in order to do "mind-reading."
> - Analysis of the neurochemical role of norepinephrine and cortisol.
>
> - Analysis of the encoding role of the MAOA gene.

Neuroprediction is a term widely used in research concerning the implications of neuroscience for legal practices and policies (i.e., neurolaw), as evidenced by its inclusion in the title of several outstanding publications from the last decade in this field.[5–10] What are its implications at the semantic level? The Oxford English Dictionary defines *predict* (meaning no. 2) as "to foretell, prophesy, announce beforehand (an event, etc.)."[11] We could then define neuroprediction as "the foretelling, prophecy, and/or announcement beforehand of a criminal event in the light of neuroscientific tools and evidence." This implies a deeply deterministic, even fatalistic interpretation, of individual behavior, assuming in practice that criminal acts whose risk is being assessed will necessarily happen.

We have highlighted two major problems in this

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perspective on risk assessment.[3–4] First, although there is no doubt that neuroprediction is based on knowledge derived from neuroscience, its approach may allow for misunderstandings or misinterpretations by which some policy-makers or citizens may believe that neuroprediction is intended to know, with absolute certainty, which specific behaviors will be carried out by an individual. This may lead to a stigmatization of the prisoner or probationer that brings us back to the outdated, inappropriate approach based on dangerousness. A criminal act not yet happened would be considered inevitable, thus classifying the individual as someone inherently "dangerous" and, consequently, as someone whose essence must be modified. Employing this mode of thought, the sad reality of the prison system summons a legal consequence in the form of imprisonment or extension of sentences. Furthermore, there is an underlying reductionist view according to which mental, volitional and cognitive life would be reduced to the nervous system or, even more reductionist, to the brain. In essence, a human being would be equivalent to a kind of "brain machine," and her/his life would be mechanically determined by the uncontrolled operations of this machine. On the contrary, it must be recognized that the external manifestations of such biological factors also depend decisively on an individual's social and physical environment.

Regarding the second problem, we believe that neuroprediction can lead to a paradoxical, even dangerous interpretation of the legal policies related to recidivism and criminal acts. Neuroprediction becomes paradoxical when, surprisingly similar to what happens in the film *Minority Report*, it implies that:

> (1) The future criminal act *will necessarily occur*; the offender cannot impede its occurrence
>
> AND
>
> (2) This criminal act *will not necessarily occur*; the legal system can impede its occurrence.

Therefore, in regard to legal policies, neuropredicting implies that the system gives itself the power to change the course of future events that, at the same time, it considers to be largely inevitable. The transformation of this paradoxical idea into a dangerous idea becomes evident if we consider its eventual generalization. It could be exploited in certain circumstances and by certain powers or individuals to legitimize, through a manipulative interpretation of scientific evidence, dictatorial practices in which citizens should accept that they are incapable of making their own decisions about their futures and that the system and their rulers should make those decisions in their place.

However, these problems are no reason to ignore the possibility that neuroscience may play a decisive role in risk assessment. In fact, we are convinced that, properly interpreted and translated into legal policies and practices, neuroscientific tools and evidence can contribute to reducing crime rates and to a more efficient use of resources destined for risk assessment and criminal prosecutions. This can be accomplished by renouncing the aspiration to *predict* crime and replacing it with the intention to *prevent* it, which we consider more realistic and fair. The Oxford English Dictionary defines *prevention* (meaning no. 3) as an "action or occurrence before or in anticipation of the expected, appointed, or normal time; anticipation."[11] Accordingly, we propose a new meaning for the term *neuroprevention*, leaving aside the health realm,[12] by defining it as:

> *An action taken by legal system operators in anticipation of an expected (not determined) criminal behavior in the light of neuroscientific tools and evidence.*

There is no implicit acceptance of the inevitable here (prediction). Rather, the emphasis is placed on anticipating the possible or probable, never conclusively determining it.

What does neuroprevention imply?

It is very important to expand upon this short, approximative definition and list what elements should form the essential components of this paradigm. In this regard, neuroprevention invites the implementation of a comprehensive policy[3–4] that should:

> (1) Always consider not only biological factors, but also environmental and social factors in pursuit of a global, non-reductionist approach
>
> (2) Allow regular and methodical monitoring of the various cognitive traits with criminogenic relevance, with the aim of suppressing, or at least sufficiently reducing, their influence on the occurrence of criminal behaviors
>
> (3) Facilitate the management by justice system operators in the following areas: (a) criminological investigations focused on understanding criminal behavior, (b) procedures for assessing liability and information on sentences, and (c) early detection of risk factors that allows timely interventions in favor of the alleged criminal or person deprived of liberty through the

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> application of training practices in cognitive skills aimed at reducing these factors.

In short, the double objective pursued by the neuroprevention paradigm is that measures and strategies can be adopted for not only improving public safety, but also for offering the prisoner or probationer a real, scientifically-based opportunity to reintegrate into society by providing better incentives. A key strategy to achieve the second goal is to adequately attend the needs of the offender by implementing rehabilitation programs aimed to improve dynamic, cognitive factors relevant to offense. Importantly, this implementation requires leaving behind "neuroessentialist" views (based on intrinsic dangerousness) that still remain even among legal system operators. This problem has been recently highlighted by researchers from Duke and Rutgers whose

> study demonstrates that such (neuro) essentialist biases might also color the perceptions of sex offenders by treatment professionals committed to patients' rehabilitation. A qualitative analysis of eleven semi-structured interviews with sex offender treatment providers in the state of Pennsylvania reveals that treatment providers demonstrate particular essentialist biases toward sex offenders, including a tendency to explain their behavior by appeal to inherent brain abnormalities.[13]

A recent paper by a team from the Center for Science & Law (SciLaw) demonstrates that the approach we propose is not a utopian scheme and that it can be supported by evidence. Despite the title of this publication referring to "predicting reoffense,"[14] we actually think this work is an excellent example of what the neuroprevention of crime should be. This team used a tablet-based software program composed of seven neuropsychological tests to evaluate various criminogenic factors (such as risk seeking, impulsivity, aggression, etc.) in order to establish the risk of recidivism in 730 probationers from Houston, Texas. The effectiveness of this NeuroCognitive Risk Assessment (NCRA) was found to be equal to or better than that of several well-known paper-based assessment tests, such as the PCRA, COMPAS, WRAN, and LSI-R, to name just a few. This tool has the added advantage of cost effectiveness since it is self-administered in groups and requires little supervision and training from the operators. What makes this resource even more interesting is that: (a) the evaluated factors are dynamic and subject to improvement through adequate intervention and (b) it ignores other factors such as legal antecedents, race, and employment or educational status. There is no room here for unscientific tools (e.g., criminal records) and opaque methodologies (e.g., "black boxes," that is, input-output algorithms whose calculations are not disclosed). Rather, the NCRA applies neuroscientific methods with public safety in mind but, at the same time, avoids the stigmatization of the probationer by taking their past "out of the equation" and focusing on which factors should be trained to facilitate their reintegration into society. These two aims give this tool the best of both worlds, just as neuroprevention aspires to achieve.

Final remarks

Of course, neuroprevention should always seek an optimal balance point between public safety and respect for the basic rights of the criminal or probationer. Consider, for example, what would be the eventual consequences of either exceeding or not reaching the appropriate balance in the case of an inmate whose parole is being assessed through this paradigm. A late liberation (i.e., bias in favor of security) could erode the inmate's right to reintegrate into society in due time. On the contrary, a premature liberation (i.e., bias in favor of the inmate) could not only pose an unacceptable risk for security, but could also spoil all the intervention work carried out with the inmate, as well as her/his options to be reintegrated at the proper time, owing to the likelihood of a new conviction. In either case, this problem is not exclusive to neuroprevention, since finding this balance point is also a challenge for traditional methodologies, such as those related to paper-based tests.

Terrorism is not predicted; it is prevented.[15] Violence against women also implies clear prevention policies.[16] Why not assume and normalize that the incidence of all kind of criminal acts must be prevented and thereby abandon any aspirations for prediction? Our proposal is not merely semantic in nature since it brings with it a comprehensive approach to how risk assessment should be applied. Furthermore, it takes into account multiple complementary factors, and also seeks to assist policy-makers in their search for a more efficient and fair legal system. But even if the proposal is limited only to semantics, it can serve an appreciated function. The value of meaning should never be underestimated and, in this sense, we cannot ignore that prevention has less strong and demanding implications than prediction; hence, both policy-makers and citizens could be more receptive and less reluctant to its systemic implementation. We are convinced that our approach would make it easier for all stakeholders to realize that the advances in neuroscience suggest exciting paths for the law, paths toward a more beneficial, flexible, and humane justice system, one with a more complete and in-depth view of criminal

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behavior.

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Competing Interests Statement

The authors declare that there are no potential conflicts of interest regarding the preparation and publication of this manuscript.

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