

Cognitive enhancement in the judiciary

O aprimoramento da cognição no Judiciário

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1. Introduction

Empirical research indicates that – like jurors, lawyers, and people in general – judges are frequently affected by intuitive processes to make case decisions. Although this automatic way of thinking can be surprisingly accurate, it can also lead to severe and systematic errors, especially in the courtroom. Evidence shows that judicial decisions are also prone to implicit biases, such as ingroup favoring, anchoring, statistical inferences, hindsight, and racial bias.

Given the high stakes in judicial decision-making not only for the parties directly affected but for society in general, the question of improving the quality of those decisions is important. Judicial review, workload reduction, adequate legal education and training are some of the methods commonly pointed out to reach that goal.

Judicial decision-making involves multiple tasks, each of which use various cognitive and emotional processes to different degrees. Albeit there are a growing number of investigations exploring the possibility of applying technologies to enhance cognitive function, there is virtually no research exploring the possibility of using these techniques to enhance *judicial* cognition.

Thus, this article aims at advancing such a discussion, by investigating the ways in which cognitive enhancement could improve the quality

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of judicial decisions. It also asks whether there could be a moral duty for judges to undergo cognitive enhancement under the specific ethical framework of virtue jurisprudence.

The breadth of the theoretical bases on which the proposed research is based implies, necessarily, its development from an interdisciplinary perspective that addresses not only ethical and legal aspects of the problem, but also aspects relating to cognitive psychology, behavioral law and economics (BLE) and neuroscience. Methodologically speaking, the proposed research is essentially theoretical and bibliographic, drawing on direct and indirect sources for a comprehensive review of the theme.

The paper will be developed as follows. First, the main theories comprising judicial behavior will be briefly analyzed in light of scientific evidence regarding judicial decision-making, in order to bring some clarity into how judges decide, how they are affected by external influences that are not relevant to the proceedings, and the heuristics and biases they are prone to. These insights will reveal what aspects of judicial cognitive processes could benefit from enhancement, and focus will be given to evaluating traditional and technological methods for enhancing cognition.

Then, literature regarding the ethics of human (especially cognitive) enhancement will be explored in order to analyze the possibility of deriving some common ground on which to build an ethical framework for judicial enhancement. Finally, the problem of whether there could be a moral duty for judges to cognitively enhance themselves will be approached through the lens of virtue ethics and virtue jurisprudence. The main findings and results of the research will be synthesized in the conclusion.

2. Judicial decision-making and implicit biases

The study of judicial behavior constitutes the study of the reasons behind judge's decisions, how to predict them and how to explain them¹. In other words, it encompasses the question of how do judges judge. This field has deeply mutated throughout the 20th century, with arguments mainly revolving around two venerable (and opposing) models of judging: the formalist and the realist.

1 MAVEETY, 2003.

Formalists argue that judges decide based on the mechanical interaction between norms within a legal order, in a similar fashion to that of a rational economic actor. According to them, judges apply the governing law to the facts of a case in a logical, mechanical, and deliberative way². Legal formalism, then, is descriptive theory of adjudication, according to which the law is rationally determinate, and judging is mechanical. It thus follows that legal reasoning is autonomous, since the class of legal reasons suffices to justify a unique outcome, with no recourse to non-legal reasons being required³.

On the other hand, legal realism posits that judges follow an intuitive process to reach conclusions – which only later are rationalized with deliberative reasoning⁴. For the realists, judges decide intuitively, using deliberative faculties afterwards to rationalize that intuition not only to themselves but also to the rest of society⁵. In short, legal realism challenges the idea of classical rationality by arguing that judges must be viewed as individuals with their own psychological quirks, which directly influence the outcome of their decisions.

Neither model of legal judging has proved satisfactory. Even though judges frequently rely on intuition, they do not decide based solely on it, but rather apply legal rules to facts. Considering this, contemporary scholars of judicial behavior have put the limits of judicial cognition to test over the last decades, borrowing concepts and tools from the field of cognitive psychology.

In this context, Guthrie et al.⁶ have proposed the “intuitive-override” model of judging, which posits that judges generally make intuitive decisions but sometimes override their intuition with deliberation. The authors describe it as a less idealistic model than the formal, but also less cynical than the realist, blending into a “realistic formalism”. Their model is realistic in as much as it recognizes the important role of judicial intuition, and formalist in the sense that it recognizes the importance of deliberation in constraining the influence of the said intuition.

2 NEUBORNE, 1992.

3 LEITER, 1999.

4 HUTCHESON, 1929.

5 GUTHRIE et al., 2007.

6 GUTHRIE et al., 2007, p. 130.

This dual process of judging is based on psychological research on judgment and choice and builds on insights from dual-system or two-process models of cognition, which distinguish between intuitive and deliberative processes. Adopting terms originally proposed by Stanovich and West⁷, Kahneman describes the two systems as follows:

System 1 operates automatically and quickly, with little or no effort and no sense of voluntary control.

System 2 allocates attention to the effortful mental activities that demand it, including complex computations. The operations of System 2 are often associated with the subjective experience of agency, choice, and concentration⁸.

The capabilities of System 1, which encompasses intuitive processes, include innate skills that are shared with other animals. Intuitive responses can also emerge from repetition of the same deliberative procedure, becoming fast and automatic through prolonged practice. Knowledge stored in memory can then be accessed without much effort. Being automatic, quick and easily invoked, intuition can easily dominate deliberation⁹.

System 2 encompasses deliberative processes, which are “mental operations requiring effort, motivation, concentration, and the execution of learned rules”¹⁰. Associated with controlled processing, they are “deliberate, rule-governed, effortful, and slow”¹¹. System 2 also has some ability to change the way System 1 works, by programming the normally automatic functions of attention and memory¹².

The division of labor between System 1 and System 2 is highly efficient, minimizing cognitive effort and optimizing performance. As Kahneman explains, the arrangement works well most of the time because System 1 is generally particularly good at modelling familiar situations, making short-term predictions, and initially reacting to challenges appropriately¹³.

7 STANOVICH; WEST, 2000.

8 KAHNEMAN, 2011, p. 29.

9 HOGARTH, 2010.

10 FREDERICK, 2005.

11 KAHNEMAN; FREDERICK, 2002.

12 KAHNEMAN, 2011.

13 KAHNEMAN, 2011.

System 1 quickly proposes intuitive answers to judgment problems as they arise, and System 2 monitors the quality of these proposals – endorsing, correcting, or overriding them. The judgments that are eventually expressed are called intuitive if they retain the hypothesized initial proposal without much modification¹⁴.

System 1 thinking, however, is prone to biases, i.e., “systematic errors that predictably recur in particular circumstances”¹⁵. Especially in the context of judicial decision-making, intuitive judging is more likely than deliberation to lead judges astray, and litigants might be adversely affected by judicial overreliance on intuition¹⁶.

There is no short of scientific evidence on this unconscious overreliance on intuition regarding judicial behavior. One of the most famous examples comes from a research made by Danziger et al.¹⁷, on which a review of sample parole decisions revealed that the proportion of favorable decisions was highest at the beginning of the day and after each food break, declining to near zero during each decision sessions. The authors interpreted this as a case of depletion of mental resources, which caused judges to default to the *status quo* of maintaining incarceration.

An effort of will or self-control is tiring, drawing from a shared pool of mental energy. After forcing oneself to do something, it is more likely that, when the next challenge comes around, a person will be less willing or less able to exert the same amount of self-control¹⁸.

This phenomenon has been named ego depletion, and its effects can be (at least partially) undone by ingesting glucose. The nervous system consumes more glucose than most other parts of the body, and effortful mental activity is especially consuming of it. The active involvement in difficult cognitive reasoning or in activities that require self-control results in a drop of blood glucose levels¹⁹. This is an example of how a simple intervention could improve the quality of judicial decision-making.

14 KAHNEMAN; FREDERICK, 2002.

15 KAHNEMAN, 2011, p. 10.

16 GUTHRIE et al., 2007.

17 DANZIGER et al., 2011.

18 BAUMEISTER et al., 1998.

19 GAILLIOT; BAUMEISTER, 2007.

Judges are also prone to cognitive biases such as anchoring, hindsight, base rate neglect, among others. Anchoring refers to an excessive reliance on numeric reference points when making numeric judgments. In many situations, people make estimates by starting from an initial value that is adjusted to yield the final answer. The initial value (called an “anchor”) may be suggested by the formulation of the problem, or it may be the result of a partial computation. In either case, adjustments are typically insufficient – different starting points yield different estimates, which are biased toward the initial values²⁰.

A series of studies have shown that numeric anchors influence how judges determine appropriate damage awards, criminal sentences, and fines²¹. The problem with anchors is that they create powerful intuitions even when they are meaningless, and research has revealed that they are able to influence statutory damage caps that exceed the expected award, the jurisdictional minimum in federal court, prior criminal sentences in unrelated cases, and extreme settlement offers²².

In its turn, hindsight bias is the tendency to overestimate the predictability of past events. The bias arises from an intuitive sense that the outcome that actually happened must have been inevitable. Because judges usually evaluate events after the fact, they are vulnerable to the hindsight bias²³.

Intuitive judicial decision-making is also affected by the representativeness heuristic, which results in the tendency to undervalue statistical information, leading to decision errors such as base rate neglect (discounting information about the frequency with which the underlying category occurs) and insensitivity to sample size²⁴. Notwithstanding the high relevance of base-rate statistics, judges, just like non-judges, discount their probative value in favor of impressionistic and intuitive reactions to the representativeness of the information²⁵.

20 KAHNEMAN; TVERSKY, 1974.

21 See RACHLINSKI et al., 2015; GUTHRIE et al., 2009.

22 See LAPPI-SEPPÄLÄ, 2001; BUSHWAY et al., 2012; LEIFER; SAMPLE, 2010.

23 See KAMIN; RACHLINSKI, 1995; GULATI et al., 2004.

24 KAHNEMAN; TVERSKY, 1974.

25 GUTHRIE et al., 2007. Examples can be found in GUTHRIE et al., 2001; RACHLINSKI et al., 2006; WISTRICH et al., 2007.

Of particular relevance are studies that show that judges are prone to ingroup favoritism, emotional decision-making, as well as racial and gender biases. When it comes to ingroup favoritism, evidence suggests that even meaningless distinctions between people are enough to promote it. As Tajfel and Turner²⁶ explain, the mere perception of belonging to two distinct groups is sufficient to trigger intergroup discrimination favoring the in-group.

In the judicial process, diversity jurisdiction exists due to the concern that litigants might not get equal justice when pursuing or defending claims outside of their home states. Even if most judges would reject such an overt bias, research by Wistrich et al.²⁷ testing this influence on judges resulted in their expression of a large in-state bias.

Judges also face other sources of potentially misleading intuitions when deciding cases, amongst which the influence of inadmissible evidence. Contrary to jury, judges cannot shield themselves from inadmissible evidence, and even though they have better understanding on why some evidence must be excluded from their analysis, they are unlikely to have developed any meaningful ability to compartmentalize it. Relevant but inadmissible evidence can create an intuitive sense of how a case should be resolved, and that intuitive sense likely influences how judges decide²⁸.

In a series of studies that compared decisions in hypothetical cases made by judges who were exposed to inadmissible information and by those who were not, judges found it difficult to ignore inadmissible information, relying on it to decide on the cases presented²⁹. Other studies have found a similar inability to disregard inadmissible evidence in contexts such as discussions protected by attorney-client privilege; the past criminal conviction of a civil defendant; discussions that occurred during a settlement conference; and statements made by a criminal defendant that a prosecutor had agreed not to use as part of a plea agreement³⁰. The one area in which judges clearly ignored inadmissible evidence was in making

26 TAJFEL; TURNER, 1979.

27 WISTRICH et al., 2015.

28 WISTRICH; RACHLINSKI, 2017.

29 WISTRICH et al., 2005.

30 For all, see RACHLINSKI et al., 2013.

probable cause determinations³¹. Being an area of law that requires judges to focus on the relevant precedent, engaging in a deliberative analysis, they were nudged to look beyond their intuitive reactions³².

Judges also have emotional reactions to cases or litigants that can shape or guide their legal judgments. Invidious reactions based on race and gender commonly manifest as emotional reactions that are hard to ignore, but they can also be erratic and present little or no relevance to case outcomes³³.

In one study, judges were asked to evaluate a (hypothetical) statute meant to shield the use of medical marijuana from prosecution. Results show that the defendant's characteristics influenced the outcome, with judges being less inclined to rule favorably for a defendant described as a 19-year-old taking the drug to combat seizures than for a defendant described as a 55-year-old who was dying of bone cancer³⁴.

In another research, judges were more inclined to rule in favor of an undocumented immigrant who had entered the US to earn money for a sick daughter than one who was tracking down a rogue member of a drug cartel; to rule a city jail's blanket strip-search policy was unconstitutional when the lead plaintiff was a co-ed protestor than a male armed robber; and to determine that the search of an employee's locker was constitutionally acceptable when the search uncovered a large quantity of heroin than when it uncovered only two marijuana cigarettes³⁵.

Finally, judicial decision-making is also prone to gender and racial biases. Researchers found that decisions federal appellate judges made in cases involving gender discrimination claims changed after judges fathered a daughter³⁶. In a hypothetical scenario of wrongful death, judges award more in compensatory damages for lost wages for a deceased male than a deceased female; treat male and female parents differently in divorce cases; and impose shorter sentences on female than male defendants with iden-

31 RACHLISNKI et al., 2011.

32 WISTRICH; RACHLINSKI, 2017.

33 WISTRICH; RACHLINSKI, 2017.

34 WISTRICH et al., 2015.

35 WISTRICH et al., 2015.

36 GLYNN; SEN, 2015.

tical backgrounds, convicted of identical crimes³⁷. Women convicted of drug offenses in federal court appear to draw shorter sentences than their male counterparts do, even when researchers control for background characteristics of the litigants³⁸.

Judges harbor the same measure of implicit biases concerning African Americans as most lay adults when tested with the Implicit Association Test (IAT, the most widely studied measure of implicit biases)³⁹. The judges who harbored strong white-positive/black-negative associations on the IAT assigned more severe dispositions to the juvenile after being primed with African American words than when primed with race-neutral words. In turn, judges who harbored white-negative/black-positive associations on the IAT treated the juvenile less harshly after being primed with African American words⁴⁰. However, explicit references in the testing materials to race triggered System 2 thinking on the subjects, forcing them to focus on the relevant elements of self-defense. When the materials did not explicitly identify the defendant's race but merely suggested it unconsciously, implicit associations influenced the judges⁴¹.

Levinson et al.⁴² also found that federal judges harbor invidious biases concerning Jewish, Christian, and Asian litigants. There is also evidence suggesting that judges treat white and black litigants differently in bail hearings⁴³; exhibit modest racial disparities in criminal sentences favoring defendants of their own race⁴⁴; impose harsher sentences on dark-skinned defendants⁴⁵; and are more likely to deviate favorably from sentencing guidelines for white than for black defendants⁴⁶.

In sum, all the aforementioned studies serve to corroborate Guthrie, Rachlinski and Wistrich's intuitive-override model of judging, setting aside other purely formalistic or realistic models that try to explain judicial be-

37 For all, see SPOHN, 2013.

38 MUSTARD, 2001.

39 RACHLINSKI et al., 2009.

40 WISTRICH; RACHLINSKI, 2017.

41 RACHLINSKI et al., 2009.

42 LEVINSON et al., 2017.

43 AYRES; WALDFOGEL, 1994.

44 ABRAMS et al., 2012.

45 BURCH, 2015.

46 MUSTARD, 2001.

havior. Judges frequently fall prey to the same systematic errors that lay people present when making decisions, due to the effects of cognitive heuristics and biases.

3. Enhancing judicial cognition

Differently from most of the decisions that lay people are required to make, however, there are high stakes involved in judicial decision-making not only for the parties directly involved in a case, but also for society in general. This raises the question of how the judicial decision-making could be improved to result in more fair and impartial outcomes.

Practices aimed at enhancing human cognition have been around for thousands of years, the prime example being education, which aims at improving general mental faculties⁴⁷. Other examples include training (e.g., mnemonics) and meditation. On a very basic level, most people employ cognitive boosting strategies such as sleeping and exposing oneself to stimulating and complex environments. In addition, a lot of people also have personal experiences with cognitive enhancing substances such as caffeine, nicotine, and glucose, used to increase mental functioning⁴⁸. All of these may be labeled as conventional means of enhancing cognition, which are often well established and culturally accepted.

When it comes to enhancing judicial cognition, some factors, such as adequate legal education, experience, and a good mental and physical state (e.g., adequate rest, nutrition, health), are obvious candidates for the task⁴⁹. Judicial review and auditing, the adoption of scripts, checklists, and multifactor tests, training and peer-reviewed feedback, opinion writing, reduced workload and even mindfulness meditation have also been suggested⁵⁰.

For instance, justice systems could implement auditing programs to evaluate the decisions of individual judges and to determine whether they appear to be influenced by implicit bias. The institutional context on which judges act provides them little prompt and useful feedback, and existing

47 SANDBERG, 2011.

48 FRÖDING, 2013.

49 CHANDLER; DODEK, 2016.

50 GUTHRIE et al., 2007.

forms of accountability primarily focus on a judge's performance in a particular case, not on the systematic study of long-term patterns within his performance that might reveal implicit bias. This would increase the available data regarding the extent to which bias affects judicial decision making, and it could also enhance the accountability of judicial decision making⁵¹.

Another method for improving the quality of judicial decisions is perspective taking, which basically consists of adopting the viewpoint of other individuals and examining the scenario at issue through the lens of their life experience⁵². This method is present in "social context education" initiatives, which seek to promote fairness and equality within demographically diverse societies by ensuring that judges are aware of and understand the experiences of all of those who may come before them⁵³. The court system could approach the issue by including perspective taking exercises as part of a training course in implicit bias.

Mindfulness targets implicit bias by reducing automatic associations with outgroup members, or with individuals outside of the race or ethnicity one identifies as, with negative concepts⁵⁴. There is evidence suggesting that through the practice of mindfulness meditation, judges can limit their reliance on automatic reactions (such as the ones made in the implicit association tests), allowing for fairer decision making. Research also suggests that mindfulness meditation increases compassionate feelings toward others⁵⁵.

Finally, mindfulness meditation may also help to control conditions that increase the magnitude of implicit bias, such as mood. For example, when people are in a heightened emotional state – be it from stress, anger, or even happiness – implicit bias manifests more strongly in their decisions⁵⁶. Practicing mindfulness meditation can enhance emotional regulation.

Judicial decision-making involves multiple tasks, each of which use various cognitive and emotional processes to different degrees:

51 WISTRICH; RACHLINSKI, 2017.

52 WISTRICH; RACHLINSKI, 2017.

53 CHANDLER; DODEK, 2016.

54 LUEKE; GIBSON, 2015.

55 WISTRICH; RACHLINSKI, 2017.

56 WISTRICH; RACHLINSKI, 2017.

The process of finding the facts involves hearing expert and nonexpert testimony and examining other evidence such as documents or objects; determining the weight to attribute to the evidence based on judgments about credibility, quality, and relevance (...) Trial judges must also apply multiple bodies of law (...) The process of applying the law involves careful deliberative processes including the relevant legal rules, interpreting their meaning, and determining how they apply to the facts of the case at hand. (...) Another important capacity for judges is emotional regulation, given the sometimes upsetting nature of the evidence or the frustrating behavior of some of the parties and lawyers. Concerns about uncontrolled emotional reactions to extremely upsetting evidence are revealed by rules of evidence that weigh the probative value of evidence against its inflammatory or prejudicial effect⁵⁷.

One little explored possibility to enhance these cognitive and emotional aspects of judicial decision-making is through the use of biotechnologies. Cognitive enhancement may be defined as the amplification or extension of core capacities of the mind, through augmentation or improvement of a person's information processing systems, which can be directed at any of the core faculties of the mind⁵⁸, such as attention, perception, and memory.

With the advance of cognitive neuroscience over the past decades, however, the use of biotechnologies aimed at improving cognitive function have steadily expanded⁵⁹. These biomedical enhancements, contrary to previous conventional techniques, use biotechnology to improve an existing capacity by acting directly on the body and brain of an individual⁶⁰.

In this sense, the Science and Technology Office of the European Parliament defines an enhancement as "a modification aimed at improving individual human performance and brought about by science-based or technology-based interventions in the human body"⁶¹. The focus on the scientific and technological aspects of these interventions is useful to distinguish them from cultural, social, and evolutionary processes that can also fit under the broad category of enhancement.

57 CHANDLER; DODEK, 2016, pp. 131-132.

58 SANDBERG, 2011, p. 71.

59 FARAH et al., 2014.

60 BUCHANAN, 2011.

61 EUROPEAN UNION, 2009, p. 13.

In face of the growing number of studies that apply biotechnologies to enhance cognitive function, with positive (albeit moderate) results, this research project aims at investigating the possibility of using these techniques to enhance judicial cognition. Specifically, it will analyze whether it can be said that judges have a moral duty to undergo cognitive enhancement.

Another important distinction refers to the roles of enhanced and enhancer (which can be but need not be the same). Enhanced are those on whom forms of enhancement are performed – in this case, the judges themselves. Enhancers, on the other hand, can be distinguished into operators – such as doctors, nurses, engineers, providers, and all who actually perform the treatment –, and controllers – those who take the initiative and decide about applying the specific enhancement, e.g., a legal authority⁶².

Most debates on cognition enhancement (and human enhancement in general) focus on issues regarding the definition of enhancement and its distinctiveness from therapy/medicine⁶³; safety concerns and risks associated with it⁶⁴; regulation and public policy⁶⁵; distributive justice⁶⁶; autonomy and authenticity⁶⁷; nature and the transcendence of given limitations⁶⁸.

These approaches typically treat enhancement for self-regarding or self-serving purposes⁶⁹. This means that they relate mainly and directly to the individual himself, including the pleasure of excellence or the desire to improve performance (self-regarding purposes), or aiming at economic gain (self-serving purposes). However, if enhancement primarily benefits society as a whole, it may be referred to as enhancement for the common good – an approach that has not received as much attention in the cognitive enhancement debate.

The importance of exploring cognitive enhancement through the lens of common good purpose is important, as highlighted by Vedder and Klaming because it shifts the focus from “whether it is acceptable to enhance

62 VEDDER, 2017.

63 See SAVULESCU et al., 2011; MCKEOWN, 2017.

64 See MASSIE et al., 2017; BELL et al., 2017.

65 See BLANK, 2016; HALL; STRANG, 2017; BOSTROM; ROACHE, 2011.

66 See KEOHANE et al., 2016; BUCHANAN, 2011.

67 JUTH, 2011.

68 See NIELSEN, 2011; SANDEL, 2007.

69 VEDDER; KLAMING, 2010.

normal cognitive functions to the question of under what circumstances it is acceptable and maybe even desirable to apply neurotechnologies for purposes that might benefit society as a whole⁷⁰.

Enhancement of judicial cognition fits under this category, as its underlying goal is to improve the quality of the decisions that are made by judges, reducing unconscious bias and other external influences in order to promote fairer outcomes. Judges wield enormous power over the interests of the litigants before them, as well as indirectly over the interest of all members of the society in the fair and effective administration of justice⁷¹.

Judicial cognition bioenhancement could be pursued through pharmacological substances that have physiological effects on the brain, like modafinil, methylphenidate, and donepezil. In experimental settings, evidence from healthy volunteers shows that they can moderately improve neuropsychological cognitive tasks.

As summarized by de Jongh, donepezil appears to enhance different types of memory, with both acute and repeated administration⁷². However, the small number of existing studies makes it difficult for firm conclusions to be drawn. The cognition-enhancing effects of methylphenidate are limited to memory, specifically spatial working memory, and recognition of verbal materials at longer test intervals. For amphetamine, there is stronger evidence for the enhancement of the consolidation of declarative memory, especially when longer periods intervene between learning and testing. Finally, with modafinil, a clear enhancing effect is found on attention in non-sleep deprived subjects, while in sleep-deprived participants, a single dose of modafinil had strong positive effects on executive functioning, memory, and wakefulness.

Another possible pharmaceutical enhancer is propranolol, a beta-blocker commonly prescribed for hypertension. The drug suppresses noradrenergic activity and reduces the physiological symptoms of emotional arousal. Research done by Terbeck et al.⁷³ tried to determine whether emotional arousal influenced by noradrenergic transmission plays a role in racial bias. By testing the drug's impact on responses to an implicit

70 VEDDER; KLAMING, 2010, pp. 6-7.

71 CHANDLER; DODEK, 2016.

72 De JONGH, 2017, p. 42.

73 TERBECK et al., 2013.

association test, the researchers found that it reduced implicit (but not explicit) racial bias. To the extent that implicit racial bias affects the quality of judicial decisions, propranolol might represent a promising method of enhancement.

In a different study, Terbeck et al.⁷⁴ also found that subjects who took propranolol were less likely to endorse harming one innocent person to save many others, compared to those taking a placebo. This result was contrary to their hypothesis that reduced emotional arousal due to propranolol would lead participants to make utilitarian rather than deontological judgments driven by emotional intuition.

Similarly, research by Crockett et al.⁷⁵ found that citalopram, a serotonin enhancer commonly prescribed as antidepressant, made participants less inclined to accept the utilitarian solution to the moral dilemma of directly harming one innocent person to save many others. The drug was also found to reduce the tendency to punish unfair offers in a version of the ultimatum game.

Another relatively new technology that is being increasingly used to boost human cognition directly at the source by improving brain function is noninvasive brain stimulation (NBS), like transcranial magnetic stimulation (TMS) or transcranial electrical stimulation (tES) – the most common being transcranial direct current stimulation (tDCS).

TMS has been found to improve various cognitive functions, such as analogic reasoning and working memory, and thus raises the possibility that it might be useful for improving certain aspects of learning⁷⁶. Moreover, researchers have also found an improvement in abilities like proof-reading and drawing after TMS⁷⁷. TMS also has the potential to be used to reduce false memories without affecting veridical memories⁷⁸.

Enhancement in executive functions, especially working memory (the ability to hold and manipulate information) is frequently attempted with tDCS, partly because it is believed that strengthening in this cognitive

74 TERBECK et al., 2013.

75 CROCKETT et al., 2010.

76 See PASCUAL-LEONE et al., 2006; FREGNI et al., 2005; MOSER et al., 2002.

77 SNYDER et al., 2003.

78 BOGGIO et al., 2009.

domain may transfer to more global improvement of cognition and function⁷⁹. Fregni et al.⁸⁰ reported improved working memory performance after a single session of tDCS, and other studies have also demonstrated similar benefits in tasks that rely upon working memory⁸¹. There are also noteworthy applications of tDCS involving manipulation of executive functions, which include enhancement in domains such as cognitive set-shifting performance⁸², deceptive behavior⁸³, reduced risk-taking behavior⁸⁴.

Studies that used tDCS to promote self–other representations (i.e. the ability to handle mental representations of both the self and other people, which is fundamental for humans to engage in successful social interactions) have also resulted in positive results⁸⁵.

Sowden et al.⁸⁶ were able to demonstrate that tDCS applied to the right temporo-parietal junction improved lie-detection performance when participants were confronted with statements in which the to-be-judged opinions conflicted with those held by the participants. Sellaro et al.⁸⁷ investigated the enhancing effect of tDCS over the medial prefrontal cortex in counteracting stereotypes activation resulting from in-group versus out-group categorization. In their study, participants who received tDCS showed increased cognitive control over stereotypes activation with a resulting reduced implicit negative bias towards a social out-group.

Neuroenhancement advocates do not claim that today's techniques are optimal, but rather admit that they are not as efficient as desired. Although many of them recommend methylphenidate and/or modafinil for cognitive enhancement purposes, these drugs are not the cognitive enhancers they expect for the future and on which their positive judgments are based⁸⁸.

79 KLINBERG et al., 2002.

80 FREGNI et al., 2005.

81 OHN et al., 2008; ZAEHLE et al., 2011.

82 LEITE et al., 2011.

83 KARIM et al., 2010.

84 FECTEAU et al., 2007.

85 See SANTIESTEBAN et al., 2012; DECETY; SOMMERVILLE, 2003; SPENGLER et al., 2009; BRASS et al., 2009; RUBY; DECETY, 2004.

86 SNOWDEN et al., 2015.

87 SELLARO et al., 2015.

88 HEINZ; MÜLLER, 2017.

Several proponents of cognitive enhancement advocate for more research on the effectiveness and safety of neuroenhancement methods⁸⁹. This request is supported by the fact that knowledge about the positive and negative effects of these methods, especially drugs, is insufficient, at least regarding its nontherapeutic use by persons who consume them for the purpose of enhancement. This holds particularly for the addiction potential of today's and future neuroenhancers⁹⁰.

Optimizing the cognitive effects of enhancements would therefore require, in effect, a search through a high dimensional space whose dimensions are dose; individual characteristics such as genetic, personality, and ability levels; and task characteristics. The mixed results in the current literature may be due to the lack of systematic optimization⁹¹.

Taking into consideration such limitations, there is clearly a need for further research regarding neuroenhancers. Two different research strategies could help provide answers: double-blind, randomized long-term studies with healthy volunteers; and epidemiological studies⁹².

4. The ethics of judicial cognitive enhancement

Despite the existence of multiple ethical theories that aim at explaining a judge's duty, it is possible to derive some agreed upon basic capabilities that define what a good judge and a desirable judicial decision are. These capabilities could potentially benefit from enhancement, whether through conventional techniques or by means of biotechnology.

According to Beck⁹³, many of the existing controversies regarding human enhancement in the end boil down to more general disagreements about morality. Whatever the ethical stance one adopts in the ethics of human enhancement debate, one or more reference points are necessary to assess its morality.

89 GALERT et al., 2009; GREELY et al., 2008.

90 HEINZ; MÜLLER, 2017.

91 SMITH; FARAH, 2011, p. 19.

92 HEINZ; MÜLLER, 2017.

93 BECK, 2015.

Some authors have suggested looking at notions of human nature⁹⁴, human authenticity⁹⁵, or human dignity⁹⁶ to find such reference points.

For example, appeals to notions of human nature serve the point of representing what it means to be human, as in Habermas' appeal against genetically enhancing one's child – something the author argues would threaten human nature: the ability of self-reflection and the autonomy to choose one's own life path⁹⁷. Also, the idea of human nature can feature as a feasibility constraint on morality, with authors like Sandel⁹⁸ considering enhancement objectionable precisely for removing the limitations on what can be done by humans, since there are irreplaceable goods that depend upon our having limitations.

For Fukuyama⁹⁹, the equality of human beings rests on the fact that all share the same human nature, which would be changed if some forms of enhancement were to be implemented. Therefore, any fundamental alterations to this shared nature would result on the fact that human beings would no longer be of equal moral status¹⁰⁰.

Roduit et al.¹⁰¹ suggest one could also find a reference point by looking at the 'ideal' human. According to the authors, the main goal of human enhancement is to become an 'ideal' or even a 'perfect' human being, on the sense that one wishes to enhance towards his or her idealized self.

The authors highlight that even though it is not possible to agree on what an ideal human would look like in all circumstances, or at all times, it is nonetheless possible to look at what some characteristics of an ideal human would be – referring to those as perfectionist assumptions of what it means to live a good human life.

These perfectionist assumptions can constitute a reference point to evaluating the morality of enhancing modifications, in the sense that if a given human enhancement moves in the direction of the chosen ideal, it

94 See HABERMAS, 2003; FUKUYAMA, 2002.

95 See LEVY, 2011; PARENS, 2005.

96 KASS, 2003; KASS, 2004.

97 HABERMAS, 2003.

98 SANDEL, 2007.

99 FUKUYAMA, 2002.

100 WILSON, 2007.

101 RODUIT et al., 2015.

will be seen as morally permitted, assuming there are no moral concerns with other issues of justice, safety and autonomy¹⁰².

In defining perfectionist assumptions, it is possible to identify two main views in the debate: a subjective and an objective one. According to the subjective view, one creates his own ideals, such as a list of subjective goods. This approach is deeply connected to the ethics of authenticity, with individuals being free to enhance towards the ideal he has subjectively chosen for himself (as long as others were not harmed). On the other end of the debate, according to the objective view, the common good is objectively outlined in a list of goods, which can be socially constructed and agreed upon democratically¹⁰³.

For instance, Savulescu outlines some non-exhaustive objective goods such as intelligence, memory, self-discipline, impulse control, foresight, patience, humor, sunny temperament, empathy, imagination, sympathy, fairness, and honesty¹⁰⁴. Buchanan et al.¹⁰⁵ state that these goods are introduced as general-purpose means, which are properties valuable to anyone regardless of what their view of the good life entails.

For Roduit, Heilinger and Baumann¹⁰⁶, the subjective stance does not stand on its own because, once a particular conception of the no-harm principle is outlined, an objective component is introduced. And the main problem with the objective view is the difficulty of reaching agreement in a liberal society about what the objective goods are and what virtues or types should be aimed for:

(...) in a pluralistic society and in different social and historical contexts, we will not find a consensus regarding what an ideal human being ought to be, act like, and look like. We can nonetheless discuss and agree upon some specific human characteristics (perfectionist assumptions) that appear to be essential for such an ideal human in our current societies. These characteristics can then be used as reference points to assess the morality of human enhancements in addition to other normative tools, such as safety, justice and

102 RODUIT et al., 2015.

103 RODUIT et al., 2015.

104 SAVULESCU, 2007.

105 BUCHANAN et al., 2001.

106 RODUIT et al., 2015.

autonomy. With an end-state of human perfection in mind – even if this ideal is not fully developed because it might develop as our societies change – we can have a set of perfectionist assumptions that become essential to leading an ideal life¹⁰⁷.

The authors suggest the adoption of Nussbaum's capabilities approach as a basis on which a theory of ideal humanity can be built. This theoretical framework focuses on the moral importance of individuals achieving well-being, which is understood in terms of people's capabilities, that is, their real opportunities to do and be what they have reason to value¹⁰⁸. Capabilities can be explained in comparison to functioning: People should have a set of opportunities (capabilities) that they are then free to exercise or not (functioning). Functioning is therefore the realization of capabilities¹⁰⁹.

As explained by Sen, capability is primarily a reflection of the freedom to achieve valuable functionings. It concentrates directly on freedom as such rather than on the means to achieve freedom, identifying the real alternatives that an individual has. Insofar as functionings are constitutive of well-being, capability represents a person's freedom to achieve well-being¹¹⁰.

Nussbaum puts forward a list of ten central capabilities, without which human life would be seriously impoverished: life; bodily health; bodily integrity; senses, imagination and thought; emotions; practical reason; affiliation; other species; play; and control over one's environment¹¹¹.

This capabilities approach has also been used by Coeckelbergh to assess human enhancement. For the author, it by providing a framework of an 'end-state' type of thinking, giving direction to human enhancement but not being a fixed end-state, human beings' capabilities are not fixed – but rather change together with the technological and social context¹¹².

Regarding an ethical reference point for the evaluation of judicial cognition enhancement, a similar approach can be found in works about

107 RODUIT et al. 2015, p. 627.

108 NUSSBAUM, 2011.

109 RODUIT et al., 2015.

110 SEN, 1992, p. 49.

111 NUSSBAUM, 2011.

112 COECKELBERGH, 2011.

virtue jurisprudence, a normative and explanatory theory of law that borrows resources from virtue ethics to answer some central questions of legal theory. This theory has been developed by scholars working within specific areas of law, such as tort, bankruptcy, contract, corporate law and property, among others¹¹³.

In Solum's analysis of the implications of a virtue-centred approach for a normative theory of judging, he tries to answer questions such as how should judges decide the controversies that are presented to them. According to the author's proposed virtue-centred theory of judging, "judges should decide cases in accord with the virtues, or judges should render the decisions that would be made by a virtuous judge"¹¹⁴.

For any given normative theory of judging, there is a corresponding account of the qualities that make for a good judge. For instance, in relation to Dworkin's theory of law as integrity¹¹⁵ it might be said that judges should decide cases in accord with the normative theory of law that best fits and justifies the law as a whole.

In order to do so, they need to possess certain characteristics, that Solum calls judicial virtues, which are excellences appropriate to the role of judge. An example would be the intellectual virtue of theoretical wisdom necessary to decide cases by constructing the theory that fits and justifies law as whole (something that can only be done by someone who appreciates legal complexity and sees the subtle interconnections between various legal doctrines)¹¹⁶.

Different normative theories of law may result in different lists of the excellences that are appropriate to judging. If it were possible to agree upon at least some qualities of judicial character necessary for reliably good judging, irrespective of any specific theory of judicial decision, such qualities would constitute what Solum calls a "thin" theory of judicial virtue:

A thin theory of judicial virtues might include the intellectual virtue of theoretical wisdom, which plausibly is necessary for judges to understand complex legal material. Likewise, irrespective of one's particular theory of good

113 CIMINO, 2017.

114 SOLUM, 2003, p. 182.

115 DWORKIN, 1986.

116 SOLUM, 2003.

judging, it might turn out that certain vices are inconsistent with reliably good judging. Judges who are civic cowards, slavishly seeking approval from others, may be incapable of reliably adhering to any coherent and plausible theory of good judicial decision making. A similar claim might be made about judges who are intemperate or avacarious and thus prone to sharp dealing or susceptible bribery. Hence, civic courage and temperance might be considered thin judicial virtues¹¹⁷.

The importance of defining a minimal set of judicial capabilities (a “thin” theory of judicial virtue, in Solum’s words) rests in identifying what characteristics judges must have in order to produce fair outcomes.

As highlighted by Chandler and Dodek¹¹⁸, some common principles may be deduced from the *Bangalore Principles of Judicial Conduct*¹¹⁹, which were endorsed by the UN Human Rights Commission in April 2003 and are recognized and embraced by many legal systems around the world.

Among the six core ethical principles mentioned in it, there is the duty of competence and diligence, according to which a judge must take reasonable steps to maintain and enhance his or her knowledge, skills, and personal qualities necessary for the proper performance of judicial duties, taking advantage for this purpose of the training and other facilities which should be made available, under judicial control, to judges.

According to the authors, the general principle that there is an obligation not just to have a basic level of competence but also to take active steps to enhance the skills and qualities necessary for the proper performance of judicial duties is important, and the reference to judicial control of training (and presumably other potential enhancement methods) discloses the concern to protect judicial independence.

Also, when it comes to the knowledge, skills, and personal qualities necessary for the proper performance of judicial duties might be, the *Bangalore Principles* recognize impartiality as being essential to the proper discharge of judicial office, and judges must perform their judicial duties without favor, bias, or prejudice.

117 SOLUM, 2003, p. 183.

118 CHANDLER; DODEK, 2016.

119 UNITED NATIONS, 2003.

From this, Chandler and Dodek¹²⁰ deduce a general acceptance that the judicial role comes with a responsibility to satisfy certain ethical obligations, including the obligation to acquire and enhance the skills necessary for proper performance of judicial duties. This is in line with the concept of “role responsibility”, according to which certain roles attract responsibilities in virtue of their institutional or social position.

5. Conclusion

Scientific literature on the influence of cognitive enhancement in the legal domain has focused on themes such as the re-assessment of the standards that the law uses to ascribe responsibility; the improvement of witness testimony; criminal liability and responsibility. Others have also approached the topic of the existence of a duty for certain professionals to enhance themselves, such as pilots, doctors, and soldiers, given the high stakes involved in these fields.

The use of biotechnological enhancements for improving judicial cognition, however, is a hardly explored theme. The main goal of this paper was to shed light on the topic, and to investigate whether there could be a duty for judges to undergo cognitive enhancement. Given the significance of their decisions for litigants and for society in general, it is possible to conclude that there are good ethical arguments for a judicial duty to enhance the cognitive capabilities necessary for judicial decision-making.

However, when it comes to traditional means for improving judicial decision-making, each of the proposed reforms tends to make the process of deciding cases more costly or time consuming. Some of the reforms might be sufficiently cumbersome that they do not justify the extra costs imposed on litigants and the justice system. The question of how effective and practical their implementation still remains open and requires further investigation.

The same is true for biotechnologies. At present, there are great obstacles to their use to improve judicial cognition, such as the risks presented and possible adverse effects. Nonetheless, the goal here was to focus primarily on the conceptual aspects of the problem.

120 CHANDLER; DODEK, 2016.

This means that arguments relating to it will first presuppose the existence of forms of cognitive bioenhancement that are morally acceptable, leaving aside primary concerns regarding safety and associated risks. This ideal situation allows for an analysis of the conditions that must be fulfilled for an obligation to enhance judicial cognition to exist, and for its societal acceptability. Results obtained from it may, in the future, be used to morally assess the real scenario, on which biomedical enhancements most likely will present at least some side effects.

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ABSTRACT: Evidence shows that judicial decisions are prone to implicit biases, such as ingroup favoring, anchoring, base rate neglect, hindsight, and racial bias. Given the high stakes in judicial decision-making not only for the parties directly affected but for society in general, the question of improving the quality of these decisions is important. Judicial review, workload reduction, adequate legal education and training are some of the methods commonly pointed out to reach this goal. Judicial decision-making involves multiple tasks, each of which use various cognitive and emotional processes to different degrees. Albeit there are a growing number of investigations exploring the possibility of applying biotechnologies to enhance cognitive function, there is virtually no research exploring the possibility of using these techniques to enhance judicial cognition. Thus, this article aims to advance the discussion, investigating the ways in which cognitive enhancement could improve the quality of judicial decisions, and questioning whether there could be a moral duty for judges to undergo cognitive enhancement. The approach to the problem through the specific ethical framework of virtue jurisprudence reveals that it is possible to establish a common ground of values from which such a duty can be derived.

Keywords: cognitive enhancement, unconscious bias, judicial decision-making, neurolaw, virtue jurisprudence.

RESUMO: As evidências mostram que decisões judiciais também estão sujeitas a vieses implícitos, como favoritismo intragrupo, ancoragem, inferências estatísticas, viés de retrospecto e racial. Dada a grande importância do processo de tomada de decisões judiciais, não apenas para as partes diretamente afetadas, mas também para a sociedade em geral, a questão de melhorar a qualidade dessas decisões é importante. Controle jurisdicional, redução da carga de trabalho, educação jurídica adequada e treinamento são alguns dos métodos comumente apontados para atingir esse objetivo. Embora haja um número crescente de investigações explorando a possibilidade de aplicar tecnologias para aprimorar a função cognitiva, praticamente não há pesquisas explorando a possibilidade de usar essas técnicas para aprimorar a cognição judicial. Assim, este artigo tem como objetivo avançar a discussão, investigando as formas pelas quais o aprimoramento cognitivo poderia melhorar a qualidade das decisões judiciais, e questiona se poderia haver um dever moral para os juízes se submeterem ao aprimoramento cognitivo. A abordagem do problema através do quadro ético específico da jurisprudência da virtude revela que é possível estabelecer um terreno comum de valores sobre os quais tal dever pode ser extraído.

Palavras-chave: aprimoramento cognitivo, viés inconsciente, tomada de decisão judicial, neurodireito, jurisprudência da virtude.

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