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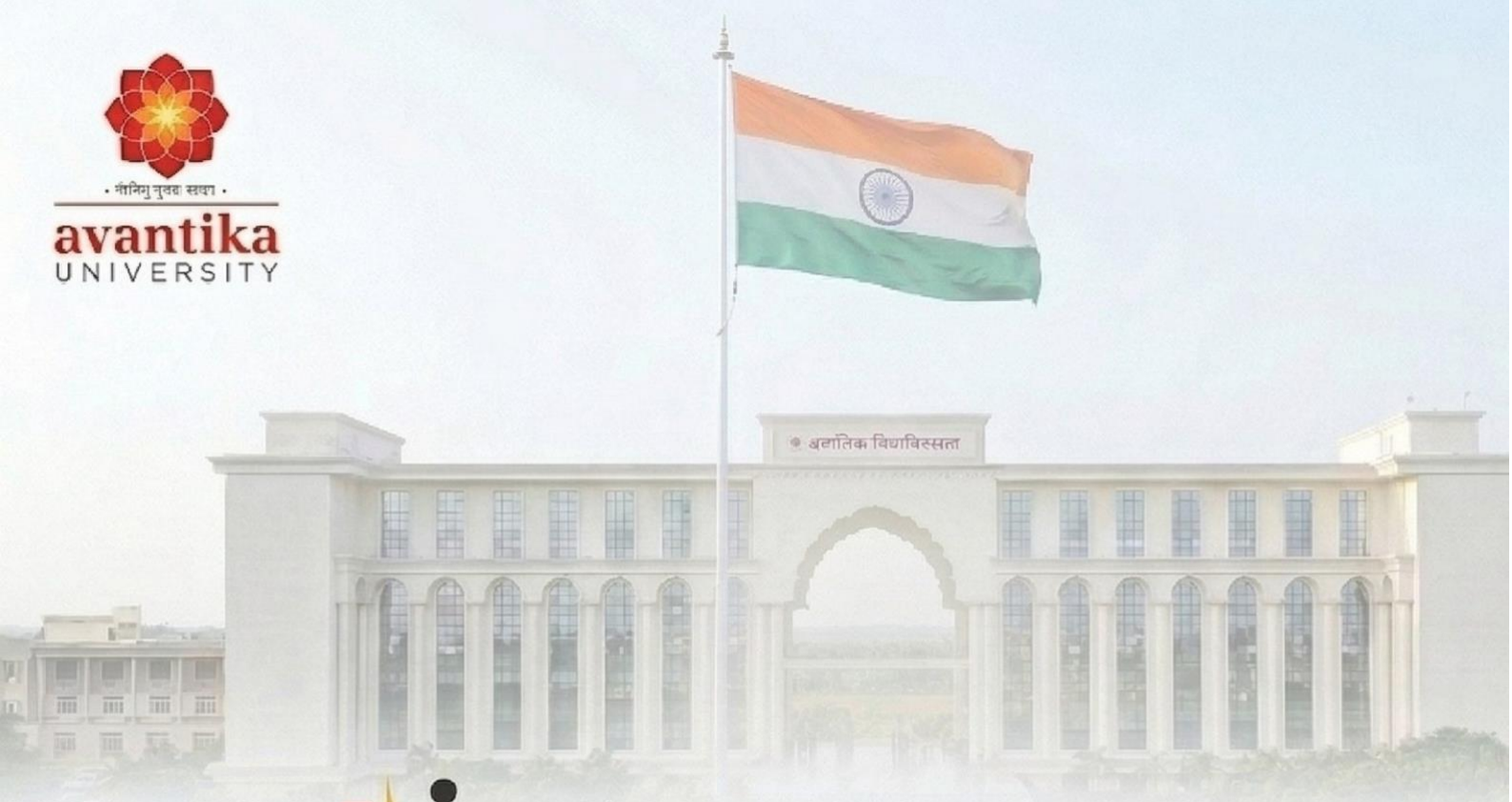

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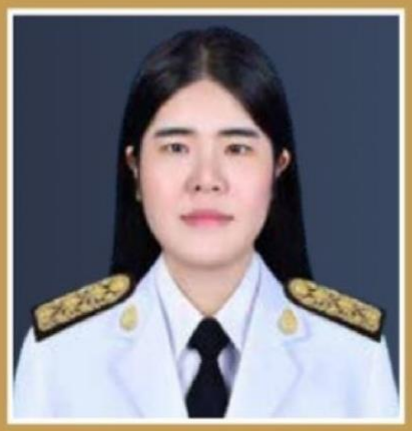

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Why People Do What They Do: Behavioural Biases and the Limits of Deterrence in Criminal Law

- Rashika Niranjan Sharma

ABSTRACT

Over the past several centuries, criminal jurisprudence has been anchored in the classical deterrence paradigm, premised on the notion that individuals operate as rational actors who engage in a cost-benefit calculus before engaging in criminal conduct. This orthodox assumption, rooted in utilitarian legal theory, constitutes the conceptual foundation of deterrence-based penal policy, wherein the certainty, severity, and celerity of punishment are posited as principal determinants of compliance. The widespread endurance of this paradigm, from Beccaria's enlightenment ideals to contemporary penology, underscores the enduring influence of rational choice theory within criminal law discourse. However, the empirical persistence of criminality despite increasingly stringent legislative and punitive interventions has rendered this rationality assumption increasingly tenuous. Insights from behavioural economics, cognitive psychology, and neuroscience have demonstrated that human agents routinely depart from rational optimization. Offending behaviour is frequently shaped by bounded rationality, temporal discounting, affective impulses, and contextspecific social pressures that constrain deliberative reasoning. Such behavioural asymmetries disrupt the predictive validity of classical deterrence and expose its limited explanatory capacity in accounting for real-world offending patterns. This paper argues that the systemic ineffectiveness of deterrence-oriented criminal law arises not from the insufficiency of punitive severity, but from its overreliance on a reductionist model of human agency. Drawing on the interdisciplinary frameworks of behavioural law and economics, criminological psychology, and normative legal theory, the study critically re-evaluates the deterrence model through an evidence-based lens. Constructing a behaviourally informed jurisprudential framework, the paper coherently integrates empirical understandings of human cognition with the normative imperatives of culpability, proportionality, and accountability. In doing so, the paper aspires to contribute to the broader discourse on criminal law reform, offering a policy-relevant model that enhances legal effectiveness while preserving the moral architecture of responsibility within penal theory.

Keywords: Behavioural economics, deterrence theory, criminal law, rational choice, bounded rationality, cognitive biases, sentencing policy, culpability

INTRODUCTION

1.1 The Deterrence Paradigm in Criminal Law

The foundation of modern criminal jurisprudence rests upon an elegant yet increasingly suspect premise: that human agents, when confronted with the prospect of criminal conduct, engage in rational deliberation wherein the expected benefits of the crime are weighed against the expected costs of punishment. This paradigm traces its intellectual lineage to Jeremy Bentham's utilitarian calculus and Cesare Beccaria's classical criminological theory, which posited that certainty, severity, and swiftness of punishment would deter rational actors from offending.[1] The paradigm's endurance reflects its intuitive appeal: it provides a coherent explanation for human behaviour and suggests straightforward policy levers increase sentence length, heighten enforcement visibility, accelerate prosecution to achieve crime reduction.

Contemporary criminal codes globally embody this rational actor assumption. Sentencing frameworks establish graduated penalties scaled to offense severity, operating under the implicit assumption that proportionately increasing punishment will incrementally increase deterrence. United States federal sentencing guidelines, for instance, mandate substantial sentence enhancements for offense aggravations and offender characteristics, reflecting a classical deterrence logic: greater criminality warrants greater punishment to enhance deterrence.[2] Similarly, mandatory minimum sentencing laws, three-strikes provisions, and

[1] Beccaria, C. (1764). *On Crimes and Punishments*. (trans. 1986, R. Davies et al.).
[2] United States Sentencing Commission. (2023). *Federal Sentencing Guidelines Manual*. U.S. Government Publishing Office.

death penalty legislation all represent legislative expressions of the rational actor model the assumption that sufficiently severe punishment will rationally deter potential offenders.

Yet this assumption confronts a persistent empirical anomaly: despite unprecedented levels of incarceration, computerized enforcement, and legislative sentence enhancements throughout the past four decades, crime rates have not declined proportionately. [3]The United States incarcerates more than 2 million individuals, representing the world's highest imprisonment rate; yet violent crime has not disappeared, and property crime remains endemic. [4] Similar patterns characterize other developed democracies: nations with progressively harsher sentences and increased policing have not achieved the crime reductions that classical deterrence theory would predict. [5]

This disconnect between theory and empirical outcome suggests a fundamental misalignment between the models upon which criminal law is premised and the actual mechanisms through which human decision-making operates.

1.2 The Behavioural Challenge to Rational Choice

Over the past four decades, behavioural economics and cognitive psychology have amassed substantial evidence demonstrating systematic deviations from rational optimization in human decision-making. Herbert Simon's bounded rationality framework established that human cognition operates under hard constraints limited working memory, finite processing capacity, and time pressures that force decisions under irreducible uncertainty rather than perfect information.[6] Daniel Kahneman and Amos Tversky's pioneering work on heuristics

and biases documented persistent patterns of cognitive bias: individuals systematically underestimate low-probability events (availability heuristic), overweight immediate outcomes relative to distant future consequences (temporal discounting), and maintain

[3] Cullen, F. T., Wright, J. P., & Chamlin, M. B. (1999). "Social support and social reform: A progressive crime control agenda." *Crime & Delinquency*, 45(2), 188-207.

[4] Wagner, P., & Sawyer, W. (2018). "Mass incarceration: The whole pie 2018." *Prison Policy Initiative*. Available at: https://www.prisonpolicy.org/reports/pie2018.html

[5] Tonry, M. (2004). "Thinking about crime: Sense and sensibility in American penal culture." Oxford University Press.

[6] Simon, H. A. (1982). *Models of Bounded Rationality*. MIT Press.

unrealistically optimistic self-assessments (optimism bias).[7]

These findings have profound implications for criminal law. If human decision-making is fundamentally constrained by cognitive limitations and systematic biases, then the rational actor model underlying deterrence theory may mischaracterize how potential offenders actually assess crime decisions. An offender deciding whether to commit robbery may not engage in the rational utility calculation that deterrence theory presumes; instead, the decision may emerge from bounded rationality, temporal myopia, and affect-driven impulses that bear little resemblance to rational deliberation.

1.3 Research Questions and Scope

This paper addresses three principal research questions:

1. **Theoretical Question**: To what extent does contemporary behavioural science evidence contradict the rational actor assumptions embedded in classical deterrence theory?
2. **Empirical Question**: What patterns in offender decision-making, offending rates, and criminal career trajectories can be explained through behavioural mechanisms rather than classical deterrence variables?
3. **Normative Question**: How can criminal law be reformed to align with empirically valid understanding of human behaviour while maintaining normative commitments to culpability, responsibility, and proportionality?

The paper's scope encompasses three primary domains: (a) theoretical analysis of behavioural limitations on rationality; (b) empirical examination of criminological evidence on deterrence effectiveness; and (c) normative legal theory addressing how behavioural insights can inform more effective and equitable criminal justice policy.

[7] Kahneman, D., & Tversky, A. (1979). "Prospect theory: An analysis of decision under risk." *Econometrica*, 47(2), 263-291.

2. THE CLASSICAL DETERRENCE PARADIGM: THEORETICAL FOUNDATIONS

2.1 Historical Development and Core Assumptions

The deterrence paradigm emerged during the Enlightenment as a radical departure from prior punitive philosophy. Medieval and early modern legal systems emphasized retribution, incapacitation, and moral condemnation. Beccaria's revolutionary "Crimes and Punishments" (1764) reframed punishment as a rational policy instrument designed to produce compliance through calculated fear of consequences[8]. Bentham's utilitarian calculus formalized this approach: rational agents, confronted with the pain of punishment, would abstain from conduct that imposed expected disutility exceeding expected utility from the crime. [9]

The classical deterrence model rests on four core assumptions:

First, rational agency: Individuals contemplating crime engage in conscious, deliberative reasoning about consequences. They assess the probability of apprehension, the likely severity of punishment if apprehended, and the anticipated benefits of criminal conduct.

Second, utility maximization: Individuals seek to maximize expected utility the weighted average of outcomes, weighted by their subjective probabilities. Crime occurs when the expected utility from offending exceeds the expected utility from lawful alternatives.

Third, sensitivity to incentives: Changes in the probability or severity of punishment will produce corresponding changes in criminal behaviour. Doubling the apprehension probability should deter approximately as much as doubling the sentence severity, since both increase expected cost equally.

Fourth, consistency across populations: These mechanisms operate similarly across diverse populations of potential offenders, varying only in the particular utility values assigned to crime benefits and punishment costs.

[8] Beccaria (1764), supra note 2.

[9] Bentham (1781), supra note 1.

2.2 The Three Pillars of Deterrence: Certainty, Severity, Celerity

Classical deterrence theory identifies three variables as principal determinants of deterrent efficacy: [10]

Certainty of Punishment: The subjective probability that criminal conduct will result in apprehension, prosecution, and conviction. The deterrent effect is hypothesized to increase with higher certainty when potential offenders perceive a high likelihood of consequences, they are rationally motivated to refrain from crime.

Severity of Punishment: The magnitude of punishment imposed upon conviction. Classical theory predicts that longer sentences, higher fines, and harsher conditions of confinement will produce greater deterrence by increasing the expected disutility from crime.

Celerity of Punishment: The temporal proximity between criminal conduct and imposition of punishment. Swift punishment is posited to enhance deterrence by creating a tighter psychological link between behaviour and consequence, facilitating learning and increasing the salience of punishment risk.

Beccaria emphasized certainty as "the most powerful deterrent," arguing that "certainty of a small punishment will make a greater impression than the fear of a greater one which is associated with hope of escaping it." [11]This qualitative hierarchy- certainty> severity has remained influential in criminological theory, though contemporary punitive policy has increasingly prioritized severity through mandatory minimums and sentence enhancements.

2.3 Modern Deterrence Operationalization in Legal Policy

Contemporary criminal law operationalizes classical deterrence through several mechanisms:

Proportionate sentencing frameworks: Sentencing guidelines in numerous jurisdictions

[10] Paternoster, R. (2010). "How much do we really know about criminal deterrence?" *Journal of Criminal Law and Criminology*, 100(3), 765-823.

[11] Beccaria (1764), supra note 2, at p. 42.

(United States federal system, United Kingdom sentencing guidelines, Australian sentencing

law) establish baseline sentences scaled to offense severity and aggregate them based on aggravating and mitigating factors. The underlying logic is that graduated sentences will produce graduated deterrence effects.

Mandatory minimum sentences: Many jurisdictions have enacted mandatory minimum sentences for serious offenses (drug trafficking, violent crime, weapons offenses), reflecting the assumption that increasing baseline punishment severity will enhance deterrence. The United States has extensively employed mandatory minimums since the 1980s; comparable provisions exist in the United Kingdom, Australia, and Canada. [12]

Three-strikes and recidivism enhancement laws: Laws providing dramatically enhanced sentences for repeat offenders or multiple serious convictions operationalize the deterrence assumption that threat of cumulative sentences will deter initial and subsequent offenses.

Capital punishment: The retention of capital punishment in numerous jurisdictions (United States, Japan, Singapore) reflects, in part, a deterrence rationale that the maximum severity of punishment (death) will deter the most serious offenses (murder). Arguments for capital punishment frequently invoke deterrence, notwithstanding substantial empirical evidence of its ineffectiveness. [13]

Visible enforcement and certainty initiatives: Some jurisdictions have attempted to operationalize certainty through focused enforcement in high-crime areas, mandatory prosecution policies, and swift adjudication initiatives, based on the theoretical expectation

[12] Mitchell, O. (2005). "A meta-analysis of race and sentencing research: Explaining the inconsistencies." *Journal of Quantitative Criminology*, 21(4), 439-466.

[13] Donohue, J. J., & Wolfers, J. (2005). "Uses and abuses of empirical evidence in the death penalty debate." *Stanford Law Review*, 58(2), 791-846.

that visible enforcement will increase perceived certainty.

3. EMPIRICAL CRITIQUE OF DETERRENCE EFFICACY

3.1 Meta-Analytic Evidence on Deterrence

A substantial body of empirical research has examined the deterrent effects of punishment certainty, severity, and celerity. Meta-analyses synthesizing this literature provide nuanced conclusions that depart significantly from classical deterrence predictions. [14]

Certainty of Punishment: Meta-analytic evidence demonstrates robust deterrent effects associated with higher perceived certainty of apprehension and punishment. A meta-analysis by Pratt et al. (2006) examining 63 studies found that perceived certainty showed statistically significant negative association with criminal behaviour across diverse methodologies and contexts[15]. The effect size, while modest in magnitude, was consistent: increases in perceived certainty correlated with decreases in offending behaviour.

Severity of Punishment: In stark contrast, meta-analytic evidence regarding sentence severity is equivocal and inconsistent. Pratt et al. (2006) found that perceived severity showed substantially weaker and less consistent associations with criminal behaviour than certainty. Importantly, when certainty and severity were examined simultaneously in regression models, severity effects frequently disappeared or became statistically insignificant once certainty was controlled. [16]This pattern suggests that the principal mechanism through which

[14] Pratt, T. C., Cullen, F. T., Blevins, K. R., Daigle, L. E., & Madensen, T. D. (2006). "The empirical status of deterrence theory: A meta-analysis." *Taking Stock: The Status of Criminological Theory*, 367-395.

[15] Ibid., p. 380.

[16] Ibid., p. 381.

punishment deters is the perceived likelihood of imposition, not the magnitude of punishment.

Celerity of Punishment: Evidence regarding punishment celerity is sparse and inconclusive. Few studies have examined temporal proximity effects, and existing research shows mixed results. Some studies find that swift punishment enhances deterrence; others find minimal celerity effects.[17] The sparsity of research on celerity reflects, in part, the difficulty of isolating celerity experimentally while controlling for other variables.

3.2 The Certainty-Severity Asymmetry

A central empirical finding that challenges classical deterrence theory is the pronounced asymmetry in deterrent effects between certainty and severity. Classical theory predicts these effects should be approximately equivalent doubling certainty or doubling severity both increase expected cost by 100%, and rational actors should be equally responsive to each change. Empirical evidence demonstrates this is not the case.

Research on tax compliance provides illustrative evidence. Rashkolnikov (2006) analyzed offender decision-making regarding tax evasion, examining how audit rates (certainty) and penalty magnitude (severity) influence compliance behaviour. The research found that audit rates the probability of detection had substantially stronger influence on tax compliance than penalty magnitude.[18] When audit rates increased, compliance increased significantly; when penalties increased without corresponding increases in audit probability, compliance showed minimal response. This pattern suggests offenders respond primarily to perceived detection risk, with limited sensitivity to punishment magnitude beyond a threshold level.

Similarly, analyses of capital punishment deterrence demonstrate this asymmetry acutely. Despite the maximum severity penalty (execution), capital punishment shows minimal and inconsistent deterrent effects on homicide rates.[19] The National Research Council (2012), after comprehensive review of capital punishment deterrence research, concluded that

[17] Baumer, E. P. (2013). "Evaluating the effects of celerity and certainty of punishment on crime." *Criminology*, 51(2), 291-317.

[18] Raskolnikov, A. (2006). "Deceit, deterrence, and the self-adjusting penalty." *Columbia Business Law Review*, 2006(3), 705-748.

[19] National Research Council. (2012). *Determining the deterrent effect of capital punishment*. The National Academies Press.

existing evidence "is fundamentally uncertain" and cannot support confident claims of

deterrent efficacy.[20] The explanation is straightforward: executions occur so rarely relative to homicides that the perceived certainty of capital punishment is infinitesimal, rendering severity irrelevant as a deterrent.

3.3 The Temporal Displacement Problem: Sentence Length and Diminishing Deterrence

Recent econometric research has identified a phenomenon termed "temporal displacement" in deterrence effects, wherein the deterrent effect of sentence length operates with diminishing returns as sentences increase.[21][22]

Mastrobuoni and Rivers (2016) analyzed recidivism data from Italy's 2006 collective pardon, which released 20,000+ prisoners and created exogenous variation in remaining sentence length. Estimating discount rates through revealed preference analysis, they calculated that offenders discount future imprisonment at rates far exceeding standard financial discount rates, with annual discount factors (δ) around 0.74 to 0.80 for most offenders. [23]This implies that the disutility of a fifth year in prison is only 22% of the first year's disutility (0.74^5 = 0.22), and the fifteenth year contributes negligibly to total disutility.

The policy implication is profound: doubling a sentence from 5 years to 10 years increases discounted disutility by approximately 22%, whereas classical rational choice theory would predict a 100% increase. This finding explains the empirical failure of sentence enhancement strategies: extending already-lengthy sentences produces minimal additional deterrent effect because high-discounting offenders experience the extended future punishment as psychologically remote and unreal.

[20] Ibid., p. 2.
[21] Mastrobuoni, G., & Rivers, D. (2016). "Criminal discount factors and deterrence." *IZA Discussion Paper*, No. 9769.
[22] Ibid., p. 2.

3.4 Empirical Patterns in Offending Behaviour Inconsistent with Rational Choice

Beyond meta-analytic syntheses, patterns in actual offending behaviour provide prima facie evidence against the rational actor model:

Impulsive and emotional crimes: Homicides, assaults, and sexual assaults frequently occur in circumstances suggesting minimal rational deliberation. Victim-offender relationships

(intimate partners, family members, acquaintances) in homicides suggest emotional rather than rational motivations. Approximately 50% of homicides occur between parties who know each other; many involve domestic violence escalation, jealousy, or perceived

disrespect. [23] These circumstances are inconsistent with cool rational calculation of punishment risk.

Substance-dependent offending: Offenders dependent on heroin, methamphetamine, cocaine, and other substances frequently commit property crimes (theft, robbery, burglary) to finance continued drug use. The pattern suggests compulsive behaviour driven by neurobiological withdrawal and craving rather than rational cost-benefit analysis. Incarceration, despite imposing enormous costs, fails to permanently suppress the behaviour for many substance-dependent individuals; recidivism rates for drug offenders approach 70%.[24]

Youth offending: Adolescent offending peaks in the mid-to-late teenage years, despite adolescents ostensibly having longer life expectancies to experience the delayed consequences of criminal sanctions. If rational deterrence operated as classical theory predicts, young people with longer lifespans over which to experience punishment costs should be more deterred, not less. Empirical evidence shows the opposite: adolescents

[23] Planty, M., Langton, L., Krebs, C., & Berzofsky, M. (2013). *Female victims of sexual violence, 1994-2010*. U.S. Bureau of Justice Statistics.

[24] Langan, P. A., & Levin, D. J. (2002). *Recidivism of prisoners released in 1994*. U.S. Bureau of Justice Statistics, NCJ 193427.

commit property and violent crimes at elevated rates despite presumably more severe longterm consequences. [25]

Repeat offending after incarceration: A substantial portion of incarcerated individuals reoffend after release, despite having directly experienced imprisonment. If incarceration functioned as a rational deterrent, the actual experience of imprisonment should rationally deter subsequent offending. Yet approximately 68% of released prisoners are rearrested within three years. [26]This pattern suggests incarceration does not consistently produce the rational recalibration of crime-benefit expectations that deterrence theory would predict.

4. COGNITIVE BIASES AND BOUNDED RATIONALITY IN CRIMINAL DECISION-MAKING

4.1 Bounded Rationality: The Cognitive Constraints on Deliberation

Herbert Simon's bounded rationality framework provides the theoretical foundation for understanding why offender decision-making departs from classical rational optimization. Human cognition operates under three fundamental constraints that render comprehensive rational optimization infeasible. [27]

Limited information processing capacity: The human brain's working memory is finite, capable of maintaining and manipulating approximately 7 ± 2 discrete information units simultaneously. [28]Complex decisions requiring integration of multiple variables (probability of apprehension, severity of penalty, personal risk factors, opportunity factors, situational contingencies) exceed working memory capacity. Consequently, decision-makers must

[25] Steinberg, L. (2008). "A social neuroscience perspective on adolescent risk-taking." *Developmental Review*, 28(1), 78-106.
[26] Langan & Levin (2002), supra note 25.
[27] Simon, H. A. (1957). *Models of man: Social and rational*. Wiley.
[28] Cowan, N. (2001). "The magical number 4 in short-term memory: A reconsideration of mental storage capacity." *Behavioural and Brain Sciences*, 24(1), 87-114.

employ simplifying heuristics rules of thumb that reduce cognitive complexity at the cost of accuracy.

Temporal and computational constraints: Real-world decisions occur under time pressure. A potential robber encountering an unattended cash register faces immediate decisions; deliberative calculation of apprehension probabilities and sentence consequences is infeasible under such time constraints. Even in contexts where time permits deliberation, computational limitations the inability to perform complex probabilistic calculations mentally constrain rational optimization.

Incomplete information: Decision-makers possess incomplete information about relevant probabilities (apprehension rate in their jurisdiction, prosecution policies, sentencing practices), contextual factors (police deployment patterns, surveillance technologies), and personal risk factors (vulnerability to arrest due to criminal history or demographic

characteristics). Rational decision-making requires subjective probability assessments based on incomplete information.

Faced with these constraints, decision-makers satisfice they seek satisfactory rather than optimal solutions.[29] A potential offender may construct a rough mental model: "If I commit this robbery and get caught, I'll face prison. But most of my associates haven't been caught, So the risk seems low." This heuristic reasoning satisfices it provides a decision-rule adequate for the present context without engaging in the comprehensive rational optimization that classical deterrence assumes.

[29] Simon, H. A. (1955). "A behavioural model of rational choice." *Quarterly Journal of Economics*, 69(1), 99118.

4.2 Temporal Discounting and Present Bias

Temporal discounting refers to the tendency of humans to undervalue future outcomes relative to present outcomes. While economic theory acknowledges discounting (individuals generally prefer present consumption to future consumption), behavioural evidence demonstrates that discounting is hyperbolic rather than exponential, and substantially exceeds standard financial discount rates.[30]

Criminal decision-making and temporal discounting: Offender decision-making exhibits extreme present bias. The benefits of crime are immediate and salient: obtaining cash from a robbery, consuming narcotics, experiencing status elevation from violent crime. The costs incarceration, social stigma, disrupted relationships are temporally distant and psychologically abstract. For an offender contemplating crime, the psychological weight of immediate crime benefits vastly exceeds the abstract, future punishment cost.

A Swedish longitudinal study following 6,749 males from age 13 to 31 measured time preferences at age 13 (preference for 900 kronor immediately versus 9,000 kronor in five years) and tracked criminal outcomes to age 31. [31] Males exhibiting steep temporal discounting at age 13 were significantly more likely to be convicted of crimes by age 31. Critically, time preference, measured years before the onset of criminal careers, predicted offending behaviour, suggesting temporal discounting is a stable individual difference that shapes propensity for offending.

4.3 Optimism Bias and the Illusion of Invulnerability

Optimism bias refers to the systematic tendency to underestimate one's personal risk of experiencing negative outcomes while maintaining accurate probabilistic judgments about others' risks. Numerous studies document that individuals estimate their own likelihood of

[30] Laibson, D. (1997). "Golden eggs and hyperbolic discounting." *Quarterly Journal of Economics*, 112(2), 443-477.

[31] Akerlund, D., Golsteyn, B. H., Granqvist, H., & Lindahl, L. (2016). "Time discounting and criminal behaviour." *Proceedings of the National Academy of Sciences*, 113(22), 6160-6165.

disease, accidents, divorces, and adverse life events as significantly lower than statistical base rates would predict.

Optimism bias in criminal populations: A study of 60 county jail inmates convicted of drug, property, and violent offenses found that all three groups exhibited robust optimism bias regarding arrest risk. Inmates believed they were significantly less likely to be apprehended for future crimes than other similarly situated offenders. Crucially, optimism bias persisted even post-conviction despite direct, costly experience of arrest and incarceration, inmates maintained elevated expectations of successfully evading future apprehension.

The psychological mechanism underlying this bias involves attribution patterns. Individuals attribute negative outcomes affecting themselves to external, situational factors (bad luck, police corruption, witness error) rather than internal factors (poor planning, overconfidence, low skill). Conversely, individuals attribute positive outcomes to internal factors (superior planning, skill, foresight). This asymmetric attribution pattern means that even after apprehension, an offender maintains the schema: "I am skilled enough to evade detection; I was simply unlucky this time."

Illusion of control: Optimism bias is reinforced by the illusion of control the tendency to overestimate the degree to which personal outcomes are subject to personal control. Offenders frequently overestimate their knowledge of police procedures, forensic science, and evasion techniques. An experienced burglar may accurately recognize that they have successfully completed multiple burglaries; they then overextend this observation by inferring that their personal competence makes apprehension unlikely. Confirmation biases the tendency to seek and remember information supporting one's beliefs while discounting contradictory evidence reinforces this overconfidence. Burglaries that succeeded are vividly remembered and rehearsed; burglaries not attempted because risk appeared too high, or which nearly resulted in apprehension, are not salient and therefore do not update risk assessments.

4.4 Affect and Emotional State: The Hot-Cold Empathy Gap

The hot-cold empathy gap refers to the phenomenon wherein individuals in different

emotional or motivational states fail to accurately predict how they will behave in alternative emotional states. [32]A person in a calm state (cold state) dramatically underestimates how their behaviour and judgment will change when they enter an intense emotional state (hot state).

Application to crimes of passion: Crimes of passion homicides, assaults, and sexual assaults motivated by intense emotion exemplify how hot-cold empathy gap operates. An individual in a calm state, learning of a partner's infidelity, might form an intention: "I would never harm this person regardless of circumstances." Yet when actually discovering the infidelity (hot state), the emotional intensity rage, humiliation, loss of control may overwhelm the individual's capacity for rational deliberation, resulting in violence inconsistent with coldstate intentions.

A study by Loewenstein et al. (2005) on medical decision-making found that individuals in cold states systematically underestimate the extent to which pain, fear, and other intense emotions would influence their behaviour in hot states. [33]Patients in a calm state, discussing hypothetical painful procedures, substantially underestimate how pain will actually influence their decisions once experiencing it. Applied to criminal conduct, this suggests individuals contemplating potential crimes in calm states substantially underestimate how emotional arousal in the actual crime situation will override rational deliberation.

Neurobiological mechanisms: Neuroscience research on affect regulation reveals that intense emotional states anger, fear, sexual arousal engage neural systems (amygdala, insula, anterior cingulate) that operate in parallel with and sometimes override rational deliberative systems

(prefrontal cortex).[34] Consequently, in high-arousal emotional states, behaviour becomes driven by affective responses rather than rational deliberation. A person's capacity for

[32] Weinstein, N. D. (1980). "Unrealistic optimism about future life events." *Journal of Personality and Social Psychology*, 39(5), 806-820.

[33] Loewenstein, G., O'Donoghue, T., & Rabin, M. (2003). "Projection bias in predicting future utility." *Quarterly Journal of Economics*, 118(4), 1209-1248.

[34] Ochsner, K. N., & Gross, J. J. (2008). "Cognitive emotion regulation: Insights from social cognitive and affective neuroscience." *Current Directions in Psychological Science*, 17(2), 153-158.

selfcontrol their ability to suppress immediate impulses in service of long-term goals—is substantially compromised during intense emotional states.

This neurobiological reality poses fundamental challenges to classical deterrence theory. Threats of punishment operate through rational, deliberative processes (imagining future consequences, calculating expected disutility). But if criminal conduct occurs in emotional

states that bypass rational deliberation, then punishment threats fail to operate as deterrents because they do not engage the decision-making systems actually generating behaviour.

4.5 Availability Heuristic and Risk Perception

The availability heuristic refers to the tendency to estimate the frequency or probability of an event based on how readily examples come to mind, rather than on actual statistical probabilities. [35]Vivid, memorable, or recent events are judged as more probable than base rates warrant; events that are difficult to imagine or recall are judged as less probable than base rates warrant.

Application to apprehension risk perception: An offender's perception of apprehension risk is substantially influenced by the availability of examples of apprehension in their social circle or local environment. If the offender has witnessed recent arrests in their neighbourhood, arrests are psychologically salient and available; risk perception increases accordingly. If arrests are rare and temporally distant, availability is low; perceived apprehension risk correspondingly decreases, even if objective apprehension rates have not changed.

This mechanism explains a counterintuitive finding in deterrence research: enforcement that is visible and memorable, but not necessarily frequent, can be more deterrent than enforcement that is frequent but invisible. Randomized evaluations of policing interventions in Rajasthan, India found that randomized, rotating drunk-driving checkpoints substantially

[35] Tversky, A., & Kahneman, D. (1973). "Availability: A heuristic for judging frequency and probability." *Cognitive Psychology*, 5(2), 207-232.

reduced accidents (35% reduction in nighttime accidents, 36% reduction in deaths) despite low checkpoint frequency. [36] Fixed checkpoints at predictable locations, even if more frequent, had zero deterrent effect because offenders learned the locations and avoided them. The rotating checkpoints' deterrent efficacy derived from their unpredictability and visibility they remained salient and available in offenders' minds despite occurring infrequently.

5. HETEROGENEITY IN OFFENDER RATIONALITY AND CRIME-TYPE VARIATION

5.1 Crime-Type Heterogeneity in Rational Actor Approximation

A critical limitation of classical deterrence theory is its assumption that deterrence mechanisms operate uniformly across crime types and offender populations. Empirical evidence demonstrates substantial heterogeneity: some offenders and crime types more closely approximate the rational actor model, while others systematically depart from it.

White-collar and financial crimes: Tax evasion, securities fraud, embezzlement, and antitrust violations represent offenses most closely approximating the rational actor model. These crimes typically involve deliberate planning, economic motivation, and calculation of risk versus benefit. A tax evader contemplating whether to claim fraudulent deductions engages in explicit reasoning: "What is the audit probability for my income bracket and filing complexity? What is the penalty if audited? Is the expected value of the deduction worth the expected penalty cost?" [37]

Research on tax evasion compliance demonstrates that such offenders are responsive to certainty (audit probability) in a manner consistent with rational choice. When audit rates increase, compliance increases; when penalties increase without corresponding increases in audit probability, compliance shows minimal response. [37]This pattern suggests white-collar

[36] Banerjee, A., Duflo, E., & Glennerster, R. (2008). "Putting a band-aid on a corpse: incentives for nurses in the Indian public healthcare system." *Journal of the European Economic Association*, 6(2-3), 487-500. [37] DeLaere, S., & Masclet, D. (2013). "Framing of an audit and tax compliance: An experimental approach." *Journal of Economic Psychology*, 34, 408-419.

[37] Raskolnikov (2006), supra note 19.

offenders closely approximate the rational economic actor posited by deterrence theory.

However, even white-collar crime involves cognitive biases absent from pure rational models. The fraud triangle framework identifies three psychological elements in financial crime: perceived pressure (financial need or desire for status), opportunity (weak internal controls), and rationalization (mental reframing of the act as acceptable). [38] The rationalization element reflects motivated reasoning and moral disengagement psychological processes through which individuals construct narratives that neutralize the wrongfulness of their conduct ("everyone does this," "the system is unfair"). This cognitive process biases the cost-benefit calculation: the perceived cost of wrongdoing is reduced through motivated interpretation of the law and societal standards.

Street crime and property crime: In contrast, street crimes robbery, burglary, theft frequently involve less deliberation and more impulsivity. Criminological research on crime commission patterns finds that many street offenders engage minimal planning; decisions to offend emerge from situational factors and affective states rather than calculated cost-benefit analysis. [39]

Substance-dependent offenders represent an extreme case of non-rational offending. Individuals dependent on heroin, methamphetamine, or cocaine experience neurobiological and psychological compulsions to obtain and use the substance that operate independently of rational cost-benefit analysis. An offender stealing to finance narcotics use may be aware intellectually of punishment risks, yet the neurobiological urgency of withdrawal and craving creates a motivational state that overrides rational deliberation[40]. Empirical evidence on drug offender recidivism demonstrates that incarceration, despite imposing enormous costs, fails

[38] Cressey, D. R. (1953). *Other people's money: A study in the social psychology of embezzlement*. Free Press.
[39] Wright, R. T., & Decker, S. H. (1994). *Burglars on the job: Streetlife and residential break-ins*. Northeastern University Press.
[40] Morse, S. J. (2006). "Addiction, genetics, and criminal responsibility." *Law and Contemporary Problems*, 69(2), 165-207.

to permanently suppress offending for many drug-dependent individuals; recidivism rates exceed 60-70% for drug offenders within three years of release. [41]

Violent crime and crimes of passion: Homicides, assaults, and sexual assaults frequently occur in circumstances suggesting emotional rather than rational motivation. The hot-cold

empathy gap operates particularly acutely in violent crime contexts: the emotional intensity of the crime situation overwhelms the rational, cold-state intentions an individual may have formed previously.

5.2 Offender Population Heterogeneity

Beyond crime-type variation, substantial heterogeneity exists within offender populations in the degree to which rational choice mechanisms operate.

Age effects: Adolescent offending peaks in mid-to-late teenage years, despite adolescents ostensibly having longer life expectancies over which to experience delayed consequences of criminal sanctions. Developmental psychology research reveals that adolescent decisionmaking exhibits exaggerated present bias compared to adults: adolescents undervalue future consequences even more severely than adults do. [42] Additionally, the adolescent prefrontal cortex the neural substrate underlying rational deliberation, impulse control, and future-

oriented thinking is still developing. Consequently, adolescents are less capable of the rational deliberation that deterrence theory assumes.

Temporal discounting heterogeneity: Mastrobuoni and Rivers' analysis revealed substantial heterogeneity in criminal discount factors. Highly educated offenders showed discount factors near $\delta = 0.99$ (approximating rational economic actors), while drug offenders clustered at $\delta = 0.70$, and immigrants averaged $\delta = 0.66$. [43]This heterogeneity suggests that the degree to which future punishment is psychologically present varies substantially across

[41] Mumola, C. J., & Karberg, J. C. (2006). *Drug use and dependence, state and federal prisoners, 2004*. U.S. Bureau of Justice Statistics.
[42] Steinberg, L. (2008), supra note 26.
[43] Mastrobuoni & Rivers (2016), supra note 22, at 24.

offender types. For high-discounting offenders, future punishment is so psychologically remote that it exerts minimal deterrent effect; for low-discounting offenders, future punishment approximates rational cost-benefit considerations.

Poverty and economic necessity: For economically marginalized populations experiencing poverty, unemployment, homelessness, or debt, crime may represent a response to necessity rather than a choice among options. Strain theory posits that crime represents an "innovation"

using illegal means to pursue socially valued goals (financial security, respectability, survival needs) when legal opportunities are blocked. [44]For such individuals, the relevant comparison is not "commit crime versus lawful employment" but "commit crime versus starvation or homelessness." The rational choice calculus operates within a constrained choice set, and the logic of deterrence becomes less relevant.

6. INTEGRATING BEHAVIOURAL INSIGHTS: TOWARD A REFORMED DETERRENCE FRAMEWORK

6.1 The Primacy of Certainty Over Severity

The empirical evidence reviewed above points to a consistent conclusion: perceived certainty of punishment deters more effectively than severity. This finding, replicated across methodological approaches and contexts, suggests that policy prioritizing severity (mandatory minimums, sentence enhancements, capital punishment) is systematically misaligned with the psychological mechanisms actually driving deterrence. [45] A reformed deterrence framework would prioritize certainty through:

Swift and certain enforcement: Research on the HOPE (Hawaii's Opportunity Probation with Enforcement) probation program demonstrates that swift, certain sanctions brief jail stays immediately following probation violations are more effective than vague threats of lengthy incarceration. [46] The program provided formal notice that violations would result in

[44] Merton, R. K. (1938). "Social structure and anomie." *American Sociological Review*, 3(5), 672-682.

[45] Pratt et al. (2006), supra note 15.

[46] Hawken, A., & Kleinman, M. (2009). *Managing drug involved probationers with swift and certain sanctions*.

immediate 2-3 day jail stays. Despite sanctions being brief and proportional, the program achieved substantial reductions in probation violations, drug use, and recidivism compared to standard probation. The mechanism is behavioural: swift, certain consequences engage learning processes and maintain salience, whereas distant, uncertain lengthy sentences are psychologically discounted to near-zero.

Visible, frequent enforcement: Hot spot policing concentrated police presence in high-crime geographic areas increases the visibility and frequency of enforcement. Randomized

evaluations find that hot spot policing reduces crime approximately 5-15% in treated areas. [47] The mechanism is both deterrent (increased visible enforcement increases perceived apprehension risk) and social-control (increased police presence disrupts crime opportunity and enables rapid response).

Certainty over legislative severity: Rather than escalating statutory penalties, policy should focus on increasing the probability that offenders perceive apprehension as likely. This might include enhanced prosecution resources, rapid case processing, visible enforcement patterns, and clear communication of enforcement efforts. The evidence suggests that increasing perceived certainty through these mechanisms produces greater crime reduction per dollar spent than sentence enhancements.

6.2 Environmental and Situational Crime Prevention

Beyond reforming punishment certainty, substantial evidence supports crime prevention strategies that operate through environmental design and situational factors rather than through threat of punishment. [48]

Situational Crime Prevention (SCP) modifies the environment to increase crime effort, increase crime risk, reduce crime rewards, and reduce provocations. Environmental design

strategies include natural access control (limiting offender access pathways), natural surveillance (maximizing visibility of spaces), territorial reinforcement (design features

UCLA School of Public Affairs.

[47] Steinberg, L. (2008). "A social neuroscience perspective on adolescent risk-taking." *Developmental Review*, 28(1), 78-106.

[48] Langan & Levin (2002), supra note 25.

signalling ownership and control), activity support (encouraging legitimate activity), and maintenance (signalling that spaces are monitored).

Meta-analytic evidence on SCP finds consistent crime reduction effects across diverse contexts. [49] These effects occur without relying on offender threat perception or rational deliberation about punishment; they operate by making crime more effortful, riskier, or less rewarding from the offender's perspective. SCP thus provides an alternative deterrence mechanism operating through environmental rather than punitive factors.

6.3 Addressing Root Causes: Necessity-Driven Offending

For substantial segments of the offender population those offending due to economic necessity, addiction, or other compulsive factors classical deterrence is theoretically inapplicable. Punishment threats cannot deter individuals experiencing neurobiological compulsions (as in addiction) or those facing blocked legitimate opportunities (as in poverty and unemployment).

Reform frameworks addressing necessity-driven offending focus on:

Drug treatment and harm reduction: For substance-dependent offenders, evidence-based treatment approaches (medication-assisted treatment, therapeutic communities, cognitivebehavioural therapy) address the underlying compulsion driving offending more effectively than incarceration. Offenders receiving treatment show lower recidivism than those receiving incarceration alone.[50]

Economic opportunity and support: For offenders driven by economic necessity, provision of legitimate income opportunities, job training, and social support addresses root causes more directly than punishment. Programs providing employment services, educational

[49] Simon, H. A. (1957). *Models of man: Social and rational*. Wiley.
[50] Cowan, N. (2001). "The magical number 4 in short-term memory: A reconsideration of mental storage capacity." *Behavioral and Brain Sciences*, 24(1), 87-114.

opportunities, and financial assistance show promise in reducing recidivism.[51]

Mental health and social services: For offenders with mental health conditions, cognitive limitations, or other vulnerabilities, therapeutic and supportive interventions address underlying factors more effectively than pure punishment.

6.4 Proportionality and Culpability in Behavioural Context

Integrating behavioural insights into criminal law raises normative questions regarding culpability and proportionality. If offenders' decision-making is shaped by bounded

rationality, temporal discounting, emotional states, and cognitive biases, should culpability and sentencing be adjusted accordingly?

A sophisticated response acknowledges that behavioural constraints do not eliminate responsibility but may reduce culpability. The distinction between capacity and exercise is crucial: an offender may have the capacity for rational deliberation while exercising it poorly due to biases and limitations. Such an offender retains moral responsibility and warrants punishment, but culpability may be reduced to the degree that behavioural constraints substantially impaired judgment.

This framework preserves moral accountability while acknowledging behavioural realities. Offenders retain responsibility; but punishment policy should reflect empirically valid understanding of how offender decision-making actually operates. Sentences should be proportionate not only to offense severity and offender culpability, but also calibrated to the degree to which the specific offender is responsive to particular deterrence mechanisms.

For offenders exhibiting extreme temporal discounting, lengthy future-oriented sentences are largely ineffective as deterrents; brief, swift, certain sanctions may be more proportional and

[51] Simon, H. A. (1955). "A behavioral model of rational choice." *Quarterly Journal of Economics*, 69(1), 99118.

more likely to produce compliance. For substance-dependent offenders, treatment-oriented dispositions may be more proportional than pure incarceration, provided adequate public protection. For impulsive, affectively-driven offenders, emotional regulation and impulse control interventions may reduce recidivism more effectively than sentence escalation.

7. NORMATIVE IMPLICATIONS: CRIMINAL LAW REFORM

7.1 The Agency Problem and Moral Responsibility

The integration of behavioural science into criminal law raises a fundamental question: If offenders' decision-making is constrained by cognitive biases and bounded rationality, can they be held morally responsible for their crimes?[52]

Two philosophical responses emerge:

The excusing response argues that substantial behavioural constraints undermine moral responsibility. If an offender's cognition is severely impaired by temporal discounting,

mental illness, addiction, or other factors, their capacity for rational agency is compromised. Moral responsibility requires a capacity for rational deliberation; if that capacity is substantially impaired, moral responsibility diminishes accordingly. Under this view, behavioural constraints may constitute grounds for excuse or significant mitigation.

The capacity response distinguishes between capacity (general ability for rational agency) and exercise (whether capacity was exercised well in the particular case). This view acknowledges that behavioural constraints may impair exercise of rational agency without eliminating the capacity itself. An offender with temporal discounting bias retains capacity for rational thought; the bias impairs their exercise of that capacity. Such an offender remains morally responsible, though culpability may be diminished to the degree that biases substantially impaired judgment.

This paper adopts the capacity response: behavioural constraints typically do not eliminate moral responsibility but may reduce culpability and warrant adjustments in punishment policy. The implications are that:

[52] Laibson, D. (1997). "Golden eggs and hyperbolic discounting." *Quarterly Journal of Economics*, 112(2), 443-477.

Offenders retain responsibility: Acknowledging cognitive biases does not excuse crime or eliminate moral responsibility. Individuals contemplating crime, even if subject to temporal discounting and optimism bias, retain the capacity to understand the illegality and wrongfulness of their conduct.

Culpability may be reduced: To the degree that behaviour constraints substantially impair judgment extreme temporal discounting, active psychosis, neurobiological addiction compulsions culpability and sentencing severity should be moderated.

Punishment policy should align with behavioural reality: Even if moral responsibility is retained, punishment policy should be designed to actually deter and reduce recidivism. Punishment that is ineffective that fails to deter because it violates behavioural realities is both ineffective and arguably unfair, as it purports to govern behaviour through consequences that fail to function as genuine deterrents.

7.2 Justice, Effectiveness, and the Social Contract

A fundamental normative principle holds that a just legal system must be an effective one. If criminal law purports to govern behaviour through punishment, but punishment is ineffective due to misalignment with behavioural realities, the law loses legitimacy.

This principle suggests that reform toward behavioural alignment serves justice. Policy that increases certainty of enforcement, calibrates punishments to offender responsiveness, and addresses root causes of necessity-driven offending is more just not because it is lenient, but because it actually functions as law. Such policy respects offenders as agents capable of understanding rules and responding to genuine consequences; it respects victims and communities by actually reducing crime; it respects legal legitimacy by ensuring punishment functions as intended.

Conversely, policy that emphasizes severity without certainty lengthy mandatory minimums with low enforcement certainty, capital punishment with decades of appeals, incarceration without treatment for addiction is arguably unjust precisely because it purports to govern behaviour through consequences that fail to function as genuine deterrents. Such policy wastes resources, fails to reduce crime, and disrespects both offenders (by imposing severe

punishment that fails to communicate genuine consequences) and communities (by failing to reduce crime despite enormous resource expenditure).

8. POLICY IMPLICATIONS AND RECOMMENDATIONS

8.1 Sentencing Policy Reform

Based on the empirical evidence reviewed above, sentencing policy reform should:

Prioritize certainty over severity: Rather than escalating statutory penalties, policy should focus on increasing the subjective probability that offenders perceive apprehension, prosecution, and conviction as likely. This includes enhanced prosecution resources, swift adjudication, and visible enforcement efforts.

Calibrate severity to offender heterogeneity: Rather than uniform mandatory minimums, sentencing should account for heterogeneity in offender responsiveness to deterrence. Offenders exhibiting extreme temporal discounting may be more effectively deterred by brief, swift sanctions than by lengthy sentences. Substance-dependent offenders may be more effectively addressed through treatment than through sentence escalation.

Eliminate counterproductive provisions: Mandatory minimum sentences, particularly for non-violent offenses, should be reevaluated given evidence of limited deterrent efficacy and substantial incarceration costs. Capital punishment should be reconsidered given evidence of its ineffectiveness as a deterrent and ethical concerns regarding irreversible punishment.

Incorporate behavioural mitigation: Sentencing guidelines should explicitly account for behavioural factors evidence of bounded rationality, temporal discounting, addiction, mental illness as mitigating factors. Culpability assessments should reflect behavioural constraints on agency.

8.2 Enforcement Policy Reform

Increase enforcement visibility and certainty: Focus enforcement resources on visible, frequent, and certain enforcement in high-crime areas. Hot spot policing, randomized enforcement patterns, and swift response to detected offenses increase perceived certainty more effectively than resource-intensive investigation of low-visibility offenses.

Implement swift-certain-fair models: Programs like HOPE probation demonstrate that swift, certain, proportional sanctions are more effective than threat of lengthy distant punishment.

Expansion of such programs to criminal justice more broadly prosecution, adjudication, probation, parole supervision would align policy with behavioural evidence.

Enhance prosecution efficiency: Swift prosecution reduces temporal discounting effects by compressing the time between crime and consequence. Resources should be devoted to rapid case processing, early resolution, and efficient adjudication.

8.3 Prevention and Root Cause Intervention

Expand treatment and social services: For substance-dependent and mentally ill offenders, treatment and social service interventions addressing root causes are more effective than incarceration alone. Drug courts, mental health courts, and diversion programs should be expanded.

Provide economic opportunity: For economically marginalized populations, provision of legitimate income opportunities, job training, education, and social support addresses root causes of necessity-driven offending. Employment and training programs should be expanded and funded adequately.

Implement situational crime prevention: Environmental design strategies that increase crime effort, increase supervision, reduce crime rewards, and remove crime provocations should be implemented in high-crime areas. Such strategies work with human behaviour rather than fighting against it.

9. LIMITATIONS AND FUTURE RESEARCH

9.1 Limitations of Current Evidence

The empirical evidence reviewed above, while substantial, has important limitations:

Ecological heterogeneity: Most deterrence research examines specific jurisdictions and offense types. Generalization across contexts may be limited; effects observed in one jurisdiction may not replicate in another.

Methodological challenges: Disentangling deterrence effects from incapacitation effects, selection bias, and confounding factors presents substantial methodological challenges. Experimental and quasi-experimental designs are limited in scope, and observational studies face threats to validity.

Individual heterogeneity: Most deterrence research examines aggregate effects across populations. Substantial heterogeneity in individual responsiveness to deterrence likely exists; identifying characteristics predicting responsiveness would enable tailored intervention but remains an area of limited research.

9.2 Directions for Future Research

Heterogeneous deterrence effects: Future research should investigate heterogeneity in deterrence responsiveness across offender populations and crime types. Identifying characteristics (age, discount rate, mental health status, substance dependence) predicting differential responsiveness would enable more tailored and effective policy.

Neurobiological mechanisms: Emerging neuroscience research on decision-making, emotional regulation, and impulse control offers promise for understanding individual differences in criminal propensity. Integration of neuroscientific findings into criminological and legal scholarship remains in early stages.

Intervention efficacy: Systematic evaluation of behavioural interventions swift-certain-fair programs, environmental design, treatment approaches should be expanded. Randomized controlled trials comparing alternative interventions would provide evidence for optimal policy design.

Long-term outcomes: Most deterrence research examines short-to-medium term effects. Understanding long-term impacts whether swift-certain-fair programs produce lasting behaviour change, whether treatment effects persist, whether environmental design effects persist after enforcement intensity decreases would strengthen evidence base for policy.

10. CONCLUSION

Classical deterrence theory has dominated criminal jurisprudence for centuries, resting on the assumption that human agents function as rational actors responsive to certainty, severity, and celerity of punishment. Yet this assumption confronts persistent empirical challenges: crime continues despite unprecedented incarceration and increasingly stringent sentences; offenders exhibit decision patterns inconsistent with rational optimization; and extensive meta-analytic evidence shows certainty effects substantially exceed severity effects.

Behavioural science offers explanatory frameworks for these anomalies: human cognition operates under bounded rationality, temporal discounting, cognitive biases, and emotional

constraints that systematically deviate from rational choice assumptions. Integrating these behavioural insights into criminal law theory reveals that policy prioritizing severity without certainty is systematically misaligned with the mechanisms actually driving criminal behaviour.

A behaviourally informed criminal law would prioritize certainty of enforcement, calibrate punishment to offender heterogeneity, address root causes of necessity-driven offending, and implement situational prevention strategies. Such policy reform would enhance both effectiveness by aligning with behavioural realities and justice by ensuring punishment functions as genuine deterrent and respects offenders' capacity for rational agency.

This reorientation does not require abandoning responsibility, culpability, or punishment. Rather, it demands that criminal law be designed to actually function as law to govern behaviour through consequences that offenders can genuinely perceive and respond to. In doing so, behavioural criminology serves not as a license for leniency, but as a path toward a criminal justice system that is simultaneously more effective and more just.