AN ANALYSIS OF THE PROPOSAL OF DEEP BRAIN STIMULATION FOR THE REHABILITATION OF CRIMINAL PSYCHOPATHS

by

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11 June 2011
Do we need a policy intervention?
Need for a policy intervention

- Psychopaths constitute a distinctive subpopulation of the prison system
  - present an attractive opportunity for policy intervention
  - neurocognitively incapable of feelings of remorse or guilt
  - enables him to act without what others would consider as their sense of a conscious

Psychopaths in prison

- Within the first year of release
  - 3x more likely to re-offend in general
  - 4x more likely to re-offend by a violent offense than even the normal criminal offender

- Regarding sexual offenders
  - 50% of rapists are psychopaths, and are more likely to be sadistic in their attacks than other offenders
Psychopaths in prison

- Though 75% of all inmates in the American and English penal systems may be classified as having antisocial personality disorder, one-third of them, or 25% of the total incarcerated population qualify as psychopaths.

- Psychopathy is estimated to have a prevalence of less than 1% in the general population.
  - Thus, one can see the profound dysfunction that psychopathy conveys nearly ensures that they will require isolation from society.

Better living through electricity
Pacemaker for the brain

- U.S. Food and Drug Administration approval
  - 35,000 patients around the world
  - Parkinson’s disease, essential tremor, dystonia, Tourett’s syndrome, depression, obsessive compulsive disorder, and addiction

Making the distinction

- Conduct disorder or antisocial personality disorder
  - antisocial behavior indiscriminate of causality
- Psychopathy
  - addition of emotional dysfunction is the hallmark of psychopathy
Two types of aggression

- Reactive aggression
  - incurred after being exposed to a frustrating or threatening event
  - emotionally charged, unplanned, and enraged
  - multiple conditions can increase one’s risk for this reactive aggression, such as bipolar disorder, recurring exposure to violence, and post-traumatic stress disorder

- Instrumental aggression
  - purposeful, goal directed aggression not necessarily associated with a heightened emotional state
  - “cold-blooded”
  - there are no known environmental factors which can lead to the pathophysiology of psychopathy
  - evidence leads us to believe it comes from within, from genetic makeup
Is there an application for neuro-augmentation?

Amygdala

- Allows communication of stimulus-reinforcement association information and reinforcement expectancies to the ventromedial prefrontal cortex for proper decision making.

- The amygdale is also salient in appetitive conditioning:
  - this is the process by which new rewards are learned and acquire their motivational significance.

- Function in instructed fear, which seems to elicit a response that has a synergistic effect with conditioned stimuli.
The psychopathic amygdala

- Considerable dysfunction
  - trying to complete tasks which depend on the capacity to create stimulus-reinforcement associations, such as with aversive conditioning
  - confirmed with fMRI
    - demonstrating a decrease level of activity in the amygdala of patients while undergoing aversive conditioning
  - instructed fear
    - blunted autonomic response to cues for instructed fears
    - Thus, recidivism is nearly inevitable with such individuals because they are deficient in creating stimulus-reinforcement associations.

Neuropathology

- The ventromedial prefrontal cortex has its role in the function of emotional regulation
- This region is active when normal individuals are instructed to suppress their emotional reactions
Ventromedial prefrontal cortex

- **Normal function**
  - internalizing and processing reinforcement outcome information
  - critical to the ability to make appropriate decisions
  - portions of this region have been implicated in the ability interpret the value of different outcomes of a scenario in order to compare the differing rewards

Psychopath ventromedial prefrontal cortex

- **Recipient of reinforcement information associated with various stimuli sent to it from the amygdala**
- It is this connection that is the source of inappropriate activation of the ventromedial prefrontal cortex in the psychopath that occurs from activation of the amygdala
  - has been demonstrated under various scenarios
  - with the assistance of fMRI
    - aversive conditioning
    - prisoner’s dilemma
    - Iowa gambling task
- Therefore, evidence demonstrates that the reinforcement-expectancy information is a vital component of best decision making
Genetic influence

- Twin studies
- Adoption studies
- Twins Early Development Study
  - nearly 3,500 sets of 7 year old twins
  - the callous and unemotional portion of psychopathic tendencies was found to have significant heritability
  - there was no shared environmental influence

What do the economics look like?
Getting tough on crime

- Since the “tough on crime” policies beginning in the 1970s
  - number of people incarcerated in prisons and jails within the United States has grown 600% to its current size, 2.3 million
  - U.S. became the country with the highest rate of incarceration in the world

- Over this time, policy-makers were responding to public dissatisfaction toward the perceived early release of offenders
  - increasing legislative control over sentencing
  - diminished the discretion of judges and parole boards
    - 9½% of the prison population, 140,610 persons, is serving a life sentence
    - 29%, 41,095 persons, have no possibility of parole
    - 6,807 juveniles are serving life sentences
    - 25.8% have no opportunity of parole
    - 3,297 inmates on death row

Economic cost of the death penalty

- Extreme due justice
  - one must recognize that it is the single most severe and immutable punishment the government may impose and for which exists no possible just amount of compensation if in error
Economic cost of the death penalty

- Mandatory jury trial
- Both prosecution and defense are allowed significantly more preemptory challenges than in non-capital cases
  - larger than typical jury pool
  - longer selection process
- Juries are more frequently sequestrated
- Most states require the defendant to have at least two attorneys experienced with capital cases
- Trials use more, and more frequently use expert witnesses
- The trials last longer
- Are more likely to go through the processes of appeals and reversals

Thus, the average time on death row is ten years

From pre-trial through death row expenses

- per-execution cost ranges from
  - $1.6 million to $3.2 million
Economic cost of a life sentence

- Annualized costs of construction and maintenance of a maximum security cell is $5,000

- Cost to house a maximum security prisoner increases over the time in prison
  - health costs rise significantly with aging
  - The estimated cost of incarceration of persons receiving long-term care ranges from $63,500 to 138,000 per year
  - The annualized cost of maintaining a maximum security prisoner is $20,000

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Economic cost of a life sentence

- On average, those convicted of homicide are 30.8 years

- On average, they will live 40 years
  - the cost per prisoner is estimated at
    - $750,000 to $1.1 million
Economic benefit of violent crime averted

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Economic cost of deep brain stimulation

- An initial cost of implanting two electrodes, the generator, and hospital fees
  - initial cost would be $60,000

- On average, a procedure will be required to replace the battery/generator every 3 years
  - at a cost of $15,000 an instance to cover the cost of surgery and generator every three years over the course of a 40 year sentence (the average time served during a life sentence)
  - discounted using a social discount rate of 3.5%
    - sum of the present value costs would equal $102,193.64
    - net present value of the deep brain stimulation would be $182,193.64
    - annual equivalent of such would then equal $7,255.34
### Economic cost of deep brain stimulation

- **Annualized costs**
  - $25,000 per year to incarcerate a prisoner
  - $7,255.34 for DBS

- $17,744.66 in savings with DBS

**Could this be ethical?**
Ethical analysis

Understanding psychopathy
- What it’s not
  - Antisocial Personality Disorder, and its variant of childhood and adolescence, Conduct Disorder,
  - describe a broad pattern of behavior
    - due to this imprecision
    - 16% of boys enrolled in mainstream education
    - greater than 80% of adults in the prison system
  - Such vagary makes these diagnoses of somewhat little use in regard to how to handle such persons

Understanding psychopathy
- A developmental disorder
- Embedded in an individual’s genetic make-up
- It has specific, distinguishable attributes that differentiate it from more vague diagnoses such as Conduct Disorder and Antisocial Personality Disorder
- Psychopathy’s hallmark is the affective-interpersonal component that accompanies the behavioral aspect
  - it is the lack of guilt or empathy which distinguishes these individuals from others in their poor conduct
Understanding psychopathy

- This emotional disturbance enables, in contrast to the reactive aggression demonstrated in many other mental disorders, the psychopath’s instrumental aggression, which is proactive, purposeful, and goal directed.

- Instrumental aggression makes the psychopath uniquely, inherently dangerous in a society.

Understanding psychopathy

- Antisocial Process Screening Device
  - or
- Psychopathy Checklist: Youth Version

- The Psychopathy Checklist –Revised
  - the preferred diagnostic tool for adults
Traits of a psychopath

1. Glibness and Superficial Charm – Smooth-talking, engaging and slick.
2. Grandiose Self-Worth – Greatly inflated idea of one's abilities and self-esteem, arrogance and a sense of superiority.
3. Needs Stimulation/Prone to Boredom – An excessive need for new, exciting stimulation and risk-taking.
4. Pathological Lying – Shrewd, crafty, sly and clever when moderate; deceptive, deceitful, underhanded and unscrupulous when high.
5. Manipulative – Uses deceit and deception to cheat others for personal gain.
6. No Guilt/Remorse: no feelings or concern for losses, pain and suffering of others, coldhearted and unempathic.
7. Emotional Poverty – Limited range or depth of feelings; interpersonal coldness.
8. Lacks Empathy – A lack of feelings toward others; cold, contemptuous and inconsiderate.
9. Parasitic Lifestyle – Intentional, manipulative, selfish and exploitative financial dependence on others.
11. Promiscuity – Brief, superficial relations, numerous affairs and indiscriminate choice of sexual partners.
12. No Realistic Long-Term Goals – Inability or constant failure to develop and accomplish long-term plans.
13. Impulsiveness – Behaviors lacking reflection or planning and done without considering consequences.
14. Irrepressible – Repeated failure to fulfill or honor commitments and obligations.
15. Fails to Accept Responsibility for Own Behavior – Denial of responsibility and an attempt to manipulate others through this.
17. Early Behavior Problems – A variety of dysfunctional and unacceptable behaviors before age thirteen.
19. Revocation of Conditional Release – Violating probation or other conditional release because of technicalities.
20. Criminal Versatility – Diversity of criminal offenses, whether or not the individual has been arrested or convicted.

Testing for psychopathy

- Prototype psychopath - 40 points
- Diagnosis of psychopathy – 30
- Most non-psychopath criminals – 22
- Very unlikely to have criminal record - <5
- No psychopathy tendencies - 0
Punishing a psychopath

- Society must remove such perpetrators from its population and imprisoning them for such acts
- One must question both the efficacy and effectiveness of society’s response

Mental deficiency of psychopathy

- Psychopaths inherently lack an ability to understand that aggression for personal gain, whether it be for possession or entertainment, defies the moral code of society
- He cannot be said to have made such a violation willingly if he inherently lacks the capacity to make such a distinction
  - As was noted, the psychopath is born with such a deficiency. It is predetermined in his genetic make-up
Criminally insane

- Similarly, we do not send the mentally ill to prison
- Instead, in criminal law, the criminal act is affirmed and the defendant is then sent for further evaluation and rehabilitation in a psychiatric facility
- It is accepted that they have faulty reasoning which prohibits mens rea, the “guilty mind”
  - in the criminal system, it is not the criminal act alone which makes a person guilty, but the criminal act performed with the mindfulness of the act being wrong
  - through medical and psychological therapies, the faulty reasoning of the mentally ill has the potential of being restored
  - this is how other mental illness remains fundamentally different from psychopathy

Mental deficiency of psychopathy

- So too does the psychopath lack the moral reasoning to understand the consequences of his actions
- This being said, as it was discussed, the qualities that make the psychopath unique are the very qualities that inherently make him dangerous to society.
What to do?

- When the source of those qualities is genetic, without available medical or psychological treatment, what options is society left with to protect itself from such an individual?
  - death and imprisonment for life
  - they achieve the goal of protecting society from future harm incurred by the psychopath
  - but there is a more ethical and cost effective solution?

What to do?

- The psychopath’s pathology is confined to only a few neuro-cognitive systems
  - this is in contrast to the often observed global deficits seen with other mental illnesses

- Implicit is that if the psychopath’s defect can be treated, one would restore a functional individual to society
Should we be changing minds

- It is their personality which society has issue with
  - the current standard in dealing with these individuals is to execute or incarcerate them
  - in either case, assuring their personality may never interact with society again
  - this is the ultimate attitude adjustment.
  - society has deemed such personalities as so dysfunctional, that they must cease to exist in the realm of free society

- Therefore, what motivation is there for preserving those individuals’ personality?

Should we be changing minds

- What is the mind?
What is the mind

- Francis Crick, *Astonishing Hypothesis: The Scientific Search for the Soul*

Believes that the informed neuroscientist has no need for the religious concept of a soul to explain the behavior of man or beast

- "You, your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behavior of a vast assembly of nerve cells and their associated molecules"

This may be unworkable

- In order to live and function within a society, one must abide by the socially constructed limits of behavior

- If we fully accept Crick and Venter’s beliefs, we should all plead the “genetic defense”
  - as such, the defendant becomes a victim of his genes, as is the transgressed individual(s)
The genetic defense of psychopaths

- End result remains the same
  - society still needs protection
  - execute or life in prison

Is this feasible?
Economic feasibility

- Cost to society averted with even one attempted fatal crime or sexual assault
  - $2,940,000 and $87,000, respectively
  - annualized cost of $25,000 for life in prison seems cost effective.
  - annualized cost of only $7,255.34
    - savings of $17,744.66 in annualized cost

To extrapolate

- 140,610 prisoners in the U.S. serving a life sentence
- 3,297 inmates on death row
- approximately one-fourth being psychopaths
- there is an applicable population of 35,977
- The alternative of deep brain stimulation treatment would potentially result in an annualized cost savings of more than $638,399,632.82
Medical feasibility

- Diagnosis can be made precisely
- DBS is proven safe and effective
- Aggression has been demonstrated to be modulatable
  - Spain
  - South Korea
  - Medical College of Georgia

Medical feasibility

- Clearly capable
  - Need more experience
  - Still refining the target
Social feasibility

- Anything less than execution or life in prison should be found acceptable
  - unless retribution is the goal

2/3rds of Americans have been in favor of the death penalty for those convicted of murder since 1937

As of 2004, only 35% of Americans believed the death penalty had any deterrent effect

For this minority who do believe in the death sentence for deterrence, they do so despite the published consensus expert opinion that deterrence studies fail to support the idea that the death penalty is more effective deterrent to homicide than lengthy imprisonment

The majority who support the death penalty do so without believing it produces a deterrence effect.
  - therefore, such support would be believed to rely on retribution
  - however, one must remember that the penal system of the United States was built on the Quaker belief in rehabilitation of criminals, with parole as the incentive for behavioral improvement
Social feasibility

- Regarding the broader concerns
  - I believe this argument will wither as deep brain stimulation continues to grow into the mainstream of medicine
  - ever expanding indications for less controversial conditions
    - movement disorders
    - obsessive-compulsive disorder
    - addiction
    - depression
    - eating disorders, etc.
  - people will become more accustomed to medical intervention for conditions arising from within the mind

- Reversible nature of DBS
  - psychosurgery was once well accepted and sought after for loved ones by many in the public
  - it only fell out of the public’s good grace when the side effects became too great
  - with better techniques and technology, the side effects are now acceptable

- Reversible nature of the therapy gives people the sense of greater control over it

- Therefore, public support is possible.
Legal feasibility

- One would think if execution and life imprisoned is legally permissible, nearly anything short of that should likewise be permissible.

- *Kaimowitz vs. Department of Mental Health*, the Michigan Circuit Court in Wayne County found that a prisoner was deemed unable to provide voluntary consent for a procedure to reduce his aggressive behavior.

Conclusion

- The recommendation to mitigate the aggression of psychopaths using deep brain stimulation should continue to receive consideration.

- It should be offered to only those identified as having psychopathy:
  - potential ability to house those prisoners at a lesser costly minimum security prison or even potentially paroled.
  - the use of deep brain stimulation could provide significant economic, ethical, and social benefit to society.
  - its main opponents will be those believing in retribution over rehabilitation and prior legal precedent.