Intersection of Personality and Psychosis in Violence Risk and Criminal Responsibility: A Trans-Diagnostic Approach

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- How might a personality disorder (PD), alone, or comorbid with a mental illness, confer risk of violence?
- What might the implications be for two key areas of forensic mental health practice?
 Risk Assessment of Dangerousness
 - Criminal Responsibility Evaluation

Risk of Future Dangerousness v. Criminal Responsibility

- Differing roles of personality disorder (PD) in risk assessments versus criminal responsibility (CR) evaluations.
- Certain (externalizing) PDs are understood to be important risk factors in assessing future dangerousness.

 By contrast, PD alone not sufficient for CR claim, and certain externalizing PDs may often negate CR claim.

Trans-diagnostic Approach to Dangerousness Risk and Criminal Responsibility

- Superior validity of dimensional approach to study of both PD and mental illness (e.g., Krueger, 1999).
- Universal Structure of Mental Disorders?
 - Externalizing
 - Internalizing
 - Anxious-misery
 - Fear

"The Structure of Common Mental Disorders" (Krueger, 1999)



Best-fitting model for the entire National Comorbidity Survey, a 3-factor variant of the 2-factor internalizing/externalizing model. All parameter estimates are standardized and significant at P<.05.

Trans-diagnostic Model of Mental Illness and Treatment

- Consistent with NIMH initiative, "Research Domain Criteria" (RDoC) (e.g., Insel & Cuthbert, 2010)
 - Negative valence
 - Positive valence
 - Cognition
 - Social
 - Arousal/modulatory

Mental Disorder and Violence: Dimensions of Personality and Psychosis

- Impulse control
- Affect regulation
- Narcissism
- Paranoia
- Psychoticism

Nestor, P.G. (2002) Mental disorder and violence: personality dimensions and clinical features. *American Journal of Psychiatry*, 159, 12, 1973-1978

Dangerousness Risk and Criminal Responsibility: A Working Model?



Social Cognition: A Unifying Approach?

- What is social cognition?
 - A complex set of processes that entails the representations of internal somatic states, knowledge about the self, perception of others and interpersonal motivations, all of which are carefully orchestrated to support skilled social functioning.
- How is it studied?
 - Individual differences in personality and motivation.
 - Neuropsychology of decision making and social perception.
 - Self- and other-relationships in psychosis.

Social Cognition of Risk and Responsibility

- Neural Architecture of Individual Differences in Personality and Motivation
- Psychosis, Personality, and Responsibility
- Psychoticism, Psychopathy and Social Intelligence
- Psychotic Capgras Delusions, and Self-Other Relationships
- Motivated Decision Making, Substance Disorder, Psychopathy, and Recidivism

Social Brain Hypothesis (SBH)

Backdrop

• Darwin (1873)

- In the Descent of Man, the evolution of intelligence is linked to living in social groups.
- "...groups with a greater number of courageous, sympathetic, and faithful members, who were ready to warn each other of danger, to aid and defend each other....would spread and be victorious over other tribes."

• Allman (1982)

- Emphasizes the role of brain structures involved in social communication.
- Byrne & Whitten (1988)
 - In Machiavellian Intelligence, proposed the development of social expertise as the key factor in the evolution of the brain in primates.

Theories of Evolution of Large Primate Brains

- General Intelligence
 - Greater memory, faster learning, longer-range planning, etc.
- Adapted Intelligence
 - Relatively specific ecological and environmental challenges.
- Social Intelligence
 - Demands of a complex social life of constant competition and cooperation with others in social groups
 - From Hermann et al. (2007)

Fellowship: Foxes bred to be tame are keenly tuned in to human behavior.



Group living may have fostered the evolution of social intelligence



Evolution of the Social Brain

- Tomasello and colleagues (2007) conducted a systematic comparison of a representative range of cognitive skills among a single set of human and nonhuman primates individuals.
- Sample consisted of 3 groups
 - Chimpanzees and orangutans (two of humans' closest relatives)
 - 2.5-year old human children before literacy and schooling.

Humans have evolved specialized skills of social cognition (Hermann et al., 2007)



Social Cognition: From the Neurology Annals [from Adolphs 1999]

- Phineas Gage (1848) ----bilateral orbital/ventromedial frontal damage impairs social comportment, social reward evaluation, and social decision making, despite entirely normal profile on standard neuropsychological measures, such as IQ, language, perception and memory.
- Phineas Gage case and the birth of modern "forensic neurology" (Mobbs et al, 2007)

First Identified Photo of Phineas P. Gage



Phineas Gage and the Birth of Forensic Neurology



Gage Lives On

- two-thirds of introductory psychology textbooks mention Gage.
- Even today, his skull, the tamping iron and a mask of his face made while he was alive are the most sought-out items at the Warren Anatomical Museum on the Harvard Medical School campus.

Phineas Gage and the Expression of Risk in the 21st Century

- Machiavellianism
 - "It's hard to get ahead without cutting corners."
 - The best way to deal with people is to tell them what they want to hear."
- Social Comprehension
 - Social Compliance
 - Social Perception
- Motivation
- NEO Big Five

Functional Neuroanatomy of Risk and Responsibility?

- Individual differences in risk-related social cognition and gray matter volume of relevant brain structures in healthy controls.
 - Orbital Frontal Cortex
 - Superior Temporal Gyrus-Fusiform Gyrus
- NEO Openness and Insight: Psychotic Disturbances of Agency and Criminal Responsibility

MRI OFC GRAY MATTER VOLUME in Healthy Controls



 Lateral Orbital Gyrus, Middle Orbital Gyrus, Gyrus Rectus

Double Dissociation: Social Cognition and OFC Gray Matter

Machiavelli and Left Lateral Orbital Gyrus

Social Comprehension and Right Middle Orbital Gyrus



Motivation and OFC Gray Matter in Social Cognition



Higher levels of personality trait of agreeableness (NEO) right middle orbital gyrus MRI gray matter volume in healthy controls



Superior Temporal Gyrus (blue), Middle Temporal Gyrus (tan), Inferior Temporal Gyrus (purple), and Fusiform Gyrus (green) from lateral (A) and ventral (B) views.



Superior Temporal Gyrus (blue), Middle Temporal Gyrus (tan), Inferior Temporal Gyrus (purple), and Fusiform Gyrus (green) from lateral (A) and ventral (B) views.



Healthy Controls (n =23): MRI left anterior fusiform gyrus and NEO agreeableness (r= 0.553, p=.006)



Healthy Controls (n =23): MRI left posterior superior temporal gyrus and NEO agreeableness (r= 0.639, p=.001).



NEO Personality Traits and Psychotic Symptoms



Openness, Insight, and Criminal Responsibility?

- Higher levels of NEO Openness to Experience and elevated thought disorder
- Creativity and psychosis?
- But more important does openness reflect disturbance insight and self awareness?

 Might this relationship provide important data with regard to CR question of appreciation of wrongfulness? Mad v. Bad: Psychosis, Psychopathy, and Murder

- 26 males (mean age = 34 years) charged or convicted of murder.
- Objective ratings of psychosis and psychopathy (PCL-R) and neuropsychological tests of social cognition.
- Cluster analysis to test for subgroups of murderers

Neuropsychology of Psychosis vs. Psychopathy

- Intellectual abilities
- Attention and memory
- Academic abilities
- Executive function
- Social Comprehension

Results: Psychotic vs. Psychopathic Clusters

- Ward's cluster analysis revealed two subgroups of 13 subjects each.
- **Cluster 1** had a higher incidence of psychosis with 13 of the 13 subjects rated "psychotic" in comparison to none of the 13 subjects in cluster 2.
- The psychotic *cluster 1* had lower scores on the PCL-R (total, mean=9.34, SD=6.09; factor 1, mean=4.23, SD=2.62; and factor 2, mean=4.92, SD= 4.08) than *cluster-2* labeled "psychopathic," (total, mean=21.29, SD=7.23; factor 1, mean=10.23, SD=3.32; factor 2, mean=10.36, SD=4.27) than the *cluster-1* subjects.

Results: NP Differences of Psychotic vs. Psychopathic Clusters

- VIQ>PIQ in psychotic cluster but VIQ<PIQ in psychopathic cluster.
- Poorer academic scores and lower scores on attention concentration tests, suggestive of verbal learning disorder in psychopathic cluster.
- Better performance on non-verbal problemsolving for psychopathic cluster vs. psychotic cluster.

Results: Dissociating Social Intelligence in Psychotic vs. Psychopathic Clusters

Social Savvy

- Machiavellian intelligence, reading social situations, measured by WAIS Picture Arrangement (PA)
- Social Conformity
 - Compliance with social conventions, rules, measured by WAIS Comprehension (CO)
- Social Comprehension as measured by WAIS (PA + CO) related to OFC gray matter in healthy participants

Psychosis, psychopathy, and homicide: a preliminary neuropsychological inquiry (Nestor, Kimble, Berman, & Haycock, 2002)



Social Brain and Risk in Psychosis and Psychopathy?

Compliance vs. Perception

OFC Gray Matter Volume



Psychotic Dimensions of Risk and Responsibility

- Psychotic symptoms reflect disturbances in social cognitive processes.
 - Theory of Mind (TOM)
 - Self-Other relationships
 - Responsibility, Agency, and Free Will

Psychosis: Risk and Responsibility

- Capgras delusions as a form of self-other disturbance?
- Delusions of alien control and impostor beliefs in extreme violence
- Psychosis, Murder, and Insanity

Risk of Violence and Capgras Delusions in Psychosis

- Severely violent group, composed primarily of psychotic patients charged with murder, compared with a less severely violent group that was composed primarily of psychotic patients involved with property crimes.
- Severely violent group more likely to have delusional beliefs about specific personal targets and to have delusions about significant others being replaced by impostors.
- Capgras delusions accompanied by higher scores on neuropsychological tests of intellectual and academic abilities.

Targets of Capgras Delusions

- A high number of blood relatives victims of psychotic murder for patients with Capgras delusions.
- Higher incidence of lethal or near lethal acts of violence may characterize intellectually intact but psychotic individuals with organized delusions involving personal, accessible targets.

Psychosis, Murder, and Responsibility

- Not guilty by reason of insanity (NGRI) acquittees (n =13) vs. convicted murderers (n = 15).
- NGRI acquittees more likely to be seen as psychotic at the time of the index offense and more likely to have killed blood relatives, especially a parent.
- Convicted murderers more likely to have killed a significant other, mainly a spouse or lover.
- At the time of the index offense, substance abuse more likely to have occurred in the convicted murderers than in the NGRI acquittees.

Insanity Acquittees and Blood Relatives

 NGRI murderers may be driven by acute psychosis directed toward blood relatives and occurring against a backdrop of relatively preserved neuropsychological functioning.

Addiction, Risk, and Psychopathy

- Motivated Decision Making
- Psychopathy
- Social Connection
- Recidivism

Neuropsychology of Decision Making and Psychopathy in High Risk Ex-Offenders

- 26 male, substance disordered exoffenders recently released from jail.
- Iowa Gambling Task (IGT) as a measure of motivated decision making that is thought to be highly dependent on OFC circuitry. IGT consists of 100 trials, divided into 5 blocks.
- PCL-R index to rate psychopathy

IOWA GAMBLING TASK (IGT)



PICK A CARD!



IOWA GAMBLING TASK (IGT)



IOWA GAMBLING TASK (IGT)



IGT and OFC Gray Matter in Social Cognition



Motivated Decision Making, Substance Disorder, and Recidivism



Psychopathy and Motivated Decision Making (IGT)



Differential Contributions of IGT and PCL-R to Socially Disadvantageous Outcomes

- Poorer decision-making (IGT) scores predicting recidivism at three-to-six-month follow-up
- Higher psychopathy linked to a total lifetime incarceration.
- Recidivists showed a distinct pattern of IGT performance for the last three blocks of trials, characterized by a failure to learn from feedback and to modify their preferences to more advantageous decks of cards.

Addiction, Criminality and Social Cognition

 Addiction Severity Index-CF (ASI-CF), (IGT), to 35 ex-offenders (24 males, 11 females) recently released from jail and from a community-based, offender-reentry service program.

Addiction, Criminality, and Social Cognition

- ASI-CF revealed highest lifetime drug use in mean years for alcohol (M = 19.77, S.D. = 13.52), followed by cannabis (M=15.49., S.D. = 15.80), cocaine (M=11.17, S.D. = 10.76), and heroin (M = 6.97, S.D. = 9.67),
- Participants reported total lifetime of incarceration of approximately 11.4 years, with an average of 42 lifetime arrests.

Risk in Female and Male Exoffenders

• Females showed similar patterns of lifetime drug use, but had significantly fewer arrests than males and reported fewer lifetime problems (54.5%) than males (87.5%) in controlling behavior.

Different Psychological Profiles for Female and Male Ex-Offenders

 Both groups reporting similar past problems with depression and anxiety, but females reporting higher rates of lifetime problems with thinking in comparison to males who reported higher lifetime problems with hallucinations

IGT Performance of Female and Male, Substance Disordered, Ex-Offenders

Figure 1: Iowa Gambling Task performance for female and male ex-offenders



Social Influences on IGT Performance in Substance Disordered Ex-Offenders



Conclusions: Social Cognition of Risk and Responsibility

- Neural architecture of normal variation in risk-related personality and cognitive traits.
- Openness and psychosis: disturbed insight and lack of responsibility?
- Psychosis vs. psychopathic dimensions of risk and responsibility: Capgras delusions and self-other disturbance?
- Social motivation, risk, recidivism in substance disordered ex-offenders