Perception, Psychosis

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Distal Attribution

Cunningham (2015), Jones & Davis (1965)
Distal (mis)Attribution

Social Perception Processes – General Model

Elaboration – perception with ‘meaning’ and ‘motives’, etc.

Decide on reaction/response based on understanding

Integration with prior experiences

Perception ← Construction Process ← Information Processed ← Proximal Stimuli ← Mediation

Organize/Categorize
Interpret in context of past information
Prepare to be more efficient next time

Distal Stimuli
“Reality”

Appearance Behavior Context

Attribute internal content to the non-self

Cunningham (2015), Jones & Davis (1965)
subvocalization...ex. while you are lost
single modality misattribution of agency

Green, 1981
Neurofeedback-enhanced mindfulness effectively modulates brain’s resting state in schizophrenia

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Background

Neuroimaging studies have consistently found hyperconnectivity of the Default Mode Network (DMN) in patients with schizophrenia\(^1\), as well as reduced anticorrelations between DMN and Central Executive Network (CEN). This may reflect an inability to redirect resources away from internal thoughts and feelings towards external stimuli\(^2\), leading to disorder related symptomatology. Moreover, greater DMN functional connectivity correlates with greater psychopathology\(^3\) (e.g. auditory hallucinations (AH)) and reduced anticorrelations are associated with greater cognitive deficits\(^4\). Mindfulness training (MT) has been shown to decrease DMN, engage CEN, and to ameliorate clinical symptoms of schizophrenia\(^5\). We show evidence that schizophrenia patients can learn to increase the positive diatmetric activity (PDA, defined as increased CEN and decreased DMN activity) through fMRI neurofeedback-enhanced MT from these networks.

Methods

8 schizophrenia patients underwent i) two 6 min. resting-state (RS) scans, ii) two no-feedback transfer task (TR) scans and iii) four feedback scans. RS-1 was used to extract the DMN & CEN networks. All processing was performed in FSL build 5.08\(^6\). ICA was performed and the components correlated to the DMN/CEN of Yeo et al\(^7\), thresholded and binarized. rt-fMRI-neurofeedback sessions consisted of mental labeling (mindfulness practice) receiving feedback from DMN/CEN activity for 2.5 min, while BOLD fluctuations were measured using rtfMRI\(^8\) (Fig. 1). Participants were instructed to try to move a white dot into an upper-yellow circle by performing the mindfulness practice (Fig. 1). Connectivity analysis was performed using the Conn Toolbox\(^9\).

Results

All patients showed A) increase PDA by performing mental labeling while receiving real-time feedback (>76% of runs), B) increase anticorrelation of MPFC/DLPC at postTR df(7)=3.79, p=0.003, d estimate: 1.78 (large) (Fig 2a), and C) reduce intrinsic DMN connectivity at RS-2 df(7)=4.0, p=0.002, d estimate: 1.06 (large) (Fig 2b). The patients had a reduction in AH after training df(7)=2.79, p=0.01, d estimate: 1.31 (large) (Fig 2c).

![Figure 1. Schematic representation of Neurofeedback](image1)

![Figure 2. Changes in DMN & CEN connectivity (a,b) and changes in historical hallucinations scores (c) before (blue) and after (red) neurofeedback enhanced mindfulness training.](image2)

Conclusions

These results demonstrate that schizophrenia patients can modulate PDA by performing MT and that neurofeedback-enhanced MT produces an increase in anticorrelation of MPFC/DLPC connectivity and a reduction of intrinsic DMN connectivity. As a result these patients had a subsequent reduction in AH. Both, intrinsic DMN and DMN/CEN anticorrelations provide targets to study the neurobiology of this disorder and may aid the development of novel forms of interventions aiming to “normalize” the brain’s resting state while avoiding the severe side-effects of current treatment.
Lower Level=Higher Level?

★ Dyslexia is a phonological deficit with contributions of visual processing problems?

★ Depression involves disorders of generalizability in memory, not affect?

★ Schizophrenia is a misattribution of stimuli, a misalignment of salience?

★ Autism a sensory processing speed problem?

So…real-time, regular, lower order interventions via wearables/portable VR therapeutics on higher order disorders
★ Synchrony

- DMN
- Salience network
- CEN

- Dynamic switching

- Internally directed action
- Externally directed action

Nature Reviews | Neuroscience

Functional view: (Hurley and Nöe) 2003

Uddin (2015)
Defective Action Recognition

From: Defective Recognition of One’s Own Actions in Patients With Schizophrenia

American Journal of Psychiatry

active=passive

EXTRA only if time

Franck N, 2001