Daydreaming Styles and Brain Functional Connectivity

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Abstract

Intrinsic modes of thinking, like daydreaming, are in large part related to more general thinking styles. Through neuroimaging techniques, we are able to identify daydreaming connectivity within brain networks. The brain's default mode network is typically associated with unintentional thinking, while the fronto-parietal network involves more intentional forms of cognition. In this study, resting brain states were collected, and participants completed the Short Imaginal Process Inventory (SIPI) to ascertain distinctive daydreaming patterns among the individuals, including positive constructive (PC), guilt and fear of failure (GF), and poor attentional control (PA) styles. Connectome-based predictive modeling was used to estimate the pattern of each participant's daydream connectivity from whole-brain, resting-state functional connectivity. In PC individuals, node connections found within frontal-parietal and default mode networks, which supports previous evidence of default mode activity associated with goal-directed cognition. Limbic network connectivity in GF individuals suggests more emotional qualities within their daydreams. Dorsolateral prefrontal cortex and subcortical/cerebellum activity in PA individuals suggests low maintenance of attention, as previously found in ADHD individuals. By delving into the individual differences of daydreaming styles, our research has contributed to a more comprehensive understanding of overall brain functional connectivity as it pertains to the intentionality and characteristic quality of different daydreamers.

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Daydreaming, commonly referred to as mind wandering, can be classified into two broad categories of deliberate and spontaneous thought. Deliberate cognition often incorporates goal-directed and task-related thought processes. Conversely, spontaneously occurring cognition involves less purposeful and involuntary thinking that frequently occurs with little to no task demands (Christoff, Ream, & Gabrieli, 2004). Past research on mind wandering has found intentional and unintentional mind wandering to be separate processes of our cognitive experience (Seli, Risko, Smilek, & Schacter, 2016). Recent neuroimaging observations have studied the connectivity of different brain networks in relation to spontaneous (unintentional), and deliberate (intentional) thought, which suggest commonalities between these two dissociable cognitive processes. The present research investigates different styles of daydreaming to help dissociate these two types of thought and to see whether each daydreaming profile can be predicted from functional brain networks.

One brain system commonly associated with daydreaming is the default mode network. This system takes part in the brain's internal cognition, and it is primarily active when an individual is not focused on the external environment (Buckner, Andrews-Hanna, & Schacter, 2008). It was once thought that the activation of regions within this network could only occur while the brain is at rest or contributing to low processing demands (Grafton, Horn, Macrae, Mason, Norton, & Wegner, 2007), thus providing more susceptibility to mind wander during these periods of low external stimulation. Hence, it is associated with imaginative processes that include spontaneous mind wandering (Beaty et al., 2014), but these processes may also elicit deliberate mind wandering.

In contrast, the fronto-parietal network, which includes regions of the anterior prefrontal cortex and inferior frontal gyrus, contributes to more intentional thought and cognitive control (Vincent et al., 2008). Additionally fronto-parietal connections have also been attributed with goal-orientation, decision-making, and task-specific activation (Dosenbach et al., 2007). It is these executive processes that give rise to deliberate mind wandering that involves the initiation or continuation of a mind wandering episode (Seli et al., 2016). Recent research suggests that the default mode network can couple with other networks, such as the fronto-parietal network, during mind wandering (Spreng, Stevens, Chamberlain, Gilmore, & Schacter, 2010). This contradicts the previous understanding of the DMN remaining a distinct network, active only in spontaneous mind wandering.

Measuring resting-state brain activity provides a suitable window into spontaneous thought processes, which can include daydreaming. Previous research has revealed correlations between self-generated thought including mind wandering, future thinking, creative cognition, and daydreaming to DMN activity (Beaty et al., 2015). Mason et al. (2007) examined individual tendencies to produce stimulus-independent thoughts that were correlated with DMN activity, in which participants completed a daydreaming scale determining individual propensities of engaging in these thoughts (Buckner, 2008). Resting-state neuroimaging may also provide time for intentional mind wandering, which is often accompanied with the executive processes associated with fronto-parietal connectivity (Christoff et al., 2009; Seli et al., 2016). It can be assumed that daydreaming patterns highly associated with characteristics of personality may show similar network distinctions and interactions in resting-state brain activity. Beaty and colleagues (2018), for example, have found that individuals higher in openness tend to spend more time in a default-mode and fronto-parietal connected brain network during resting-state scans.

Short Imaginal Process Inventory

Much of our time is spent in spontaneous cognition. Whether it is through thoughts of the past, present, or future, these self-generated thoughts are subjective cognitive experiences that reflect personality traits and the context in our daily lives (Kane et al., 2017). Kane and colleagues (2017), for example, found that openness to experience was a predictor of mind wandering tendencies and that individuals higher in openness frequently mind wander in everyday life settings. These intrinsic thought processes take place in the form of internal conversations, imagery, or daydreams that contribute to our human experience and “stream of consciousness” (Buckner, 2007).

The Short Imaginal Process Inventory (SIPI) is a widely used scale for measuring daydreaming patterns. The SIPI is a shorter, 45-item measure, developed from the original 400-item Imaginal Process Inventory (IPI). The SIPI contains three subscales that classify distinct daydreaming styles: positive-constructive, guilt and fear of failure, and poor attentional control. The positive-constructive subscale is accompanied with positive thoughts, acceptance, playful/wish-fulfilling fantasies, and problem solving (Gruis, 2005; Singer & Zhiyan, 1997). It is often expressed through future thinking and vivid auditory and visual imagery (Gruis, 2005). The guilt and fear of failure subscale includes frightened reactions to daydreams, fear of failure, fear of doing something wrong, and hostile daydreams. This style of daydreaming also involves achievement by heroic actions. Lastly, the poor attentional control dimension involves poor maintenance of control, easy loss of interest, boredom susceptibility, and distractibility. It is possible for an individual to experience all three patterns, but their daydreams often gravitate towards one style (Gruis, 2005).

Research on individual differences have successfully linked traits of personality to these different patterns of daydreaming, concluding that openness to experience was associated with positive constructive daydreaming, guilty-dysphoric was linked with neuroticism, and poor attentional was negatively correlated with conscientiousness (Singer & Zhiyan, 1997). The act of daydreaming often carries a negative connotation to it, but the style of positive constructive daydreaming allows more acceptance and openness towards the action of daydreaming. This openness to daydreaming is reflected in the basic description from one of the Big Five personality traits, Openness to Experience (McCrae & John, 1992). Openness elicits a form of sensitivity to new experiences, which is mirrored with positive constructive daydreaming sensitivity to the act of daydreaming. Guilty-dysphoric daydreaming was associated with neuroticism as each dimension expresses more depressive cognition. Some literature has suggests that neuroticism in spontaneously self-generated thoughts is associated with creativity as a result of prolonged periods of rumination (Perkins, Arnone, Smallwood, & Mobbs, 2015). Others counter this research, suggesting that self-generated thoughts in neurotic individuals do not lead to creative thinking but rather to more aversive rumination (Pickering et al., 2016). In Singer and Zhiyan (1997), a negative correlation was found between conscientiousness and poor attentional control, illustrating that poor control over one's internal thoughts is consequently associated with less conscientiousness, or control.

The daydreaming styles within the SIPI had yet to be mapped out in the brain until the present study. However, various studies have provided neural correlates for key characteristics of each profile. Positive constructive daydreaming, for example, involves planning and thinking about the future. Some studies have observed this future cognition in the brain, including Addis and colleagues (2007) in their assessment of episodic construction of events, which determined active brain areas that mostly included default mode regions (parietal lobule, temporal gyrus, cuneus). Future event construction tasks yielded more fronto-parietal activity with regions including the frontal gyrus, anterior cingulate cortex, and frontal pole. For poor attentional control, daydreams are characterized by low control of attention, a common symptom of attention deficit hyperactivity disorder. In past studies, individuals with ADHD have shown more dorsolateral prefrontal cortex, subcortical (thalamus, striatum) and cerebellum activity (O'Halloran & Cao, 2017; Rosenberg et al., 2016). This contrasts with future constructive in that the fronto-parietal network is connecting with different regions, which suggests that this fronto-parietal connectivity may be associated with lower maintenance of control, as these regions are most notable for sustaining attention (O'Halloran & Cao, 2017). Less clear is how affective mind wandering, such as guilty-dysphoric might be expressed in the brain. Previous neuroimaging findings reveal that neurotic individuals who show more rumination and affective mind wandering exhibit increased activation in the posterior cingulate cortex and other regions associated with negative affect (amygdala, medial thalamus, and midbrain areas), areas that are important for emotional regulation (Perkins, 2015).

Connectome-based Predictive Modeling (CPM) is a newly developed analysis that has been used in a few studies to estimate functional brain connections related to creativity (Beaty et al., 2018) and sustained attention (Rosenberg et al., 2016). The predictive models generated from this analysis are then used to predict behavior in novel participants. Beaty and colleagues (2018) have demonstrated CPM can reliably predict high creative ability by using large-scale brain networks including default, salience, and executive networks. The current study used CPM to predict daydreaming connectivity for each participant using whole-brain resting states.

The present study explores functional connectivity within patterns of daydreaming by assessing networks activity during resting-state fMRI scans. Spontaneous and non-purposeful mind wandering is associated with default mode activity; however, it is also recognized that the default mode network may also be associated with intentional, goal-directed cognition when accompanied with regions in the fronto-parietal network (Schacter et al., 2012). The current research identifies connectivity of various brain networks in relation to three distinct daydreaming profiles, which allowed us to examine network function related to each daydreaming style. We hypothesized that executive control regions (i.e., fronto-parietal) would exhibit higher connectivity within patterns associated with positive constructive and poor attentional control daydreams. Additionally, positive constructive connectivity was expected to appear in default regions. Finally, we expected emotionally characterized daydreams (guilty-dysphoric) to yield connectivity in limbic networks in regions associated with emotion.

Method

Participants

In the original study, 163 participants from the University of North Carolina at Greensboro and surrounding community were recruited as a part of a larger study examining individual differences in creativity. This study specifically recruited individuals with art, music, and science majors (Beaty et al., 2018).

In the present study, we included 138 of these participants, (M = 22.82, SD = 6.54), who were comparable on age and demographics. This subset of participants completed the IPI assessment during a midweek survey. The individuals were awarded $100 and a mug with an image of their brain on it for the MRI session, and $10 for the online web survey. Flyers were distributed around UNCG and the surrounding community for the recruitment of participants. Eligibility for the study included people that were at least 18 years old and right-hand dominant. Strong magnetic fields from MRI machinery entail strict exclusion criteria such as having a heart pacemaker, previous history of neurological disorders, taking any medications that affect the central nervous system, having metal in the body (excluding dental work), medical implants, magnets in the body, having had surgery in the last 6 weeks, weight of more than 450 pounds, or being pregnant or possibly pregnant. Participants' information remained confidential and opportunity for withdrawal was at any point in the study.

Materials

IPI daydreaming scales. This study measured different daydreaming styles by using the 45-item Shortened Imaginal Process Inventory (SIPI), which was administered though Qualtrics in addition to other self-report surveys within the same week as the scanning session. The survey included 45 questions with 15 questions pertaining to each daydreaming pattern. Participants answered the open-ended questions using a Likert-type scale ranging from 1-5 ("directly untrue, uncharacteristic of me" to "very true, strongly characteristic of me") for positive constructive, guilty and fear of failure, and poor attentional control. Positive constructive items generally exhibit a more positive view on daydreams and may present possible solutions to problems. A positive constructive question may ask, "Sometimes an answer to a difficult problem will come to me during a daydream." Guilty-dysphoric questions consider more negative, fearful, or guilty aspects of daydreaming such as, "In my fantasies, a friend discovers I have lied." Poor attentional tend to ask questions about boredom susceptibility and distractibility, for example, "I find that I easily lose interest in things that I have to do."

Statistical Analyses

Data Acquisition and Preprocessing. Participants were scanned using a 3T Siemens Skyra system (Siemens Medical Systems, Erlangen, Germany) with a 32-channel head coil. BOLD-sensitive T2n- weighted functional images were acquired using a single shot gradient-echo EPI pulse sequence (TR1⁄42500 ms, TE1⁄427 ms, flip angle1⁄4901, 32 axial slices, 4.0 4.0 4.0 mm3, distance factor 25%, FoV1⁄4256 256 mm2, interleaved slice ordering) and corrected online for head motion. The first two volumes were discarded to allow for T1 equilibration effects. Head motion was restricted using firm padding that surrounded the head. Data were acquired for five minutes while participants rested with their eyes closed. Following functional imaging, a high resolution T1 scan was acquired for anatomic normalization. Imaging data were then slice-time corrected and realigned using the Statistical Parametric Mapping (SPM) 8 package (Wellcome Institute of Cognitive Neurology, London). Functional volumes were coregistered and resliced to a voxel size of 2 mm3, normalized to the MNI template brain (Montreal Neurological Institute), and smoothed with an 8 mm3 isotropic Gaussian kernel.

Functional Network Construction. Each participant had whole-brain networks computed using CONN. We used the Shen brain atlas, which provides whole-brain coverage of the cerebral cortex, cerebellum, and brainstem (Shen, 2013). Consisting of 268 regions of interest (ROIs) of 2-mm dimensions, this application is consistent with past work that employs CPM (Rosenberg et al., 2016). A 268 × 268 correlation matrix for each participant included a BOLD signal that was extracted from each ROI during the resting-state period and bivariate correlations that were computed between each pair of ROIs.

Connectome-Based Predictive Modeling. The main analysis utilized connectome-base predictive modeling (CPM) to estimate participant's daydream connectivity from whole-brain, resting-state functional connectivity. CPM identifies functional brain connections that are related to a behavioral variable of interest and is typically used to predict behavior in participants whose data were not included in the model creation. CPM has been reported in a series of studies that apply its procedure to an array of cognitive variables, including fluid intelligence, attention control, and creativity (Beaty et al., 2018). However, we have provided a brief overview of the CPM processing pipeline here. In the functional connectivity matrix of each participant, a vector of behavioral values (i.e., a single daydreaming score for each participant) and each edge (i.e., correlation of mean BOLD signals between a given pair of brain regions) are correlated in the first step. To retain edges that were significantly positively and negatively correlated with behavior ($p < 0.01$), a threshold was applied to the matrix.

Next, the edge strength was summed (i.e., correlation coefficients) in the positive and negative tails of the correlation distribution through the application of CPM to a participant's data. Behavioral and connectivity values' frequency distributions were checked for normality to meet assumptions for Pearson's correlations. To estimate the relationship between the model predicted behavior score and the observed behavior score, a linear regression model was conducted. Lastly, the model was applied to new participants such that the model was trained on $n - 1$ participants' connectivity matrices and behavior scores in a leave-one-out cross-validation. This was then tested on the participant that was left out. The leave-one-out loop also included feature selection (i.e., network edges retained), which resulted in marginally different networks and predictive models for each iteration. The magnitude and statistical significance of the Pearson's correlation between the model predicted and observed behavior scores reflects the predictive power of the resulting model.

The CPM analyses were completed in the *NetworkToolbox* package (Christensen, 2018) in *R* (R Core Team, 2018). The visualization of the connectivity profiles was produced using the BioImage Connectivity Viewer: http://bisweb.yale.edu/build/connviewer.html.

Procedure

The Institutional Review Board approved of this study and all participants provided informed consent before participating in the study. Participants visited the Joint School of Nanoscience and Nanoengineering, where fMRI scans were conducted with a 3T Siemens scanner. Among other cognitive tasks in the scanner, participants had a five-minute rest period where they were instructed to relax with their eyes open. The resting-state was obtained from this period and was used to measure full-brain connectivity.

Results

Neuroanatomy of daydreaming. Whole-brain functional networks were constructed for each participant by extracting and correlating the task-related blood oxygen level-dependent (BOLD) signal from 268 brain regions. To identify network edges (i.e., functional connections) related to each daydreaming style, we correlated all edges in this network with the daydreaming score extracted via sum scores and applied a statistical threshold ($p < 0.01$) to retain the most significant edges in the connectivity matrices.

We employed a leave-one-out internal validation analysis to test whether the brain connectivity model (i.e., strength of functional connectivity within daydream network) could reliably predict each daydreaming style in left-out participants (Note that daydream networks can differ in each round of cross-validation since they are defined on a different set of 137 individuals and tested on the left-out 138th participant.)

Positive constructive individuals exhibited functional connections in predominantly fronto-parietal and default mode networks, forming 129 total edges (Figure 1). Consistent with past work, the regions showing the highest degree (i.e., number of functional connections) corresponded to the core hubs of the default (e.g., medial temporal gyrus, BA 21; supramarginal gyrus, BA40) and frontoparietal/executive network (e.g., anterior prefrontal cortex, BA10), which formed a connectivity triangle. Of the 25 highest degree nodes in the positive constructive network, 4 were within the frontoparietal/executive network, 3 were within the default network, 1 was within the salience network, 1 was within the somato-motor network, and 1 was within the ventral-attention network.

Guilty-dysphoric individuals exhibited functional connections in predominantly cerebellum and limbic regions, containing 168 total edges (Figure 2). Consistent with past work, the regions showing the highest degree corresponded to the core hubs of the default (e.g., anterior prefrontal cortex), visual (e.g., fusiform), and subcortical (e.g., putamen) networks. Of the 25 highest degree nodes in the guilty-dysphoric network, 6 were within the default network, 4 were within the subcortical network, 2 were within the salience network, and 1 was within the frontoparietal/executive network.

Poor attentional control individuals exhibited functional connections in predominantly prefrontal and cerebellum regions with a total of 203 edges (Figure 3). Consistent with past work, the regions showing the highest degree corresponded to the core hubs of the frontoparietal (e.g., dorsolateral prefrontal cortex and inferior frontal gyrus) and subcortical/cerebellar networks (e.g., putamen and cerebellum). Of the 25 highest degree nodes in the poor attentional control network, 5 were within the frontoparietal/executive network, 4 were within the subcortical network, 3 were within the default network, 1 was within the ventral-attention and salience network.

Internal Validation. Daydreaming connectivity was predicted through the identification of functional brain regions related to each daydreaming pattern. Predicted behavior was then regressed by the observed behavior in the participants, with the strength of the prediction reflected in correlational values. The leave-one-out internal validation analysis revealed significant predictions for guilty-dysphoric ($r = 0.214$, $p = 0.012$), poor attentional control ($r = 0.208$, $p = 0.014$), and positive constructive ($r = 0.157$, $p = 0.065$). Predictive models significantly predict connectivity in positive constructive participants.

Discussion

The current research is the first to implement CPM on mind-wandering-like scales. The SIPI has been widely used in assessments of personality to emotionality (Singer & Zhiyan, 1997) but has never before been analyzed using resting-state data. This research has provided a closer look into daydreaming profiles that reveal disparities as well as commonalities between subcategories of imaginative thought. In recent mind wandering literature, intentionality of thought has become a topic of debate. Daydreaming and mind wandering have typically been associated with spontaneous thought processes. Our findings help us to incorporate the intention of daydreams with the separation of different qualities of daydreaming.

The positive constructive daydreaming style falls in line with previous conceptions of intentional mind wandering. Prior to recent research on the default mode network and cognitive control, we would not expect to find default activity in this daydreaming profile (Spreng et al., 2010). Although traditionally once assumed to be involved with solely unintentional, non-purposeful cognition, the default mode network has been associated with deliberate, cognitive control when paired with the fronto-parietal network (Spreng et al., 2010). Golchert et al. (2016) demonstrated that deliberate mind wandering is associated with the integration of default and fronto-parietal regions (right supramarginal gyrus and inferior frontal gyrus), but also more effective communication between these regions when compared to more spontaneous mind wandering. In this study, we extend existing evidence of executive processes (frontoparietal network) coupling with the DMN with connectivity found in regions including the medial temporal gyrus and anterior prefrontal cortex. One key feature of positive constructive daydreamers is future planning, which traditionally relies on executive processes.

When it comes to intentionality, the guilty-dysphoric daydream is a grey area that few studies have focused on. It does not quite show spontaneous, nor deliberate qualities, but these daydreams do resemble affective characteristics that encompass an emotionality aspect of mind wandering that is neurotic and depressive in nature (Perkins et al., 2015). Perkins and colleagues (2015) argued that spontaneous self-generated thoughts of past and future problems are the reason why neurotic individuals experience unpleasant emotions in the absence of stimuli. Apart from a daydreaming state, connectivity in the default mode network may suggest the existence of ruminative, emotional, and depressive thoughts as noted in studies examining a neural basis for depressive symptomology (Ellis et al., 2016; Perkins et al., 2015; Sliz & Hayley, 2012). In a previous study that analyzed depressive symptoms in adolescence, participants who experienced moderate early symptoms (chronic depressive symptoms) that only gradually decreased over time, revealed higher node activity in limbic areas including the putamen, caudate, and connections between cingulate cortex and the prefrontal cortex (Ellis et al., 2016). Our findings support the previous study with cerebellum and other limbic regions (anterior/posterior cingulate cortex) of the brain providing most of the connectivity found in these individuals, along with introducing subcortical regions (putamen, parahippocampus, caudate, thalamus) that are typically associated with emotional regulation.

In past studies, individuals who score higher on ADHD measures report more high levels of spontaneous mind wandering (Golchert et al., 2016). We characterized the poor attentional control daydreaming pattern as more spontaneous in nature, incorporating less cognitive control and intentionality within inner thoughts. Previous studies on individuals exhibiting ADHD symptoms show increased connectivity between the cerebellar and fronto-parietal networks (Rosenberg et al., 2016), consistent with what we found in the poor attentional control profile. Thus, we directly replicated Rosenberg and colleagues' (2016) whole-brain functional connectivity. Research by O'Halloran and Cao (2017) also suggests that poor sustained attention is associated with strong connectivity in the prefrontal networks. Our evidence supports this notion with prefrontal regions (anterior prefrontal cortex, premotor, inferior frontal gyrus, and frontal eye field) exhibiting a larger number of connections for poor attentional control individuals. Although counterintuitive in nature, poor attentional control seems to be associated with greater connectivity in cognitive control regions.

Implications

This study further contributes to research on brain functional connectivity within daydreaming states. Connectivity within the default mode network was expected to appear for each daydreaming model since it is typically activated in resting-state where the mind tends to be susceptible to daydreaming and mind wandering. More specifically, the present research supports existing literature on the interaction of different brain networks during internal experiences. A commonality between spontaneous and intentional daydreaming, in addition to the prevalence of the default mode network, was connectivity in fronto-parietal/prefrontal regions, which is consistent with past studies on daydreaming intentionality (Golchert, 2016).

Limitations and Future Directions

It is difficult to determine whether participants' thoughts were fit to specific criteria of each daydreaming profile because we did not request post resting-state thought content. Future research can utilize leading questions to acquire more post resting-state content, which can be coded individually by raters to further solidify daydreaming styles. Additionally, our data was limited to five-minute resting-states that were conducted right after a task. It is hard to decipher whether these daydreams were focused on the previous task at hand or on different spontaneous and intentional thoughts that encompassed their past, present, or future. Laboratory settings may alter wandering thoughts of participants during experiments (Kane et al., 2017). Perhaps experience sampling methods may be used to compare perceived daydreaming style determined by the SIPI to daily self-reports of daydreaming patterns in everyday environments.

Conclusion

Our research provides additional understanding of the functional brain connectivity that occurs within our imaginative minds. By analyzing specific networks pertaining to cognitive control and attention, this study validates the idea that daydreaming can be associated with control of intentional thought as well as preservation of attention. Lastly, we extend daydreaming/mind-wandering research by mapping functional connectivity in affective daydreamers, which may suggest more spontaneously generated cognition. Definitions of daydreaming may vary; therefore, the continuum of daydreaming is something researchers in the field should consider in the future.

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Figure 1. This figure depicts connectivity profile of positive constructive daydreaming. The connectivity between lobes is displayed on the left of the image. The right of the image depicts a glass brain of the top (top) and left (bottom) view of the connectivity profile.

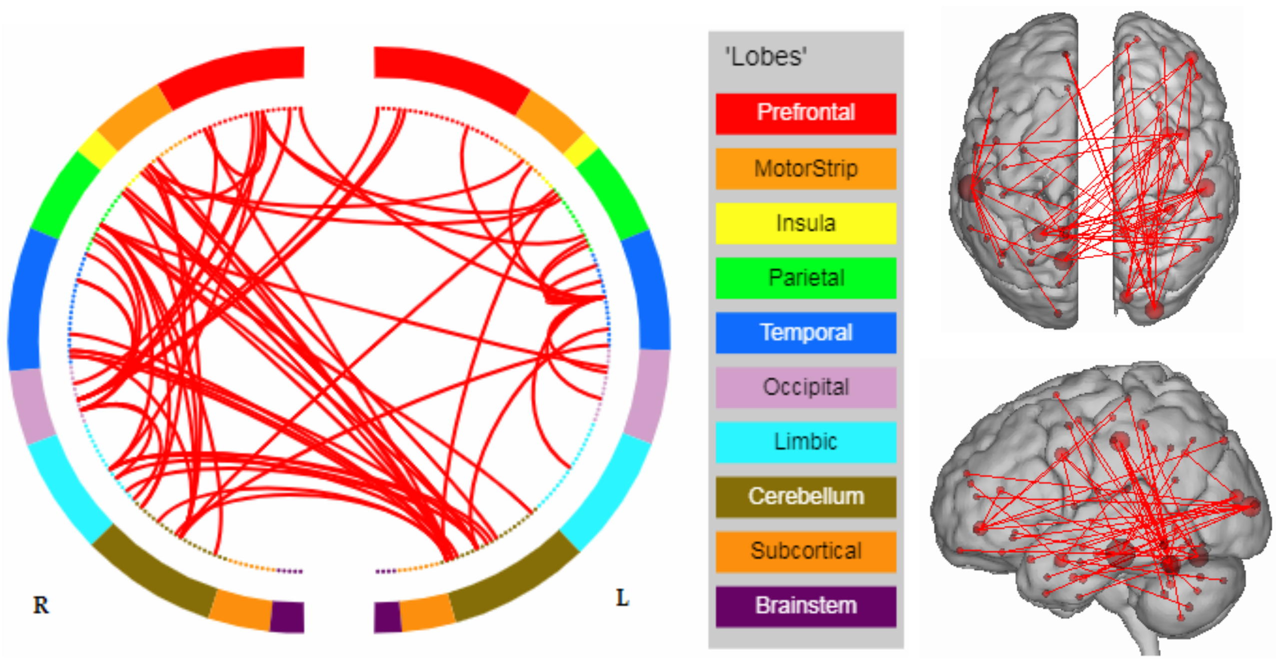


Figure 2. This figure depicts connectivity profile of guilty-dysphoric daydreaming. The connectivity between lobes is displayed on the left of the image. The right of the image depicts a glass brain of the top (top) and left (bottom) view of the connectivity profile.

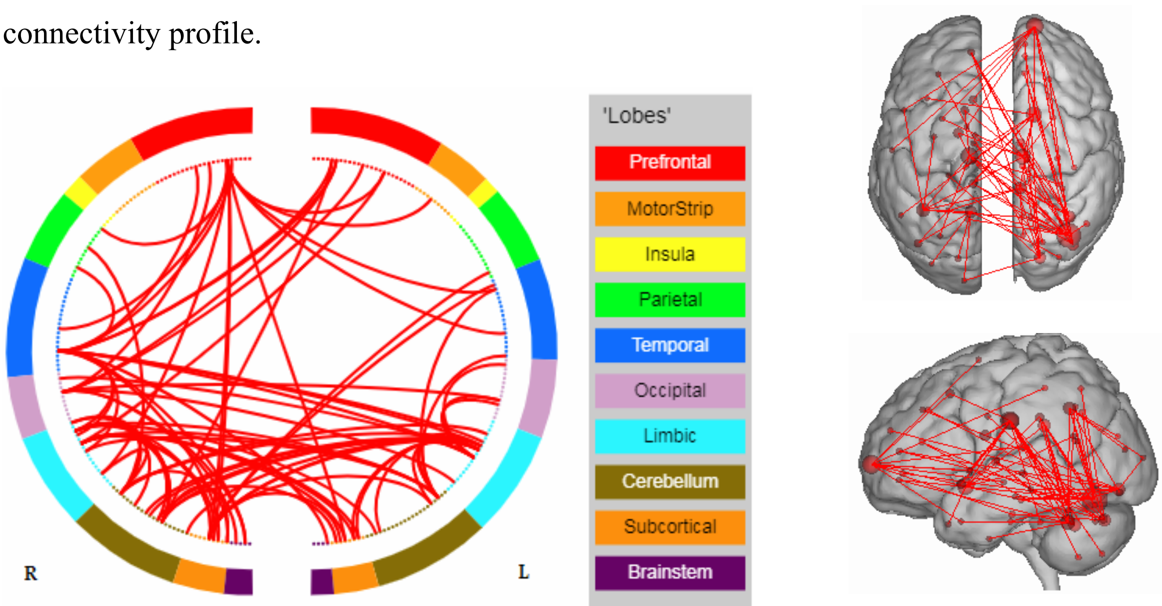
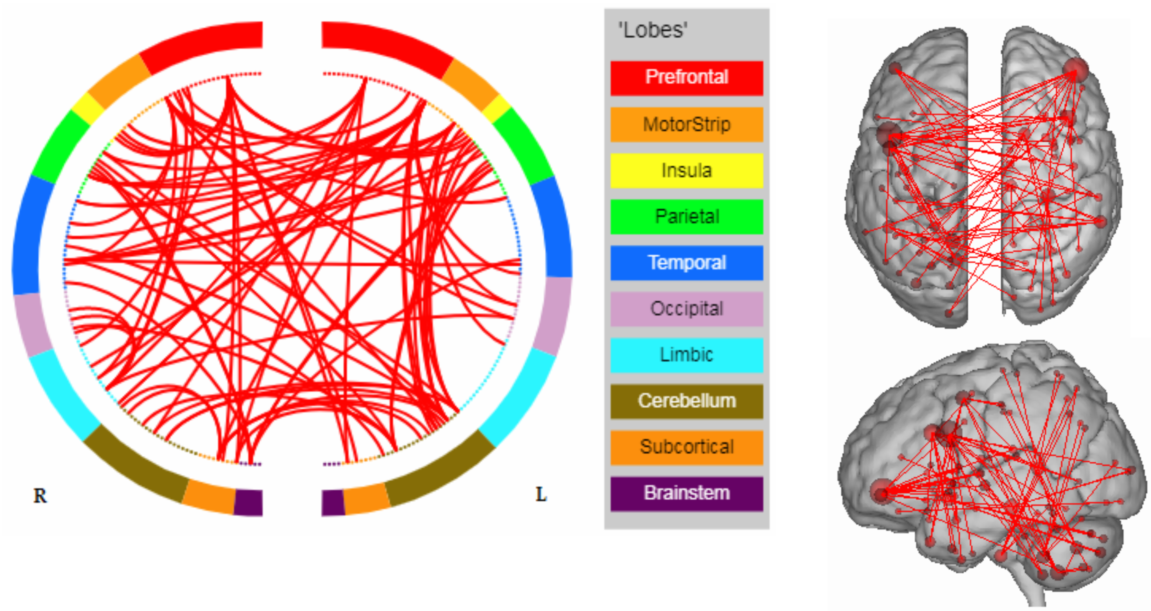


Figure 3. This figure depicts connectivity profile of poor attentional control daydreaming. The connectivity between lobes is displayed on the left of the image. The right of the image depicts a glass brain of the top (top) and left (bottom) view of the connectivity profile.



Appendix

IPI

This section of the questionnaire asks for your views about your inner experiences, your images, dreams, and daydreaming. There is no "official" definition for words like "daydream". Interpret these words in terms of their common meanings as they might apply to you. Be careful to distinguish between thinking about something you are doing at that moment and daydreaming about something else. Thinking about a task while working on it is not daydreaming, although having thoughts about the task at other times, such as while getting ready for sleep or on a long bus ride, could be daydreaming.

	Definitely untrue or strongly uncharacteristic of me (1)	Moderately untrue or uncharacteristic of me (2)	Neither particularly uncharacteristic nor uncharacteristic of me (3)	Moderately true or characteristic of me (4)	Very true or strongly characteristic of me (5)
I tend to get quite wrapped up and interested in whatever I am doing. (1)	❍	❍	❍	❍	❍
A really original idea can sometimes develop from a really fantastic daydream. (2)	❍	❍	❍	❍	❍
In my fantasies, a friend discovers I have lied. (3)	❍	❍	❍	❍	❍
I do not really "see" the objects in a daydream. (4)	❍	❍	❍	❍	❍
I am the kind of person whose thoughts often wander. (5)	❍	❍	❍	❍	❍
In my daydreams, I see myself as an expert, whose opinion is sought by all. (6)	❍	❍	❍	❍	❍
Sometimes an answer to a difficult problem will come to me during a	❍	❍	❍	❍	❍

daydream. (7)					
My mind seldom wanders from my work. (8)	❍	❍	❍	❍	❍
I imagine myself failing those I love. (9)	❍	❍	❍	❍	❍
I picture myself as I will be several years from now. (10)	❍	❍	❍	❍	❍
I find that I easily lose interest in things that I have to do. (11)	❍	❍	❍	❍	❍
My daydreams often contain depressing events which upset me. (12)	❍	❍	❍	❍	❍
I am not easily distracted. (13)	❍	❍	❍	❍	❍
In my dreams, I show anger toward my enemies. (14)	❍	❍	❍	❍	❍
My fantasies usually provide me with pleasant thoughts. (15)	❍	❍	❍	❍	❍
My ability to concentrate is not impaired by someone talking in another part of my house or apartment. (16)	❍	❍	❍	❍	❍

The sounds I hear in my daydreams are clear and distinct. (17)	❍	❍	❍	❍	❍
I imagine myself not being able to finish a job I am required to do. (18)	❍	❍	❍	❍	❍
Daydreaming never solves any problem. (19)	❍	❍	❍	❍	❍
No matter how hard I try to concentrate, thoughts unrelated to my work always creep in. (20)	❍	❍	❍	❍	❍
In my daydreams I become angry and even antagonistic toward others. (21)	❍	❍	❍	❍	❍
My daydreams are often stimulating and rewarding. (22)	❍	❍	❍	❍	❍
I can work at something for a long period of time without feeling a bit bored or restless. (23)	❍	❍	❍	❍	❍
In my daydreams, I	❍	❍	❍	❍	❍

am always afraid of being caught doing something wrong. (24)					
Faced with a tedious job, I notice all the other things that I could be doing. (25)	❍	❍	❍	❍	❍
I seldom think about what I will be doing in the future. (26)	❍	❍	❍	❍	❍
In my fantasies, I receive an award before a large audience. (27)	❍	❍	❍	❍	❍
My daydreams offer me useful clues to tricky situations I face. (28)	❍	❍	❍	❍	❍
I tend to be easily bored. (29)	❍	❍	❍	❍	❍
Unpleasant daydreams don't frighten or bother me. (30)	❍	❍	❍	❍	❍
The "pictures in my mind" seem clear as photographs. (31)	❍	❍	❍	❍	❍
In my daydreams, I fear meeting new responsibilitie s in life. (32)	❍	❍	❍	❍	❍

I find it hard to read when someone is on the telephone in a neighboring room. (33)	❍	❍	❍	❍	❍
I find myself imagining ways of getting even with those I dislike. (34)	❍	❍	❍	❍	❍
I am seldom bored. (35)	❍	❍	❍	❍	❍
My daydreams often leave me with a warm, happy feeling. (36)	❍	❍	❍	❍	❍
I picture myself being accepted into an organization for successful individuals only. (37)	❍	❍	❍	❍	❍
Daydreams do not have any practical significance for me. (38)	❍	❍	❍	❍	❍
I find it difficult to concentrate when the TV or radio is on. (39)	❍	❍	❍	❍	❍
I daydream about what I would like to see happen in the future. (40)	❍	❍	❍	❍	❍
In my daydreams I	❍	❍	❍	❍	❍

feel guilty for having escaped punishment. (41)					
My thoughts seldom drift from the subject before me. (42)	❍	❍	❍	❍	❍
I find my daydreams are worthwhile and interesting to me. (43)	❍	❍	❍	❍	❍
I never panic as a result of a daydream. (44)	❍	❍	❍	❍	❍
I have difficulty in maintaining concentration for long periods of time. (45)	❍	❍	❍	❍	❍