

The Default Mode Network in Attention-Deficit/Hyperactivity Disorder

Edmund Sonuga-Barke



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	Lecturer	Consultancy	Research Grant	Royalties
Medice	X			
Janssen-Cilag	X			
Shire	X	X	X	
Qbtech	X			
New Forest Parenting Package				X
MRC, ESRC, NIHR, Wellcome Trust			X	
KU Leuven		X		
Aarhus University		X		

OUTLINE

- **The default mode network: structure - function**
- **Default mode network in ADHD - Three models**
 - ***Disturbed task-independent cognition during “rest”.***
 - (i) ***Reduced DMN integrity - Impaired introspection***
 - ***Excess task-independent cognition during***

THE DEFAULT BRAIN NETWORK

- **Task independent de-activations found during cognitive tasks in areas of high metabolic activity during rest (Raichle & Gusnard)**

(Buckner)

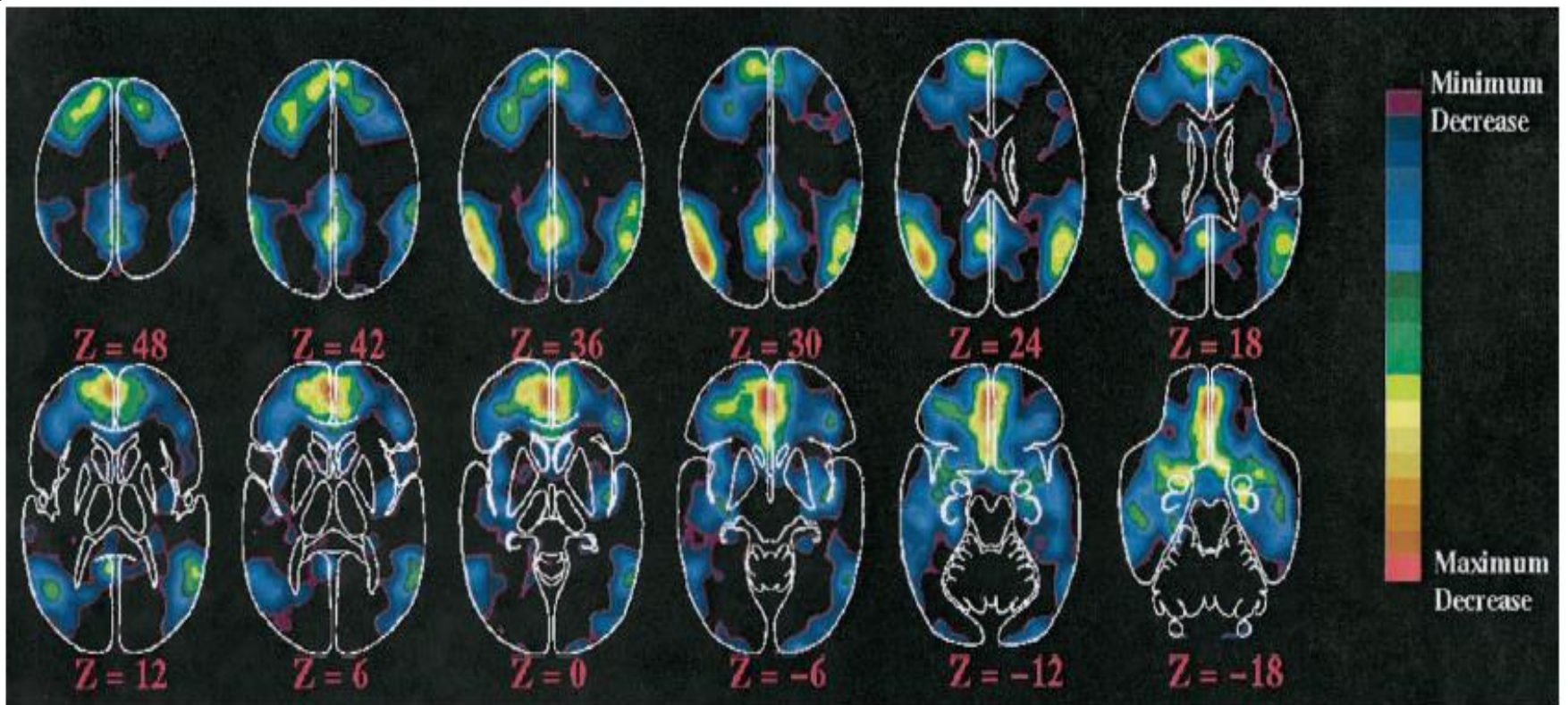


Fig. 1. Regions of the brain regularly observed to decrease their activity during attention demanding cognitive tasks. These data represent a metaanalysis of nine functional brain imaging studies performed with PET and analyzed by Shulman and colleagues (49). In each of the studies included, the subjects processed a particular visual image in the task state and viewed it passively in the control state. One hundred thirty-two individuals contributed to the data in these images. These decreases appear to be largely task independent. The images are oriented with the anterior at the top and the left side to the reader's left. The numbers beneath each image represent the millimeters above or below a transverse plane running through the anterior and posterior commissures (26).

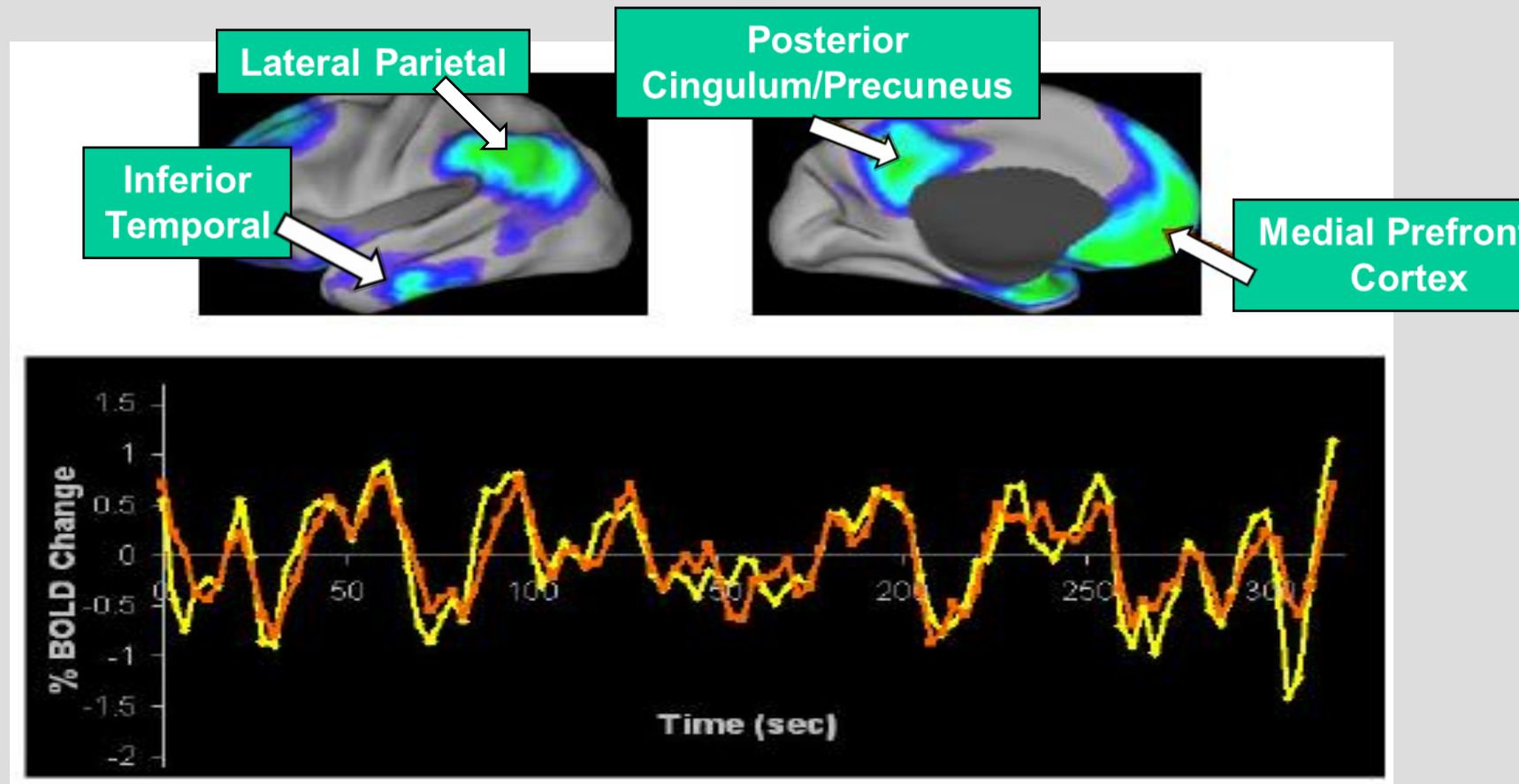
THE DEFAULT BRAIN NETWORK

- **Task independent de-activations found during cognitive tasks in areas of high metabolic activity during rest (Raichle & Gusnard)**
- **Low frequency coherent spontaneous hemodynamic BOLD signal changes define functional networks (Biswal)**

(Buckner)

THE HUMAN BRAIN IS ORGANIZED INTO DYNAMIC, FUNCTIONAL NETWORKS SYNCHRONIZED ACTIVITY

Fox et al., 2005 – PNAS

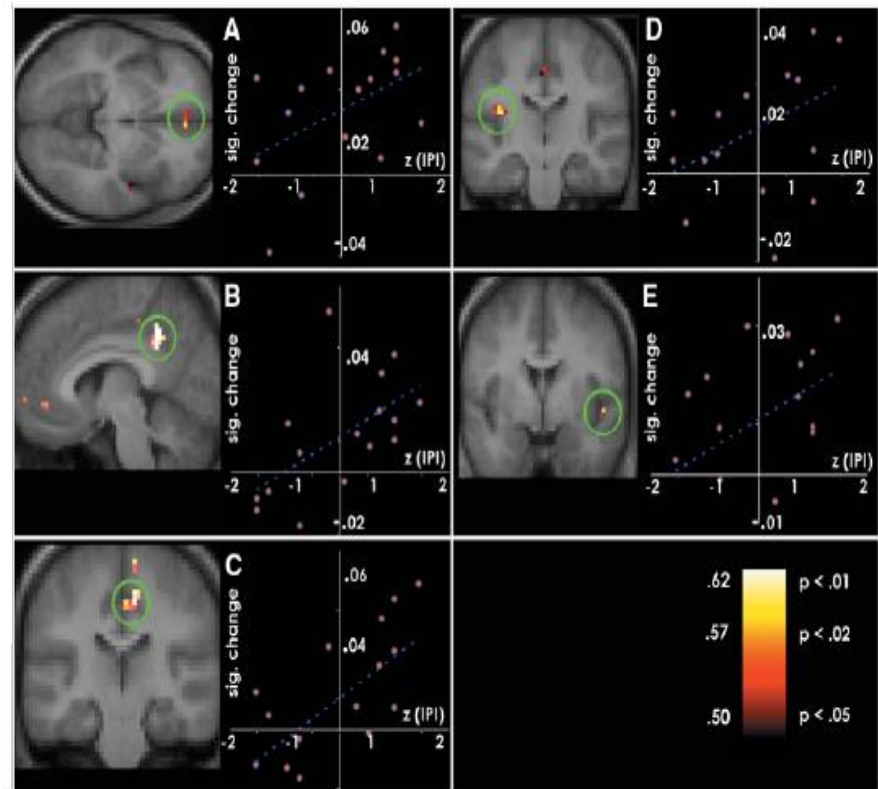


THE DEFAULT BRAIN NETWORK

- **Task independent de-activations found during cognitive tasks in areas of high metabolic activity during rest (Raichle & Gusnard)**
- **Low frequency coherent spontaneous hemodynamic BOLD signal changes define functional networks (Biswal)**
- **Core hubs of the task negative network are implicated in self referential cognition that occurs during day dreaming (Buckner)**

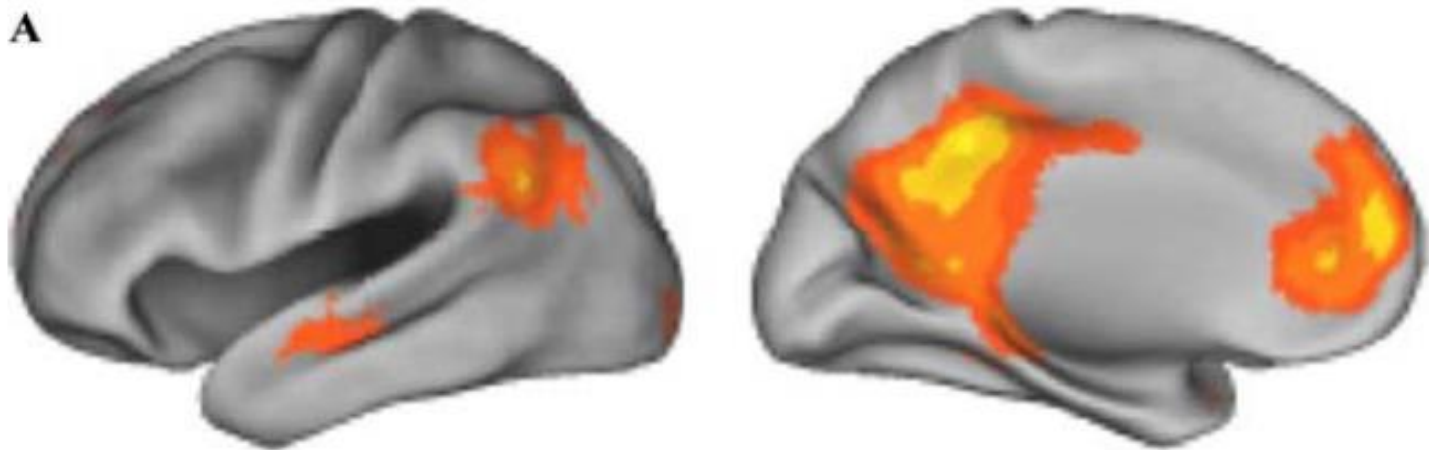
Wandering Minds: The Default Network and Stimulus-Independent Thought

Malia F. Mason,^{1*§} Michael I. Norton,² John D. Van Horn,^{1†} Daniel M. Wegner,³
Scott T. Grafton,^{1‡} C. Neil Macrae⁴



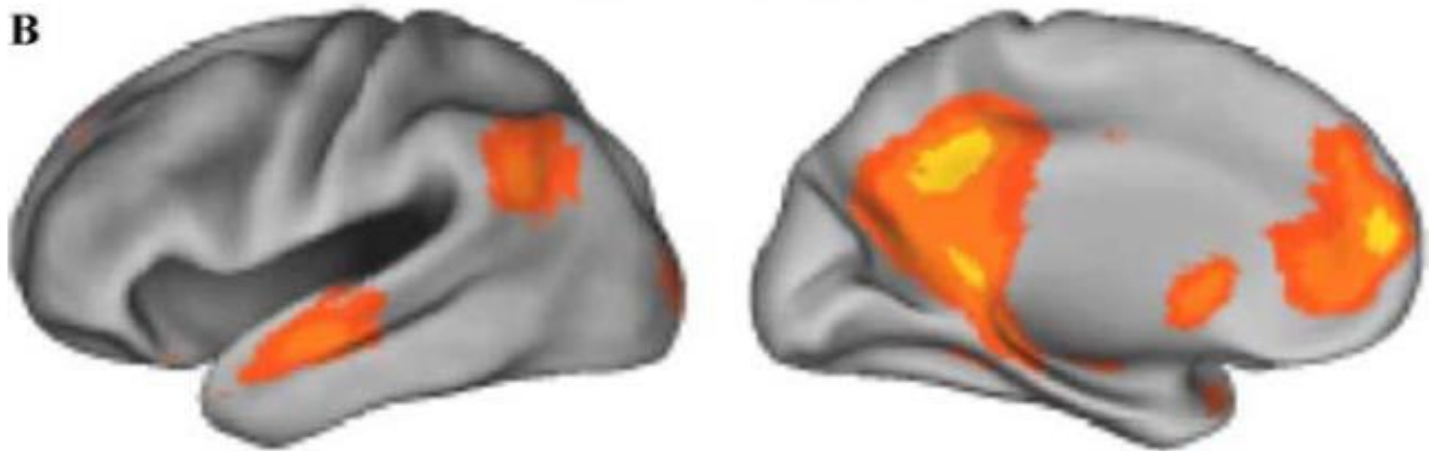
AUTOBIOGRAPHICAL MEMORY

A



ENVISIONING THE FUTURE

B

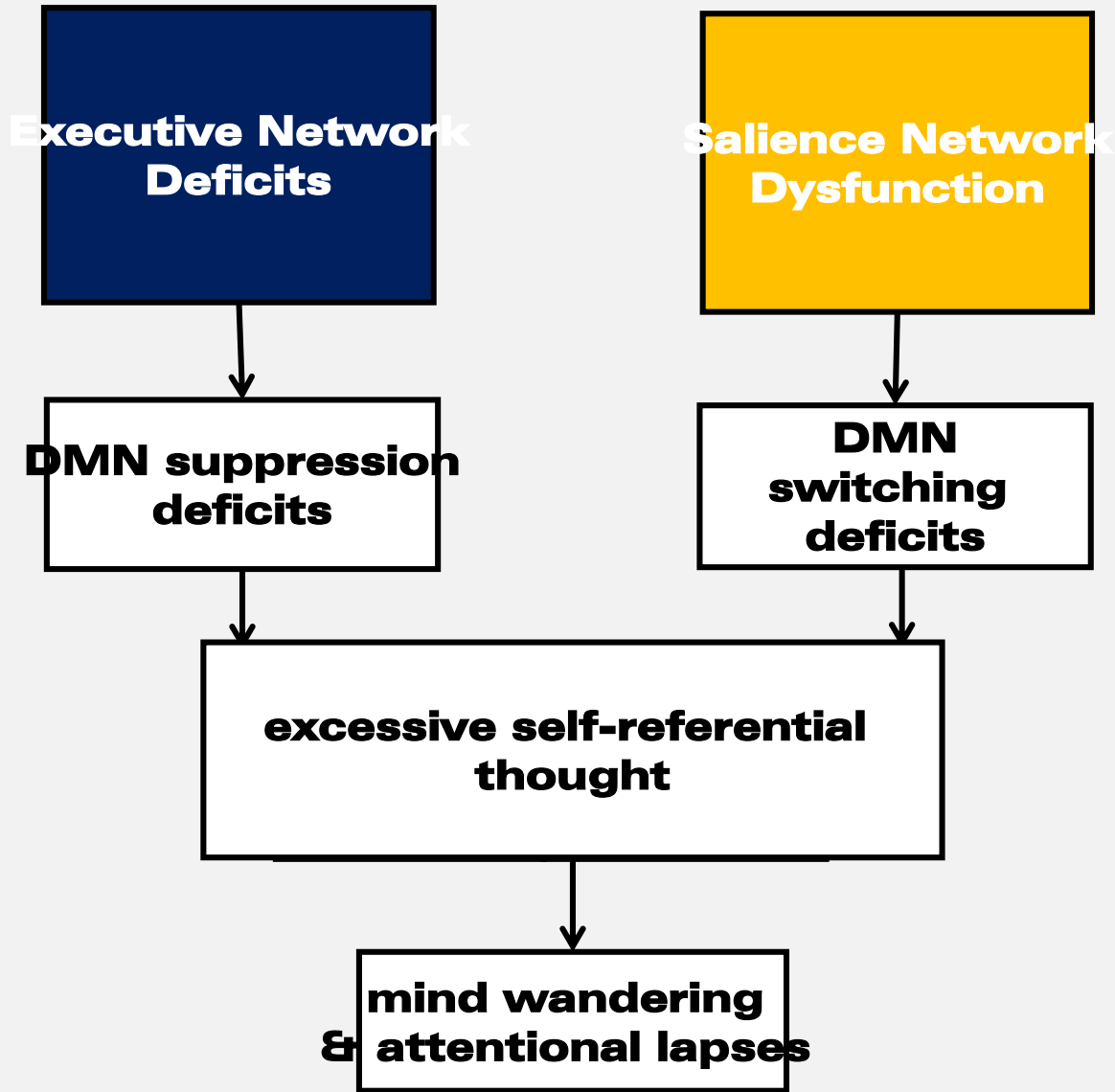


Stuff I do in CLASS

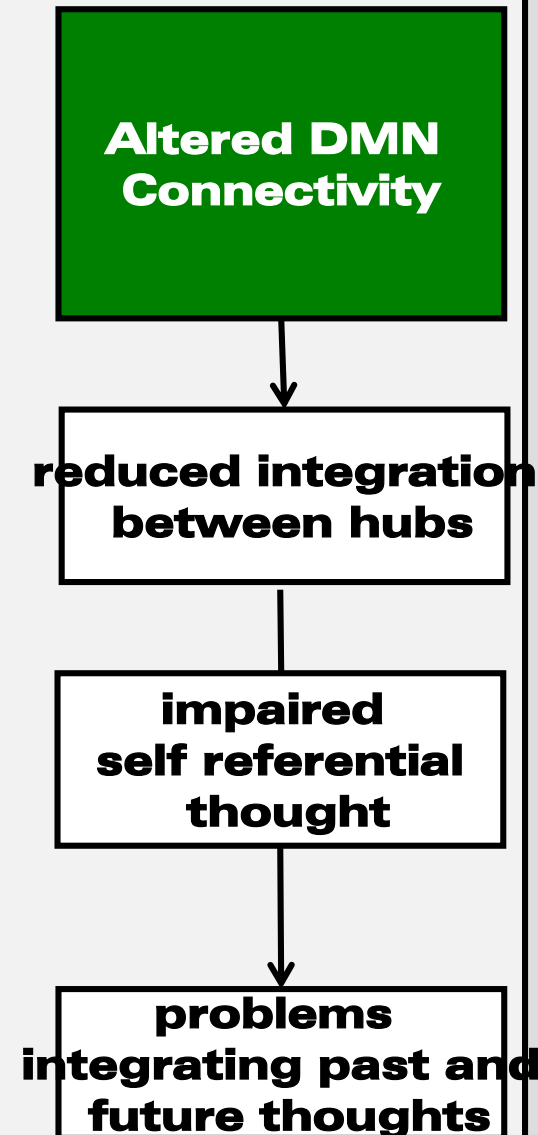


THREE DEFAULT MODE-RELATED PATHWAYS

DURING TASKS



DURING "REST"



CONCLUSION

- **DMN is crucial for self referential cognitive processes.**
- **However, ability to initiate and terminate this in a way that does not interfere with task performance is crucial.**
- **DMN dysfunction appears to be implicated in ADHD at a number of levels;**
 - **intrinsic properties (reduced connectivity)**
 - **modulation in the transitions to attention demanding tasks.**
- **Treatments that might increase DMN integrity and strengthen context dependent state switching offer interesting avenues for**

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