

# Neural response to Positive and Negative Interpersonal Feedback in Socially Anxious Adults



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## Introduction

- Individuals with social anxiety are more particularly inclined to fixate upon ambiguous or negative social cues, especially in response to unwanted or unexpected feedback, criticism or embarrassment
- Individuals with social anxiety exhibit cognitive biases related to hyper attentiveness and failure to disengage.
- Recent research has shown the involvement of anterior cingulate in identifying emotionally salient features of person, people, or situation regarding negative feedback association and self-reflectiveness(Bohme et al., 2014)
- The Prisoner's Dilemma (PD) task provides a structured context that effectively evokes anxious and non-anxious patterns of interaction (e.g., displays of dominance or submission) (McClure E., et al., 2007).
- High levels of SA showed significant differences in the PD task in activation of the anterior cingulate compared to controls in co-player's response in association with negative feedback . (Peterburs et al., 2016)

## Present Study

Model brain activity associated with cooperation and betrayal in individuals with high and low levels of SA.

**Hypothesis:** There will be significant elevated activity in the Anterior Cingulate of individuals with high levels of SA.

## Participants

	Social Anxiety	Controls
Sample size	11	10
Age, mean ± SD	19.8 ± 2.2	21.2 ± 4.7
No. Female (%)	8 (47.0)	9 (53.0)
No. Male (%)	3 (75.0)	1 (25.0)

## fMRI Data Acquisition

- Functional and structural images were acquired in a Siemens 3T scanner in 2008 (legacy data) and a Siemens Trio 3T Scanner in 2016 (new data).
- Statistical Parametric Mapping (SPM8) software was used to preprocess and analyze fMRI data from 2008. Data Processing Assistant for Resting-State fMRI (DPARSF) was used to preprocess fMRI data from 2016.
- General Linear Modelling was used to estimate event-related response amplitudes at the individual subject and group levels.

## Methods

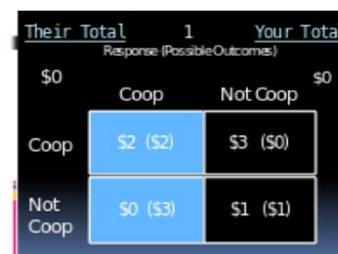
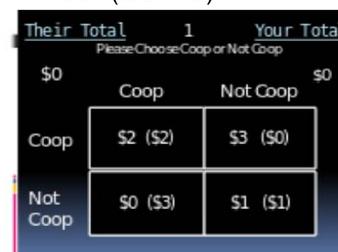
### Participant Selection

Liebowitz Social Anxiety Scale

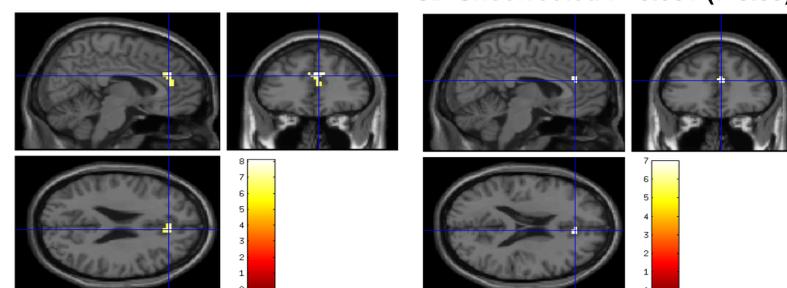
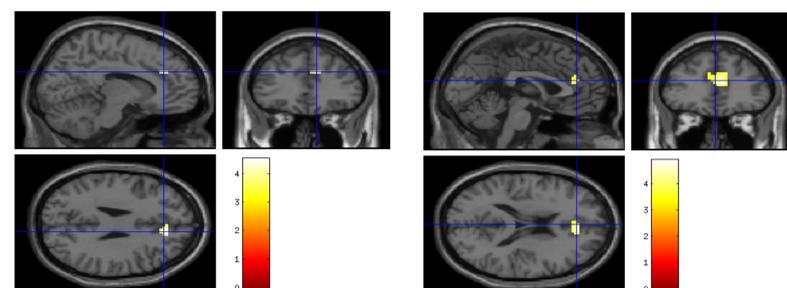
### Prisoner's Dilemma

- In each 20 trial iterated (PD) game the individual chooses to cooperate or defect, and then waits for a "co-player" to make their decision.
- Each participant play 3 PD games in a randomized order—in two, they are deceived to believe that they are playing with a confederate (but actually play a computer algorithm) and in one they are told that they are playing the computer.
- PD measures the willingness to work together or to work for one's own self interest by counting the number of times a participant cooperates or defects.
- To the right is a single trial in which both the subject and the co-player chose to cooperate (CC). Other

An example trial of PD task (CC trial)



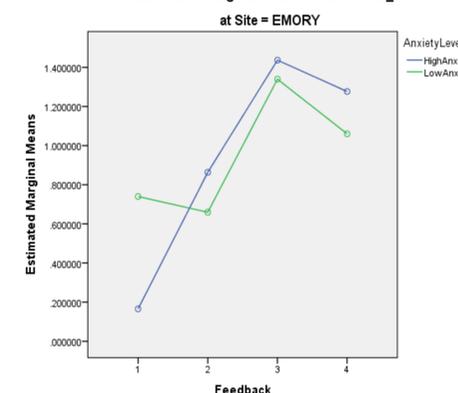
## fMRI Results



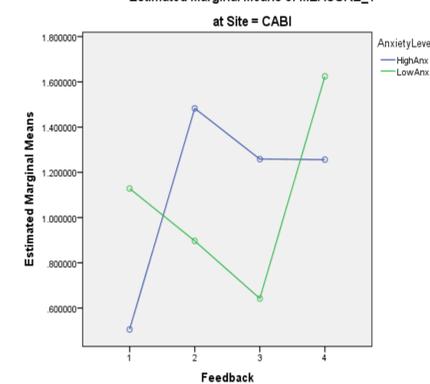
Data analysis (N= 30): Independent one sample t-test analyzing the signal following each trial's outcome.

Site	AnxietyLevel	Mean	Std. Deviation	N
CC	CABI	50547500	710344785	8
	LowAnx	1.12830000	.965868728	8
	Total	81688750	879927600	16
EMORY	HighAnx	16583750	531083141	8
	LowAnx	74005000	791335043	6
	Total	41192857	692590979	14
Total	HighAnx	33566250	630760791	16
	LowAnx	96190714	884837611	14
	Total	62790667	811011071	30
CD	CABI	1.49283750	2.023932467	8
	LowAnx	89675000	1.093743264	8
	Total	1.18979375	1.600458954	16
EMORY	HighAnx	86366250	669915184	8
	LowAnx	65963333	7.57023293	6
	Total	77622143	687786306	14
Total	HighAnx	1.17325000	1.491065248	16
	LowAnx	79512857	937759634	14
	Total	99679333	1.257375442	30
DC	CABI	1.2584250	5.70701904	8
	LowAnx	64211250	616907355	8
	Total	95028750	656488028	16
EMORY	HighAnx	1.43688750	905946540	8
	LowAnx	1.33980000	1.179215142	6
	Total	1.39527857	998599967	14
Total	HighAnx	1.34767500	737220930	16
	LowAnx	94112143	931766736	14
	Total	1.15795000	844311896	30
DD	CABI	1.25610000	1.567546303	8
	LowAnx	1.62453750	1.176042681	8
	Total	1.44031875	1.352157026	16
EMORY	HighAnx	1.27671250	688775357	8
	LowAnx	1.06013333	6.29762230	6
	Total	1.18389286	6.4835321	14
Total	HighAnx	1.26640625	1.169700527	16
	LowAnx	1.38265000	990598714	14
	Total	1.32065333	1.072872386	30

Estimated Marginal Means of MEASURE\_1



Estimated Marginal Means of MEASURE\_1



## Conclusions

- In the initial analysis, the anterior cingulate showed significant BOLD activation in response to DC and DD feedback conditions
- Feedback Condition DC and DD represent presents of emotion salient; while Feedback Conditions CC and CD show no significant activation.
- The role of the anterior cingulate shows significant activation in association with negative feedback when subject displays initial betrayal response to co-player
- The analysis of the combined datasets showed no significant difference in activation of anterior cingulate between low SA and high SA regarding negative feedback.
- The analysis revealed significant BOLD response in the anterior cingulate regardless of SA levels in association with initial betrayal which may be more emotional salient; however, these response could produce negative feelings that most SA people would like to avoid

## References

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