Background

John Richey  (richey@vt.edu)  
Ass’t Professor - Dept. of Psychology  
Clinical Psychology / Cognitive Neuroscience

Primary Research Areas

• Functional Macrocircuitry of:

1) Reward-related learning (esp. social learning)  
2) Emotion regulation
Key Questions

- In ASD, how is social dysfunction represented in the functional organization of the brain?
- Can fMRI and functional connectivity by fMRI (fcMRI) be used to create credible network models of information flow?
- What are the effects of cognitive reappraisal of social information in ASD?
Findings To Date

• **Reward Learning**

  • In ASD, reward-related structures in the brain do not respond to social stimuli

  • Domain-general deficit.

* p ≤ .05
** p ≤ .01
† p = 0.07
Findings To Date

- **Emotion Regulation**
- People with ASD can learn and implement cognitive reappraisal strategies.
- Difficulty modifying function of emotion-generative structures.
- Hypotheses about a specific candidate gene implicated in this circuit.

### Positive Reappraisal

<table>
<thead>
<tr>
<th>Controls</th>
<th>Autism</th>
<th>Controls &gt; Autism</th>
</tr>
</thead>
<tbody>
<tr>
<td>R NAc</td>
<td>0.10</td>
<td>-0.12</td>
</tr>
<tr>
<td>L NAc</td>
<td>-0.31***</td>
<td>0.10**</td>
</tr>
<tr>
<td>dIPFC</td>
<td>-0.99***</td>
<td>-0.76***</td>
</tr>
<tr>
<td>VTA</td>
<td>0.01</td>
<td>-0.42</td>
</tr>
<tr>
<td>R NAc</td>
<td>-0.10</td>
<td>-0.31***</td>
</tr>
<tr>
<td>L NAc</td>
<td>-0.05</td>
<td>0.33</td>
</tr>
<tr>
<td>dIPFC</td>
<td>-0.99</td>
<td>0.76</td>
</tr>
<tr>
<td>VTA</td>
<td>0.02</td>
<td>-0.37</td>
</tr>
</tbody>
</table>

*Coefficients are significant at p<0.05.*

Suggests faulty connectivity in this circuit.
Current Resources / Relationships

• **We have expertise in:**
  – Behavioral Characterization of ASD
  – All aspects of fMRI data collection & analysis
  – Network modeling of fMRI data

• **We would benefit from:**
  – Expertise in Genetics
  – Expertise in brain-computer interface (BCI)