Feelings and Thinking
Mechanisms of Creativity
in Bipolar Disorder

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Overview

- Creativity enhanced in bipolar disorder
- Contributors
  - Negative, changeable feelings
  - Intuitive, open-minded thinking
- Emerging neuroanatomy
Feelings | Thinking
---|---
Negative | Intuitive
Changeable | Open-minded

Mechanisms of Creativity in Bipolar Disorder

Affective

Neuroticism

Cyclothymia

Cognitive

Intuition

Openness

Study Design

- **Sample**
  - 32 bipolar, 42 healthy controls, 21 unipolar, 22 creative controls

- **Assessments**
  - Barron-Welsh Art Scale (BWAS)
  - Five Factor Personality Model (NEO-PI)
  - Myers-Briggs Type Inventory (MBTI)
  - Akiskal Temperament Scale (TEMPS-A)

Barron-Welsh Art Scale

- Frank Barron & George S. Welsh, 1963
- Respond “like” or “dislike” to 86 figures

Barron-Welsh Art Scale

Decide whether you like or don’t like each of the following drawings. Mark each with L for like and D for dislike. If you can’t decide, guess. Do not skip any drawings. Try to work as fast as you can.

Barron-Welsh Art Scale

- Creative - Complex, asymmetric
- Not creative - Simple, symmetric
Negative Feelings and Open-Mindedness in Five Factor Model of Personality

<table>
<thead>
<tr>
<th>Neuroticism (Negative feelings)</th>
<th>Openness (Open-mindedness)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calm – <strong>Worrying</strong></td>
<td>Down-to-earth – Imaginative</td>
</tr>
<tr>
<td>Even tempered – Temperamental</td>
<td>Uncreative – Creative</td>
</tr>
<tr>
<td>Self-satisfied – Self-pitying</td>
<td>Conventional – Original</td>
</tr>
<tr>
<td>Comfortable – Self-conscious</td>
<td>Prefer routine – Prefer variety</td>
</tr>
<tr>
<td>Unemotional – Emotional</td>
<td>Uncurious – Curious</td>
</tr>
<tr>
<td>Hardy - Vulnerable</td>
<td>Conservative - Liberal</td>
</tr>
</tbody>
</table>

Myers-Briggs Type Inventory (MBTI) and Five Factor Model (NEO-PI)

<table>
<thead>
<tr>
<th>Myers-Briggs Type Inventory</th>
<th>Five Factor Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Neuroticism</td>
</tr>
<tr>
<td></td>
<td>(Negative feelings)</td>
</tr>
<tr>
<td>Extraversion – Introversion</td>
<td>Extraversion</td>
</tr>
<tr>
<td>Sensing – Intuition</td>
<td>Openness</td>
</tr>
<tr>
<td>Thinking – Feeling</td>
<td>Agreeableness</td>
</tr>
<tr>
<td>Judging – Perceiving</td>
<td>Conscientiousness</td>
</tr>
</tbody>
</table>

## Sensing and Intuition Preferences in Myers-Briggs Type Inventory

<table>
<thead>
<tr>
<th>Sensing</th>
<th>Intuition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on what is real and actual</td>
<td>Focus on “big picture”, possibilities</td>
</tr>
<tr>
<td>Value practical applications</td>
<td>Value imaginative insight</td>
</tr>
<tr>
<td>Factual and concrete, notice details</td>
<td>Abstract and theoretical</td>
</tr>
<tr>
<td>Observe and remember sequentially</td>
<td>See patterns and meanings in facts</td>
</tr>
<tr>
<td>Present-oriented</td>
<td>Future-oriented</td>
</tr>
<tr>
<td>Want information step-by-step</td>
<td>Jump around, leap in anywhere</td>
</tr>
<tr>
<td>Trust experience</td>
<td>Trust inspiration</td>
</tr>
</tbody>
</table>

## Stanford Creativity Study Sample

<table>
<thead>
<tr>
<th></th>
<th>Healthy Controls</th>
<th>Major Depressive Disorder</th>
<th>Bipolar Disorder</th>
<th>Creative Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>42</td>
<td>21</td>
<td>32</td>
<td>22</td>
</tr>
<tr>
<td>% Female</td>
<td>61.9</td>
<td>61.9</td>
<td>62.5</td>
<td>63.6</td>
</tr>
<tr>
<td>Age</td>
<td>34.3 ± 14.8</td>
<td>33.3 ± 12.3</td>
<td>35.3 ± 10.5</td>
<td>29.5 ± 3.9</td>
</tr>
<tr>
<td>Education</td>
<td>5.6 ± 1.7</td>
<td>6.6 ± 1.5</td>
<td>5.8 ± 1.7</td>
<td>7.6 ± 0.5</td>
</tr>
<tr>
<td>BDI</td>
<td>0.8 ± 1.4</td>
<td>7.6 ± 3.2</td>
<td>4.7 ± 3.4</td>
<td>6.4 ± 3.7</td>
</tr>
</tbody>
</table>

*p < 0.05 CC vs. BP; **p < 0.0001 vs. BP and HC, ***p < 0.01 vs MDD, ****p < 0.001 vs. HC

BWAS-Total Advantage in Bipolar Patients and Creative Controls Driven by BWAS-Dislike

Barron-Welsh Art Scale (Percent Difference from Healthy Controls)

*p < 0.05, ***p < 0.003 vs HC.

Negative/Changeable Feelings, and Intuitive/Open-Minded Thinking in Bipolar Disorders and Creative Controls

Percentage Difference from Healthy Controls

* \( p < 0.05 \), **** \( p < 0.0001 \) vs HC.

Feelings and Thinking Contributors to Creativity

Feelings

Negative
15%

Changeable
14%

Thinking

Intuitive
10%

Open-Minded
4%

BWAS-Total

N = 117, R² values in %, all p < 0.05

Feeling and Thinking Contributors to Creativity

Feelings

- Negative
- Changeable

Thinking

- Intuitive
- Open-Minded

BWAS-Dislike

N = 117, R² values in %, all p < 0.05

Feeling and Thinking Contributors to Creativity

Feelings

<table>
<thead>
<tr>
<th>Feelings</th>
<th>BWAS-Dislike</th>
<th>BWAS-Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negative</td>
<td>17%</td>
<td>15%</td>
</tr>
<tr>
<td>Changeable 13%</td>
<td>14%</td>
<td></td>
</tr>
</tbody>
</table>

Thinking

<table>
<thead>
<tr>
<th>Thinking</th>
<th>BWAS-Like</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intuitive</td>
<td>10%</td>
</tr>
<tr>
<td>Open-Minded</td>
<td>9%</td>
</tr>
</tbody>
</table>

N = 117, R^2 values in %, all p < 0.05  
Feeling and Thinking Contributors to Creativity

Feelings
- Negative
  - ACL
  - CPS
  - 3%

Thinking
- Intuitive
  - ACL
  - CPS
  - 14%

Changeable
- 0.3%

Open-Minded
- 24%

N = 117, R² values in %, p < 0.05 for Intuition, Openness

Emerging Neurobiology of Creativity

Transcendent
Production
Rule
Meaningful
BWAS Correlates with Gray Matter Density in 25 Healthy Volunteers

Positive Correlations in Regions Associated with Feelings, Associative Thought

Negative Correlations in Regions Associated with Analytic Thought

Conclusions

- Creativity enhanced in bipolar disorder

- Contributors
  - Negative, changeable feelings
  - Intuitive, open-minded thinking

- Emerging neuroanatomy