Recognition of Nonverbal Facial and Vocal Affect After TBI

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Affect Recognition Difficulties

Research has shown that people with TBI have perceptual deficits in the recognition of facial affect (Babbage et al., 2011; Green et al., 2004; Hopkins et al., 2002) and vocal affect (Dimoska et al., 2010; Pell, 2006; Pell & Baum, 1997; Pell et al., 2011)

BUT few studies have simultaneously examined recognition of facial and vocal affect in the same group of people

Do these deficits co-occur?

Is one modality impacted more greatly than the other?
<table>
<thead>
<tr>
<th></th>
<th>Spell &amp; Frank, 2000</th>
<th>Milders et al., 2003</th>
<th>McDonald &amp; Saunders, 2005</th>
<th>Ietswaart et al., 2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants</td>
<td>24 TBI 24 Controls</td>
<td>17 TBI 17 Controls</td>
<td>34 TBI 28 Controls</td>
<td>37 TBI 34 Controls</td>
</tr>
<tr>
<td>Severity</td>
<td>Not specified</td>
<td>Moderate to Severe</td>
<td>Severe Only</td>
<td>Mild to Severe</td>
</tr>
<tr>
<td>Test</td>
<td>DANVA2 (4 emotions)</td>
<td>E-60-FT (6 emotions)</td>
<td>TASIT-EET (7 emotions)</td>
<td>E-60-FT (6 emotions)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FAB-8A (5 emotions)</td>
<td></td>
<td>FAB-8A (5 emotions)</td>
</tr>
<tr>
<td>Deficits</td>
<td>Impairment in both modalities</td>
<td>Impairment in both modalities</td>
<td>No group difference for static/dynamic faces Poorer on voices only</td>
<td>Impairment in both modalities</td>
</tr>
<tr>
<td>Face vs Voice</td>
<td>Higher accuracy for faces</td>
<td>N/A</td>
<td>Higher accuracy for faces</td>
<td>Higher accuracy for voices</td>
</tr>
<tr>
<td>Other Findings</td>
<td>Had more difficulty with high intensity faces than Controls but not low</td>
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</table>
The Current Study

- Data collected as part of a Randomized Clinical Trial
  - Funded by the National Institute on Disability and Rehabilitation Research (H133G080043)

- Three sites
  - Canada, United States, New Zealand

- Comparing two treatment programs to one control group
  - Facial Affect Recognition
  - Social Emotional Inferencing

- Extensive testing done to evaluate eligibility and changes due to treatment
Participation Criteria

- People with moderate to severe TBI
- Injury sustained after the age of 8
- All were between 18 and 65 years of age at time of testing
- Able to respond to basic oral and written language
- No current substance dependence, major psychiatric disorder

**Screened:** 202
- Ontario: 41 (19)
- US: 108 (36)
- NZ: 53 (18)

**Gender**
- Males: 149
- Females: 53

**Age**
- Mean: 39.9 yrs
- Range: 21-65 yrs

**Time Since Injury**
- Mean: 10 yrs
- Range: 1 - 42 yrs

**Cause**
- MVA: 124 (62%)
- Fall: 28 (14%)
- Assault: 14 (7%)
Diagnostic Analysis of Nonverbal Affect-2 (Nowicki, 2008)

Adult Faces

- 24 coloured photographs
- 6 of each emotion
  - Happy, sad, angry, fearful
- 3 high intensity expressions
- 3 low intensity expressions
- Displayed 15 seconds
Diagnostic Analysis of Nonverbal Affect-2 (Nowicki, 2008)

- Adult Paralanguage
- 24 repetitions portrayed by one male and one female actor
  - “I’m going out of the room now and I’ll be back later”
- 6 of each emotion
  - Happy, sad, angry, fearful
- 3 high and 3 low intensity exemplars within each category
- Heard each sentence one time only
Results

<table>
<thead>
<tr>
<th>Not impaired</th>
<th>Faces Only</th>
<th>Voices Only</th>
<th>Both Modalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>48%</td>
<td>17%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>n=92</td>
<td>n=32</td>
<td>n=26</td>
<td>n=40</td>
</tr>
</tbody>
</table>

- Over half of the participants showed impaired recognition in one or both modalities (n=98)

- Facial stimuli recognized significantly better than vocal stimuli, $\chi^2 (2)= 22.16, p < .001$

- Supports previous work by Spell and Frank (2000) and McDonald and Saunders (2005)
Rasch Analysis

- Need to evaluate psychometric properties of \textit{DANVA2} when considering the effect of intensity and emotion category on affect recognition.

- Items should be sensitive to different skills levels as indicated by Item Characteristic Curves.

![Face 05](image1.png)

![Face 23](image2.png)
DANVA-AF

- **Happy**
- **Sad**
- **Angry**
- **Fearful**
High intensity

Happy had low difficulty

Not sensitive for differentiation

Other items showed appropriate properties and adequate range of difficulty

Low intensity items more difficult across categories
Low intensity items more difficult across categories

Voice stimuli less well differentiated in difficulty and intensity
Conclusion

More than half of the 202 participants screened showed deficits in the recognition of one or both modalities.

Significantly more participants had difficulty with faces.

Happy faces easier to identify than other emotions.

No differentiation by emotion category for voices.

High intensity expressions easier than low for both modalities.

With the exception of high intensity Happy faces, the DANVA2 appears to provide a suitable range of difficulty to assess facial and vocal affect recognition in people with moderate to severe TBI.
References


