Dynavision Normative Data for Reaction Time

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What is the Dynavision used for?

- Originally designed as a device to improve visual skills and eye-hand coordination of athletes.
  - Tiger Woods
  - Professional Hockey and Football Players

- Rehabilitation
  - Device provides the same training benefits to persons whose visual and motor function has been compromised by injury or disease
    - Stroke
    - TBI
    - Spinal Cord Injury
    - ADD
Benefits of Dynavision

• Improve visual and cognitive skills
  – Hemi inattention
  – Left neglect
  – Processing speed
  – Divided attention and concentration

• Improve Activities of Daily Living
  – Driving
  – Reading
  – Managing finances
  – School performance
Mallard Jersey Auction

On March 17, 2013, the Quad City Mallard’s Jersey Auction contributed $19,745 toward purchase of the Dynavision equipment!
Research Purpose

• No established norms for Dynavision equipment.

• Establishing norms for visual reaction, physical response and motor response times will assist therapists in properly assessing and treating visual perceptual deficits.
Study Objectives

• To determine the visual reaction speed of adults in age categories 18 – 40, 41 – 59 and 60-80 years, using the Dynavision D2 Visuomotor Training System

• To determine the physical response speed of adults in age categories 18 – 40, 41 – 59 and 60-80 years, using the Dynavision D2 Visuomotor Training System

• To determine the motor response time of adults in age categories 18 – 40, 41 – 59 and 60-80 years, using the Dynavision D2 Visuomotor Training System
Methodology

- Cross-sectional, descriptive
- 300 participants
  - 100 in each of the three age categories
- Inclusion Criteria
- Exclusion Criteria
Recruitment

- Flyers
- Local newspaper articles
- Newsletters
- Word-of-mouth to families and patients in the Outpatient Physical Rehabilitation facility
Data Collection

• Initial Intake Form
• Informed Consent
• Standard Screening Form (i.e., past medical history, ROM screen)
Dynavision Reaction Test
Dynavision Reaction Test
Dynavision Reaction Test
Sample Reaction Speed Test Results

**Glossary:**

- **Visual** = time elapsed after target is lit until hand is lifted
- **Motor** = time elapsed after lifting hand until striking target
- **Physical** = sum of Visual and Motor

**Reaction Timer**

- **Started at 10:24, 5/25/2017**

**Test 1, Right Hand, 4 Choice**

<table>
<thead>
<tr>
<th>Reaction Times:</th>
<th>Visual</th>
<th>Motor</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastest</td>
<td>0.35</td>
<td>0.22</td>
<td>0.67</td>
</tr>
<tr>
<td>Slowest</td>
<td>0.54</td>
<td>0.33</td>
<td>0.87</td>
</tr>
<tr>
<td>Average</td>
<td>0.46</td>
<td>0.29</td>
<td>0.75</td>
</tr>
<tr>
<td>Median</td>
<td>0.45</td>
<td>0.32</td>
<td>0.68</td>
</tr>
</tbody>
</table>

**Test 2, Left Hand, 4 Choice**

<table>
<thead>
<tr>
<th>Reaction Times:</th>
<th>Visual</th>
<th>Motor</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastest</td>
<td>0.34</td>
<td>0.19</td>
<td>0.55</td>
</tr>
<tr>
<td>Slowest</td>
<td>0.38</td>
<td>0.30</td>
<td>0.66</td>
</tr>
<tr>
<td>Average</td>
<td>0.36</td>
<td>0.24</td>
<td>0.60</td>
</tr>
<tr>
<td>Median</td>
<td>0.35</td>
<td>0.22</td>
<td>0.57</td>
</tr>
</tbody>
</table>

**Test 3, Right Hand, 8 Choice**

<table>
<thead>
<tr>
<th>Reaction Times:</th>
<th>Visual</th>
<th>Motor</th>
<th>Physical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fastest</td>
<td>0.35</td>
<td>0.21</td>
<td>0.69</td>
</tr>
<tr>
<td>Slowest</td>
<td>0.61</td>
<td>0.69</td>
<td>1.04</td>
</tr>
<tr>
<td>Average</td>
<td>0.47</td>
<td>0.33</td>
<td>0.80</td>
</tr>
<tr>
<td>Median</td>
<td>0.46</td>
<td>0.24</td>
<td>0.72</td>
</tr>
</tbody>
</table>
Data Analysis

- GHS Business Intelligence Center analyzed the 6 samples of 50 cases for each strata.

- The total reaction times across the 6 tasks for each age group was used to establish normal limits.

- Given reaction times follow an inverse normal distribution, we were able to use 50 patients for each strata as opposed to 400 otherwise.
Data Analysis

- 300 patients age 18-80
  - Calculate time to complete all 6 tests
  - Take reciprocal of these values
  - Plot and test for normality
  - Find 2.5 and 97.5 percentiles
  - Divide percentiles by 30 to obtain clinically relevant values to interpret test.
<table>
<thead>
<tr>
<th>Age Category</th>
<th>Sex</th>
<th>2.5&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
<th>Lower Limit (s)</th>
<th>97.5&lt;sup&gt;th&lt;/sup&gt; Percentile</th>
<th>Higher Limit (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-40</td>
<td>Male</td>
<td>17.24</td>
<td>0.57</td>
<td>41.67</td>
<td>1.39</td>
</tr>
<tr>
<td>18-40</td>
<td>Female</td>
<td>19.23</td>
<td>0.64</td>
<td>41.67</td>
<td>1.39</td>
</tr>
<tr>
<td>41-60</td>
<td>Male</td>
<td>17.86</td>
<td>0.59</td>
<td>32.26</td>
<td>1.08</td>
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<tr>
<td>41-60</td>
<td>Female</td>
<td>17.54</td>
<td>0.58</td>
<td>38.46</td>
<td>1.28</td>
</tr>
<tr>
<td>61-80</td>
<td>Male</td>
<td>18.87</td>
<td>0.63</td>
<td>47.62</td>
<td>1.59</td>
</tr>
<tr>
<td>61-80</td>
<td>Female</td>
<td>19.23</td>
<td>0.64</td>
<td>43.48</td>
<td>1.45</td>
</tr>
<tr>
<td>All</td>
<td>Male &amp; Female</td>
<td>15.33</td>
<td>0.51</td>
<td>36.87</td>
<td>1.23</td>
</tr>
</tbody>
</table>
Barriers to Data Collection

- Our equipment is not portable
- Conducted during regular business hours
- Men 40-60 were more reluctant to participate due to this being working age
- Full time employees trying to manage caseload and research
- Convenience population fall in exclusion criteria
Clinical Application

• Dynavision reaction test was found to be beneficial as an assessment tool.
• Can be added to battery of other common evaluation measures OT’s utilize.
• Can be applied to concussion population and sports enhancement.
Conclusion

• Results provide a range of normal reaction time based on different age ranges for the D2.
• Results directly impact the field of Occupational Therapy.
• Future research applications
Dynavision Video
Questions???
References


