An Internet Based Instrument for Cognitive Function Assessment

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BACKGROUND
- Many large scale registry trials in normal and pathological aging are being planned or conducted.
- In Alzheimer's disease, interest is turning to prevention studies which may be conducted in healthy populations identified to be at risk of developing Alzheimer's disease.
- Automated cognitive function testing may be a practical solution for such work, and the present study investigates the utility of administering such testing online.

METHODS
- Four tests from a computer based cognitive methodology, the CDR System, were internet enabled: simple reaction time, choice reaction time, digit vigilance and delayed picture recognition.
- Participants were invited to complete these tests online.
- Their data were assessed by age and compared to normative data from the standard administration of these CDR tests.

RESULTS
- A total of 14,283 individuals aged 18 and over participated in the study.
- Table 1 presents the demographic sample.

Table 1. Demographic Sample Population

<table>
<thead>
<tr>
<th>Age-Bands (Years)</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-10</td>
<td>173</td>
<td>161</td>
<td>334</td>
</tr>
<tr>
<td>11-14</td>
<td>433</td>
<td>930</td>
<td>1363</td>
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<td>510</td>
<td>936</td>
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<td>18-25</td>
<td>240</td>
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<td>26-30</td>
<td>333</td>
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<td>302</td>
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<td>1806</td>
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<td>6089</td>
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<tr>
<td>71-80</td>
<td>812</td>
<td>2918</td>
<td>3730</td>
</tr>
<tr>
<td>81-102</td>
<td>351</td>
<td>3128</td>
<td>3479</td>
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<tr>
<td>Totals</td>
<td>2220</td>
<td>3419</td>
<td>5639</td>
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</table>

- Power of Attention: A measure of focussed attention and information processing.
- Continuity of Attention: A measure of sustained attention/vigilance reflecting accuracy of responding which is penalized for impulsive responses.
- Cognitive Reaction Time: A measure of central processing speed which is independent of motor speed.
- Fluctuations in Attention: Reflects momentary fluctuations in the focus of attention.

CHANGES IN ATTENTIONAL PROCESSES OVER THE ADULT LIFE SPAN
- Power of attention declines progressively from the early 20s on.
- Continuity of attention also declines, showing that central processing declines independent of motor speed.
- Fluctuations in attention become greater from the mid-40s onwards.

- Continuity of Attention improves slightly until middle-age, then declines.
- Cognitive reaction time also declines, showing that central processing declines independent of motor speed.

THE CHANGES ON THIS TASK POSSIBLY REFLECT DECLINING ACTIVITY IN THE DENTATE GYRUS AND THUS COMPROMISED NEUROGENESIS
- The task assesses pattern separation, and the more difficult discrimination is correctly rejecting the similar but different pictures.
- The pattern of changes directly supports previous work (Wesnes & Stark, 2007; Wesnes 2010) and extends it to demonstrate the continuous decline in performance activity over the life-span.

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COMPARISONS TO NORMATIVE DATA FROM THE CDR SYSTEM DATABASE
- The data from the online testing were contrasted to CDR healthy volunteers aged 18 to 87 years (5324 males, 1424 females).

CONCLUSIONS
- Power of attention declines progressively from the early 20s on.
- Cognitive reaction time also declines, showing that central processing declines independent of motor speed.
- Fluctuations in attention become greater from the mid-40s onwards.

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REFERENCES