Are the Word Memory Test Genuine Memory Impairment Profiles Specific to (Typical) Alzheimer Dementia Processes?

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What in heavens name is the Word Memory Test?
www.wordmemorytest.com
Green’s Word Memory Test for Windows (WMT; Green, 2003)

A computerized performance validity measure (PVT) composed of multiple subtests that primarily assess response consistency (“effort”)

Besides assessing validity the WMT is sensitive to memory impairment associated to dementia, and allows for statistical and graphic comparison of patient results to cognitively impaired and dementia samples.
Green’s Word Memory Test for Windows (WMT; Green, 2003)

- A word-pair list learning task translated into several languages, including Spanish.
- The person must read or is read a list of 20 semantically-related words that appears twice on the computer screen (E.g. PENCIL-PEN) at a rate of 2 sec. per word.
WMT memory and response consistency are assessed through 7 different measures
WMT’s first two subtests facilitate semantic interference

- **Immediate Recognition (IR).** E.g., forced choice between PENCIL-BALLPOINT
- **Delayed Recognition (DR-15 min.).** E.g., forced choice between PENCIL-CRAYON
- **Consistency (CNS) between IR and DR**
The next two subtests can be selectively affected by semantic interference

- **Multiple Choice (MC).** E.g., forced choice for the pair to **PENCIL (PEN)** among 8 other words (E.g., BALLPOINT, CRAYON)

- **Paired Associates (PA).** E.g., name the original word pair to **PENCIL**
Whereas the next two, harder subtests are proportionately less impaired in memory clinic samples

- **Free Recall (FR).** E.g., name all the words from the original list

- **Long Delay Free Recall (LDFR-15 min.).** E.g. tell me again all the words from the list
WMT performance graphically differentiates among cognitively normal patients, nondemented but impaired (MCI, incipient dementia) patients, and patients with dementia.
Figure 1. WMT Performance of a Puerto Rican Sample (n = 86) According to Clinical Dementia Rating (CDR)
Both impaired/nondemented (MCI) and dementia samples show typical profiles when compared to a sample with normal performance on the California Verbal Learning Test.
Figure 2. WMT performance of a Puerto Rican mild dementia sample (CDR 1; n 12) is practically identical to a German early dementia sample (n 25).
Figure 3. WMT performance of a Puerto Rican mostly moderate dementia sample (CDR 2, 3; n 10) is very similar to a German advanced dementia sample (n 7)
Figure 4. WMT Performance of a Puerto Rican MCI sample (CDR 0.5/Incipient Dementia; n = 37) is practically identical to a German non-demented psychogeriatric sample (n 8)
What all of these incipient, possible or probable dementia profiles have in common is a proportionally better performance in the hardest subtest, Free Recall (FR) than on two “easier” ones, Multiple Choice (MC) and Paired Associates (PA), when compared to the sample with normal memory in the CVLT.
63 year old woman, CDR 0.5/DAT, impaired in business management just a few months before assessment.
The WMT Genuine Memory Impairment Profile/Dementia Profile (GMIP/DP)

- Persons in both early and advanced stages of dementia may fail the easier basic validity measures (IR, DR, and CNS) but still show a distinct profile from persons without dementia and probably feigned cognitive impairment: Difference between easy - hard subtest averages ≥ 30 points
- This profile is specific to 90 to 100% of dementia samples
- Persons with feigned cognitive complaints may present the GMIP, but it is highly unlikely that someone with dementia will present as feigned cognitive impairment
The main limitation of the GMIP/DP in the early detection of dementia is that it requires failure on the easy subtests.

But most patients with MCI and about half of all mild dementia patients pass the easy subtests but have genuine difficulty in the harder ones, particularly in MC and PA.
A modification of the GMIP criteria (MGMIP; Montijo) to include patients that pass the easier tests helps to identify many more incipient and early dementia cases.
# Table 1. Sensitivity comparison: GMIP/DP vs MGIMP

<table>
<thead>
<tr>
<th>Sample</th>
<th>N</th>
<th>GMIP/DP</th>
<th>MGMIP</th>
<th>% Sensitivity DP</th>
<th>% Sensitivity MGMIP</th>
<th>% Increase</th>
</tr>
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<tbody>
<tr>
<td>No impairment</td>
<td>14</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cognitive impairment</td>
<td>74</td>
<td>34</td>
<td>66</td>
<td>34 (46)</td>
<td>66 (89.1)</td>
<td></td>
</tr>
<tr>
<td>CDR 0.5 Incipient</td>
<td>37</td>
<td>10</td>
<td>29</td>
<td>27</td>
<td>78.4</td>
<td>51.4</td>
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<tr>
<td>CDR 0.5 DAT</td>
<td>16</td>
<td>8</td>
<td>16</td>
<td>50</td>
<td>100</td>
<td>50</td>
</tr>
<tr>
<td>CDR 1 Mild</td>
<td>12</td>
<td>7</td>
<td>12</td>
<td>58</td>
<td>100</td>
<td>42</td>
</tr>
<tr>
<td>CDR 2 Moderate</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>100</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>
Our hypothesis is that these profiles reflect selective vulnerability to semantic interference that unduly affects associative processes in tasks such as multiple choice and paired associates.
And that such selective vulnerability to semantic interference is possibly or probably related to Alzheimer dementia.
So, is this blue profile

Green's Word Memory Test
Comparison to: Normal memory on CVLT, pass WMT (Dr. Green) (N=247)

Z-Score

-5 -4 -3 -2 -1 0 1 2 3 4 5

IR DR CNS MC PA FR LDFR

- Non-demented psycho-geriatrics age 66, sd 9 (Dr. R. Brockhaus)
- Early dementia, age 74, sd 12 (Dr. R. Brockhaus)
- Mean ± 2 Standard Deviations

Note: Pay attention to the Z-Score scale. IR, DR, and CNS are NOT normally distributed. The free recall scores ARE normally distributed.
roughly the neuropsychological equivalent of the central image?
Still needed for an answer

- Longitudinal studies with the WMT
- Correlation with other neuropsychological, neuroimage and biologic markers
- Histopathological confirmation
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Thank you!!

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