Development of the Standardised Mini Linguistic State Examination (MLSE) to Classify and Monitor Primary Progressive Aphasia

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Introduction
- Language loss is common in dementia and is an isolated feature of primary progressive aphasia (PPA); available assessments are time-consuming and not readily comparable across languages.
- Current criteria identify three main variants of PPA based on complex clinical criteria and/or imaging1. Improved clinical tools to screen, diagnose, and monitor PPA are essential.
- In this study, we develop English and Italian versions of a brief (<20 mins) language assessment tool that includes the major domains affected by the different PPA syndromes.

<table>
<thead>
<tr>
<th>Semantic Dementia (SD)</th>
<th>Progressive non-fluent aphasia (PNFA)</th>
<th>Logopenic aphasia (LPA)</th>
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<tbody>
<tr>
<td>Impaired</td>
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<td>Spared</td>
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<tr>
<td>Object naming, single-word comprehension and object knowledge.</td>
<td>Repetition, grammar and motor speech production.</td>
<td>Aggramination, effortful halting speech, apraxia of speech, impaired comprehension of syntactically/syndrome sentences.</td>
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<tr>
<td>Single-word comprehension and object knowledge.</td>
<td>Impaired single-word retrieval and sentence repetition, phonological errors.</td>
<td>Single-word comprehension, object knowledge, grammar and motor speech production.</td>
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Procedural assessments: Impairment in one domain is typically reflected in similar patterns of impairment in other domains.

Study outline
Recruitment
Phase 1: pre-norming and pilot data
180 controls (age: 45-75 years) for English and Italian versions.
Phase 2: Principal study
40 controls (age 45-75) and 90 patients with a diagnosis of: 60 patients with PPA
SD [n=25] PNFA [n= 25] LPA [n= 10]
30 patients with movement disorders
PSP
CBS

The MLSE
Components of the MLSE are selected by the relevant domains, and based on the recommendation of current diagnostic guidelines5:

Confrontation naming: for assessing anomaia, semantic-phonemic features. Asking 9 items (non-living and living); all with low values of familiarity/spoken frequency to be sensitive to mild deficits [Fig. 1].

Sentence comprehension: for assessing the effects of sentence length and grammatical complexity. Tasks including matching orally presented sentences to pictures, and answering questions about orally presented sentences. Sentences vary in grammatical complexity, length, and predictability [Fig. 4].

Single-word comprehension (repeat and point): for assessing semantic knowledge. One target and 5 distractors from the same semantic category [Fig. 2].

Repetition: includes single words of varying syllabic length, repeated production of a polysyllabic word, polysyllabic nonsense words, and sentences assessing difficulties with phonology, articulation, and working memory [Fig. 5].

Semantic association: for assessing semantic knowledge. [Fig. 3]

Reading (words and non-words): like repetition, reading aloud can indicate problems with phonology and articulation, but is also sensitive to impaired lexical-semantic word knowledge as indicated in English language by regularisation errors such as “SEW” pronounced as “sue”. This task features regular and irregular words. There is no spelling irregularity in Italian (i.e. orthography is ‘transparent’); typical and atypical stress assignment is therefore used instead [Fig. 7].

Writing: for assessing modifications (e.g. allography, micrography) and errors (e.g. orthographic, semantic, grammatical/syntactic). Instructed to write how to brush your teeth in sentences [Fig. 8].

References

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Table 1: Language assessment tool

<table>
<thead>
<tr>
<th>Type</th>
<th>Domain</th>
<th>Language</th>
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<tbody>
<tr>
<td>SD</td>
<td>Impaired</td>
<td>English</td>
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<tr>
<td>SD</td>
<td>Spared</td>
<td>Italian</td>
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<tr>
<td>PNFA</td>
<td>Impaired</td>
<td>English</td>
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<tr>
<td>PNFA</td>
<td>Spared</td>
<td>Italian</td>
</tr>
<tr>
<td>LPA</td>
<td>Impaired</td>
<td>English</td>
</tr>
<tr>
<td>LPA</td>
<td>Spared</td>
<td>Italian</td>
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</tbody>
</table>

Figure 1, Confrontation naming example
Figure 2, Single-word comprehension example
Figure 3, Semantic association example
Figure 4, Sentence comprehension example
Figure 5, Repetition example
Figure 6, Picture description example
Figure 7, Reading (words and non-words) example
Figure 8, Writing example

Background: Clinical features of the 3 main variants of Primary Progressive Aphasia

Sentence comprehension: I am going to read you some sentences and I will ask you a question after each sentence.

Repetition: I want you to repeat the sentence after me. "Which one is that?" No chance to practice.

Semantic association: I want you to point to the word in the sentence that I ask you about.

Reading (words and non-words): I want you to read the words aloud in this page.

Writing: I want you to write a few sentences explaining how to brush your teeth.