Development of the standardised, multilingual Mini Linguistic State Examination (MLSE) to classify and monitor primary progressive aphasia

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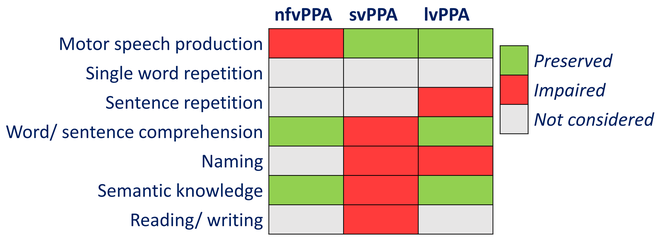
Summary

- Language loss is common in dementia (including in primary progressive aphasia [PPA]), but language tests are time-consuming and not readily comparable across languages
- Current criteria identify three main variants of PPA based on lengthy clinical tests or imaging.[1]
- Improved tools to screen, diagnose, and monitor PPA are essential
- In this study, we develop English and Italian versions of a brief (<20minutes) language screening tool which includes the major domains affected in PPA syndromes

Background: clinical features of the three main variants of PPA[1]

PPA has three main forms: (1) the **nonfluent** variant of PPA (nfvPPA) (2) the **semantic** variant of PPA (svPPA), and (3) the **logopenic** variant of PPA (lvPPA).

The three variants have differing linguistic profiles, as summarised below:



The linguistic profiles of the three variants of PPA are associated with characteristic imaging features, and underlying pathologies:

	nfvPPA	svPPA	lvPPA
Imaging features	Left inferior frontal atrophy	Bilateral anterior temporal atrophy	Left parietotemporal atrophy
Associated pathology	FTD-Tau; Corticobasal degeneration; FTD-TDP; Alzheimer's disease	FTD-TDP	Alzheimer's disease; (FTD-Tau)

The Mini Linguistic State Examination (MLSE)

MLSE test items are selected by the relevant domains, and based on the recommendations of current diagnostic guidelines[1]:

Confrontation naming

for assessing anomia, semantic/ phonemic errors

Featuring 9 items (non-living and living); all with low values of familiarity/ spoken frequency to be sensitive to mild deficits

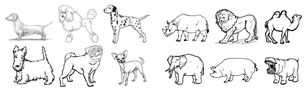
Example items

English version **Italian version**

Single-word comprehension (repeat and point)

for assessing semantic knowledge

1 target and 5 distractors from same semantic category

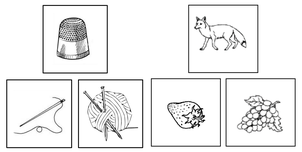


Repetition

Includes single words of varying syllabic length, repeated production of a polysyllabic word, polysyllabic nonsense words, and sentences for assessing difficulties with phonology, articulation, and working memory

Semantic association

for assessing semantic knowledge



Which item on the bottom row "goes with" the item on the top row?

Quale di queste due immagini va bene assieme a questa?

Reading (words and non-words)

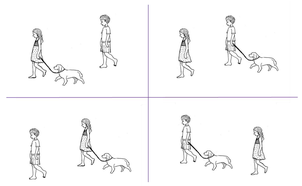
Like repetition, reading aloud can indicate problems with phonology and articulation, but is also sensitive to impaired lexical-semantic word knowledge as indicated in English by regularisation errors such as SEW pronounced as "sue". This task features regular and irregular words (and regular/ irregular stress words for the Italian version)

	Regular	Irregular	Nonword
English	TWICE	SCARCE	PLENG
Italian	GRANITA	BRUFOLO	SFITARO

Sentence comprehension

for assessing the effects of sentence length and grammatical complexity

Tasks include matching orally presented sentences to pictures, and answering questions about orally presented sentences. Sentences vary in grammatical complexity, length, and predictability

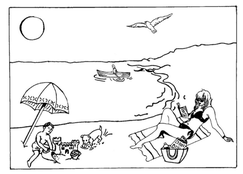


"The girl, who is leading the dog, is following the boy"/
"La bambina, che tiene il cane, segue il bambino"

Writing

for assessing modifications (e.g. allography, micrography) and errors (e.g. orthographic, semantic, grammatical/ syntactic)

Instructed writing task



Picture description

for connected speech analysis, including assessment of narrative structure, vocabulary, grammar, phonology, and fluency

Study Outline

Phase 1: Pre-norming and pilot data

180 English- and Italian-speaking controls complete MLSE test items

Results from Phase 1 were used to inform the design of the MLSE for use in Phase 2

Phase 2: Principal study

120 English- or Italian speaking patients with:
- one of the three main variants of PPA, or
- other neurodegenerative syndromes affecting motor or cognitive function (e.g. PSP, CBS, AD, FTD)

and 70 English- or Italian-speaking controls (age 45-75)

Procedure

Baseline: participants complete the MLSE, the Addenbrooke's cognitive examination (ACE-III), and 3T MRI. The MLSE is validated against the Boston Diagnostic Aphasia Examination for English-speaking participants or the Screening for Aphasia in NeuroDegeneration battery[2] for Italian-speaking participants

Follow-up: repeat assessment at 1 year

Conclusions

- The MLSE will provide a much needed short screening tool to assess aphasia, especially in diagnosis and monitoring of progressive aphasia
- Translation of the MLSE into other languages will increase sample sizes; and aid cross-linguistic/cultural investigation of language impairment associated with dementia
- The English version of the MLSE will provide a template for the development of further language-specific versions

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References

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2. Catricalà E, Gobbi E, Battista P, et al. SAND: a Screening for Aphasia in NeuroDegeneration. Development and normative data. *Neurological Sciences* 2017;**38**:1469-1483