Analysing language and cognition of patients living with dementia:
A view from a RRG perspective

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In this study we will use Role and Reference Grammar (RRG)´s functional model (Van Valin Jr 2005) for a grammatical analysis, and FungramKB's ontology (Periñán-Pascual and Arcas-Túnez 2010) for a cognitive assessment, to ascertain the symptomatic changes of language production in patients living with dementia. We will explore mild cognitive impairment (MCI) and dementia. MCI is a condition in which someone has minor problems with cognition - one or more of the following: memory, reasoning, planning or problem-solving, attention, language and visual depth perception ("alzheimers.org.uk" 2021). Here the decline in mental abilities is greater than in normal ageing during the middle age – 40, 50 and early 60 onwards ("alzheimers.org.uk" 2021). It is estimated that between 5 and 20% of people aged over 65 have MCI, and a person with MCI is more likely to go on to develop dementia ("alzheimers.org.uk" 2021). Dementia refers to a range of progressive neurological disorders. It is a clinically complex syndrome, whereby Alzheimer's disease and vascular dementia are the most prevalent ("nhs.uk" 2020) with more critical changes of language, understanding, as well as memory loss. They further state there are more than 850,000 people in the UK living with dementia, with over 7% over the age of 65, and the condition affects 17% of people over 80. With an ageing population, and it is estimated that by 2025 there will be 1 million more people living with dementia. Previous dementia conversation dataset research include: (1) conversational profiling of video and audio recordings of personal information and working memory (Jones, Drew et al. 2016); (2) conversational analysis of the pause to speech ratio and measures of linguistic complexity (O'Malley, Morris et al. 2020). There is much research discussed on a timely diagnosis for MCI, to help reduce the dementia rates, and to provide the best treatment, support and plans promptly ("DementiaUK" 2021). At a recent AI Business Digital Symposium - healthcare panel discussion - they unanimously agreed a need for a proactive evidence-based approach that will engage patients, monitor their therapy adherence, and measure outcomes - rather than a reactive mindset ("babylonhealth.com" 2021). This concurs with a review on conversational agents (CAs) in healthcare by Car, Dhinagaran et al. (2020) who stated their infancy, and required a robust investigation into potential diagnosis use rather than just health service support. This analysis supports a proactive strategy and potential of CA intervention to aid diagnosis based on a range of tasks. We will deploy RRG's functional model to analyse the utterances for the lexical and grammatical complexity, word order, and represent their structure and meaning. We aim to train a Dementia screening language and cognition model (DSLCM) for focusing on language production and cognition, with markers of MCI with reference to the global dementia deterioration scale ("universityofedinburgh" 2021). These analyses will support a future computational RRG based assessment tool, with recommendations for the patient, deployed in a conversational interface, as a a proactive intervention for normal ageing patients, who are concerned about their memory ("DementiaUK" 2021).

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