

Proceeding Paper

Application for Decision-Making on Mild Cognitive Impairments [†]

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[†] Presented at the 4th XoveTIC Conference, A Coruña, Spain, 7–8 October 2021.

Abstract: Life expectancy in Western countries is increasing. The fact that humans are living longer lives presents new challenges to people's quality of life. Some of the problems that most affect older people are the problems associated with cognitive impairment. The development of a tool that helps psychologists to carry out different types of tests is the main objective of this work. To this end, an interdisciplinary group of psychologists and engineers have joined forces to create a tool that generates a series of standardised metrics to guide clinicians and help them make decisions about a patient's cognitive impairment.

Keywords: depression; cognitive impairment; neuropsychological test



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Citation: Gonzalez-Martin, E.; Alvarellos, A.; Mato-Abad, V.; Pias-Peleiteiro, J.M.; Jimenez-Martin, I.; Cedron, F. Application for Decision-Making on Mild Cognitive Impairments. *Eng. Proc.* **2021**, *7*, 55. <https://doi.org/10.3390/engproc2021007055>

Academic Editors: Joaquim de Moura, Marco A. González, Javier Pereira and Manuel G. Penedo

Published: 27 October 2021

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1. Introduction

Despite the problems that continually arise in our society (social, political, economic, health, etc.), it has been proven that, in Western countries, the ageing of the population is a growing trend, i.e., the life expectancy of the elderly is increasing [1]. The fact that humans are living longer and longer lives has brought a series of challenges to the quality of life. One of the problems that most affect the elderly are the problems associated with cognitive impairments [2]. Among the cognitive problems, the best known is Alzheimer's disease, which causes very serious problems such as personality changes, deterioration in the ability to move or walk, difficulty communicating, memory loss, attention and orientation problems, among many others [3]. Alzheimer's disease usually occurs in people over the age of 65, although there are documented cases of people who may have developed it from the age of 40 onwards [4]. The big problem with Alzheimer's, and many other types of cognitive impairment, is that they are currently incurable, the only possibility being early detection and then carrying out activities and/or taking medication that can slow down the disease [5].

2. Objective

The main objective of this work is the creation of a tool that helps psychologists to carry out different types of tests to help diagnose their patients. To do this, the tool has to generate a series of standardised metrics to guide clinicians in making the final decision about the patient's cognitive impairment.

3. State-of-the-Art

Without a doubt, the health field is evolving towards an environment where technology is more omnipresent and where there are more and more applications to help doctors make decisions. The world of neuropsychology is no exception and those that seek to improve cognitive functioning through a set of activities related to memory, reasoning, calculation and communication stand out. Some existing applications are detailed below:

- Imentia [6]: It is a tool that detects possible cognitive impairment through the ENM.dem test. It then generates cognitive stimulation sessions [7]. This tool is designed for people who have already been diagnosed with Alzheimer's disease. The tool costs EUR 288 per year.
- Cantab [8]: It has a battery of neuropsychological tests to detect neurological diseases, disorders, pharmacological manipulations and neurocognitive syndromes. The tool is not intended to study cognitive impairment. It costs EUR 30,000.
- Stimulus [9]: This is an application that allows cognitive stimulation and rehabilitation. The cost of the tool is EUR 1296 per year.
- Accesible [10]: It is a cognitive impairment detection platform in which the patient's acoustic data is extracted. Their price is not public.

The main difference between the application developed and those available on the market is that it does not focus on the use of one or several specific tests. The tool that has been created allows the clinician to perform the necessary tests and then have a report on which to make a final decision.

4. Methodology

This paper presents a system for decision making in cases of mild cognitive impairment. The application allows to have several patients and to perform certain operations on them, such as viewing previous reports or performing new tests for a report (Figure 1). Figure 2 shows the different tests that were applied to the patient, where the clinician enters the PD value, which indicates the real value of the test, while the PZ value is the standardised value obtained and calculated by the application from the PD value entered by the clinician. It is important to mention that the clinician chooses at any time the tests he wants for the report and that at any time he can finalise the report by indicating the clinical suspicion of the patient (Figure 3).



ID	Nhc	Nombre	Sexo	Profesion	Estudios	Edad	Informes	
17	123	Juan Rodríguez	HOMBRE	Marinero	SECUNDARIOS	87	Ver informes	Vista Editar Eliminar
18	124	María Pérez	MUJER	Ama de casa	ILETRADO	91	Ver informes	Vista Editar Eliminar
19	125	Antonio González	HOMBRE	Hostelería	PRIMARIOS	88	Ver informes	Vista Editar Eliminar

Figure 1. List of the patients registered in the application and quick actions that can be performed on them.

Paciente

User

Fecha Evaluación

ID	Tipo Prueba	Prueba	PD	PZ (Autocalculado)
29	TBA	20. Test de Barcelona Abreviado (TBA). Praxias gestuales a la orden D	15	0
30	MMSE	28. Prueba MMSE	13	-8.444445
31	PUNTOS_DE_CORTE	9. Torre de Hanoi 3 piezas	15	Superada

+ Crear nuevo Resultado Prueba

Figure 2. A view of the tests that have been performed at one point in time on the patient. The PD value is entered by the clinician and is the direct score of a test. The PZ value is automatically calculated by the system using normalised values.

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Sospecha Clínica

Figure 3. Patient report screen where the clinician can view the tests that were performed on a patient. The clinician to indicate the type of clinical suspicion based on the tests performed.

Author Contributions: Conceptualization, J.M.P.-P. and I.J.-M.; methodology, A.A., V.M.-A. and F.C.; software, E.G.-M. and F.C.; validation, E.G.-M., J.M.P.-P. and I.J.-M.; writing—original draft preparation, F.C.; writing—review and editing, F.C.; visualization, E.G.-M.; supervision, F.C. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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