



Neurocognitive Stimulation of Moroccan Bilingual Patient with Alzheimer's Disease: A Case Study

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Abstract

Background and Objective: As a non-pharmacological intervention with proven clinical effectiveness and cost-effectiveness for patients, caregivers, and stakeholders, cognitive stimulation therapy (CST) was widely implemented in different European countries. In light of the increasing international adaptation of CST, it is essential to make it more accessible in non-Western countries.

Case Presentation: This study aimed to report a case study of T. A., a 74-year-old agricultural engineer with mild to moderate Alzheimer's disease (AD). His neurological examination results were normal, while the cerebral magnetic resonance imaging revealed hippocampal atrophy. A neuropsychological assessment was conducted, and the patient was enrolled in an individualized cognitive program according to clinical guidelines. The sessions were conducted twice a week in French and Arabic and lasted 45 minutes. Although the patient showed some positive outcomes, including improved mood, neuropsychological testing revealed impairments in memory and language. To address these issues, a culturally specific intervention of neurocognitive stimulation was implemented, which involved tailoring a range of cognitive activities to the premorbid occupational and linguistic history of the patient as a compensatory strategy to maintain his level of autonomy in everyday life.

Conclusions: Finally, it is recommended that a specific cultural adaptation and translation of the CST be developed for Arabic and non-Arabic-speaking individuals with AD.

Keywords: Alzheimer's disease, Arabic, Bilingual, Neurocognitive, Training

Background

The World Alzheimer's Report [1] emphasizes the importance of Cognitive Stimulation Therapy (CST) for individuals with dementia at an early stage. The CST has been developed in the United Kingdom and found to improve cognitive function and quality of life in individuals with dementia [1]. However, for countries whose primary language is not English, such as Morocco, adaptation and translation of the therapy may be necessary. This study aimed to reflect on the standard administration of non-pharmacological interventions for individuals with mild-to-moderate dementia using an individualized program.

There are various non-pharmacological interventions available to enhance the psychological, physical, and cognitive well-being of patients with Alzheimer's disease (AD). For example, reminiscence therapy [2] and multi-sensory stimulation [3] have been used to improve general functioning in daily life. Additionally, coupling Cognitive Stimulation Therapy with Montessori-Based Dementia may enhance cognitive functions [4].

Moreover, cognitive training and rehabilitation are the primary therapeutic approaches used for individuals with early-stage AD. While there is

limited evidence due to methodological biases and a lack of randomized controlled trials, single-case designs and small-group studies [5] provide cautiously positive outcomes [6]. These approaches may enhance specific cognitive processes, such as attention, executive function, and memory. One study found that memory training in patients with AD resulted in a significant improvement in their abilities [7].

The AD often presents with psycho-emotional disorders in addition to cognitive disorders. Non-pharmacological interventions, such as music therapy, have been the subject of increasing research. In this regard, the daycare center for Alzheimer's patients in Rabat, Morocco, offers singing and cooking therapy workshops. The singing workshop is held bimonthly and lasts for 90 min. It incorporates choral singing, both with and without musical instruments, and features songs from the Moroccan and Arabic musical repertoires. Studies have indicated that music therapy can help patients cope with negative emotions [8], improve feelings of well-being [9], and reduce anxiety, depression, and irritability [10]. Additionally, music

therapy has been found to help reduce social isolation [11].

Finally, Chan et al. [12] developed a 10-session group-based mindfulness program tailored for individuals with mild-to-moderate dementia to manage psychological distress with support from caregivers. The program was found to significantly increase the quality of life of these patients. The manual presented here is designed to be administered flexibly to promote the personhood of participants and is intended for use by therapists with experience in practicing mindfulness meditation.

Case Presentation

This study was carried out between October 2017 and 2019, and aimed to report the case of T. A., who presented with mild to moderate AD. He was 74 years old, 100% right-handed, married, father of three children, agricultural engineer specializing in horticulture. The patient practiced oil painting and participated in various artistic exhibitions 10 years ago. The patient's neurological examination results were normal; however, brain magnetic resonance imaging revealed hippocampal atrophy (figure 1). A neuropsychological assessment revealed that the patient had experienced difficulties with memory and language since 2011, which had

impeded communication with others. The patient showed an overall cognitive decline, with dominant memory impairment (Mini-Mental State Examination: 23/30 in 2017 vs. 15/30 in 2019)(table1). Despite these cognitive challenges, the patient continued to drive his car and engage in 30 min of physical activity each day.

The patient was enrolled in an individualized cognitive stimulation therapy (iCST) program according to clinical guidelines [2,13]. This therapy involved a 30-minute one-to-one bilingual French-Arabic session three times a week for 25 weeks. The themes addressed childhood, food, current affairs, faces/scenes, word associations, creativity, object categorization, orientation, money usage, number games, word games, and team games. The program activities included structured cognitive stimulation through themed activities (current affairs and associated word number games) tailored to the needs and preferences of patients. The usual format of the session followed this pattern: 5 min dedicated to time and space orientation, followed by a discussion of current affairs and a focus on the main activity for 20 min. The spouse of the patient was also involved in the provision of home-based stimulation using a diary and activities from the activity workbook.

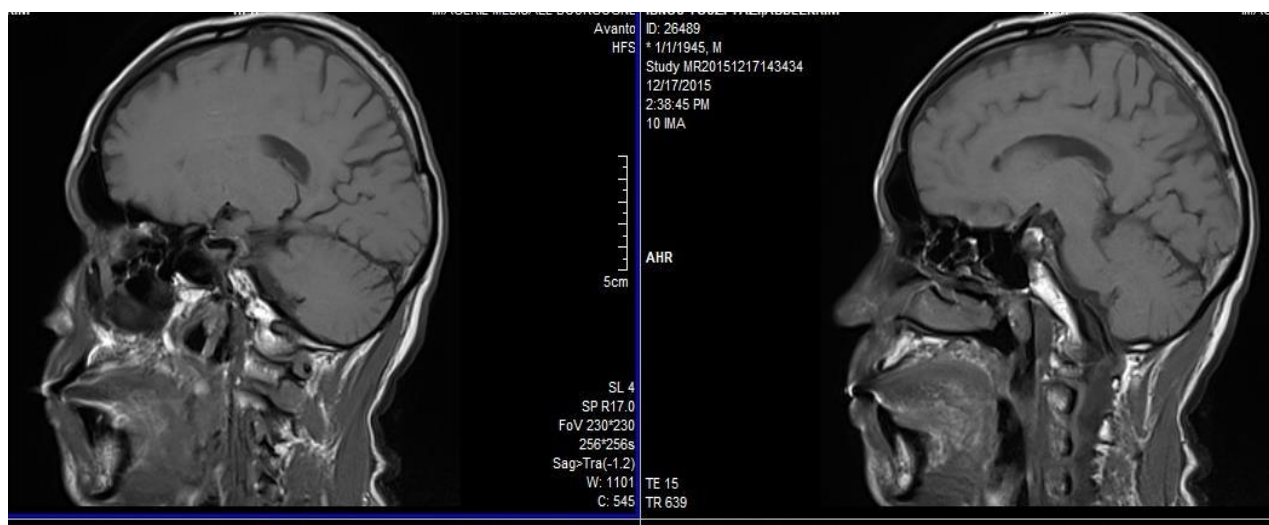


Figure 1. Cerebral magnetic resonance imaging sagittal cut showing a left hippocampal atrophy

The patient demonstrated significant improvement in spoken language and mood as a result of iCST; however, his memory was impaired, as evidenced by his Mini-Mental State Examination and Memory Impairment Screen scores during the follow-up assessment (table 1). In particular, iCST sessions involved discussion of a wide range of news with the patient about TV soap operas or political shows they were following. As the patient had exceptional visuospatial and constructional abilities, multiple

sessions were conducted in which a geopolitical map was used to test their knowledge of agriculture in different countries while they practiced their former occupation (figure 2 & 3). Additionally, the patient was asked to draw a map at home and then draw it from memory as a technique to engage them positively in iCST. This was later coupled with reminiscence therapy, in which the patient was guided through life experiences and encouraged to evaluate them.

Table 1. Summary of neuropsychological assessments

Tests	Assessment in December 2017	Assessment in January 2019
Mini-Mental State Examination [14]	Total score: 23/30 Orientation: 7/10 Registration: 3/3 Attention et calculation: 5/5 Recall: 0/3 Language: 7/7 Praxis: 1/1	Total score: 15/30 Orientation: 5/10 Registration: 3/3 Attention et calculation: 1/5 Recall: 0/3 Language: 5/7 Praxis: 1/1
Trail making test [15]	TMT A: 1 Error/1 min and 20 sec TMT B: 6 Errors/3 min and 31 sec	TMT A: 1 Error/2 min and 11 sec TMT B failed
Clock drawing test [16]	7/10	2/10
Categorical and literal verbal fluency [16]	Letter fluency: 13 (3 intrusions) Semantic category fluency: - Animals: 11 - Fruits: 5 (1 intrusions)	Letter fluency: 4 (3 intrusions) Semantic category fluency: - Animals: 4 - Fruits: 5 (3 intrusions)
Digit span task [16]	Digit span forwards: 4 Digit span backwards: 3	Digit span forwards: 4 Digit span backwards: 3
Face-name associative recognition test [17]	Total score: 12/34 Part A: 14/15 Part B: 15/15	Total score: 7/34 Part A: 8/15 Part B: 3/15
Hayling test [18]	8/8	8/8
Instrumental activities of daily living	8/8	8/8
Starkstein apathy scale [19]	14/42	12/42

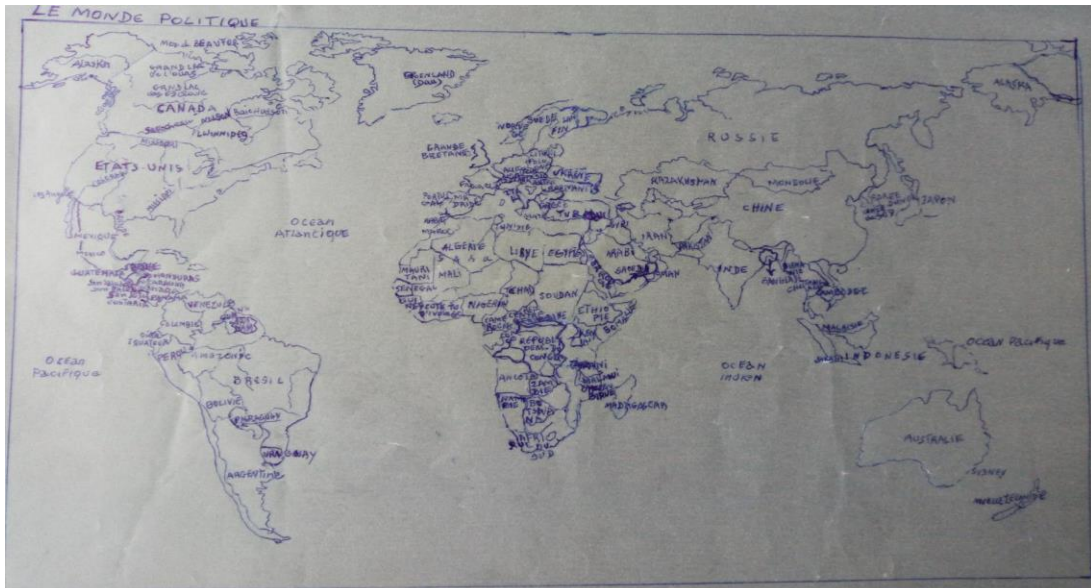


Fig 2. Geopolitical map drawn by the patient in October 2017



Fig 3. Geopolitical map drawn by the patient in January 2019

Discussion

When adapting CST for use in different cultures, it is important to involve relevant stakeholders, such as participants and family caregivers, community health workers, mental healthcare staff, and other older people with knowledge of historical, cultural, and religious issues. Furthermore, an extensive cultural adaptation and translation of the CST into Arabic is necessary. Future research should focus on the establishment of the effectiveness of CST for dementia patients with AD in Morocco across various settings. Despite a lack of evidence regarding the impact of iCST on cognitive function or quality of life of people with dementia [2], participation in iCST may improve the quality of the relationship between patients and their caregivers if the protocol follows a structured rationale in terms of thematic sessions.

Wilson et al. [20] suggested that remaining mentally active throughout life may support brain health and possibly reduce the risk of AD and other dementias. Besides, remaining socially and mentally active may help build cognitive reserves but the exact mechanism by which this may occur is unknown. Further research is needed to better understand how social and cognitive engagement may affect biological processes to reduce risk.

Hall et al. [21] explored the neuropsychological underpinning as well as the effects of CST on specific cognitive domains. They found that memory, comprehension of syntax, and orientation seem to be the cognitive areas most affected by the CST. They explained this finding by the induced language-based nature of the CST, which might improve neural pathways responsible for processing such cognitive processes. However, Liu et al. [22] stipulated that CST as a person-centered therapy may enhance these cognitive processes, especially in people with higher brain/cognitive reserve. The CST group maintained the total brain volume/total intracranial volume, compared to the control group. Increased resting-state functional connectivity in the default mode network (DMN) in the posterior cingulate cortex and bilateral parietal cortex nodes was observed in the CST, compared to the control group. The authors correlated the potential role of the DMN in episodic memory retrieval with metacognitive processes.

Finally, in the aftermath of the COVID-19 pandemic [23], utilizing the e-mental health framework in dementia care [24] appears to be essential in the transition from traditional face-to-face interventions to online or hybrid formats. However, there are current challenges that lead to digital inequities in the implementation of CST in the post-COVID era, particularly in low-income countries. These challenges include lower mental

abilities, IT illiteracy, and limited access to the internet.

As the COVID-19 pandemic is expected to be a long-lasting issue, there is a pressing need to deliver CST services for dementia that can overcome geographic barriers, connect people from different backgrounds, reduce transportation time and costs, and provide access to those with mobility and health issues that prevent them from attending groups. In light of these circumstances, the authors of CST and iCST have developed an online platform to promote cognitive and mental well-being in individuals with dementia [25,26].

The iSupport [27] is a self-help online program developed by the World Health Organization that provides training for caregivers of AD patients. This web-based intervention is an example of a cross-cultural tool that needs to be translated and adapted in different languages and cultures, especially in non-European languages, such as Arabic or Persian. The same approach could be applied to remote cognitive stimulation therapy [28]. Therefore, technological advances should be made accessible worldwide through equity and digital inclusion using cross-cultural responsive guidelines in remote cognitive stimulation interventions for patients with AD and their caregivers [29].

Conclusions

Patient T. A. was diagnosed with late-stage 1 mild to moderate AD in 2011, characterized by memory disorders confirmed by neurological, neuropsychological, and neuroradiological examinations. He was enrolled in the iCST program, which resulted in a slight improvement in mood; however, memory and language were still impaired, as indicated by neuropsychological testing. This later highlighted some aspects of CST application and its benefits in the case of T.A.; however, further research is needed using a larger dataset and comparing the cohort to age-matched and healthy controls to validate the impact on cognition and quality of life.

A specific adaptation of CST in Arabic is necessary [27], taking into account the socio-linguistic and socio-cultural profile of the Moroccan Arabic language (diglossia), cultural legacy and heritage (Moroccan crafts, games, and musical folklore), level of literacy (illiterate vs. educated), and social economic status (occupation, quality of life, well-being, and opportunities for lifelong stimulation).

Compliance with ethical guidelines

This research does not have the ethics code. However, all ethical principles were considered in this article. The participants were informed about the purpose of the research and its therapeutic stages; they were also assured about the

confidentiality of their information. Furthermore, they were allowed to leave the study whenever they wish.

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Authors' contributions

MT developed the original idea, wrote and revised the manuscript. He also assessed and treated the patient.

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Conflicts of Interest

The author declared no conflict of interest.

References

1. Spector A, Thorgrimsen L, Woods B, et al. Efficacy of an evidence-based cognitive stimulation therapy programme for people with dementia: randomised controlled trial. *Br J Psychiatry*. 2003;183:248-254. [DOI: 10.1192/bjp.183.3.248] [PMID]
2. Orrell M, Yates L, Leung P, et al. The impact of individual Cognitive Stimulation Therapy (iCST) on cognition, quality of life, caregiver health, and family relationships in dementia: A randomised controlled trial. *PLoS Med*. 2017;14(3):e1002269. [DOI: 10.1371/journal.pmed.1002269] [PMID] [PMCID]
3. Mahboubinia M, Dalvandi A, Nourozi K, Mahmoudi N, Sadat Safavi S, Hosseinzadeh S. The effect of Multi Sensory Stimulation (MSS) on cognitive disturbances and quality of Life of male patients with Alzheimer's disease. *Iranian Rehabilitation Journal*. 2012;10(2):50-5. [Link]
4. Ahadi H, Jomehri F, Kalthornia Golkar M. Comparison of Cognitive Stimulation Therapy and Montessori-Based Dementia on cognitive function in people with Alzheimer's disease. *Studies in Medical Sciences*. 2018;29(5):336-48. [Link]
5. Germain S, Wojtasik V, Lekeu F, et al. Efficacy of Cognitive Rehabilitation in Alzheimer Disease: A 1-Year Follow-Up Study. *J Geriatr Psychiatry Neurol*. 2019;32(1):16-23. [DOI: 10.1177/0891988718813724] [PMID]
6. Clare L, Woods RT, Moniz Cook ED, Orrell M, Spector A. Cognitive rehabilitation and cognitive training for early-stage Alzheimer's disease and vascular dementia. *Cochrane Database Syst Rev*. 2003;(4):CD003260. [DOI: 10.1002/14651858.CD003260] [PMID]
7. Amini M, Dowlatshahi B, Dadkhan A, Lotfi M. The effect of memory and attention rehabilitation to decrease of memory deficits in older adults with Alzheimer disease. *Iranian Journal of Ageing*. 2013;8(3):53-62. [Link]
8. De la Rubia Orth JE, Pardo MP, Benlloch M, Drehmer E, Platero JL, Sancho D, Rodriguez MM. Music therapy decreases sadness and increases happiness in Alzheimer patients: a Pilot Study. *Neuropsychiatry*. 2019;9(1):2013-20. [Link]
9. Cuddy LL, Sikka R, Silveira K, Bai S, Vanstone A. Music-evoked autobiographical memories (MEAMs) in Alzheimer disease: Evidence for a positivity effect. *Cogent Psychology*. 2017;4(1):1277578. [DOI: 10.1080/23311908.2016.1277578]
10. McDermott O, Crellin N, Ridder HM, Orrell M. Music therapy in dementia: a narrative synthesis systematic review. *Int J Geriatr Psychiatry*. 2013;28(8):781-94. [DOI: 10.1002/gps.3895] [PMID]
11. Ueda T, Suzukamo Y, Sato M, Izumi S. Effects of music therapy on behavioral and psychological symptoms of dementia: a systematic review and meta-analysis. *Ageing Res Rev*. 2013;12(2):628-41. [DOI: 10.1016/j.arr.2013.02.003] [PMID]
12. Chan J, Churcher Clarke A, Royan L, Stott J, Spector A. A Mindfulness Program Manual for People With Dementia. *Behav Modif*. 2017;41(6):764-87. [DOI: 10.1177/0145445517715872] [PMID]
13. Yates LA, Leung P, Orgeta V, Spector A, Orrell M. The development of individual cognitive stimulation therapy (iCST) for dementia. *Clin Interv Aging*. 2014;10:95-104. [DOI: 10.2147/CIA.S73844] [PMID] [PMCID]
14. Folstein MF, Folstein SE, McHugh PR. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res*. 1975;12(3):189-98. [DOI: 10.1016/0022-3956(75)90026-6] [PMID]
15. Oumellal A, Faris ME, Benabdeljlil M. The trail making test in Morocco: Normative data stratified by age and level of education. *Open Journal of Medical Psychology*. 2017;7(1):1-2. [DOI: 10.4236/ojmp.2018.71001]
16. Azdad A, Benabdeljlil M, Al Zemmouri K, El Alaoui Faris M. Standardization and validation of Montreal cognitive assessment (MoCA) in the Moroccan population. *International Journal of Brain and Cognitive Sciences*. 2019;8(1):1-5. [DOI: 10.5923/j.ijbcs.20190801.01]
17. Mackinnon A, Mulligan R. Estimation de l'intelligence primordiale chez les francophones [The estimation of premorbid intelligence levels in French speakers]. *Encephale*. 2005;31(1 Pt 1):31-43. [DOI: 10.1016/s0013-7006(05)82370-x] [PMID]
18. Belleville S, Rouleau N, Van der Linden M. Use of the Hayling task to measure inhibition of prepotent responses in normal aging and Alzheimer's disease. *Brain Cogn*. 2006;62(2):113-9. [DOI: 10.1016/j.bandc.2006.04.006] [PMID]
19. Starkstein SE, Petracca G, Chmerinski E, Kremer J. Syndromic validity of apathy in Alzheimer's disease. *Am J Psychiatry*. 2001;158(6):872-7. [DOI: 10.1176/appi.ajp.158.6.872] [PMID]
20. Wilson RS, Mendes De Leon CF, Barnes LL, Schneider JA, Bienias JL, Evans DA, Bennett DA. Participation in cognitively stimulating activities and risk of incident Alzheimer disease. *JAMA*. 2002;287(6):742-8. [DOI: 10.1001/jama.287.6.742] [PMID]
21. Hall L, Orrell M, Stott J, Spector A. Cognitive stimulation therapy (CST): neuropsychological mechanisms of change. *Int Psychogeriatr*. 2013;25(3):479-489. [DOI: 10.1017/S1041610212001822] [PMID]
22. Liu T, Spector A, Mograbi DC, Cheung G, Wong GHY. Changes in Default Mode Network Connectivity in Resting-State fMRI in People with Mild Dementia Receiving Cognitive Stimulation Therapy. *Brain Sci*. 2021;11(9):1137. [DOI: 10.3390/brainsci11091137] [PMID] [PMCID]
23. Taiebine, M. COVID-19 Report from Morocco: Telepractice Solutions for Patients with Dementia. *Leader Live*.2020. [Link]
24. Dai R, Spector A, Wong G. e-Mental health care for people living with dementia: A lesson on digital equality from COVID-19. *Alzheimers Dement*. 2020;12(1):e12100. [DOI: 10.1002/dad2.12100] [PMID] [PMCID]
25. Leung P, Lane J. Bridging the gap in implementing non-pharmacological interventions in dementia during the Covid-19 pandemic: What more can we do to implementing individual Cognitive Stimulation Therapy (iCST) in dementia?. *Int J Geriatr Psychiatry*. 2022;37(1):10.1002/gps.5651. [DOI: 10.1002/gps.5651] [PMID] [PMCID]
26. Rai HK, Griffiths R, Yates L, Schneider J, Orrell M. Field-testing an iCST touch-screen application with people with dementia and carers: a mixed method study. *Ageing Ment Health*. 2021;25(6):1008-18. [DOI: 10.1080/13607863.2020.1783515] [PMID]
27. World Health Organization. Supporting informal caregivers of people living with dementia. 2015. [Link]
28. Perkins L, Fisher E, Felstead C, et al. Delivering Cognitive Stimulation Therapy (CST) Virtually: Developing and Field-Testing a New Framework. *Clin Interv Aging*. 2022;17:97-116. [DOI: 10.2147/CIA.S348906] [PMID] [PMCID]
29. Taiebine M. Need for cross-culturally responsive guidelines in remote cognitive stimulation interventions for patients with Alzheimer's disease and their caregivers: A literature review. *Journal of the Neurological Sciences*. 2023;455. [DOI: 10.1016/j.jns.2023.121465]