



Pragmatic Language Disorders Resulting from Semantic Degradation in Patients with Alzheimer's Disease

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ABSTRACT

Objective: The aim of this study is to create an inventory of pragmatic language disorders specific to Alzheimer's disease (AD), to illustrate them by case examples, to determine the severity of disorders according to the stages of Alzheimer's, and to specify the impact of patients' demographic characteristics on the pragmatic disorders experienced by them.

Methods: The study adopted a descriptive research design. The sample was selected using the stratified sampling method. Interviews were conducted with the patients using the free association technique. The feedbacks from the participants were collected as audio recordings and transcribed using the SALT program. The findings were analysed and compared with the control group data, and the conclusion was drawn from the results obtained.

Results: In the course of study 19 types of pragmatic language disorders of AD patients were identified. The differences between the pragmatic disorders detected at various stages of the disease were illustrated in detail using case examples, and the effect of the demographic variables on the disorders was determined.

Conclusion: As a result of the research, pragmatic language disorders resulting from semantic degradation experienced by AD patients were identified. It was found out that the early stage of AD is characterised by mild pragmatic disorders, which tend to get more distinct at the middle stage and even more severe at the late stage. In addition, it was determined that the demographic characteristics of patients have an impact on the severity of pragmatic language disorders.

Keywords: Dementia, Alzheimer's disease, semantic degradation, pragmatic language disorders.

1. INTRODUCTION

The American Psychiatric Association describes dementia as being a complex of mental and behavioural disorders, comprising one or more executive dysfunctions such as aphasia, apraxia, and agnosia, and exhibiting clinical features such as memory impairment (1,2).

The most common type of dementia is Alzheimer's disease (AD), corresponding to about 60% of cases (3,4). AD, characterized by cognitive dysfunctions, is a progressive neurodegenerative disease (5). The most prominent feature of AD is forgetfulness observed from the very beginning of the disease (6). Neuropathological changes in AD include senile plaques formed by deposits of diffuse extracellular amyloid, intracellular neurofibrillary tangles, reactive microgliosis and neuron-synapse losses (7,8).

Post-mortem macroscopic examination of the brains of individuals with AD reveals such neuropathological features as cortical atrophy and enlarged ventricles and sulci (9). In the late stages of AD the degeneration spreads from temporal

association cortex to the parietal cortex, and from there to the frontal cortex and eventually to other areas of the neocortex (10). In the prodromal phase patients with mild cognitive disorders usually have no functional impairment, however since neurodegeneration affects the large-dimensional neurocognitive network of episodic memory, the patient has a progressive memory impairment that can be detected by neuropsychological methods (11).

Language disorders occurring in AD patients are closely related to the impairment of such functions as memory, attention and abstraction, and they show themselves at an early, middle or late stage depending on the course of the disease. These linguistic disorders also reveal extremely important findings in terms of diagnosing clinical subtypes of dementia (12,13). In the early stages of the disease, individuals usually have fluent speech. Articulation disorders, breakdown of the syntactic structure of language as well as auditory processing disorders and difficulties when reading

out loud do not fully manifest themselves at this stage (14). Symptoms related to language disorders in the early stages of AD include difficulties with object and action naming, word recalling and finding the correct word. The middle stage is characterised by patients not being able to syllabify and find the appropriate words during communication. This situation shows the loss of conceptual basic perception and abstract information in patients. In the late stages of the disease, the impairment in language functions becomes more severe (6,15-18).

In the early stages of AD, pragmatic language disorders are not much evident. However, as the disease progresses, the symptoms get much more severe and in the last stages of the disease result in the patient's complete loss of the linguistic communication with the outside world (19). The deterioration of the pragmatic component of language in different stages of the disease is closely related to the impairment of explicit memory, which includes episodic and semantic memory, and the loss of the awareness of the distinctive semantic features such as the features and functions of concepts in communication (20,21). As the disease progresses, disconnected speech is observed alongside with the decline in the ability of patients to choose the correct words and use them according to the context (22). Based on these findings, pragmatic language disorders occurring in AD can be said to be the result of semantic memory destruction caused by temporal lobe atrophy experienced by the patient (23-26).

In the light of the facts mentioned above, our research aims at creating a profile of pragmatic language disorders specific to AD, making an inventory of these disorders and illustrating them by case examples, determining the severity of disorders according to the stages of AD, and specifying the impact of patients' demographic characteristics on the pragmatic disorders experienced by them.

2. METHODS

The sample was selected using the 'stratified sampling' method that involves the division of a population into smaller subgroups. After the group that constitutes the population of the study was stratified, the participants were selected from each stratum using a simple random non-proportional stratified sampling method. The study was carried out on 20 patients possessing different demographic characteristics, diagnosed with early, middle and late stages of AD, and staying in the AD Department of one of the elderly care centres in Istanbul, and a control group of 20 healthy aging elderly participants with similar demographic characteristics. The study adopted a descriptive research design. The selection and exclusion criteria of the sample group included having been diagnosed with early, middle or late stage of AD, being in the age range of at least 65 and at most 95, not having undergone language and speech therapy before, not having severe intelligibility and hearing problems. Control group selection and exclusion criteria are as follows: having similar demographic characteristics with the case group, not having any mental problems, not having language

and speech disorders, not having undergone language and speech therapy.

Ethical approval was obtained from the Hamidiye Scientific Research Ethical Committee of University of Health Sciences (Approval number: 20/380). After participants and staff members were informed about the research design and any other related issues, question sets related to 'professions, clothes, household items, seasons and food' to be used in the interview were created. Interviews were conducted with the patients using free association technique in order to obtain natural verbal feedback from them. In addition, pictures containing visuals related to the question sets were shown to the patients and the answers of the participants were collected in the form of audio recordings. The audio recordings were transcribed using the 'Systematic Analysis of Language Transcripts (SALT)' program without adding or removing anything. After analysing the obtained written texts, an inventory of pragmatic language disorders caused by semantic degradation was created and the differences between these disorders according to the stages and demographic characteristics of the patients were illustrated by case examples.

3. RESULTS

Pragmatic language disorders caused by semantic degradation experienced by AD patients, which were detected within the scope of the study, were as follows:

3.1. Inability to Understand and Use Abstract Language

1st stage AD patient T.S. said, "İçi sizi, içi beni, içi beni dışı sizi yakıyor" (tries to reproduce the saying "Dışı seni, içi beni yakar" – "Good from far, far from good"). 2nd stage AD patient P.S. said, "Oğlumun, çocukları severler, gülü seversin, oğlum, gülü, başına katlanırsın" (tries to reproduce the proverb "Gülü seven dikenine katlanır" – "There's no rose without a thorn"). When told, "I guess you've grown cold towards such people," 3rd stage AD patient Y.E.A said, "hmmm, I haven't, if I'm cold, I'll put on this".

3.2. Inability to Make up Long Sentences

When asked, "Do you have children, if any, can you talk about them?" 1st stage AD patient S.S. responded, "Yes, I have children, of course I have". When asked what she was going to do that day, 2nd stage AD patient G.H. responded, "I'm here today. Here". When asked, "What did you do in the garden, how was your day?" 3rd stage AD patient F.Ç. said, "Today? It was good, good".

3.3. Repetitions

Perseveration

When asked about her hometown, 1st stage AD patient Z.T. answered, "Erzurum, Erzurum, Erzurum, are you from

Erzurum?" 2nd stage AD patient A.S. said, "Yaşar Nuri Öztürk, professor, professor, professor of theology theology". When asked, "Did you eat? Are you hungry?" 3rd stage AD patient L.H. replied, "eat, I ate, I ate, eat, yes".

Echolalia

When asked "It feels like it's summer, isn't it?" 1st stage AD patient B.B. answered, "It feels like summer, it feels like summer". When asked, "Are you fifty years old?" 2nd stage AD patient G.H. replied, "Fifty, fifty, are you fifty, you fifty". When asked, "Where were you born?" 3rd stage AD patient F.Ç. responded, "Were born, were born, were born, were born".

3.4. Inability to Follow a Thread of Conversation

When asked, "This cat is very nice, is it yours?" 1st stage AD patient S.S. said, "Yes, this cat is very nice, I can speak English, yes I did good translations". When asked, "What's the weather like now?" 2nd stage AD patient A.E. replied "Right now I don't stay there". When asked, "What is there in the room?" 3rd stage AD patient F.Ç. said, "They are not mine, this is hotel, hotel".

3.5. Lesser Tendency for Clustering Behaviour

When asked, "What things are brown?" 1st stage AD patient S.S. answered, "A tree", when asked to add anything else, she said, "A tree, a table". When asked, "What other professions are there other than the doctor related to health?" 2nd stage AD patient V.Y. answered, "There is a doctor, there is a nurse, there are those who wear white clothes, in the hospital". When asked, "So what other animals are there in the village?" 3rd stage AD patient F.Ç. responded, "There are sheep, there are animals, running, there are sheep".

3.6. Being Aware of Having Made a Mistake but Not Being Able to Correct It

When asked, "Do you like listening to music?" 1st stage AD patient S.S. said, "Yes, I do. Sorry, I don't like so much". When asked if he was married 2nd stage AD patient F.M.N. said that he wasn't. However, when the interviewer noticed that his records said that he was married, the patient replied, "No, no, yes I'm married". When asked, "Do you have a notebook?" 3rd stage AD patient E.İ. said, "Here is it, I've brought it from above". After being reminded that it was not his notebook, he still said, "No, no, I've just brought it, I've bought it from inside, I've brought it".

3.7. Inability to Grasp the Main Idea of the Conversation

When asked to describe her childhood home, 1st stage AD patient A.Ö. said, "I say, they graduate from their universities. They are not married, that is they are single". When asked if he had any close friends, 2nd stage AD patient V.Y. answered, "I came from there, set off but it took a long time". When asked what her favourite food was, 3rd stage AD patient F.Ç. replied, "I came today today, I'll go here tomorrow. To Paşabahçe".

3.8. Inability to Start a Conversation

After the interview was finished, 1st stage AD patient T.S. asked, "Do you have any other questions?" 2nd stage AD patient E.D. said, "There are red flowers, do you know what their names are?" Patients at the 3rd stage didn't make any attempts to initiate a conversation.

3.9. Inability to Understand the Question Asked

When asked, "Are you in pain?" 1st stage AD patient A.Ö. replied, "They don't give any, look here is the hospital, we stay here but they didn't give any". When asked if she read books, 2nd stage AD patient G.H. responded, "If I had a job related to it, I would speak English brilliantly today, but mine was different". When asked how many children she had, 3rd stage AD patient F.Ç. answered, "I was born in thirty-seven, I'm over eighty".

3.10. Lack of Use of Respectful Language

While 1st stage AD patient T.S. used respectful language when saying, "My deceased husband was a very kind gentleman, he was a retired teacher" and 2nd stage AD patient P.S. used words like "You're welcome" and "Thank you", patients at the 3rd stage weren't found out to use respectful language.

3.11. Frequent Use of the Word "Şey" ("Thing", "Um")

1st stage AD patient T.S. said, "İnönü did um, um, that is, he criticized that he did not enter the war, he said yes, we were hungry, but we didn't lose our fathers". 2nd stage AD patient G.H. said, "Because since um, that is since 12 years old she has experienced great um, difficulty". 3rd stage AD patient F.Ç. said, "I studied only at primary um, um".

3.12. Periphrasis

When asked, "Where does this animal live?" 1st stage AD patient A.Ö. responded, "They have their place. They also have a house. Where they stay, they have a house apart from home". When asked what her job was, 2nd stage AD patient G.H. said, "I do different kind of things, when they ask something I answer, when it is wrong, I correct it, this kind of job you see". When asked if she knew any other neighbourhoods or districts in Istanbul, 3rd stage AD patient F.Ç. said, "It was in Istanbul. The place where our aunt used to live".

3.13. Paraphasia

Semantic Paraphasia

When asked, "So what do you eat the soup with?" 1st stage AD patient A.A. answered, "With fork". When asked if he had an umbrella, 2nd stage AD patient F.M.N. replied, "Umbrella, it is used in summer, umbrella then". When asked, "(by pointing

the window) What is the name of this?" 3rd stage AD patient S.M. answered, "Door, let's open the door, let the air in".

Neologistic Paraphasia

When asked, "What did you use in the field?" 1st stage AD patient Z.T. answered, "These are agricultural *biği* chemicals". When asked, "In which season do we wear warm things?" 2nd stage AD patient G.H. replied, "There is more *assulu* in winter". When asked, "What do we write in the notebook with?" 3rd stage AD patient S.M. said, "With *yeesin*".

3.14. Omitting Words and Predicates in Sentences

When asked, "Do you like reading?" 1st stage AD patient T.S. answered, "I ... hmm... every book I can get here. When they come to visit the patients, I even ...". 2nd stage AD patient A.E. said, "there was a patient, I would ... him, I would examine him". When asked if she liked to watch movies, patient at the 3rd stage of AD F.Ç. answered, "Very much, I wat..., movies, I wat..." (tries to say the verb "seyretmek" – "watch").

3.15. Inability to Answer the Question Properly

When asked, "So what kind of objects are there in the garden?" 1st stage AD patient B.B. answered, "Well that's enough for me, I don't need anything else. I'm not fond of luxury". When asked if she was married, 2nd stage AD patient G.H. replied, "My daughter has 2 children, a son and a daughter, they all went to America". When asked, "Do you know the capital city of Germany?" 3rd stage AD patient E.İ. said, "I do not speak German, I went there for the first time, I worked alone, I came back but I did not learn it."

3.16. Speaking out of Context

When asked, "Where did you live before?" 1st stage AD patient T.S. answered, "I actually used to live in Ankara. I'm from Izmir, though. My son is a doctor here. I was ill. In 2015 my hip bone was broken. I've had a lot of surgery. After the operation, my children hired a caregiver for me. I lost my wife in 2003, it has been sixteen years". When asked, "Who do you live with here, alone? Or with your wife?" 2nd stage AD patient E.D. replied, "I hate fighting with my wife. We shout at each other, then quickly calm down". When asked, "What would you plant in your field in the village?" 3rd stage AD patient Y.K. said, "Cucumber, tomato, pepper. My mom died. My brother died. My sister died. It's not easy, it's very difficult. May God give no one so much pain, that is, death causes much pain. It never comes out of you again. That's how loneliness is".

3.17. Inability to Provide Information and Explanations

No disorder of this kind was observed in 1st stage AD patients participating in the study. When asked, "Why do you think winters are not so cold anymore, especially in Istanbul?" 2nd stage AD patient A.E. replied, "Yes, it is, yeah so the weather

is not so much anymore, but it's not cold". When asked to describe her profession, 3rd stage AD patient F.Ç. answered, "Washing like this all the time, doing um like this, my dear".

3.18. Inappropriate and Incorrect Use of Subjects and Personal Endings

No disorder of this kind was observed in 1st stage AD patients participating in the study. 2nd stage AD patient V.Y. said, "Ayna varım, büyük bir aynam" (tried to say, "I have a mirror, a big mirror," but used first-person singular instead of third-person singular). 3rd stage AD patient F.Ç. said "Allaha şükür. Onu hiçbir şeye sıklımadı bu zamana kadar" (tries to say "Thanks God. I haven't had any problems until now" but used passive voice with direct object and wrong subject).

3.19. Inability to Explain the Working Principles of Tools and Equipment

No disorder of this kind was observed in 1st stage AD patients participating in the study. When asked, "How do you think this clock works?" 2nd stage AD patient P.S., answered, "This shows what time is it, there with these hands". When asked, "How do we write on the notebook with this pen?" 3rd stage AD patient S.M. replied, "This is what does it in a book or a notebook, a pen, now whatever is there of course".

4. DISCUSSION

AD is a progressive neurodegenerative disease, characterized by semantic degradation caused by the aggressive course of cortical atrophy. This degradation results in the impairment of patients' pragmatic functions, representing the most complex component of language. Literature review shows that there are few studies in the field of language and speech therapy in Turkey, especially those dealing with pragmatic language disorders. In order to fill this gap, it is crucial to identify pragmatic language disorders caused by semantic degradation, as recent studies reveal that some types of dementia can be reversed by early diagnosis (27). Since one of the early symptoms of the disease is the deterioration in the ability to use language, this study is important in terms of detecting the disease at an early stage and allowing to start the medical intervention much earlier.

As a result of the study, a significant difference was observed in pragmatic language skills of AD patients compared to the control group. After analysing the transcribed texts, a 19-item inventory of pragmatic disorders resulting from semantic degradation experienced by AD patients was developed. The inventory includes such disorders as inability to understand and use abstract language, inability to make up long sentences, repetitions (perseveration and echolalia), inability to follow a thread of conversation, showing lesser tendency for clustering behaviour, being aware of having made a mistake but not being able to correct it, inability to grasp the main idea of the conversation, inability to start a conversation, inability to understand the question asked, lack

of respectful language usage, frequent use of the word “şey”, periphrasis, semantic and neologistic paraphasia, omitting words and predicates in sentences, inability to answer the question properly, speaking out of context, inability to provide information and explanations, inappropriate and incorrect use of subjects and personal endings, and inability to explain the working principles of tools and equipment.

The above-mentioned disorders were found out to differ according to the stages of AD and the demographic characteristics of the patients. It was determined that the early stage of AD is characterised by mild pragmatic disorders, which tend to get more distinct at the middle stage and even more severe at the late stage. In addition, the evidence from this study suggests that patients which have a higher level of education and a daily reading habit and which communicate more with other individuals display lower levels of pragmatic disorders than other patients at the same stage of AD.

The results obtained are consistent with the findings of previous studies. For example, Cuerva et al. examined pragmatic abilities in thirty-four subjects with probable AD and came to the conclusion that AD subjects displayed significantly more severe pragmatic deficits than controls (28). Amanzio et al., Papagno, Rassiga et al., Papagno et al. reported that comprehension of non-literal language in AD patients decreased over time (29-32). Leyhe et al. and Chapman et al. found that AD patients experienced significant difficulty with interpretation of proverbs (33,34). Mentis et al. discussed discourse deficits in AD patients, such as problems with topic management during casual conversational interaction (35). Carlomagno et al. found that AD patients produced confounding and irrelevant information during the communication task (36). Welland et al. reported poorer overall comprehension of narratives in subjects with early-stage and middle-stage AD (37).

Limitations of the Study

The findings of this study have to be seen in light of some limitations. The primary limitation to the generalization of the results is a small sample size. However, the results of this study provide valuable insight about the types of pragmatic language disorders in AD patients.

5. CONCLUSION

The present study confirmed previous findings and contributed additional evidence that suggests that unlike healthy aging elderly people, adults with AD suffer from pragmatic language impairment. It revealed a broad spectrum of pragmatic disorders in AD patients, which were classified into 19 categories. It was determined that the demographic characteristics of the patients as well as their reading habits and quantity of communication have an impact on the severity of the pragmatic language disorders.

REFERENCES

- [1] Gürvit Hİ. Demans sendromu, Alzheimer hastalığı ve Alzheimer dışı demanslar. Bahar SZ, Öge EA, editors. Nöroloji. İstanbul: Nobel Tıp Kitabevleri; 2004.p.367-415. (Turkish)
- [2] Bayles K, Tomoeda C. Cognitive-Communication Disorders of Dementia. 1st ed. Oxford: Plural Publishing; 2007.
- [3] McKhann GM, Knopman DS, Chertkow H, Hyman BT, Jack CR Jr, Kawas CH, Klunk WE, Koroshetz WJ, Manly JJ, Mayeux R, Mohs RC, Morris JC, Rossor MN, Scheltens P, Carrillo MC, Thies B, Weintraub S, Phelps CH. The diagnosis of dementia due to AD disease: Recommendations from the National Institute on Aging-AD Association Workgroups on diagnostic guidelines for AD disease. *Alzheimers Dement* 2011;7(3):263-269.
- [4] Koçer B. Demans epidemiyolojisi. *Türk Psikiyatri Dizi*: Demans Dizisi 1999;1(2):41-44. (Turkish)
- [5] Ferri CP, Prince M, Brayne C, Brodaty H, Fratiglioni L, Ganguli M, Hall K, Hasegawa K, Hendrie H, Huang Y, Jorm A, Mathers C, Menezes PR, Rimmer E, Sczufca M, Alzheimer's Disease International. Global prevalence of dementia: a Delphi consensus study. *Lancet* 2005;366(9503):2112-2117.
- [6] Maviş İ, Özbabalık D. Yaşlılıkta nörolojik temelli iletişim sorunları ve dil ve konuşma terapisi. *Sosyal Bilimler Dergisi* 2006;6(1):1-18. (Turkish)
- [7] Weintraub S, Mesulam M. With or without FUS, it is the anatomy that dictates the dementia phenotype. *Brain* 2009;132:2906-2908.
- [8] Wilcock GK, Esiri MM. Plaques, tangles and dementia. A quantitative study. *J Neurol Sci* 1982;56(2-3):343-356.
- [9] Ringman JM, Vinters HV. AD and the frontotemporal dementia syndromes. Coffey CE, Cummings JL, editors. *The American Psychiatric Publishing Textbook of Geriatric Neuropsychiatry*. Arlington: The American Psychiatric Publishing; 2011.p.407-425.
- [10] Braak H, Alafuzoff I, Arzberger T, Kretschmar H, Del Tredici K. Staging of Alzheimer disease-associated neurofibrillary pathology using paraffin sections and immunocytochemistry. *Acta Neuropathologica* 2006;112:389-404.
- [11] Yıldırım E. Alzheimer Hastalığında Sosyal Kognitif Becerilerin Dinlenim Durumu Bağlantısallığı ile İlişkinin İncelenmesi. İstanbul Üniversitesi. Sağlık Bilimleri Enstitüsü, Doktora Tezi. 2018. (Turkish)
- [12] Miller E. Language impairment in Alzheimer type dementia. *Clinical Psychology Review* 1989;9:181-195.
- [13] Locassio JJ, Growdon JH, Corkin S. Cognitive test performance in detecting, staging and tracking Alzheimer's disease. *Arch Neurol* 1995;52(1):1087-1099.
- [14] Grossman M, White-Devine T. Sentence comprehension in AD disease. *Brain and Language* 1998;62:186-201.
- [15] Helmes E, Ostbye T. Beyond memory impairment cognitive changes in Alzheimer's disease. *Arch Clin Neuropsychol* 2002;17:179-193.
- [16] Mesulam MM. Principles of Behavioral and Cognitive Neurology. 2nd ed. New York: Oxford University; 2000.
- [17] Öktem Ö. Alzheimer hastalığının erken, orta ve ileri dönemlerinde genel kognitif profil. Karakaş S, Irkeç C, Yüksel N, editors. *Beyin ve Nöropsikoloji*. Ankara: Çizgi Tıp Yayınevi; 2003.p.101-111. (Turkish)
- [18] Can H, Karakaş S. Bilişsel süreçlerde Alzheimer tipi demansa bağlı değişiklikler. *Klinik Psikiyatri* 2005;8(1):39-41. (Turkish)

- [19] Tonkovich J. Managing long-term communication and memory consequences of dementia. *Neurophysiology and Neurogenic Speech and Language Disorders* 1995;9(5):9-14.
- [20] Martin A. Semantic knowledge in patients with Alzheimer's disease: evidence for degraded representation. Backman L, editor. *Memory functioning in dementia*. Amsterdam: Elsevier Publishers; 1992:p.119-134.
- [21] Fleischman DA, Gabrieli JD. Long term memory in Alzheimer's disease. *Curr Opin Neurobiol* 1999;9:240-244.
- [22] March E, Wales R, Pattison P. Language use in normal ageing and dementia of the AD type. *Clinical Psychologist* 2003;7:300-328.
- [23] Williams VG, Bruce JM, Westervelt HJ, Davis JD, Grace J, Malloy PF, Tremont G. Boston naming performance distinguishes between Lewy body and AD dementias. *Archives of Clinical Neuropsychology* 2007;22:925-931.
- [24] Visch-Brink EG, Hagelstein M, Middelkoop HAM, van der Cammen TMJ. Naming and semantic processing in Alzheimer dementia: A coherent picture. *Brain and Language* 2004;91:11-12.
- [25] Chapman SB, Highley AP, Thompson JL. Discourse in fluent aphasia and Alzheimer's disease: Linguistic and pragmatic considerations. *Journal of Neurolinguistics* 1998;11:55-78.
- [26] March EG, Wales R, Pattison P. The uses of nouns and deixis in discourse production in AD disease. *Journal of Neurolinguistics* 2006;19:311-340.
- [27] Eker E. Alzheimer hastalığı. Uğur M, Balcıoğlu İ, Kocabaşoğlu N, editors. *Türkiye'de Sık Karşılaşılan Psikiyatrik Hastalıklar Sempozyum Dizisi*; 2008 March 6-7; Istanbul, Turkey. 2008. pp.85-110. (Turkish)
- [28] Cuerva AG, Sabe L, Kuzis G, Tiberti C, Dorrego F, Starkstein SE. Theory of mind and pragmatic abilities in dementia. *Neuropsychiatry, Neuropsychology and Behavioural Neurology* 2001;14(3):153-158.
- [29] Amanzio M, Geminiani G, Leotta D, Cappa S. Metaphor comprehension in Alzheimer's disease: Novelty matters. *Brain and Language* 2008;107:1-10.
- [30] Papagno C. Comprehension of metaphors and idioms in patients with Alzheimer's disease: A longitudinal study. *Brain* 2001;124:1450-1460.
- [31] Rassiga C, Lucchelli F, Crippa F, Papago C. Ambiguous idiom comprehension in Alzheimer's disease. *Journal of Clinical and Experimental Neuropsychology* 2009;31:402-411.
- [32] Papagno C, Lucchelli F, Muggia S, Rizzo S. Idiom comprehension in Alzheimer's disease: The role of the central executive. *Brain* 2003;126:2419-2430.
- [33] Leyhe T, Saur R, Eschweiler GW, Milian M. Impairment in proverb interpretation as an executive function deficit in patients with amnesic mild cognitive impairment and early Alzheimer's disease. *Dementia and Geriatric Cognitive Disorders Extra* 2011;1:51-61.
- [34] Chapman SB, Highley AP, Thompson JL. Discourse in fluent aphasia and Alzheimer's disease: Linguistic and pragmatic considerations. *Journal of Neurolinguistics* 1998;11:55-78.
- [35] [35] Mentis M, Briggs-Whittaker J, Gramigna GD. Discourse topic management in senile dementia of the Alzheimer's type. *Journal of Speech and Hearing Research* 1995;38:1054-1066.
- [36] Carlomagno S, Santoro A, Menditti A, Pandolfi M, Marini A. Referential communication in Alzheimer's type dementia. *Cortex* 2005;41(4):520-534.
- [37] Welland RJ, Lubinski R, Higginbotham DJ. Discourse comprehension test performance of elders with dementia of the Alzheimer type. *Journal of Speech, Language, and Hearing Research* 2002;45:1175-1187.

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