

Lexical and grammatical aspect in Mild Cognitive Impairment and Alzheimer's disease

Georgia Roumpea¹, Anastasia Nousia², Stavroula Stavrakaki³,
Grigorios Nasios² & Christina Manouilidou¹

¹University of Ljubljana, ²Technological Educational Institute of Epirus,
³Aristotle University of Thessaloniki
georoubea@gmail.com, sialogo@gmail.com, svoula@itl.auth.gr,
grigoriosnasios@gmail.com, Christina.Manouilidou@ff.uni-lj.si

Abstract

This study aims at investigating the ability of Greek-speaking individuals diagnosed with Alzheimer's disease (AD) and Mild Cognitive Impairment (MCI) to comprehend and produce verbs that vary with respect to their lexical and grammatical aspect. Lexical aspect concerns situation types with different temporal and semantic features, such as activity (*run*), state (*know*), achievement (*break*), semelfactive (*hit*), accomplishment (*build*) verbs (Smith 1997). Grammatical aspect is divided into perfective (*I untied*) and imperfective (*I was untying*) (Comrie 1976). The interaction of lexical and grammatical aspect and how that might be affected by patients' linguistic impairment is also examined.

Keywords: Mild Cognitive Impairment, Alzheimer's disease, lexical aspect, grammatical aspect

1 Introduction

Alzheimer's disease (AD) is the most common type of dementia (Visser et al. 1999) characterized by progressive cognitive impairment. At the begging of the disease, working memory (WM) is impaired (Braaten et al. 2006) and, as a result, patients have memory and learning problems (Visser et al. 1999). Specifically, AD patients have a deficit in the central executive, part of WM, which offers access to long-term memory, coordinates information from different sources and plays a major role in

dual task (two different tasks that individuals have to perform simultaneously) (Baddeley 1996).

As the disease progresses the impairment spreads to other functions, such as executive functions, language, and visuospatial ability. Regarding language impairment, patients have problems in both production and comprehension (Taler & Phillips 2008). Patients' naming abilities are impaired and they have problem recalling and producing single words (Braaten et al. 2006). Both nouns (Whatmough & Chertkow 2002) and verbs (Kim & Thompson 2004; Manouilidou et al. 2009) are impaired in AD. It has been argued that the language impairment in AD is associated with degraded semantic memory, the part of long-term memory which includes language and mental lexicon information (Braaten et al. 2006). Their speech is fluent but without meaning or coherence (Taler & Phillips 2008).

When it comes to MCI, it is defined as the transition stage between normal aging and Alzheimer's disease or some other type of dementia and characterized by loss of cognitive and functional abilities without, however, meeting the dementia criteria (Petersen et al. 2001). MCI patients might progress to AD but this is not absolute, some of them might remain stable (Petersen et al. 2001). With respect to language impairment in MCI, there exists plentiful evidence from standardized assessments (for a review see Taler & Philips 2008) and not much from psycholinguistic studies. MCI individuals are found to be impaired mainly at lexical-semantic level. Specifically, they exhibit impaired semantic priming (Manouilidou et al. 2014), difficulties in processing ambiguous words (Taler & Jarema 2006) and impaired naming and semantic knowledge of objects (Joubert et al. 2010). When it comes to verbal fluency some studies reveal deficits (e.g. Petersen et al. 1999), while others have yielded controversial results (e.g. Albert et al. 2007). With respect to morphological knowledge and syntactical structure there are studies showing that MCI individuals did not differ compared to control group (e.g. De Jager et al. 2003; Manouilidou et al. 2016). However, Manouilidou et al. (2016) point out that while structural knowledge is not affected as such, processing of morphological structure might appear to be impaired as a result of impaired executive functions, which help patients evaluate the necessary information according to the requirements of the specific task.

2 Linguistic Background

2.1 Grammatical aspect

Grammatical aspect is considered to be a functional category (Chomsky 1995, 2000, 2001) which conveys information about time. More specifically, *grammatical aspect* refers to the internal temporal structure of a situation-action, given a specific time (Comrie 1976; Holton et al. 2010), while *tense* indicates “when” a situation-action took place (present, past, future). Considering, for example, the cooking events in the sentences *Yesterday, I was cooking when John broke the window* and *Yesterday, I cooked fries* we observe that even both sentences are in the past tense, as they describe a situation located prior to the moment of speaking, they differ according to how the action pertains to the past (*progressively* vs *non-progressively*, respectively). This internal temporal difference of the sentences relates to grammatical aspect (Comrie 1976). The most important aspectual distinction is between perfective and imperfective: the former presents the situation as a complete event without paying attention to the separate phases making up the situation, while the latter describes the situation as an event with internal structure (Comrie 1976; Smith 1997). The example of the cooking events above refers to the imperfective and perfective aspect respectively. According to the minimalistic program, grammatical aspect helps us understand how a situation took place and contributes to the semantic interpretation of the sentence. As such, grammatical aspect carries interpretable features (Chomsky 1995, 2000, 2001).

Also, grammatical aspect is a subjective category (Moser 2013; Smith 1997), which means that the same situation-action can be presented by both perfective and imperfective aspect. For example, a Greek speaker can use perfective or imperfective to describe a situation according to his point of view. Let’s examine the following sentences *Xθές egó djáva-s-a mésa se mía óra* “Yesterday I read_{past,perfective} within an hour” and *Xθές egó djáva-z-a_{past,imperfective} epí mía óra* “Yesterday I was reading_{past,imperfective} for an hour”. In these sentences the speaker has no choice but to use the past tense in order to refer to the reading event that took place prior to the moment of speaking, but when it comes to grammatical aspect, as we observe, he can use either the perfective or the imperfective if he/she wants to present the situation as a whole event or a progressive situation respectively. Moreover, when a category is derived into different types (perfective and imperfective) one of them is considered as a

marked value and the other as an unmarked (Comrie 1976). In Greek, the perfective is considered to be the marked value as the verb encodes it morphologically (ðjáva-s-a), while the imperfective is the unmarked value due to the lack of morphological or phonological change to the verb stem for its formation (ðjávaz-a). The perfective-imperfective aspectual distinction is marked only in past and future tenses (Comrie 1976; Holton et al. 2010; Moser 2013). Table 1 illustrates the interaction of tense and aspect in Greek.

	Perfective	Imperfective
Present	N.A.	péz-o “I play”
Past	é-peks-a “I played”	é-pez-a “I was playing”
Future	θα péks-o “I will play”	θα péz -o “I will be playing”

Table 1. Interaction of tense and aspect in Greek. Example is from the verb *pezo* “play”, with the imperfective stem *pez-* and the perfective *peks-*

2.2 Lexical aspect

Lexical aspect is a semantic category inherent to the verb (Comrie 1976; Moser 2013; Smith 1997). According to Smith (1997) there are five different verb categories with different semantic and temporal features: activity (*run*), accomplishment (*build*), semelfactive (*hit*), achievement (*break*) and state verbs (*know*).

Activities are processes that involve physical or mental activity and their temporal features are durative, dynamic and atelic. As such, activity verbs describe events which last in time but they do not have a natural end point in which they complete. On the other hand, accomplishment verbs have duration in time and consist of a process with internal stages and an outcome or change of state, which is the completion of the process. Both semelfactive and achievement verbs are dynamic and instantaneous which means that they describe single-stage events without internal structure and duration in time. The difference between them is that the former refers to situations with no outcome but the latter result in a change of state. State verbs refers to situations which are stable. The temporal features of state verbs are static and durative.

According to their temporal features, verbs appear more either in their perfective or imperfective form. For example, according to Moser (2013) state verbs

appear more in the imperfective aspect as they describe a stable in time situation. On the other hand, achievement verbs appear more in their perfective form as more instantaneous. Activity and accomplishment verbs might appear more in the imperfective aspect as verbs with duration. As far as semelfactive verbs are concerned, they might appear more in the perfective aspect as instantaneous verbs without duration. Table 2 summarizes the main features of each verb category.

Lexical aspect	Durative	Dynamic	Instantaneous	Stable	Telic	Atelic	Verb example
activity	+	+	-	-	-	+	trexo “run”
accomplishment	+	+	-	-	+	-	χtizo “build”
semelfactive	-	+	+	-	-	+	χtipao “hit”
state	+	-	-	+	-	-	ksero “know”
achievement	-	+	+	-	+	-	spao “break”

Table 2. Lexical aspect, verb categories and temporal features

3 Background research and predictions for MCI and AD individuals

Grammatical aspect has already been examined in individuals with AD. AD individuals were found to be impaired in aspect both in production and comprehension (Fyndanis et al. 2013). More specifically, Fyndanis et al. (2013) tested 10 Greek-speaking mild AD patients on the functional categories of subject-verb agreement, tense and aspect. Patients participated in a sentence-completion task, grammaticality judgement task, and a sentence-picture matching task. Six (6) healthy Greek-speaking individuals were examined in the same tasks as control group. The results revealed that participants were more impaired in aspect compared to tense and agreement, in both production and grammaticality judgement/comprehension. Also, the imperfective aspect was found to be significantly more impaired than the perfective aspect which is at odds with the suggestion that unmarked values are better preserved than marked values (Lapointe 1985). According to Fyndanis et al. (2013) working memory limitations and impaired semantic memory combined with the high

processing demands of aspect can explain these results. Given that the role of aspect is to provide semantic information about the sentence and that it is considered to be an interpretable feature (Chomsky 2001), its processing involves integration of grammatical and extra-linguistic information (Kok et al. 2007). Also, the authors attribute the better performance on imperfective than perfective on the semantic complexity of the imperfective aspect (concept of continuousness and repetition) which makes it more demanding in processing terms.

Motivated by the unexpected better performance on the imperfective aspect in Fyndanis et al. (2013) study and the assumption that impaired semantic memory affects participants' ability, in this study we examine MCI and AD individuals' ability to produce, name and comprehend verbs which vary with respect to their grammatical but also lexical aspect. The reason we chose to examine lexical aspect is that it is an inherent semantic feature in verbs and might help us further investigate the assumption that semantic memory impairment can affect patients' ability when it comes to grammatical aspect. Also, we examine the interaction between grammatical and lexical aspect and how it can affect AD and MCI individuals' naming and producing ability. For the needs of this study we designed two experimental tasks: picture-naming task and sentence-completion task. Based on the linguistic profile of MCI and AD individuals we assume that semantic and in general cognitive restrictions (Albert et al. 2001; Fyndanis et al. 2013; Manouilidou et al. 2016) might affect patients' performance in both tasks.

In the naming task better performance on achievement (*spao* "break"), semelfactive (*χtipao* "hit") and state (*ksero* "know") verbs is expected, as they are semantically less complex than activity (*trecho* "run") and accomplishment (*χtizo* "build") verbs (internal stages and temporal complexity). Achievement, semelfactive and state verbs describe instantaneous or static events which means that these verbs lack any internal stages and duration so it would be easy for the MCI and AD individuals to recognize and recall them as they will not have to process a lot of information. On the other hand, activity and accomplishment verbs seem to be semantically more complex as they have internal stages and duration in time.

In sentence-completion task we expect that participants will perform the same as the participants at Fyndanis et al. (2013). In particular, semantic memory limitations and executive dysfunction will lead participants to perform better in the perfective aspect than in the imperfective. Also, participants might complete the

perfective aspect in sentences where the imperfective aspect is the grammatically correct form. When it comes to lexical aspect we expect that participants will have difficulty either in giving instantaneous verbs (achievement, semelfactive) a durative meaning or in understanding the temporal complexity of durative verbs (activity, accomplishment, state). Specifically, they will prefer perfective forms of semelfactive and achievement verbs even in sentences where the right form is the imperfective. About activity, state and accomplishment verbs, although these verbs appear mainly in imperfective forms, a better performance on the perfective is expected.

4 Method

4.1 Participants

Four monolingual native speakers of Greek, three diagnosed with MCI and one with mild AD were tested. Also, four healthy participants were tested in the same tasks as the control group. All participants were right-handed, with an average of 74 years. The participants had received an average of 8, 1 years of education¹. Participants were not matched perfectly with regard to sex. The control group consisted of three females and one male, while from the MCI and AD individuals three of them were males and one female.

To collect more information about the cognitive, functional and linguistic profile of the participants, we administered three additional tasks, MoCA², drawing CLOCK³ and Verbal Fluency Phonemic⁴. Specifically, in the MoCA diagnostic test the performance of all participants was below 30, indicating that they had cognitive impairment. With regard to the drawing CLOCK test that examines the executive capabilities, only two patients with mild cognitive impairment scored high. The performance of patients in the Verbal Fluency Phonemic test showed that they have

¹ It remains as a limitation to our study that Patients and Control participants are not matched with regard to sex, age & years of education and could be potentially affecting the results of our study.

² MoCA is a diagnostic tool that examines the decline of cognitive functions (work memory, audiovisual skills, repetition, orientation, etc.). The maximum score that anyone can accumulate is 30 and any score lower than this indicates cognitive impairment.

³ Drawing CLOCK is a test that acts as a diagnostic tool for dementia and Alzheimer's disease and examines patient's executive operations. In this test, patients are asked to draw a clock, then place the numbers in the correct order within it and then indicate a specific time.

⁴ The Verbal Fluency Phonemic test examines the verbal capabilities of patients who are asked to name as many words as they can in a specific time (usually 60 seconds), which must begin with a specific letter, e.g. /t/.

reduced verbal skills. Table 3 provides detailed information on participants' demographics as well as their scores in the neuropsychological tasks.

Finally, four University students with an average age of 25 years were tested before the control group in order to check that the experimental material for normative purposes.

Participants	ID	Gender	Age	Disease	Years of education	MoCA	VERBAL FLUENCY PHONEMIC	CLOCK
Patients								
1	VP	female	70	MCI	6	24	43	15/15
2	ACh	male	73	MCI	12	23	25	15/15
3	GM	male	75	AD	14	16	13	6/15
4	IS	male	77	MCI	6	22	30	8/15
Control Group								
1	EG	female	78	-	9	-	-	-
2	IK	female	71	-	6	-	-	-
3	AK	female	71	-	6	-	-	-
4	AS	male	79	-	6	-	-	-

Table 3. Demographic data, scores on cognitive and language tests, for participants

4.2 Experimental tasks

A picture-naming task and a sentence-completion task were designed to test the ability of MCI and mild AD individuals to comprehend, name and produce verbs that vary with respect to their lexical and grammatical aspect. The same 100 verbs were used in both tasks. These verbs were divided into two lists (List 1 and List 2), each of them contained 50 verbs, 10 per verb category (activity, accomplishment, achievement, semelfactive and state verbs). For the needs of the picture-naming tasks, 100 colored pictures illustrating the actions presented by the verbs were gathered and 100 pairs of sentences were developed for the sentence-completion task. Both pictures and sentences were divided into two groups (A and B) and each group contained verbs from both List 1 and List 2. The verbs used for the experimental tasks were matched⁵ for frequency, number of syllables and number of letters.

⁵ The SPSS software was used for statistical testing and a t-test of independent samples was performed.

4.2.1 Picture-naming task: Design

Online sources were used to gather the pictures for the naming task. 100 colored pictures were used for this naming task, 20 for each verb category (activity, accomplishment, state, semelfactive and achievement). We ensured that the pictures used depicted the task verb as accurately as possible by excluding pictures depicting a lot of people or actions that might draw the attention of participants. Microsoft Power Point was used to organize and present each picture separately to the participants.

4.2.2 Sentence-completion task: Design

The sentence completion task included 100 source sentences (SS)/target sentence (TS) pairs: 50 tested perfective aspect and 50 imperfective aspect. More specifically, for each verb category (activity, state, achievement, semelfactive and accomplishment) 20 pairs of sentences were designed, 10 tested the perfective aspect and 10 the imperfective. The SS and the TS were presented simultaneously to the participants. The verb was missing from the TS as the participants had to complete it in the right form of grammatical aspect. The SS differed from the TS only to the point that it was necessary to trigger the production of the target verb forms. Only past and future tenses were used for the sentences as in Greek we can equally use perfective and imperfective with present tenses, for example *Tóra élisa* “Now I solved” and *Tóra lino* “Now I solve”. The (1) and (2) are examples of perfective and imperfective aspect, respectively.

- (1) SS: Avrio, i Maria tha trayuðai oli mera.
 “Tomorrow, Maria will sing _{3rd imperfective} all day”.
 TS: Avrio, i Maria tha trayuðisi mono ena trayuði.
 “Tomorrow, Maria will sing _{3rd perfective} only one song”
- (2) SS: Xθés, to pedí ðjávase mésa se mía óra.
 “Yesterday, the child studied within an hour.”
 TS: Xθés, to pedí ðjávaze epí mía óra.
 “Yesterday, the child was studying for an hour.”

4.3 Procedure

The sentence-completion task and the picture-naming task were completed in one session, within a day. For all participants the picture-naming task was administered first and the sentence-completion task second. Also, we have to note that 3 participants (2 MCI and 1 AD) were examined at Group A and 1 MCI at Group B. The software Microsoft Office and specifically Power Point was used in order to present the experimental tasks to participants. Each picture and each pair of sentences (SS and TS) were presented separately to the participants. Also, instructions of how to complete the experimental tasks and example of pictures and sentences were given to the participants at the beginning of the experimental procedure. At the picture-naming task, participants had to name the verb which described the illustrated event, while at the sentence-completion task participants had to complete the right form of the missing verb, perfective or imperfective aspect of past and future tenses. Both tasks were offline which means that participants had as much time as they wanted in order to complete the experimental procedure. Finally, since there were two different groups (MCI and AD), the total duration of the two tasks differed, but not significantly. It took 15-20 minutes for the MCI to complete the experimental tasks and 20-25 minutes for the AD.

4.4 Results

In order to analyze the results of both picture-naming and sentence-completion task, we used SPSS. Specifically, all statistical comparisons were done by performing Fisher's exact test. In all comparisons, participants' responses were treated as dependent variables while, the groups (MCI, AD, controls), the verb categories in lexical aspect (activity, accomplishment, semelfactive, state, achievement) and the type of grammatical aspect (perfective, imperfective) were treated as independent.

4.4.1 Picture-naming task

Pictures that control group did not recognize were excluded from the analysis (totally from both Group A and B 9 pictures were excluded from the analysis, from which 4 depicted state verbs, 4 depicted achievement verbs and 1 depicted a semelfactive verb) in order to make sure that patients' right or wrong answer was based only on their knowledge and was not affected by any distraction of the picture. Also, when a mild AD or MCI participant named a picture using a tense other than the present or

different person from the 1st single (e.g. spáo “I break” → spáme “We break”), we considered that answer correct. In picture-naming task we scored the ability of recalling and producing verbs and not the categories of agreement and tense. As there was no statistical difference between the performance of MCI and mild AD participants (only the performance of participants P2 and P3 was statistical different, $p=.027$), we decided to move on an overall review of the results. Overall, MCI and mild AD participants performed statistically worse than control group ($p=.000$) with only 63% correct responses compared to 100%. Focusing on patients’ performance, when it comes to individual verb categories, Fisher’s exact test showed that achievement and state verbs (50% right answers and 44% right answers, respectively) were significantly more impaired than activity ($p=.023$ and $p=.028$, respectively) and accomplishment ($p=.011$, $p=.003$, respectively) (78% right answers in activity and 80% right answers in accomplishment) which were better preserved. Semelfactive verbs (57% right answers) differ statistically ($p=.048$) only with accomplishment verbs. Group and individual results of the picture-naming task are given in Table 4.

Participants	State	Accomplishment	Activity	Achievement	Semelfactive
P1, MCI	3/8	10/10	7/10	4/7	5/9
P2, MCI	5/8	8/10	9/10	4/7	7/9
P3, mild AD	1/8	7/10	6/10	4/7	4/9
P4, MCI	5/8	7/10	9/10	3/9	5/10
Total answers	14/32	32/40	31/40	15/30	21/37

Table 4. Raw accuracy scores in picture-naming task

Regarding the nature of the participants’ wrong answers, the majority of them had to do with answers irrelevant to the target verb. Also, there were some cases in which participants used a phrase (e.g. kolibáo → káni bánjo “swim → takes a swim) to name the verb, thus we guessed that they recognized the action but they were not able to recall the corresponding verb. Semantic paraphasias were the most common mistake in participants’ answers. In those cases participants used a semantically close word to name the target verb (e.g. ðagóno → tróo).

4.4.2 Sentence-completion task

When a mild AD or MCI participant completed a sentence using a different tense or person from the target (e.g. *éspase* “He broke” → *spásame* “We broke”), we considered that answer correct. Our target was to examine the ability of the participants to produce the right type of grammatical aspect (perfective and imperfective) and not their ability to complete tense or agreement. As there was no statistical difference between the performance of MCI and mild AD participants (only P2 performed statistically differently from P3 and P4, $p=.000$ and $p=.016$ respectively), we moved on an overall review of the results. Participants’ performance was better than in the picture-naming test (83, 5% correct answers) but still statistically different ($p=.000$) from the control group (100% right answers). Analysis revealed no significant preponderance of perfective (82% right answers) over imperfective (85% right answers) aspect ($p=.704$). The same performance (85% right answers) in each verb category was observed by the analysis, with the exception of semelfactive verbs in which participants performed lower (77, 5% right answers). However, this difference did not reach significance ($p=.568$). The participants’ total answers were used for the statistic comparisons. Group and individual results of the sentence-completion task are given in Table 5.

Participants	Perfective	Imperfective	State	Activity	Accomplishment	Achievement	Semelfactive
P1, MCI	23/25	20/25	5/10	8/10	9/10	9/10	7/10
P2, MCI	24/25	25/25	9/10	10/10	10/10	10/10	10/10
P3, mild AD	16/25	18/25	7/10	7/10	7/10	8/10	6/10
P4, MCI	19/25	22/25	9/10	9/10	8/10	7/10	8/10
Total answers	82/100	85/100	34/40	34/40	34/40	34/40	31/40

Table 5. Raw accuracy scores in sentence completion task

Finally, we examined participants’ answers in each verb category. The results revealed that the category in which a verb belongs did not affect the participants’ preference regarding perfective or imperfective aspect. Table 6 presents group results in each verb and aspect category. Also the statistical comparisons are given.

Verb Category	Perfective Aspect	Imperfective Aspect
Semelfactive	16/20	15/20
State	15/20	19/20
Activity	16/20	18/20
Achievement	17/20	17/20
Accomplishment	18/20	16/20

Table 6. Group results in verb categories and aspect

5 Discussion

Results revealed that patients performed statistically worse than control group in both tasks. More specifically, the results of both picture-naming and sentence-completion task show that AD and MCI individuals have problems, naming and producing verbs that vary with respect to their lexical and grammatical aspect. These results are in line with previous studies which revealed that MCI and AD individuals have problems recalling or producing verbs due to executive dysfunction and semantic memory limitations (Adlam et al. 2006; Fyndanis et al. 2013; Taler & Phillips 2008). Furthermore, the results are consistent with Kim & Thompson (2004) who suggested that verbs are equally impaired with nouns in AD.

In picture-naming task, we examined participants' ability to recall and name verbs. Also, one of our goals was to examine how lexical aspect (different verb categories which vary with respect to their temporal features) will affect participants' naming-ability. Patients performed statistically worse than control group (63% correct answers compared to 100% right answers), thus their naming ability seems to be impaired. Our prediction that lexical aspect will affect patients' performance and lead them to perform better on achievement, semelfactive and state verbs than on activity and accomplishments was partially confirmed by the results. Activity and accomplishment verbs revealed to be statistically better preserved than the other three categories (78% and 80% right answers respectively). This unexpected performance might show that lexical aspect can affect patients' ability to process and recall verbs. This assumption is based on the fact that participants performed the same in verb categories which share the same temporal features. Activity and accomplishment are durative verbs that last in time, while semelfactive, achievement and state are verbs

which are instantaneous or stable. According to this, MCI and AD participants might tend to prefer verbs with duration.

In sentence-completion task, we examined the ability of patients to produce the right type of grammatical aspect (perfective and imperfective). Moreover, this task would reveal the interaction between grammatical and lexical aspect. Patients were expected to show a preference for the perfective form of semelfactive and achievement verbs even in sentences where the right form is the imperfective. About activity, state and accomplishment verbs, although these verbs appear mainly in imperfective forms, a better performance on the perfective was expected. Participants' performance was statistically lower than control group (83% compared to 100% right answers). These results are in line with Fyndanis et al. (2013) where AD patients were found to be impaired when it comes to production and comprehension of grammatical aspect. The prediction of better performance on the perfective aspect than imperfective was not confirmed from the data. No significant preponderance of perfective over imperfective came out from the results (82% and 85% right answers, respectively), thus lexical aspect does not seem to affect participants' choice between the two types of grammatical aspect. More specifically, participants performed the same in each verb category (activity, accomplishment, semelfactive, state and achievement) without showing more preference to perfective than imperfective.

Based on the linguistic profile of MCI and AD patients and the results of the cognitive and language tests (MoCA, Verbal Fluency Phonemic and drawing Clock) in which participants took part for the needs of this research, we could assume that participants' low performance in both tasks can be explained by executive dysfunction and impaired verbal skills. In picture-naming task, executive limitation might cause difficulty in processing the pictures and recalling the target-verb. As far as the sentence-completion task is concerned, grammatical aspect carries interpretable features (Chomsky 2000, 2001) and as such it demands processing of linguistic and extra-linguistic information in order to produce and comprehend it. This high-demanding procedure (multi-tasking, tasks that individuals are required to perform simultaneously) is difficult for individuals with impaired cognitive and executive skills like AD and MCI.

At this point we have to note that lack of difference in the performance of MCI and AD patients in both tasks might show that MCI is equally impaired as mild AD when it comes to processing grammatical and lexical aspect. However, in this

research we examined a small group of MCI and AD patients. It is possible that a larger group of participants might bring into light differences in the performance of the two groups. This investigation is currently in preparation (Roumpea et al. 2019). Finally, the fact that in sentence-completion task no difference among verb categories was observed could reflect a task effect given that the picture-naming task yielded significant differences. It seems that the naming task is more demanding and thus, differences among verb categories surface.

6 Conclusion

This study provides evidence about the ability of AD and MCI individuals to name, produce and comprehend verbs that vary with respect to their lexical and grammatical aspect. While previous study revealed that AD patients preferred perfective instead of imperfective aspect (Fyndanis et al. 2013) the interaction of lexical and grammatical aspect has not been investigated. Motivated by that, we decided to examine how lexical and grammatical aspect interact and affect AD and MCI individuals' performance. The results revealed that lexical aspect might affect the naming-ability of AD and MCI individuals. However, lexical aspect did not seem to affect their ability when it comes to grammatical aspect. Cognitive impairment and executive dysfunction might explain the low performance in both picture-naming task and sentence-completion task. Also, semantic memory impairment might affect participants' performance, but in this study participants were not examined in semantic tasks before the experimental tasks, thus we cannot be sure about this assumption. In sum, this was the first attempt to investigate how lexical aspect affects the naming ability of AD and MCI individuals and its interaction with grammatical aspect. Further research is required with a bigger number of participants for more accurate conclusions (see Roumpea et al. 2019).

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