EasyChair Preprint

№ 6507

Assessing Verb-Argument Structure and Syntactic Complexity in Aphasia with the Italian Version of the Northwestern Assessment of Verbs and Sentences (NAVS-I)

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August 31, 2021

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Introduction

Verb production in agrammatic aphasia is more impaired for verbs with complex (vs. simple) verb-argument structure (VAS, [1]). Namely, verbs requiring 2 or 3 arguments are more difficult to produce than 1-argument verbs, and optionally transitive verbs may be more difficult to produce than 1-argument verbs [2]. In agrammatism, production of non-canonical sentences with Object-Verb-Subject (OVS) order is also more impaired than that of canonical (SVO) sentences [1]. Building on these findings, the Northwestern Assessment of Verbs and Sentences (NAVS, [3]) was developed to evaluate verb and sentence production and comprehension in aphasia. Results from English and German participants with aphasia show that the NAVS is able to capture effects of VAS and syntactic complexity in both agrammatic participants [1] and individuals with mild (residual) forms of aphasia [4].

Methods

Forty-four healthy participants (age range: 41-84) and 28 participants with aphasia (age range: 30-84) took part in the study. Sixteen were diagnosed with fluent aphasia (Wernicke's, Conduction, or residual) and 12 with non-fluent (Broca's) aphasia, based on language assessment ([5-6]).
All participants were administered a paper-and-pencil form of the Italian version of the NAVS (NAVS-I, [7]), which was adapted from the original NAVS [1] (Table 1).

Results

All but two participants with aphasia were significantly impaired (vs. healthy) on one or more subtests of NAVS-I, based on Crawford's statistic procedure.
Mixed-effects regressions showed, for the nonfluent group, better production of 1- (vs. 2-) argument verbs on the VNT, and no effects of VAS complexity on the ASPT. For the fluent group, verb production was more impaired for 3- (vs. both 1- and 2-) argument verbs on the VNT, although such differences disappeared when verb frequency and imageability were introduced as covariates, and on the ASPT. No effect of argument optionality was found.
Both fluent and nonfluent groups showed better production and comprehension of canonical (vs. non-canonical) sentences. In production (SPPT), the canonical advantage was greater

for longer than shorter sentences (Fig. 1a) for nonfluent participants, and for people with lesser (vs. greater) aphasia severity (as measured by the Token Test [8], Fig.1b) in the fluent group. On the SCT, comprehension of object-relative sentences was significantly more impaired than that of subject-relative sentences in nonfluent, but not fluent, participants.

Conclusions

Results indicate that verb production – in both nonfluent and fluent aphasia - is affected by VAS complexity, in line with previous studies [3-4, 9]. Contrary to some findings [2-3] and in line with data obtained from healthy participants [7], argument optionality did not influence verb production in either group, suggesting that with respect to Italian participants optionally-transitive verbs are not stored with two VAS representations in the lexicon.

Syntactic complexity, both in terms of NP-movement (passives) and Wh-movement (object clefts, object relatives), affected sentence production and comprehension in both nonfluent and fluent aphasia. However, while a canonical advantage in production was found in all nonfluent participants independently of aphasia severity, this only emerges in mild (residual) forms of fluent aphasia (see [4]), i.e., when lexical retrieval is relatively spared.

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Acknowledgments

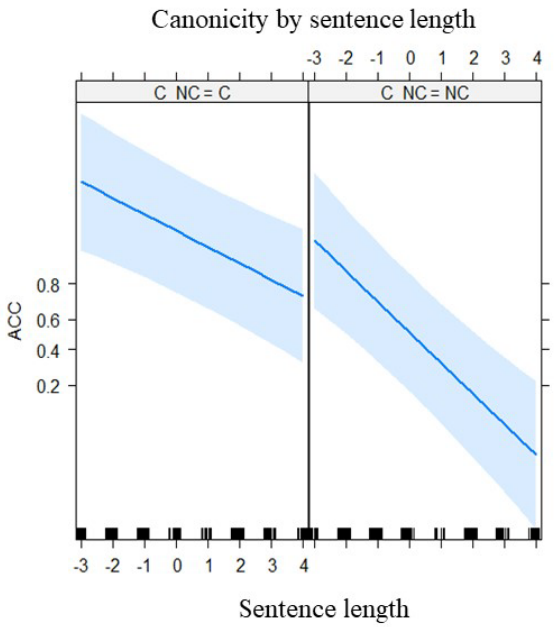
The study was funded by the NIH R01DC01948 grant awarded to Cynthia K. Thompson.

Table 1. Subtests and materials included in the NAVS-I.

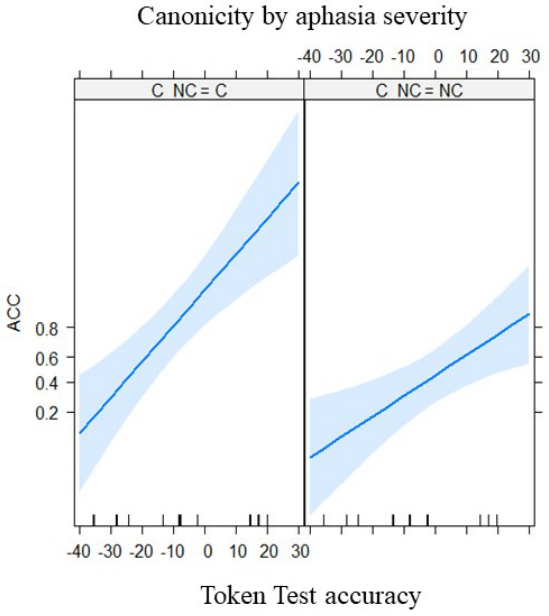
				Verb Naming Test (VNT)	Verb Comprehension Test (VCT)	Argument Structure Production Test (ASPT)
argument number	verb type	example	translation	# items	# items	# items
1	1-arg	abbaiare	bark	5	5	5
2	2-arg (op)	guidare	drive	5	5	10
	2-arg (ob)	tagliare	cut	5	5	5
3	3-arg (op)	consegnare	deliver	5	5	10
	3-arg (ob)	dare	give	2	2	2

				Sentence Production Priming Test (SPPT)	Sentence Comprehension Test (SCT)
word order	sentence type	example	translation	# items	# items
canonical	active	Il cane sta inseguendo il gatto	The dog is chasing the cat	5	5
	subject cleft	E' il cane che sta inseguendo il gatto	It is the dog who is chasing the cat	5	5
	subject relative	Pietro vede il cane che sta inseguendo il gatto	Pete sees the dog who is chasing the cat	5	5
noncanonical	passive	Il gatto e' inseguito dal cane	The cat is chased by the dog	5	5
	object cleft	E' il gatto che il cane sta inseguendo	It is the cat who the dog is chasing	5	5
	object relative	Pietro vede il cane che il gatto sta inseguendo	Pete sees the dog who the cat is chasing	5	5

Figure 1. Interactions between canonicity and sentence length (a) and canonicity and aphasia severity (b) found in the nonfluent (a) and fluent (b) patient groups, respectively.



a)



b)