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ASSESSING VERBAL FLUENCY IN GREEK SIGN LANGUAGE

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ABSTRACT

The aim of our study is to develop a fluency task for Greek Sign Language (GSL), by which the fluency of adult Deaf signers can be measured. Following the standard methodology, the GSL fluency task used both semantic and phonemic categories. The task was administered to a pilot sample of five participants. We compared performances on the GSL fluency task with those on British Sign Language and oral Greek fluency tasks and found expected results on the basis of previous research. We conclude that the GSL fluency task can be successfully used to assess the performance of GSL users.

Keywords: Semantic fluency; Phonological fluency; Greek Sign Language

1. Introduction

Greek Sign Language (GSL) is the natural language of the Deaf¹ community in Greece. In 2000 it was recognized by Greek Legislation (2817/2000) as the official language of deaf and hard-of-hearing pupils in the Hellenic State (Ministry of National Education and Religion & Pedagogic Institute, 2004). It constitutes a fully-fledged and autonomous linguistic system with its own vocabulary, syntax, morphology and grammatical forms, just like any other known spoken language (Sandler, 2003). At the same time it shares the common features of sign languages across the world, by being organized grammatically in space in a three-dimension manner (Stokoe, 1972; Stokoe and Kuschel, 1978).

It is estimated that GSL is currently used by 12,000 children and 30,000 adults throughout Greece; however, precise quantitative data of this kind is difficult to collate due to lack of up-to-date archives. According to studies conducted at the Gallaudet University cited in the Ethnologue (2002), GSL is not derived from the oral Greek language, but rather has its origins in American and French Sign Languages and various indigenous sign languages. It should be noted that sign languages spring up wherever there are Deaf communities (Klima and Bellugi, 1988) passing them down from one generation to another. In this sense, they are culture-dependent to a greater degree than spoken languages (Emmorey, 2002; Kourbetis, 1999) and for that reason there is a heterogeneous language background among members of Deaf communities leading to a widespread variation in signing proficiency (Hauser, Paludneviene, Supalla and Bavelier, 2006).

¹ Here and throughout we adopt the established convention of signaling with a capital D those persons with hearing impairments who are members of the Deaf community and use Sign Language in their everyday communication.

While sign languages are structured languages as the oral ones, they employ a different modality than oral languages in order to be transmitted. Therefore, there are significant differences between oral and sign languages. Consequently, to assess the performance in a sign language special assessment materials need to be developed. Notably, only a few studies have been carried out in this domain (Herman, Holmes & Woll, 1999; Herman et al., in press).

1.1 Fluency tasks in oral and sign languages

In oral verbal fluency tasks, individuals are given a limited amount of time, generally one minute, in which to produce as many items as they can within a particular category, and categories can be either semantic (e.g. “animals”) or phonological (“words beginning with ‘f’”) (Reitan and Wolfson, 1994; Lezak, 1995; Phillips, 1997). Verbal fluency tasks tap a wide range of cognitive processes, including semantic memory, language and executive functions. Consequently, they have been widely used for neuropsychological assessment and diagnosis, particularly after incidents of neurological damage (Parker and Crawford, 1992; Peña-Casanova et al., 2009). Notably, there has been a lot of research in order to develop norms appropriate for different languages, such as Greek (Kosmidis, Vlahou, Panagiotaki and Kiosseoglou, 2004), Spanish (Acevedo et al., 2000; Benito-Cuadrado et al., 2002; Peña-Casanova et al. 2009), and Hindi (Ratcliff et al., 1998). Moreover, in the literature there has been a lot of debate as to what determines how productive, or “fluent”, an individual is. Most studies suggest that factors predictive of greater fluency are the employment of categorization strategies, widely known as *clustering*, and the shifting from one subcategory to another when the time between responses lengthens (*switching*) (Raskin et al., 1992; Troyer et al., 1997; Abwender et al., 2001 among others).

With respect to the fluency assessment in sign languages, to the best of our knowledge, the only language to have been studied so far is *British Sign Language* (BSL; Marshall et al, to appear; Marshall, Rowley & Atkinson, submitted). Marshall and her colleagues (to appear; submitted) used two semantic categories, “animals” and “foods”, and found that Deaf children and Deaf adults produced responses that were comparable in all important ways – for example, total number of items produced, types of clusters, a slowing down of response rate during the course of the minute, most frequent responses – to those reported for spoken language fluency tasks.

Marshall et al.’s phonological fluency task used six categories that took into account the phonological structure of BSL, which, like all sign languages, can be divided into features “handshape”, “location” and “movement” (Marshall et al., submitted). Three were handshape categories, two were locations, and one was a movement category. Overall Deaf adults found this task quite difficult, with fewer responses than are typically reported for phonological fluency tasks in spoken languages. Marshall et al. speculated that this might be due to lower metaphonological awareness in signers, arising from sign languages not having an orthographic form.

2. The present study

The present study pilots a verbal fluency task for GSL which adapts Kosmidis et al.’s (2004) semantic categories for Greek and Marshall et al.’s (submitted) phonological categories for BSL. The aim is to compare performance to (oral) Greek and to BSL, in order to understand the types of responses produced by signers of GSL. The ultimate aim is to produce a task that can be used as part of a battery of tasks to assess GSL proficiency in a range of individuals, including deaf children.

2.1 Methods

2.1.1 Participants

For the needs of our study we contacted Associations of the Deaf in Thessaloniki and three schools of GSL situated in the same city in order to recruit informants. Data for the pilot study were collected from 5 participants (3 male; aged 24-36 & 2 female; aged 20-23, mean age=28). GSL, as any other sign language, has regional variation, especially in the field of vocabulary, and thus we intentionally selected participants from the northern part of Greece (cf. Marshall et al., to appear).

In order to collect demographic information on the participants we used a questionnaire, that included questions concerning sex, age, educational level, time of hearing loss and GSL acquisition, interaction with Deaf people and the use of GSL in everyday communication (see Appendix). All the

participants but one fulfilled the standard criteria for informant selection, that is, deafness at birth (or pre-lingual deafness), daily exposure to sign language, normal IQ abilities, full integration into the Deaf culture and following the standard procedure informed consent was received from each participant (Stokoe, 1972). Consider Table 1 for detailed information on signers' profile.

	Sex	Age	Hearing loss age	Level of education	Context of GSL acquisition
1	f	23	Birth	Technological Educational Institute degree	school teacher
2	f	20	Birth	University student	parents
3	m	36	1-12 months	High School	schoolmates
4	m	36	7 years	University degree	schoolmates
5	m	24	Birth	University student	schoolmates

Table 1 Demographic data

Participant 2 is a native signer who acquired GSL from Deaf parents. All the rest have daily exposure to the language using it as their preferred one. They are members of the Deaf community and acknowledged as competent signers (for criteria setting, see Stokoe, 1972; cf. Sapountzaki, 2005). They range in age from twenty to thirty six years. Four of them are pre-lingual deaf and one of them is a post-lingual deaf (participant 4), who nevertheless meets the criteria of exposure to GSL set previously.

2.1.2 Materials and procedure

2.1.2.1 Semantic fluency task

Participants were asked to generate as many words as possible for three semantic categories: animals, fruits and objects, which are the three categories used by Kosmidis et al. (2004) for oral Greek. They were allowed sixty seconds for each category. All signers received specific instructions in GSL by a Deaf person who collaborated with the first author of this study for the data collection. The signers were instructed by the Deaf person to sign all the names of animals/ fruits/objects that came into their mind. No examples were given at any time. The whole procedure was videotaped to allow for later transcription of the responses.

2.1.2.2 Phonological fluency task

For the phonological part of the task three handshapes were selected:

1. "Δ": the fist with the forefinger extended
2. "5": open hand
3. "Φ": thumb and forefinger together with the three remaining fingers extended



Figure 1 "Δ" handshape



Figure 2 "5" handshape



Figure 3 "Φ" handshape

The handshapes were selected based on their relative frequency in signs listed in the digital GSL dictionary *NOIMA* (ILSP, 2001). Specifically, the “Δ” handshape is used more frequently in the signs presented in the dictionary (i.e. 121 signs); “5” handshape is used in half of the tokens (i.e. 52 signs) and “Φ” corresponds to the ¾ of the sign words using the second handshape (i.e. 36 signs). As for the semantic categories, for each handshape participants were allowed sixty seconds. Again the instructions were delivered by the same Deaf person who showed them the specified handshape and asked them to tell him as many signs they could think of that use that handshape. No examples were given at any time and the whole procedure was filmed.

2.1.3 Analysis of the data

Responses were glossed with the equivalent Greek word and scored as either correct or incorrect. Repetitions and nonexistent signs counted as errors. Responses were assigned semantic clusters based on the subcategories that emerged from the data, that is both thematic (e.g. *pets, wild animals*) and taxonomic (e.g. *birds, mammals*) (Kosmidis et al., 2004; cf. Marshall et al., to appear, Marshall et al., submitted). Following Marshall and collaborators, we considered clusters as two or more adjacent responses from the same subcategory. Switches between clusters, or between items that did not form clusters were also calculated.

3. Results

In this section information is given on the numbers of responses to each category, the categorization of the clustering and the most frequent answers in all categories.

Table 2 shows the number of correct items produced by each participant in each category.

	Animals	Fruits	Objects	“Δ”	“5”	“Φ”
1	16	10	21	7	6	8
2	29	17	28	21	16	21
3	25	14	33	29	24	17
4	17	9	22	16	14	14
5	15	7	17	13	12	10
Mean	20.4	11.4	24.2	14.4	17.2	14

Table 2 Fluency data

Fluency for the semantic categories of animals and objects is higher than for the rest of the categories tested. Surprisingly this is not the case for the semantic category of fruits, which yielded the fewest responses compared to the total of the categories tested (semantic or phonological).

Coding semantic clustering in semantic and phonological categories in one participant’s responses is presented in table 3 and 4.

“5”		
Sign Gloss	Switches	Cluster type
TO MAKE AN INSULTING GESTURE		GAMES
BALL		
BASKETBALL		
HANDBALL		
CHILD	*	
BATHE	*	TO CLEAN ONESELF
TOWEL		
SLAP	*	TO USE VIOLENCE
HIT ON THE HEAD		
BEAT		
ATTACK		
FLIRT	*	
GRAB	*	
CONGRATULATIONS	*	

Table 3 Semantic clustering: phonological fluency

“ANIMALS”		
Sign Gloss	Switches	Cluster type
DOG		FARM ANIMALS
CHICKEN		
CAT		
HORSE		
COW		
PIG		
BEAR	*	FOREST ANIMALS
FOX		
WOLF		
BULL	*	FARM ANIMALS
SHEEP		
GOAT		
DEER	*	FOREST ANIMALS
SNAKE		
MOUSE	*	
BIRD	*	BIRDS
PARROT		

Table 4 Semantic clustering: semantic fluency

Most frequent responses and the number of their occurrence are shown in table 5.

“Φ”		“5”		“Δ”	
Sign Gloss	N	Sign Gloss	N	Sign Gloss	N
PERFECT	5	5	4	I/ YOU	8
WHERE	4	TREE	3	UP	3
EXACTLY	3	SLAP	3	TEASE	3
BUTTONS	2	BEAT	3	DOWN	2
FRANCE	2	MAKE AN INSULTING GESTURE	3	THERE	2
MOSQUITO	2			SOMETIMES	2
REACH	2			MUST	2
GOLD	2				
Animals		Fruits		Objects	
Sign Gloss	N	Sign Gloss	N	Sign Gloss	N
SNAKE	5	CHERRY	5	TV	5
DOG	4	APPLE	5	TABLE	4
GIRAFFE	4	BANANA	5	CHAIR	4
MOUSE	4	GRAPE	5	DVD	3
HORSE	3	PEAR	4	CURTAIN	3
BEAR	3	WATERMELON	4	BOARD	3
CAT	3	MELON	4	CLOCK	3
PIG	3	APRICOT	4	MIRROR	2
DOLPHIN	3	STRAWBERRY	4	CAMERA	2
SHARK	3	PINEAPPLE	3	PENCIL	2
GOAT	3	FIG	3	FORK	2
CHICKEN	3	ORANGE	3	PLATE	2
BIRD	3			PAPER	2
SHEEP	3				

Table 5 Most frequent responses

4. Discussion

Our results indicate that there are both similarities and differences between Deaf adult signers’ performance on the semantic and phonological fluency tasks and the performance reported in the literature for hearing individuals on analogous tasks. Specifically, we found the following similarities

to spoken languages: a larger number of responses for semantic than for phonological categories, and semantic clustering for both semantic and phonological categories (cf. Marshall et al., to appear). Since the participants of our study group do not show a wide range of age and educational level, it is quite difficult to match them with studies mentioned in the literature and more specifically with the one conducted in the hearing Greek population by Kosmidis et al. (2004). Comparing our results with that of BSL analyzed by Marshall et al. (to appear) is also complex, since the two sign language systems have dissociations in the way they encode their vocabulary, namely the use of finger-spelling. In addition to that, in the phonological part of the BSL fluency task a range of phonological categories was selected (i.e. handshape, location and movement), which concluded in different mapping of the participants responses (according to Marshall et al., phonological fluency in signed languages may be very dependent upon the particular category chosen).

In any case, it seems that Greek signers showed a comparable performance on both the semantic and phonological task to that of their hearing counterparts: a mean of 18.50 for correct responses as far as the category “animals” is concerned in spoken Greek (Kosmidis et al., 2004), whereas in GSL the mean is 20.4. Spoken Greek phonological fluency is in the region of 10-13 words (Kosmidis et al., 2004), lower than the mean of 15.2 which appears in the data of our study. In sum, our pilot investigation showed that semantic and phonological fluency tasks appear to be feasible in GSL. The participants understood the instructions, produced a set of relevant responses, and produced responses that were expected on the basis of previous work in Greek and BSL. It would therefore be worth testing the categories further with a larger number of neurotypical adult participants, and then with children and adults with neurological damage. With more data, subtle cross-linguistic differences between GSL and Greek and GSL and BSL might emerge, allowing insight into those aspects of fluency that are modality-specific, those that are modality-independent, and those that are language-specific. Given the paucity of cross-linguistic comparisons of sign languages, the fact that this task is quick and easy to administer and score might make it a prime candidate for comparisons across different sign languages.

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Appendix

ΕΡΩΤΗΜΑΤΟΛΟΓΙΟ

A. Προσωπικά στοιχεία

Όνοματεπώνυμο:
 Ηλικία:
 Φύλο: Γυναίκα Άνδρας
 Τηλέφωνο επικοινωνίας:

B. Απώλεια ακοής

α. πότε έχασα την ακοή μου;
 1. εκ γενετής
 2. από 1 έως 12 μηνών
 3. από 1 χρόνου έως 6 χρονών
 Προσδιορίστε ακριβή ηλικία:
 4. από 6 χρονών και πάνω
 Προσδιορίστε ακριβή ηλικία:

β. αιτία απώλειας ακοής
 1. κληρονομικότητα
 2. μηνιγγίτιδα
 3. άλλη ασθένεια
 Προσδιορίστε:
 4. άλλο
 Προσδιορίστε:

γ. Είμαι Κωφόσ/η Βαρήκοσ/η
 Ακριβές ποσοστό απώλειας ακοής (βάσει ακουσγράμματος)
 1. αριστερό αυτί% 2. δεξί αυτί:%

Γ. Εκπαίδευση

Εχω φοιτήσει σε:
 Δημοτικό Σχολείο Κωφών
 Βαρηκώων
 Γενικής φοίτησης
 Προσδιορίστε τάξη και τόπο σχολείου:

Γυμνάσιο Κωφών
 Βαρηκώων
 Γενικής φοίτησης
 Προσδιορίστε τάξη και τόπο σχολείου:

Λύκειο Κωφών
 Βαρηκώων
 Γενικής φοίτησης
 Προσδιορίστε τάξη και τόπο σχολείου:

T.E.I. A.E.I.
 Προσδιορίστε έτος ή τίτλο σπουδών:

Μεταπτυχιακές σπουδές Α΄ κύκλου Β΄ κύκλου
 Προσδιορίστε έτος ή τίτλο σπουδών:

Δ. Ελληνική Νοηματική Γλώσσα

Ηλικία κατάκτησης
 Πώς την κατέκτησα
 1. γονείς
 2. συγγενής Κωφόσ/η
 Προσδιορίστε:
 3. επαφές με συμμαθητές στο σχολείο
 4. διδασκαλία από ειδικό δάσκαλο στο σχολείο

Γνωρίζω την Ελληνική Νοηματική Γλώσσα

1. Τέλεια
 2. Πολύ καλά
 3. Καλά
 4. Σχετικά καλά
 5. Καθόλου

Χρησιμοποίησα την ΕΝΓ Πού χρησιμοποίησα την ΕΝΓ
 1. συνέχεια 1. εργασία
 2. αρκετές φορές 2. σχολείο
 3. μερικές φορές 3. οικογένεια
 4. καθόλου 4. φιλική παρέα

Ε. Ελληνική γραπτή γλώσσα

Ηλικία εκμάθησης
 Πώς την έμαθα
 1. γονείς
 2. συγγενής ακούων/ουσα
 Προσδιορίστε:
 3. διδασκαλία στο σχολείο

Ο δάσκαλος που μου δίδαξε τη νελληνική γλώσσα
 1. γνώριζε και χρησιμοποιούσε αποκλειστικά την ΕΝΓ
 2. γνώριζε και χρησιμοποιούσε αρκετά την ΕΝΓ
 3. γνώριζε και χρησιμοποιούσε σε μικρό βαθμό την ΕΝΓ
 4. δε γνώριζε και δε χρησιμοποιούσε καθόλου την ΕΝΓ

Γνωρίζω την ελληνική γλώσσα

1. Τέλεια
 2. Πολύ καλά
 3. Καλά
 4. Σχετικά καλά
 5. Καθόλου

Χρησιμοποίησα την ελληνική γλώσσα Πού χρησιμοποίησα την ελληνική γλώσσα
 1. συνέχεια 1. εργασία
 2. αρκετές φορές 2. σχολείο
 3. λίγες φορές 3. οικογένεια
 4. καθόλου 4. φιλική παρέα