

Morphosyntactic and syntactic production in Greek-speaking agrammatic aphasia: None of the existing theories can fully account for the patterns of performance

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Introduction

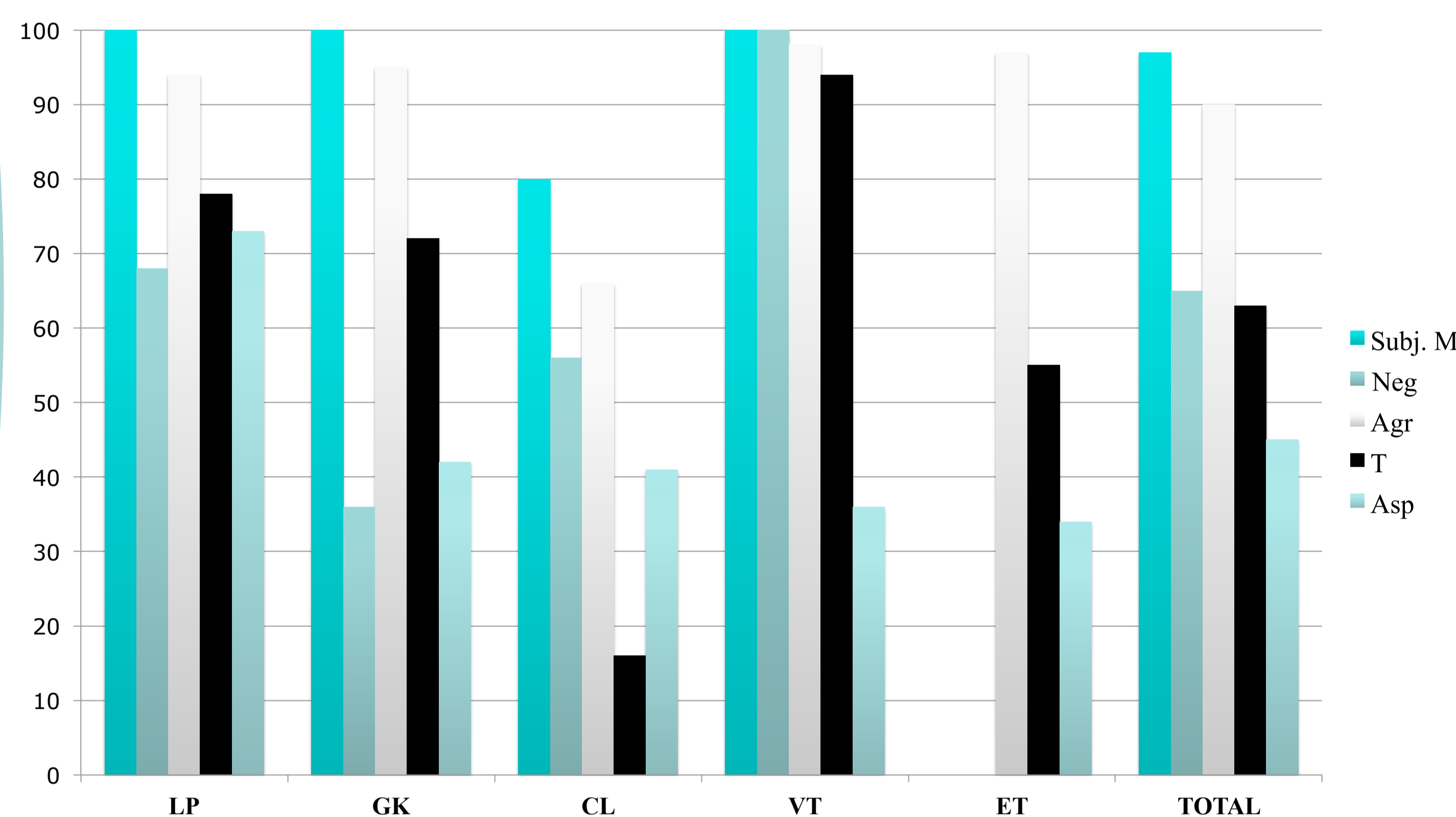
- In agrammatic aphasia, (morpho)syntactic production is impaired. Many studies have shown that this deficit is selective (e.g., Friedmann & Grodzinsky, 1997; Wenzlaff & Clahsen, 2004, 2005).
- To date, several accounts of agrammatic production have been put forward:
 - Tree Pruning Hypothesis (TPH) (Friedmann & Grodzinsky, 1997): The syntactic tree is pruned at a specific node, usually Tense (T); all nodes/categories above the pruning site are deleted; all nodes below are preserved.
 - Tense Underspecification Hypothesis (TUH) (Wenzlaff & Clahsen, 2004, 2005): T is underspecified, but subject-verb Agreement (Agr) and Mood (M) are well-preserved.
 - Tense and/or Agreement Underspecification Hypothesis (TAUH) (Burchert et al., 2005): What is underspecified is either T or Agr, or both of them, or none of them!
 - Interpretable Features' Impairment Hypothesis (IFIH) (Fyndanis et al., 2012; Nanousi et al., 2006; Varlokosta et al., 2006): Categories with uninterpretable features (e.g., Agr) are better preserved than categories with interpretable features (e.g., T, Negation (Neg), M).
 - Distributed Morphology Hypothesis (DMH) (e.g., Wang et al., 2014): Categories involving inflectional alternations are impaired.

Methods

- Against the above background, we investigated the ability of five Greek-speaking agrammatic individuals and five control participants to produce verb-related functional categories.
 - 2 sentence completion tasks and 1 constituent ordering task were administered to investigate participants' ability to produce T, (subject-verb) Agr, Asp, Subjunctive (Subj.) M, and sentential Neg.
 - Sentence completion task I tested Agr (192 source sentence-target sentence (SS-TS) pairs – 64 SS-TS pairs tested Agr, 64 T, 64 Asp).
- Example of Agr condition:** *Ávrio méssa se misí óra eyó tha sidéroso tis káltses.* 'Tomorrow within half an hour I will iron the socks. (lit.)' > *Ávrio méssa se misí óra i jajá _____.* 'Tomorrow within half an hour the grandmother _____.' (lit.) [target: *tha siderósi tis káltses* 'will iron the socks']
- Example of T condition:** *Méssa se misí óra i jajá ávrio tha siderósi tis blúzes.* 'Within half an hour the grandmother tomorrow will iron the sweaters. (lit.)' > *Méssa se misí óra i jajá xthés _____.* 'Within half an hour the grandmother yesterday _____.' (lit.) [target: *sidérose tis blúzes* 'ironed the sweaters']
- Example of Asp condition:** *Xthés i jajá méssa se misí óra sidérose tis blúzes.* 'Yesterday the grandmother within half an hour ironed-perfective the sweaters. (lit.)' > *Xthés i jajá epi misí óra _____.* 'Yesterday the grandmother for half an hour _____.' (lit.) [target: *sidérone tis blúzes* 'ironed-imperfective the sweaters']
- Sentence completion task II was picture-based and tested M (60 items overall; 30 elicited Subj. M & 30 Indicative (Indic) M).
 - Example of Subj. M:** *To korísi kolibái.* 'The girl is swimming.' *Ce to ayóri théli _____.* 'Also the boy wants _____.' [target: *na kolibái* 'to swim']
 - Example of Indic. M:** *To korísi théli na kolibái, enó to ayóri _____.* 'The girl wants to swim, while the boy _____.' [target: *kolibái* 'is swimming']
 - The picture-based constituent ordering task (based on Rispens et al., 2001) tested participants' ability to construct negative sentences (N=25) and control affirmative sentences (N=25). The cards always contained the negative element *non* "not/no". Participants were asked to construct a sentence matching the picture and on the basis of the picture they had to decide whether or not to use the negative element. The target sentences were simple structures, with a subject Determiner Phrase (DP), a verb in present tense and active voice, and an object DP. Twenty-five pictures were used and each one appeared twice (once it accompanied a negative and once an affirmative target sentence.)
 - All five control participants had ceiling performance on all tasks, therefore their performance will be further ignored.

Results

Agrammatic participants' %correct performance



LP

Subj. M/Agr > Neg/T/Asp, Fisher's exact test, $p < .02$
All other comparisons yield non-significant differences.

GK

Subj. M/Agr > T > Neg/Asp, Fisher's exact test, $p < .01$
All other comparisons yield non-significant differences.

CL

Subj. M/Agr > Asp > T & Neg/Asp > T, Fisher's exact test, $p < .01$
All other comparisons yield non-significant differences.

VT

Subj. M/Neg/Agr/T > Asp, Fisher's exact test, $p < .01$
All other comparisons yield non-significant differences.

ET

Agr > T/Asp, Fisher's exact test, $p < .01$
All other comparisons yield non-significant differences.

TOTAL

Subj. M/Agr > Neg/T > Asp, Fisher's exact test, $p < .01$
All other comparisons yield non-significant differences.

Discussion

- At the group level, agrammatic participants' worse performance on T compared to Subj. M and Agr are consistent with the TUH (Wenzlaff & Clahsen, 2004, 2005) and the TAUH (Burchert et al., 2005). However, the scope of these hypotheses is limited, thus they cannot account for the performance on all five functional/morphosyntactic categories.
- Agrammatic participants' results are against the IFIH (Fyndanis et al., 2012; Nanousi et al., 2006; Varlokosta et al., 2006), as Subj. M, which bears an interpretable feature, was found to be well preserved.
- Assuming the syntactic hierarchy proposed by Philippaki-Warbuton (1998), according to which Subj. M > Neg > Agr > T > Asp, our results are not in line with hierarchical accounts such as the TPH (Friedmann & Grodzinsky, 1997). Since T was found to be severely impaired, the TPH would expect all categories above T to be impaired and all categories below T to be spared. Contrary to these predictions, however, Subj. M. and Agr, which are above T, were spared and Asp, which is below T, was impaired.
- The results cannot be fully accounted for by the DMH (Wang et al., 2014), because this hypothesis cannot explain the selective impairments in categories involving inflectional alternations. Why are T and Asp more impaired than Agr?
- At the individual level, similar conclusions could be drawn. None of the theories discussed here can account for all the results.
- Partial support is provided only for theories with limited scope such as the TUH (Wenzlaff & Clahsen, 2004, 2005) and the TAUH (Burchert et al., 2005), as the performance of all participants but VT on Subj. M, Agr and T were consistent with these theories.
- Likewise, only the results on the categories associated with the verbal morphology, that is, Agr, T and Asp, are in line with the IFIH (e.g., Fyndanis et al., 2012), as all participants but VT exhibited the predicted pattern of performance (Agr > T/Asp or Agr > T > Asp). It might be the case that the IFIH holds only at the level of verbal morphology.
- These results, together with the production results of other agrammatic speakers reported in the literature, show that all possible patterns of (morpho)syntactic production can be observed in agrammatic aphasia, and that a unitary account of the disorder is unlikely to succeed (Miceli et al., 1989). None of the existing theories can capture all patterns of performance observed in agrammatism.
- It might be the case that a number of factors such as subject-specific characteristics (e.g., site, type and volume of brain damage, type and severity of aphasia, education, age) and language-specific properties of functional categories (e.g., syntactic hierarchy, interpretability, morphological complexity, frequency, phonological saliency) interact in determining the way in which (morpho)syntactic impairments manifest themselves across persons with aphasia and languages. **Identifying the factors that play a role and the way they interact is a challenge for future research.**

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