

1. Goal

The purpose of this study was to analyze the impact of different syntactic structures on eye movements during reading.

2. Experiment

Methods

The eye movements of 20 portuguese university students (native speakers) were registered with the ASL 504 system at a 60 Hz rate.

Stimuli

Two texts (T1; T2) with different topic, but with similar length and controlled syntactic structure, were used:

- T1 – concerning a well known topic
- T2 – concerning a not well known topic

Two versions of each text were used: the original and a syntactically manipulated one.

Procedures

10 subjects read the original version of T1 and the manipulated version of T2 (*T2); the other 10 subjects read T1 with syntactic manipulations (*T1) and T2 in the original version.

Syntactic manipulations

Context 1 (C1): pronominal enclisis within an obligatory proclisis context
*que se[clitic] vislumbra / através dos eléctricos em movimento (T1) versus *que vislumbra-se[clitic] / através dos eléctricos em movimento (*T1)*

*that [clitic] Verb AP versus *that Verb-[clitic] AP*

Context 2 (C2): deletion of the clitic, a obligatory Verb argument

*revela-se / ao virar de cada esquina das suas ruas de passeios largos (T1) versus revela[_] / ao virar de cada esquina das suas ruas de passeios largos (*T1)*

*Verb-[ODclitic] PP versus *Verb-[_] PP*

Context 3 (C3): postverbal Subject within a declarative sentence (ambiguous interpretation: VSO or VOS)

*as donas de casa atarefadas procuram os melhores produtos frescos (T1) versus procuram as donas de casa atarefadas os melhores produtos frescos (*T1)*

NP Verb NP versus Verb NP NP

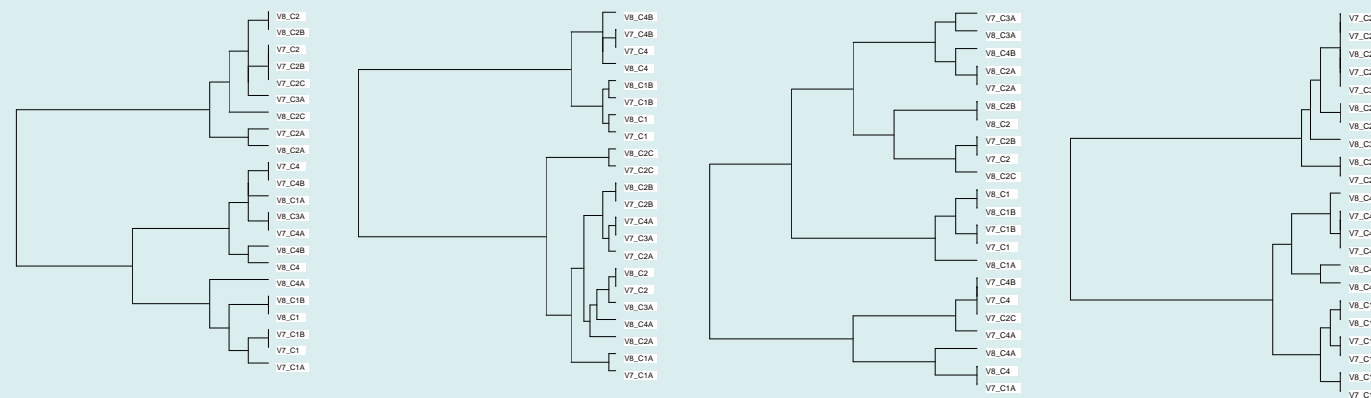
Context 4 (C4): Wh- question without Subject/Verb inversion (obligatory in European Portuguese)

*Como reagem os moradores de Campo de Ourique? / Receiam que as vizinhas torres do progresso (T1) versus Como os moradores de Campo de Ourique reagem? / Receiam que as vizinhas torres do progresso (*T1)*

*Wh- Verb NP versus *Wh- NP Verb*

Sentences were divided in regions, except Context 2. Regions are delimited by the (/). First is region A (e.g., C1A), second region B (e.g., C1B), etc.

3. Results



Dendrogram 1 – Reading of T1.

Dendrogram 2 – Reading of *T1.

Dendrogram 3 – Reading of T2.

Dendrogram 4 – Reading of *T2.

Legend:

- V7 – Total Reading Time spent on a region
- V8 – Number of Fixations done on a region

4. Discussion and conclusions

All dendrograms show the formation of two main groups, one joining C2 and C3, another associating C1 and C4. Nevertheless, C1 and C4 form separated classes at first levels.

We may interpret this as the expression of parsing movement constituents existing in C1 and C4 with strong cues, due to the presence in both structures of a Wh- morpheme. Separation of classes C1 and C4 is better observed in the less well known topic texts (T2 and *T2) which we interpret as a topic effect. The presence of a Wh- word creates expectations of movement which, in fact, does not exist in the manipulated texts (*T1 and *T2) as a consequence of the manipulation.

In the other two contexts, the lack of Object in *C2 and the late positioning of the Object in *C3 led to late closure processing, with non canonical order VSO. Despite these results, C2 and C3 may associate for absence of movement and of Wh- word, in contrast with C1 and C4.

Our results show that:

The presence of a Wh- morpheme, usually associated with movement, changes the reading behavior of the respective structure even when the sentence is manipulated for not containing movement.

At this level of explanation C2 and C3 may associate for showing absence of the Wh- morpheme, in contrast with the two other structures.

5. References

- Costa, M.^a A., (1991). *Leitura: Compreensão e Processamento Sintático*. Master Dissertation presented to Faculdade de Letras da Universidade de Lisboa.
- Costa, M.^a A. (2003). *Processamento de Frases em Português Europeu. Aspectos cognitivos e linguísticos implicados na compreensão da linguagem escrita*. PhD Thesis. Published by Calouste Gulbenkian Foundation in 2005.
- Faria, I., Costa, M.^a A., Freitas, M.^a J., Figueira, M.^a L., (1993). *Processamento da Informação na Leitura Oral em Situação de Stress: construção do estudo experimental e análise de resultados*. Actas do IX Encontro da APL. Coimbra. 1994. 211–231.
- Hyönä, J., Lorch, R.F., Jr., & Rinck, M., (2003). Eye movement measures to study global text processing. In J. Hyönä, R. Radach & H. Deubel (Eds.), *The mind's eye: Cognitive and applied aspects of eye movement research* (pp. 313-334). Amsterdam: Elsevier Science.
- Luegi, P. (2006). *O Registo do Movimento dos Olhos durante a Leitura de Textos*. Master Dissertation presented to Faculdade de Letras da Universidade de Lisboa.
- Rayner, K., Liversedge, S. P., (2004). Visual and Linguistic Processing During Eye Fixations in Reading. In J.M. Henderson & F. Ferreira (Eds.), *The interface of language, vision, and action*. (59–104). New York: Psychology Press.