

## 1. Introduction

Reading is a very fast and automatic activity. However, there are some situations where automaticity is disrupted, for instance, during the reading of ambiguous sentences or when reading a text with a less familiar topic. In these situations readers' behavior changes, showing not only the difficulties but also strategies they are using to solve the problems. These changes may be analyzed by measuring reading speed (in general) while reading aloud or registering readers' eye movements during silent reading. This last methodology allows us not only to detect that the reader has had difficulties while reading a text or fragment, but where did that happen and what did the reader do as well.

## 2. Goal

The purpose of this study was to analyze:

1. The impact of different degrees of ungrammaticality in reading comprehension.
2. The role of the argumental structure of the verb during sentence reading.

## 3. 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:** pronominal enclisis within an obligatory proclisis context (ungrammatical)

*que se[clitic] vislumbra / através dos eléctricos em movimento (T1) versus \*que vislumbra-se[clitic] / através dos eléctricos em movimento (\*T1)*  
*que se[clitic] captam / no interior de cada edifício (T2) versus \*que captam-se[clitic] / no interior de cada edifício (\*T2)*

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

**Context 3:** 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)*  
*o painel ISOLPAN apresenta características excepcionais (T2) versus apresentam os painéis ISOLPAN características excepcionais (\*T2)*

*NP Verb NP versus Verb NP NP*

## 4. Results

	CONTEXT 1												FP.TRT [s]	
	Region A		Region B		Region A+B		Region A		Region B		Região A+B			FP.NFix
	T1	*T1	T1	*T1	T1	*T1	T2	*T2	T2	*T2	T2	*T2		
FP.TRT [s]	0,512	0,669	1,488	1,099			0,424	0,462	0,973	0,836			FP.TRT [s]	
FP.NFix	1,7	1,9	5	3,2			1,5	1,6	3,5	2,7			FP.NFix	
			(u= 13,500; p<0,05)											
SP.TRT [s]	0,032	0,322	0,100	0,517			0	0,254	0	0,636			SP.TRT [s]	
	(u= 28,500; p<0,05)													
SP.NFix	0,1	1,1	0,3	1,9			0	0,9	0	2,4			SP.NFix	
	(u= 28,000; p<0,05)													
TP.TRT [s]	0,544	0,991	1,589	1,490	2,132	2,347	0,424	0,716	0,973	1,471	1,397	2,187	TP.TRT [s]	
	(t(18)= -2,205; p<0,05)						(t(9,993)= -2,613; p<0,05)		(t(18)= -3,079; p<0,05)		(t(13,316)= -3,523; p<0,05)			
TP.NFix	1,8	3,0	5,3	5,1	7,1	8,1	1,5	2,5	3,5	5,1	5,0	7,6	TP.NFix	
	(u= 22,000; p<0,05)						(u= 19,500; p<0,05)		(u= 19,500; p<0,05)		(u= 11,000; p<0,05)			
Int.Regr	0	0,4	0,7	0,8	0,7	1,2	0	0,2	0,2	0,8	0,2	1	Int.Regr	
	(u= 30,000; p<0,05)										(u= 27,000; p<0,05)			

Table 1 – Reading times of Context 1 (manipulation of the clitic position on a relative sentence).

	CONTEXT 3				TP.TRT [s]	
	T1	*T1	T2	*T2		TP.NFix
	T1	*T1	T2	*T2		
TP.TRT [s]	2,114	1,913	2,156	2,652	TP.TRT [s]	
TP.NFix	7,1	7,6	6,1	8,1	TP.NFix	
			(t(18)= -2,496; p<0,05)			
Int.Regr	0,5	0,6	0,6	1,0	Int.Regr	

Table 2 – Reading times of Context 3 (manipulation of Subject position on a declarative sentence).

### Measures:

Total Reading Time (TRT) and Number of Fixations (NFix) during First-Pass (FP.TRT; FP.NFix), Second-Pass (SP.TRT; SP.NFix), and Total-Pass (TP.TRT; TP.NFix); Internal Regression (Int.Regr.)

## 5. Discussion

**Context 1** – Was the only context where we found significant differences between the original and the manipulated version in both texts.

This structure is under variation among Portuguese varieties. It occurs not only in oral but also in written European, Brazilian, and African Portuguese.

**Context 3** – In this context (see Table 2), we only found differences between the original version and the manipulated one in the less accessible text (T2 vs. \*T2).

While in T1 the ambiguity is not noticed, in T2 it is only solved late, after the second NP is found.

Comparing both sentences, we can see that while the first post verbal NP in T1 is [+human] ('the house wife's') in T2 it is [-animated] ('the panels'). It seems that as soon as the readers finds a NP that fulfills the argumental structure of the Verb, (s)he interprets it as the missing constituent.

## 7. References

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## 6. Conclusions

Our results show that:

1. A structure under variation, although frequent, is understood as ungrammatical. In the case of Verb/clitic inversion, the change may have taken place in other varieties, but not in European Portuguese.
2. Information concerning the argumental structure of the verb is used very early during reading. Readers integrate semantic information and use it very early during the reading process to solve possible ambiguities. In European Portuguese, a pro-drop language, during the reading of sentences like C3, with post-verbal NPs, readers try to fill the empty place as soon as possible with a candidate that fulfills the requisites of a Subject, accordingly to the argumental grid of the verb.