

## **EXPERIMENTAL SYNTAX – AN INTERVIEW WITH MARCUS MAIA**

**Marcus Maia**

Federal University of Rio de Janeiro (UFRJ)

### **ReVEL – What is Experimental Syntax? How does it relate to Theoretical Syntax, Language Acquisition and Psycholinguistics?**

**Marcus Maia** – The expression *Experimental Syntax* was used for the first time as the title of a book by Wayne Cowart: *Experimental Syntax: Applying Objective Methods to Sentence Judgments*, published in 1997. However, the subject is complex and had been at the centre of intense discussions for quite some time before that. It is worth noting that the branch of Psycholinguistics known as Sentence Processing has been using Experimental Syntax ever since its beginning in the 1960's, as the psychological reality of some of Chomsky's Syntactic Theory propositions were studied through different experimental paradigms. Several of the paradigms created during this seminal period are still used today. Fodor Bever & Garrett's famous *The Psychology of Language: An Introduction to Psycholinguistics and Generative Grammar* (1974) reviews dozens of experimental studies demonstrating how this first model of transformational grammar was influencing our understanding of language. It was a really important period that should be remembered, especially now that the relationship between grammatical theory and Psycholinguistics is the subject of a new interest. Just to name a few, there are studies like Epstein's (1961) demonstrating that series of nonsense syllables are easier to remember when they are grouped in phrasal structure, which shows the importance of syntactic structure in memory storage and retrieval. There is also Caplan's priming study (1972) demonstrating that sentence information is accumulated in the working memory in

groups corresponding to sentence constituents. Research by Garrett, Bever & Fodor (1966) shows that, in the location paradigm of clicks, syntactic constituents are resistant to interruption. Even when the click is in the middle of a constituent, the click is perceived as being outside of it. There is also Miller's *Sentence Transformation Cube* (1962), on which is based the *Derivational Theory of Complexity*, suggesting that there is a transparent relationship between grammatical structure and perceptual reality, a theory that was later rejected. These are lessons from the history of Linguistics that should not be forgotten now that Experimental Syntax is coming back to the forefront.

The question today is mostly in relation to the exclusive use of informal judgements of sentence acceptability or grammaticality by what Phillips (2009) calls "armchair linguists." This method, sometimes known as the "Hey Sally Method", allowed Generative Linguistics to make an important change of focus within linguistic studies, from exhaustive corpus analyses made under structuralist influence to modeling of cognitive processes underlying language knowledge. This change enabled the analysis of not only what is said but also what cannot be said. It was thus realized that a syntactic constituent cannot be taken out of a complex determiner phrase, for instance.

Trying to determine the generative capacity of language, Chomsky proposed that it would be possible to test sentence grammaticality by capturing "some sort of bizarreness reaction" (cf. Chomsky 1956/1982, LSLT, p. 95). Even if Chomsky himself later admitted that you cannot trust a theory exclusively on intuitive judgments and must therefore include strict criteria in these judgments as soon as possible (cf. Chomsky 1962), the fact is that intuitive judgments of acceptability and grammaticality were, for decades, the principal tool of Generative Grammar. It is worth noting the revolutionary aspect of using introspection and intuition as valid analytical instruments during a period dominated by deeply anti-mentalist Behaviorism.

Introspection and intuition are nonetheless the necessary starting point for a systematic reflection on linguistic phenomena. What has been questioned in practice, however, is whether they should also be the arrival point. It is in this sense that the

intuitive judgment of acceptability and grammaticality has been called derisively the “Hey Sally Method,” evoking with that the image of the linguist—generally a syntactician— nervously asking his secretary “Hey Sally, do you get this sentence?” That the question can be asked should not be a surprise, but the fact that complex language theories can be developed on the sole basis of such questions is what has been seriously disputed. There are research studies convincingly showing that judgments are not necessarily of the “all or nothing” type but often present gradience (cf. Cowart 1997; Featherston 2005, among many others). However, Snyder (2000) experimentally demonstrated the so-called “linguists’ disease” or satiation effect in sentence grammaticality judgment. Many linguists admit that sentences that were initially considered ungrammatical tend to sound increasingly acceptable over time, to the point that they are referred to as ungrammatical only by the force of habit or because their ungrammaticality became a model in the literature. In my own lab at the UFRJ, a study published here in **ReVEL** (cf. Barile & Maia 2008) already showed that sentences in Portuguese with QU structures in syntactic islands give different judgment times and rates depending on the metalinguistic conscience of the subjects. Subjects who were aware of the syntactic island phenomenon (because they had already judged this type of sentence before) had a stronger tendency to accept these sentences than the subjects who were not aware of the phenomenon.

It is thus clear that Linguistics can benefit from the use of experimental chronometric techniques, such as self-paced reading and listening, priming, lexical decisions, eye tracking, or even electroencephalography or brain imaging technics from neuroscience of language. Moreover, thinking experimentally, explicitly defining the hypotheses, the independent and dependant variables, to try to control extraneous and confounding variables while rigorously establishing the materials, the experimental tasks and the subject groups, and applying appropriate statistical analyses to the results—has an extremely beneficial effect on the theoretical thinking itself, making it more accurate and judicious.

These findings raise, however, important questions:

1. On the one hand, it seems clear from what we have said before that experimental methodology can give more precise and stable tools for

developing the empirical basis of theories and thus significantly contribute to establish these theories.

2. On the other hand, prior theoretical research that did not use the most rigorous experimental methodology could be compromised by uncontrolled effects such as the satiation effect and thus the theories based on more informal methodologies could be untrustworthy.

Sprouse & Almeida (2010) have, however, shown evidence that appear to invalidate the second point. Using sophisticated statistical analyses, the authors demonstrated that the judgements on the grammaticality of 469 types of sentences from an introductory book on syntax (Adger, *Core Syntax*), obtained by rigorous methodology from 440 participants, showed a replication rate of 98% with the results obtained in the past by informal methodology. Sprouse & Almeida conclude that such results would suggest that the informal technique of grammaticality judgment used in Generative Linguistics for decades could not have led the theory to err because of poor quality data.

Considering that there are two types of mistakes in experimental methodology, FALSE POSITIVE and FALSE NEGATIVE, the use of informal tests of judgement may not have led to the first, but this does not mean that the second type did not occur.

TYPE 2 ERROR – FALSE POSITIVE – Rejection of a true null hypothesis
TYPE 2 ERROR – FALSE NEGATIVE – Acceptation of a false null hypothesis

What we want to say with this is that, although informal judgment methods (like “Hey Sally”) used by and large for decades in Generative Linguistics may not have led to wrong assumptions, **it is not possible to rule out the hypothesis that phenomena that could have been observed with more precise and rigorous techniques have not in fact been observed because of an inadequate methodology.** Absence of evidence is not evidence of absence. For this reason, the new linguistic specialty called EXPERIMENTAL SYNTAX, which has gained popularity in recent years, rigorously applies the EXPERIMENTAL METHOD already used in PSYCHOLINGUISTICS for decades. The specialty not only has the

potential to show more precise and trustworthy results for the construction of linguistic theories, but also facilitates a more refined dialogue between research in linguistic competence and linguistic performance.

**ReVEL – How would you describe the importance and visibility of the research in Experimental Syntax conducted in Brazil nowadays?**

**Marcus Maia** – Unsurprisingly, a great part of the Brazilian research studies in this field are conducted in laboratories of Psycholinguistics; these labs not only have the equipment, but also the theoretical knowledge and adequate methodologies to develop good quality research. In order to have a good perspective on the diversity of studies in the field, we can have a look at the different programs of the workgroups in Psycholinguistics presented at ANPOLL (<http://www.ufjf.br/anpoll/memoria-do-gt/>) in recent years, and the inter workgroup sessions between the Psycholinguistics workgroup and the Theory of Grammar workgroup. We can take a look also at the First International Congress of Psycholinguistics ([http://www.letras.ufrj.br/poslinguistica/first\\_international\\_meeting.htm](http://www.letras.ufrj.br/poslinguistica/first_international_meeting.htm)). There is also the Teoria da Gramática (Grammatical Theory) workgroup and the First International Congress of Psycholinguistics ([http://www.letras.ufrj.br/poslinguistica/first\\_international\\_meeting.htm](http://www.letras.ufrj.br/poslinguistica/first_international_meeting.htm)). There is also the I EXFA of Unicamp (<http://www.iel.unicamp.br/exfa/program.html>), organized by Ruth Lopes.

Linguists working in Theoretical Linguistics also show a growing interest for experimental research. As with any interdisciplinary undertaking, there are questions and tensions to resolve. An important one would be, in my opinion, to try to control reductionism—not to use linguistic theories as a restraint on the one hand and, on the other hand, not to pretend that experimental method or statistical analyses are the answer to all questions. There are different subtlety of analysis between the epistemological, psychological and neurological levels that cannot be erased by force. I like to quote the response Chomsky gave to Mike Dillinger during an interview in Rio de Janeiro. Dillinger had asked him how relevant was, at the time, the difference between competence and performance that he had proposed in *Aspects* (1965).

Chomsky answered: “...*people know things and people do things,*” which stresses once more, in my opinion, the necessary conceptual naturalness of the distinction between knowing and doing. If it is not possible to access linguistic knowledge otherwise than through linguistic *performance*, it is nevertheless impossible to reduce one dimension to the other, because they are necessarily distinct.

Theoretical linguists have mostly returned to better-controlled research on grammaticality/acceptability judgments, which is a good thing, but it is essential that they keep progressing towards on-line methodologies that allow them to have access to the TIME COURSE of the processes. These methodologies can identify structural factors and isolate them from semantic factors in context and have, for this reason, the potential to contribute to central questions on grammar architecture by comparing theoretical models in terms of their psychological realities.

**ReVEL – You have founded the Laboratório de Psicolinguística Experimental (LAPEX, Laboratory of Experimental Linguistics), which you now lead at the Federal University of Rio de Janeiro (UFRJ). What type of research are your professors, students and researchers working on at the LAPEX at the moment?**

**Marcus Maia** – With the help of the CNPq, FAPERJ and FUJB/UFRJ<sup>1</sup>, the research group LAPEX (UFRJ) has been studying, ever since its creation 12 years ago, the morphosyntactic structure and the processes of parsing and interpretation in sentence- and word understanding and production in natural languages by subjects with or without linguistic disorders. The group is conducting theoretical and experimental research, using different psycholinguistic protocols such as eye-movement tracking, priming, lexical decision, self-paced reading and listening, speeded grammaticality and acceptability judgment, etc. In relation to syntactic processing, there are research studies on questions such as coreference anaphora, verb argument structure, differences between argument and adjunct, processing of

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<sup>1</sup> **CNPq**: Conselho Nacional de Desenvolvimento Científico e Tecnológico (National Council of Technologies and Scientific Development); **FAPERJ**: Fundação de Amparo à Pesquisa do Estado de Janeiro (Foundation for the Support of Research in the State of Rio de Janeiro); **FUJB/UFRJ**: Fundação Universitária José Bonifácio/Universidade Federal do Rio de Janeiro (University Foundation of José Bonifácio/Federal University of Rio de Janeiro).

adverbs, ambiguity of relative clause attachment, ambiguity of prepositional phrase attachment, and ambiguity between noun and adjective phrases. These questions are also relevant to sentence processing by bilingual subjects, including speakers of Brazilian indigenous languages. In relation to lexical processing, there are research studies on computation within the phonological word. The theoretical questions that are being studied are on the syntax/semantics and pragmatics and syntax/prosody interfaces, with the objective of finding empirical data for linguistic modules characteristics and their integration in the on-line process of sentence understanding. The results we have obtained have been systematically presented in conferences in Brazil and abroad, such as meetings of the Associação Brasileira de Linguística (ABRALIN, Brazilian Linguistics Association), of the Associação Nacional de Pós-graduação e Pesquisa em Letras e Linguística (ANPOLL, National Research and Graduate Research Association in Modern Languages and Linguistics), the CUNY Human Sentence Processing Conference, USA, and the International Society of Applied Psycholinguistics (ISAPL).

**ReVEL – What can the results of these research studies in Experimental Syntax bring to the research in Formal Syntax and syntactic processes of natural languages?**

**Marcus Maia** – Schütze (1996) believes that, even though data based on subtle judgements of grammaticality have become central in theoretical arguments, there are three problems associated with their use:

The judgment data are not systematically reported or notationally identified;

The judgment data are used or discarded according to their relevance to the theory;

The process of collecting the data is generally not rigorous and is thus intrinsically unstable and untrustworthy.

As I have already discussed, questioning the informality and, most importantly, the instability of acceptability/grammaticality judgments is not rare or recent. Using

experimental methodology may potentially allow us to identify the temporal course of grammatical processes, and thus significantly contribute to resolving questions about language architecture. There are studies such as Sturt's (2002) showing how, through the eye-movement tracking method, Principle A of the Binding Theory is already present in the initial stages of coreference processing. Other studies such as those of Kazanina, Lau, Yoshida, Liebermann & Phillips (2007), analyse the effect of syntactic conditions in anaphora processing. In a study about the reading of words in Brazilian Portuguese, Maia, França & Lemle (2007) (<http://www.cienciasecognicao.org/revista/index.php/cec/article/view/639>) argue in favor of constructionist theories and in opposition to lexicalist theories, on the basis of experimental studies.

However, the grammar/parser relationship is far from being entirely understood. As it has been pointed out in Phillips (2007), there are still many interesting discrepancies, and the results are still clearly inconclusive. Research must continue, and each case individually evaluated in order for us to be able to propose integrated models with better bases in the future. At any rate, we are exploring a fascinating area with much potential for discovery in the study of human language.

**ReVEL – Could you suggest some essential readings on Experimental Syntax for our readers (students, professors and researchers in Modern Languages and Linguistics)?**

**Marcus Maia** – Wayne Cowart's book, which I have already mentioned, is essential and questions the inherent instability of the grammaticality judgment method and proposes better controlled methodologies instead:

COWART, Wayne (1997). *Experimental syntax: Applying objective methods to sentence judgments*. Thousand Oaks, CA: Sage Publications.

Snyder's squib in *Linguistic Inquiry* is also essential reading and clearly describes what he calls the satiation effect or "linguists' disease" in informal grammaticality judgment:

SNYDER, W. (2000) An experimental investigation of syntactic satiation effects, *LI* 31, 575-582.

Another classic is Schütze's paper, in which he reviews the literature and makes an ample and detailed evaluation of the methodology of grammaticality judgment, with extremely interesting recommendations:

SCHÜTZE, C.T. (1996). *The Empirical Base of Linguistics: Grammaticality Judgments and Linguistic Methodology*. Chicago: The University of Chicago Press.

Featherston's paper is another reading I find important. He assesses in a rather didactic manner the positive and negative reasons why syntacticists use experimental method, by which they can improve the quality of their data and thus benefit from empirically adequate data:

FEATHERSTON S. (2007). Data in Generative Grammar; the carrot and the stick. *Theoretical Linguistics* 33 (3).269-318.

Jon Sprouse's doctoral dissertation, under the supervision of Lasnik, is also a landmark in the literature, and his paper with Diogo Almeida became an instant classic when it was published in 2010:

Sprouse, J. (2007a). A program for experimental syntax. Doctoral dissertation, University of Maryland.

SPROUSE, J. & D. ALMEIDA. 2010. A quantitative defense of linguistic methodology. [LingBuzz/001075](http://LingBuzz/001075)

Colin Phillips' paper (2009) and the ongoing debate between Gibson & Fedorenko are helpful to understand the questions and tensions in this field of research. Phillips' 2011 paper is also a landmark:

Phillips, C. (2009). Should we impeach armchair linguists? In S. Iwasaki, H. Hoji, P. Clancy, & S.-O. Sohn (Eds.), *Japanese/Korean Linguistics* 17. Stanford, CA: CSLI Publications.

Phillips, C. (2011). Some arguments and non-arguments for reductionist accounts of syntactic phenomena. *Language and Cognitive Processes*.

Gibson, E. & Fedorenko, E. (2010a). Weak quantitative standards in linguistics research. *Trends in Cognitive Sciences*, 14(6), 233-234.

Gibson, E. & Fedorenko, E. (2010b). The need for quantitative methods in syntax. *Language and Cognitive Processes*.

Here in Brazil, we can find the important work of Leticia Sicuro Corrêa and Marina Augusto, among which:

CORRÊA, L. M. S.. Relação processador lingüístico-gramática em perspectiva: problema de unificação em contexto minimalista. *DELTA. Documentação de Estudos em Lingüística Teórica e Aplicada*, v. 24, p. 231-282, 2008.

CORRÊA, L. M. S. ; Augusto, M. R. A.. Computação linguística no processamento on-line: soluções formais para a incorporação de uma derivação minimalista em modelos de processamento.. *Cadernos de Estudos Lingüísticos (UNICAMP)*, v. 49, p. 167-183, 2007.

I also recommend reading the following article:

FRANCA, A. I.. A Interface Lingüística-Neurociência da Linguagem. *Cadernos de Estudos Lingüísticos (UNICAMP)*, v. 49, p. 151-166, 2007.

In the recently published book on the First International Congress of Psycholinguistics, there are also several important papers:

FRANÇA, Aniela Improta (Org.) ; MAIA, Marcus. (Org.). *Papers in Psycholinguistics*. Rio de Janeiro: Ed. Imprinta, 2010. v. 1. 457 p.

And finally, in this issue of **ReVEL**, we have a varied selection of research studies to show how this area of Linguistics has generated interest here in Brazil.