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► **To cite this version:**

Livy-Maria Real-Coelho, Christian Retoré. A Generative Montagovian Lexicon for Polysemous Deverbal Nouns. 4th world congress on Universal Logic – workshop on Logic and linguistics, Apr 2013, Rio de Janeiro, Brazil. <http://www.uni-log.org/>. hal-00760380

**HAL Id: hal-00760380**

**<https://hal.science/hal-00760380>**

Submitted on 4 Dec 2012

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4th world congress on Universal Logic — workshop on Logic and linguistics  
UNILOG: 4–7 April 2013 Rio de Janeiro

## A Generative Montagovian Lexicon for Polysemous Deverbal Nouns

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We propose a computational formalization of some forms of polysemy. Here we focus on the resultative/processual polysemy of deverbal nouns like *assinatura* (“signing/signature”) or *abertura* (“opening/aperture”) in Portuguese — we also study similar constructs in French, Italian, and English. We follow the Montagovian Generative Lexicon (MGL) introduced in Bassac, Mery & Retoré (2010) based on second-order Girard’s F system with several entity types — including at least one type  $t$  for propositions and several entity types, as  $v$  (*event*),  $s$  (*state*)  $\varphi$  (*physical object*). Our formalization produces the readings involving one aspect of the polysemous noun, and it also handles properly co-predication phenomena. Indeed, co-predications on several aspects of a polysemous term can be correct or incorrect. For instance, one cannot assert a predicate of the resultative meaning and simultaneously a predicate of the processual meaning.

To do so, a lexical entry consists in the “usual” Montagovian  $\lambda$ -term expressing the argument structure (with fine-grained types) and optional modifiers turning the type of an object (e.g.  $v$  or  $s$ ) into another type (e.g.  $\varphi$ ). Consider the lexical entry to “assinatura” (whose type is  $v$ ) as the following:

$$\langle \lambda x^v.(assinatura^{v \rightarrow t}x); id = \lambda x^v.x, f_r^{v \rightarrow s}, f_\varphi^{v \rightarrow \varphi} \rangle$$

When there is a type mismatch, one is allowed to apply some optional modifier(s). We thus are able to derive “A assinatura atrasou três dias”<sup>1</sup> and “A assinatura estava ilegível”<sup>2</sup>.

The definite article “a” (“the”), is handled by a typed choice function  $\iota$  (or  $\epsilon$ , one of the first smiler approach being Egli & von Heusinger, 1995) whose type is  $\Lambda\alpha.(\alpha \rightarrow t) \rightarrow \alpha$ . When this polymorphic  $\iota$  ( $\Lambda\alpha\dots$ ) is specialised to the type  $v$  ( $\alpha := v$ ) it becomes of type  $(v \rightarrow t) \rightarrow v$  and when applied to  $assinatura : (v \rightarrow t)$  it yields a term  $\iota\{v\}assinatura$  of type  $v$  whose short hand in the examples is written  $(sig)^v$ . This term introduces a presupposition:  $assinatura(\iota(assinatura))$ , saying that the designed event is an “assinatura”.

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<sup>1</sup>“The signing was delayed by three days.” Example from <http://noticias.uol.com.br/inter/efe/2004/03/05/ult1808u6970.jhtm>.

<sup>2</sup>“The signature was illegible.” Example from <http://www.reclameaqui.com.br/3372739/dix-saude/cancelamento-do-plano-a-mais-de-um-mes-e-nada/>.

In the examples, let us denote by  $atras3 : (v \rightarrow t)$  the predicate “atrasou três dias” (*took three days*) which applies to events and by  $ilg : \phi \rightarrow t$  the predicate “estava ilegível” (*was illegible*) that applies to physical objects. Both predicates are computed from the lexicon, but we cannot include the details.

$$(1) \text{“A assinatura atrasou três dias”}^1 \quad (2) \text{“A assinatura estava ilegível”}^2$$

$$\lambda y^v . (atras3^{v \rightarrow t} y) (sig^v) \quad (\lambda y^\varphi . ilg^{\varphi \rightarrow t} y) ((sig^v))$$

$$atras3^{v \rightarrow t} (sig^v) \quad (\lambda y^\varphi . ilg^{\varphi \rightarrow t} y) (g^{v \rightarrow \varphi} (sig^v))$$

$$ilg^{\varphi \rightarrow t} (g sig^v)^\varphi$$

Now let us show that the co-predication between “took three days” and “was illegible” cannot be derived. Firstly, the conjunction of two predicates that apply to different types (different view of the same object) is depicted using the second order typing. The “and” formalisation is:

$$\Lambda \alpha \Lambda \beta \lambda P^{\alpha \rightarrow t} \lambda Q^{\beta \rightarrow t} \Lambda \xi \lambda x^\xi \lambda f^{\xi \rightarrow \alpha} \lambda g^{\xi \rightarrow \beta} \& (P(f x)) (Q(g x))$$

The instantiations for our example should be as follows:  $P = atras3$ ,  $\alpha = v$ ,  $f = Id_v$ ,  $Q = ilg$ ,  $\beta = \varphi$ ,  $g = f$  and  $\xi = v$ ,  $x = sig^v$ . This polymorphic “and” takes as arguments two properties  $P$  (here:  $atras3$ ) and  $Q$  (here:  $ilg$ ) which apply to entities of type  $\alpha$  (here:  $v$ ) and  $\beta$  (here:  $\varphi$ ), returning a predicate that applies to a term  $x$  of type  $\xi$ . This predicates says that  $x$  of type  $\xi$  (here  $sig$  of type  $v$ ) which via some  $f$  (here  $Id$ ) can be viewed as an object of type  $\alpha$  (here  $v$ ) enjoying  $P$  (here  $atras3(x)$ ) and that the same  $x$  can also be viewed via some  $g$  (here  $f_\varphi$ ) as an object of type  $\beta$  (here  $\phi$ ) enjoying  $Q$  (here  $ilg(f_\varphi(x))$ ). — hence  $x$  has both properties (here  $atras3(x) \& ilg(f_\varphi(x))$ ), provided the proper meanings of  $x$  are considered.

The constraint that both the identity and the result are rigid modifiers, means that if one of the occurrences of the argument of the predicate is used via a modifier, so are the others. Here, if one occurrences is the process itself (through the identity) or the result (through the optional modifier) it ought to be used with the same meaning for each of the occurrences — the presence of the identity in the lexical entry allows us to express that the original type itself is incompatible with others that are derived from it. As expected, this flexible/rigid distinction properly blocks the above co-predication that effectively cannot be derived. A less strict rule is possible: such compound infringing the rigid rule are given bad marks.

## References

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