

Electrophysiological correlates of aspectual coercion: the combination of telic and atelic Italian predicates with *in/for* X-time expressions

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1. Topic, background and purpose.

Among Dowty's (1979) most cited collections of aspectual diagnostics, the *for/in* x-time test discriminating between telic vs. atelic predicates has informed a huge literature (e.g., Filip 2012). According to the test, in sentences (1)-(2), the (a)telicity of *walk* (atelic) and *paint a picture* (telic) would be surfaced by their (in)compatibility - respectively – with prepositions *in* and *for*.

(1) *John walked for/*in an hour*

(2) *John painted a picture in/ ?for one hour*

Many agree that (a) the test is asymmetric (it does not affect telic and atelic predicates evenly), (b) telicity is not computed on V, but at VP level and beyond and – most importantly – (c) speakers can resolve aspectual conflicts through the mechanism of aspectual coercion (De Swart 1998; Verkuyl 1993). Recent ERP studies identified the sustained anterior negativity as the best candidate for reflecting the cognitive activity involved in aspectual coercion (e.g., Baggio et al., 2008). In our experiment, Italian native speakers read a set of sentences containing verbs that are classified a priori as being telic or atelic following the aspectual literature. In the stimuli, such predicates are combined with either XP 'in x-time' or 'for x-time' expressions. The aim of the study is to isolate the signatures of aspectual coercion and the associated processing costs (as they can be revealed by the analysis of ERP components) following participants' attempts to accommodate VP with allegedly (in)compatible time expressions.

2. Rationale and predictions: diagnostics vs reagent.

Italian prepositions *in* and *per* which – given their frequency, skewed distribution, polysemy, entropy and semantic flexibility – do not just act as elements whose (in)compatibility with a given verb reveals whether that verb is telic or atelic. In contrast, they represent a reagent, that is, what forces a given verb to be interpreted as telic or atelic by speakers, that is, the place where telicity is *composed* and assembled in real time, rather than being the place where telicity is *checked*. We therefore do not expect the typical signatures of semantic violations (e.g. N400), but the correlates of an interpretive mechanism which integrates the linguistic input in the ongoing discourse representation (Paczynski et al., 2014).

3. Research questions.

(1) do brain responses show native speakers' attempt to accommodate telic vs atelic predicate and time expressions? (2) Are there differences (onset, amplitude, duration) in ERP components with telic and atelic predicates? (3) Do frequency and distribution of prepositions modulate ERP effects?

4. Method and materials.

We tested n. 28 right-handed Italian native speaker (Mean Age=24.46, Range=20-37) with ERPs. Sentence stimuli adapted from the Dowty's test had identical structure. Corpus analysis (ItTenTen20, 12b words) show that – for our sample verbs – such rule holds more for atelic than telic verbs, with the latter showing no clear preference toward either preposition. The raw EEG acquired from 59 active electrodes placed on the scalp was pre-processed with BrainVision Analyzer 2 (filter: 0.15-35Hz; ICA correction of ocular artifacts; semi-automatic artifact rejection (9.17%)). The effects of the experimental factors [Acceptability and Telicity] and one topographical factor [Longitude (Frontal, Central and Parietal)] were tested at two word positions - prepositions and noun - with linear mixed models in R.

5. Results.

We analyzed voltage amplitude in a time window spanning from 400 to 700ms to capture sustained anterior negativities. No effects were found either at the verb or

at time- expressions. In contrast, a significant effect was found at the prepositions. A three way interaction between Telicity, Acceptability (compatibility between verb and time expressions) and Longitude emerged [$F=7.79$, $p<.001$], showing that the effect of compatibility in frontal electrodes for atelic sentences (see distribution in Figure 1) surfaces the form of a larger negativity for allegedly incompatible ones [$-0.78\mu V$, $t=-2.03$, $p=.04$], while the effect was not robust for telic sentences.

6. Discussion.

On the one hand our results are compatible with the those already found in the ERP literature concerning coercion. On the other hand, our study introduces frequency and distribution of prepositions (the *ratio* of their temporal uses) as novel factors which enter the *aspectual calculus*. Indeed, at the preposition, incompatible combinations with preposition *in* elicited a sustained negativity with atelic but not with telic verbs, possibly confirming that (1) the test is asymmetric (as suggested in the literature) and (2) the amplitude of the effect linked to coercion is modulated by the distribution of temporal uses of the prepositions in the Italian input. The results are commented in the light of recent debate concerning the relationship between the impact of statistical processing on semantic representations.

References:

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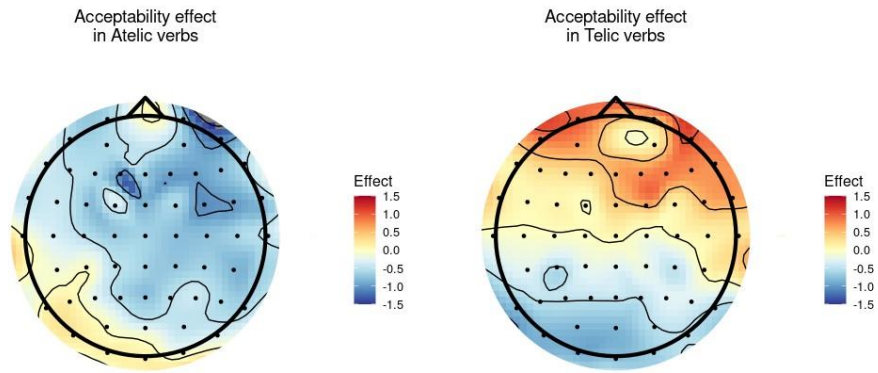


Figure 1: Scalp distribution of the difference between Acceptable and Unacceptable sentences for atelic (on the left) and telic (on the right) sentences.