HOW THE MOVEMENT OF TEMPORAL ADVERBS CAN AFFECT TENSE PROCESSING

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THE CRUCIAL ROLE OF DEICTIC TEMPORAL ADVERBS

In Italian, temporal information is mainly expressed through the tense morphology and through temporal adverbs.

Deictic temporal adverbs must denote a time interval that is coherent with the temporal features expressed by the verb otherwise the sentence would be ungrammatical.
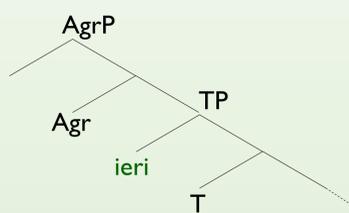
Deictic
ieri
la settimana scorsa
domani   due anni fa
....
Clock-calendar
martedì
nella notte   alle 2
a mezzogiorno

(Smith, 1981)

Ieri $_{PAST}$ Gigi andò $_{PAST}$ al concerto.
'Yesterday Gigi went to the concert'

* Ieri $_{PAST}$ Gigi andrà $_{FUT}$ al concerto.
'Yesterday Gigi will go to the concert'

Temporal Concord is that linguistic phenomenon that guarantees the coherence between the temporal features expressed by the verbal morphology and a deictic temporal adverb in a sentence.

STRUCTURAL POSITION

AgrP
Agr   TP
ieri
T

(Cinque 1999, Alexiadou 2000)

however ...

* Gigi ha ieri comprato una chitarra.
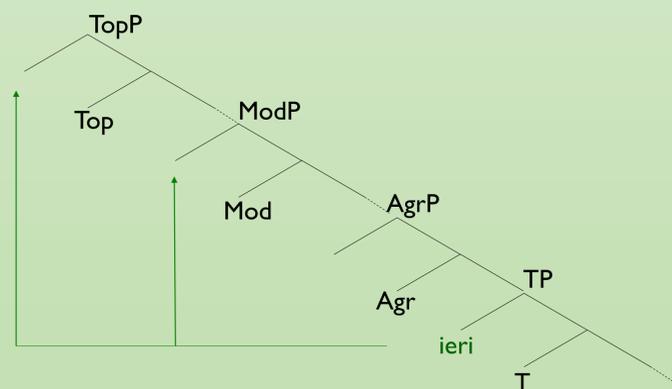'Gigi has yesterday bought a guitar.'

[$_{AgrP}$ phi-f ha] ... [$_{TP}$ ieri [...[$_{vP}$ Gigi [$_{VP}$ comprato una chitarra]]]

The adverb seems to intervene during the *probe-goal* operation between the functional head in AgrP bearing phi-features and the subject inside vP.

The interference can be avoided by moving a verbal chunk past the adverb through *smuggling* (Collins, 2005) as proposed by Belletti&Rizzi (2012) in the case of an intervening adverbial PP containing a nominal phrase (e.g. 'di corsa').

[$_{AgrP}$ phi-f ha] ... [$_{TP}$ ieri [...[$_{vP}$ Gigi [$_{VP}$ comprato una chitarra]]])

MOVEMENTS TOWARDS THE LEFT PERIPHERY

TopP
Top   ModP
Mod   AgrP
Agr   TP
ieri
T

(Rizzi, 2004a)

As other preposed adverbs, the temporal adverb generally moves to [spec,ModP] for prominence reasons but can move also to [spec,TopP] if:
• mentioned in the previous context
...
   X: Cosa è successo ieri a Gigi?
      'What happened yesterday to Gigi?'
   Y: Ieri Gigi ha trovato un nuovo lavoro.
      'Yesterday Gigi found a new job.'
• internal/external argument of a verb
   (a) Ieri, Gigi lo ricorderà come il giorno più bello della sua vita.
      'Yesterday, Gigi will remember it as the best day of his life'
   (b) Ieri, Gigi dirà che è stato il giorno più bello della sua vita.
      'Yesterday, Gigi will say that it was the best day of his life'

Is the online processing of the temporal information sensitive to the movement and to the position of the temporal adverb?

A BEHAVIOURAL STUDY
(Biondo & Vespignani)

Hypothesis

I. When a temporal violation is detected on the verb (condition 1. and 2.) we expect a different pattern of response with respect to the condition in which the mismatch is detected on the adverb (condition 3.);

II. We expect also different parsing costs depending on the manipulation of the structural/linear distance between the two critical constituents (condition 1. and 2.)

Method

Participants: 36 (13 males, 23 females, mean age 25.2 years)
Paradigm: self-paced reading and yes/no comprehension questions
Stimuli: 72 critical sentences + 86 fillers (Number and Negative Polarity Items violations)

1. **ADVERB_Subj_Verb**   a) Ieri $_{PAST}$ notte il conte trovò $_{PAST}$ il tesoro nella caverna...
   b) *Ieri $_{PAST}$ notte il conte troverà $_{FUT}$ il tesoro nella caverna...

2. **Subj_ADVERB_Verb**   c) Il conte ieri $_{PAST}$ notte trovò $_{PAST}$ il tesoro nella caverna...
   d) *Il conte ieri $_{PAST}$ notte troverà $_{FUT}$ il tesoro nella caverna...

3. **Subj_Verb_ADVERB**   e) Il conte trovò $_{PAST}$ il tesoro ieri $_{PAST}$ notte nella caverna...
   f) *Il conte troverà $_{FUT}$ il tesoro ieri $_{PAST}$ notte nella caverna...

(target word underlined)

Results

Condition 1, surprisingly, shows no effects: a small numerical difference shows up only 2 words after the critical one. **Condition 2** shows the larger and more sustained effect. **Condition 3** shows significant parsing costs but less prolonged than the costs in condition 2.

Table: differences between mean reaction times (RTs) for the violated and the control sentences, repeated measures ANOVAs on average RTs and T-tests for each condition and for each word position (target word and the following 4 words).

$p < 0.01 = $ '**' $p < 0.05 = $ '*' $p < 0.1 = $ '.'

		Critic Word Position				
		target	**1**	**2**	**3**	**4**
Difference mean RTs (ms)	1. **ADV_Sj_V**	-7	-7	27	8	0
	2. **Sj_ADV_V**	36	24	20	23	12
	3. **Sj_V_ADV**	17	27	6	-1	2
ANOVAs			CondXGram * F(2,70)=3.99	CondXGram * F(2,70)=3.99 Gram * F(1,35)=4.45		
T-tests	1. **ADV_Sj_V**					
	2. **Sj_ADV_V**	**	*	.	*	.
	3. **Sj_V_ADV**	.	*			

Conclusions

The different location of the adverb affects the temporal concord processing during sentence comprehension.

In the Left Periphery of the structure the adverb can assume different discourse-related properties that do not necessarily require a matching with the tense morphology so the temporal concord checking could be postponed to later stages of processing in which discourse properties will be checked.

When the adverb and the verb are structurally/linearly closer, the temporal mismatch gives rise to a strong and sustained effect (spillover).

When the violation is detected on the adverb, the pattern of response is different with respect to the other conditions, as reported in the previous literature (Faroqi-Shah & Dickey 2009).

References: Alexiadou (2000) in *Rivista di linguistica*, 12(1), 55–75; Cinque (1999), Adverbs and Functional Heads, OUP; Belletti & Rizzi (2012) in: The Cartography of Syntactic Structures vol.7, OUP; Collins (2005) in *Syntax*, 8(2), 81-120; Faroqi-Shah & Dickey (2009) in *Brain & Language*, 108, 97-111; Rizzi (2004a) in: The Cartography of Syntactic Structures vol.3, OUP; Smith (1981) in: Syntax and Semantics vol.14, AP.

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