



TRANSITIVITY IN THE LIGHT OF EVENT RELATED POTENTIALS

Stéphane ROBERT
CNRS-LLACAN and Labex EFL, Paris

stephane.robert@cnrs.fr



A joint work with neuroscientists

Experiment

- on transitive construction in French
- using Event Related Potential's (ERPs) measures
(Magne, Besson & Robert, 2014)

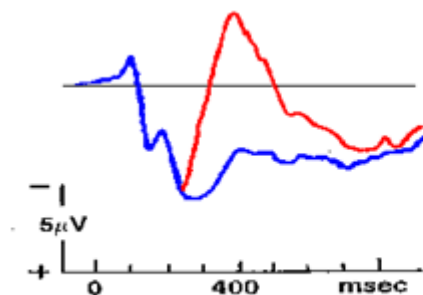
ERPs : recording of

- changes in the brain's electrical activity
- timelocked to an event
- e.g. introduction of an unexpected word





- **N400 and semantic processing**
(Kutas & Hillyard, 1980)

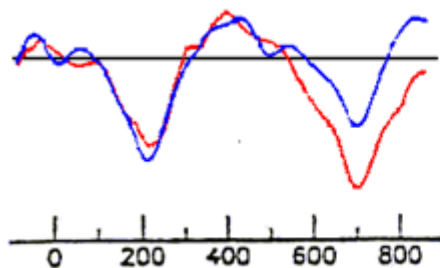


He carries his kid in his

— arms

— nostrils

- **P600 and syntactic processing**
(Osterhout & Holcomb, 1992)



The boy ... with the ball

— plays

— play



Purpose of experiment on transitive clauses in French:

- Semantics processed **independently** or in **interaction with syntax** ?



Testing transitivity

Manipulating **2 factors** (each with 2 values) in **SVO clauses** (French)

✓ **Syntactic congruence**

S+ vs **S-**

(transitive V)

(intransitive V)

✓ **Semantic ('conceptual') congruence**

C+ vs **C-**

(congruent Obj.)

(incongr. Obj.)



4 experimental conditions

4 types of SVO clauses:

- | | |
|--|---|
| (1) L'ennemi a préparé un complot
The enemy prepared a scheme (T) | S+C+
<i>control condition</i> |
| → (2) *L'ennemi a conspiré un complot
The enemy conspired a scheme (I) | S-C+
<i>transitive coercion</i> |
| (3) L'ennemi a labouré un complot
The enemy ploughed a scheme (T) | S+C- |
| (4) *L'ennemi a déjeuné un complot
The enemy lunched a scheme (I) | S-C- |

Hypothesis : meaning influences syntactic processing



Maximizing semantic congruence

Target **(S-C+)** condition :

Strong semantic association between VO and SV

prototypical **S** → Verb → 'internal' **Object**

L'ennemi a conspiré un complot.

The enemy conspired a scheme. (I)

La concierge a bavardé un ragot.

The janitor chattered a rumour. (I)

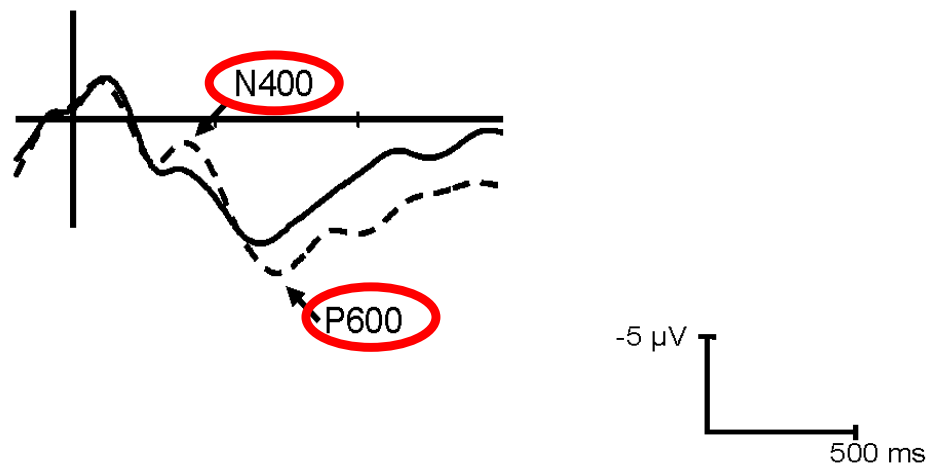
Le gamin a pleurniché un sanglot.

The kid whined a tear. (I)



(1) Double incongruity (S-C- vs. S+C+) :

the expected **N400** (semantics) and **P600** (syntax) on Object



— *Congruous*

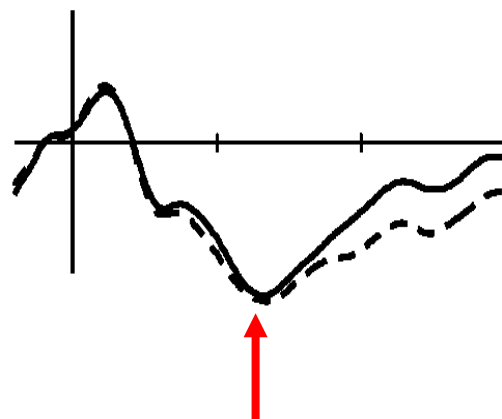
L'ennemi a préparé un complot
The enemy prepared a scheme

- - - *Incongruous*

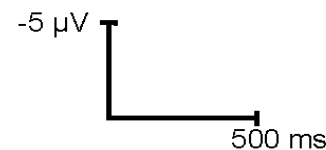
L'ennemi a déjeuné un complot
The enemy lunched a scheme



(2) Simple syntactic incongruity (S-C+ vs. S+C+)



no significant differences !
syntactic violation undetected
semantics overrides syntax



<p>— Congruous</p> <p>L'ennemi a préparé un complot The enemy prepared <u>a scheme</u></p>	<p>- - - Incongruous</p> <p>L'ennemi a conspiré un complot The enemy conspired <u>a scheme</u></p>
--	--



A linguistic account

How to account for these results ?

Frame semantics and Construction Grammar

(Fillmore 1982, Goldberg 1995 and 2004)

- ✓ **Verbs**
 - a rich semantic structure ('semantic frame')
 - foregrounded components: 'participant' roles (obligatory)
- ✓ **Syntactic constructions :**
 - have an intrinsic meaning (profiling 'argument' roles)



A linguistic account

- ✓ Semantics of the transitive construction:
to profile an Object as the affected or effected Patient of the process
- ✓ Transitive coercion (**transitive construction on Intransitive V**):
Adding an Object argument role profiled as an affected or effected Patient

A suitable argument, **backgrounded** in the **verb's semantic frame** ?



A linguistic account

(1) S-C+ sentences: « successful » transitive coercion

L'ennemi a conspiré un complot

The enemy **conspired a scheme** ← internal Obj. (*sem. frame*)

a scheme is a result (or effected object) of conspiring

Backgrounded component retrieved by the construction

(2) S-C- sentences: « failed » transitive coercion

L'ennemi a déjeuné un complot

The enemy **lunched a scheme**

a scheme can not be retrieved from semantic frame of lunch

→ P600



Reducing S-V semantic association

Experiment 1

Semantic congruence maximized (S-V-O)

prototypical Subject + Verb + « **internal Object** »

L'ennemi a conspiré un complot
The enemy conspired a scheme

Experiment 2

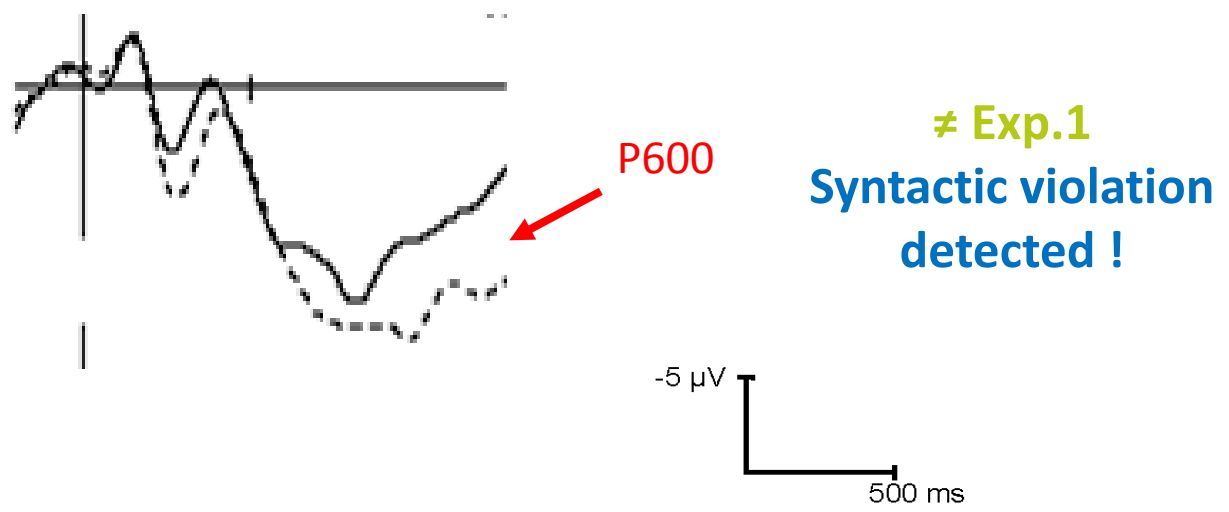
Reduction of the (S-V) semantic association

Proper name + Verb + « **internal Object** »

Thomas a conspiré un complot
Thomas conspired a scheme



Simple syntactic incongruity (S-C+ vs. S+C+) with Neutral subject



—	<i>Congruous</i>	- - - -	<i>Incongruous</i>
Thomas a préparé un complot Thomas prepared <u>a scheme</u>		Thomas a conspiré un complot Thomas conspired <u>a scheme</u>	



Transitives clauses (SVO) with intransitive verb

(Exp.1) If **S-V-O semantically strongly related** : **no P600 on Object**
Semantic congruence overrides syntactic violation (V-O)

→ Semantic context influences syntactic processing

(Exp.2) With a **congruent O** but a **neutral Subject** : **P600 on Object**
Semantically related Object not sufficient

→ Syntactic processing relies on the entire semantic context

Gradual effect of semantic context, with threshold

(cf. multifactorial and gradual aspects of transitivity)

- The **S-V** relationship influences processing of **V-O** relationship !

→ (prototypical) S induces **scenarios and expectations**

Neutral Subject : **reduced semantic anticipation** on O



Results validate models :

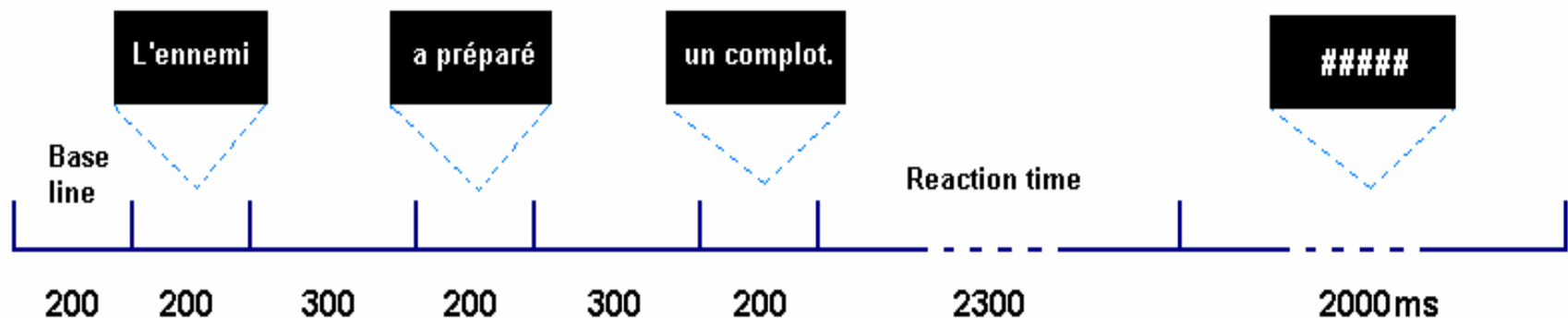
- Constructionist (≠ modularist) approach to coercion (Michaelis 2004)
- Sentence comprehension :
 - all linguistic cues integrated into a meaningful global representation
 - constantly updated (new coming information)
 - generating expectations(cf. e.g. Robert 1999, Michaelis 2003 « scene construal »)
- In line with interactive models of language processing

References

- Fillmore Charles. 1982. Frame Semantics. In Linguistic Society of Korea (ed.), *Linguistics in the Morning Calm*. Seoul: Hanshin, 111-138.
- Goldberg Adele. 1995. *Constructions. A construction grammar approach to argument structure*. Chicago/London: The University of Chicago Press.
- Kutas M. & Hillyard S. A. 1980. Reading senseless sentences: brain potentials reflect semantic incongruity. *Science* 207: 203–204.
- Magne Cyrille, Besson Mireille & Robert Stéphane. 2014.** Context influences the processing of verb transitivity in French sentences: more evidence for semantic-syntax interactions, *Language and Cognition* 6/2: 181-216.
- Michaelis L. 2004. Word meaning, sentence meaning, and syntactic meaning. In H. Cuykens, R. Dirven & J. R. Taylor (Eds.), *Cognitive approaches to lexical semantics*. Berlin/New York : Mouton de Guyter, 163-210.
- Michaelis Laura A. 2004. Type-shifting in Construction Grammar: An Integrated Approach to Aspectual Coercion. *Cognitive Linguistics* 15 (1): 1–67.
- Osterhout L. & Holcomb P. J. 1992. Event-Related brain potentials elicited by syntactic anomaly. *Journal of Memory and Language* 31: 785 – 804.
- Robert S. 1999. Cognitive invariants and linguistic variability: from units to utterance . In C. Fuchs & S. Robert (Eds.), *Language diversity and cognitive representations*. Amsterdam/Philadelphia : John Benjamins, 21-35.

Thank you for your patience !

- Subjects : 25 native French-speaking students (Mean = 25 years)
- Task : Participants were asked to decide whether the sentence was semantically and syntactically acceptable.
(112 experimental sentences + 112 fillers)
- Timing : (Visually presented)



The 26 intransitive verbs of the corpus for S-C+ condition

Speech

bavarder	to chatter
disserter	to talk at length
divaguer	to wander (psy.)
papoter	to have a natter
plaisanter	to joke, to kid
radoter	to ramble (on)
ronchonner	to grumble
tempêter	to storm, rage
fabuler	to confabulate
délirer	to rave

Gesture

grimacer	to make a face
jubiler	to exult
minauder	to simper
pleurnicher	to whine
ricaner	to sneer
sourciller	to frown
tressaillir	to shudder

Motion

naviguer	to sail
tournoyer	to spin
voltiger	to do acrobatics, to flutter

Arrangement

conspirer	to conspire
intriguer	to scheme
magouiller	to wangle
transiger	to compromise

Reduced Activity

flemmarder	to idle
paresser	to laze
somnoler	to doze