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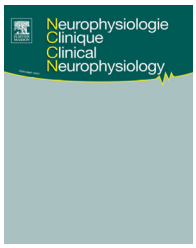

ORIGINAL ARTICLE/ARTICLE ORIGINAL

''All that glitters is not . . . alone''. Congruity effects in highly and less predictable sentence contexts

« *Tout ce qui brille n'est pas...* » : *effets de congruité dans des phrases que le contexte rend hautement ou faiblement prédictibles*

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Summary
Context. — Using natural connected speech, the aim of the present study was to examine the semantic congruity effect (i.e. the difference between semantically incongruous and congruous words) in sentence contexts that generate high or moderate final word expectancies.
Methods. — We used sentences with two levels of word expectancy in the auditory modality: familiar proverbs (that generate high final word expectancy), and unfamiliar sentences (that generate only moderate final word expectancy).
Results. — Results revealed an early congruity effect (0—200 ms) that developed across all scalp sites for familiar proverbs but not for unfamiliar sentences. By contrast, typical centro-parietal N400 and Late Positivity Component congruity effects developed later (200—500 ms and 600—900 ms ranges) for both familiar proverbs and unfamiliar sentences.
Discussion. — We argue that the early congruity effect for proverbs comprises both a Phonological Mismatch Negativity, reflecting the processing of the acoustic/phonological mismatch

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between the expected (congruous) and unexpected (incongruous) sentence completions and a typical N400 semantic congruity effect with an unusual short latency because final words can be predicted from the unusually high contextual constraints of familiar proverbs. These results are considered in the light of current views of anticipation and prediction processes in sentence contexts.
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MOTS CLÉS
Langage en conditions naturelles ;
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LPC

Résumé
Contexte. — À partir d'un matériel linguistique en conditions écologiques, nous proposons d'étudier l'effet de congruité sémantique (i.e. la différence entre mots sémantiquement incongrus et mots congruents) lors de la présentation de phrases entières.
Méthodes. — Les phrases présentées en modalité auditive sont des proverbes familiers (anticipation élevée du mot cible final) ou des phrases littérales non familières (anticipation modérée).
Résultats. — Pour l'écoute de proverbes familiers, les résultats montrent un effet de congruité précoce (0—200 ms), topographiquement diffus. Cet effet précoce n'est pas retrouvé lors de l'écoute des phrases littérales non familières. En revanche, les deux types de phrases sont associés à des effets de congruité plus typiques pour les composantes N400 (200—500 ms, distribution centro-pariétale) et LPC (600—900 ms).
Discussion. — Nous décrivons l'effet de congruité précoce associé à l'écoute des proverbes familiers comme secondaire (1) à un décalage de nature acoustico-phonologique entre les phrases attendues (congruentes) et celles non attendues (incongrues) (en discutant l'influence de la composante PMN, pour *Phonological Mismatch Negativity*) et (2) à un effet de congruité sémantique de type N400, avec une latence particulièrement précoce. Cette précocité implique une prédiction de mots cibles dans des contextes sémantiques hautement contraints (proverbes familiers). Ces résultats sont examinés en termes de processus d'anticipation et de prédiction mises en jeu lors de l'écoute de phrases entières.
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Introduction

Language is one of the most complex and still one of the fastest human abilities. Adults without neurological or psychiatric disease can read several hundred words per minute and on-line measures of language processing have revealed that it takes no longer than 200 to 400 ms to access a word meaning. Processing times may even be faster if the critical word is highly expected based on the sentence context. The general aim of the present experiment was to examine the semantic congruity effect (i.e., the difference in processing semantically incongruous and congruous words) in sentence contexts that generate high or moderate expectations of the final words. To favor high expectations of the final words, we selected familiar proverbs. We also used connected speech that has been less studied than visual sentence presentation, especially in the study of proverb comprehension. Finally, we recorded both behavioral data and Event-Related brain Potentials (ERPs). ERPs, and in particular the N400 and Late Positive Components (LPC), have been extensively used to specify the time course of language comprehension. We will first briefly review the main findings related to these two components. We will then summarize previous results with proverb comprehension before describing the specific aims and hypotheses of the present study.

The N400 is one of the most studied ERP components in neurolinguistics. Initially described in the visual modality by Kutas and Hillyard [54], this negative component, with an onset latency around 250 ms and a maximum amplitude over right centro-posterior scalp sites at approximately 400 ms post-stimulus onset, is classically elicited by semantically unexpected sentence completions (see [53,58,93] for reviews). The N400 is also elicited in the context of a single word (in word pair designs), of a single sentence or of a discourse [2,8,32,37,55,88]. Maybe most importantly, N400 amplitude is inversely correlated to word expectancy [1,55,94]: contextually congruous but unexpected words elicit larger N400s than congruous and expected words [34,55]. N400 amplitude has also been shown to be larger for imageable and concrete nouns than for abstract and less pictureable nouns [40], for low frequency than for high frequency words [94] and for a word's first presentation than for its repetition [3,95]. Finally, the N400 develops in both the visual and the auditory modalities [22,39,54,57], as well as in sign language [71]. Interestingly, and perhaps paradoxically since the auditory input unfolds in time (while visual information is presented all at once) the N400 for spoken words in connected speech typically shows earlier onset latency and longer duration than for written words in visual sentences [4,35,38,39]. The auditory N400 effect (i.e. the difference between the N400 for auditorily presented semantically unexpected and expected words) typically develops as early as 50—100 ms, with a fronto-central or equipotential scalp distribution, and lasts for several hundred milliseconds [4,35,38,56].

The N400 component has largely been used to test specific models of word recognition and sentence comprehension [32,53,58,97]. An issue that is still a matter of debate and of interest here is whether the N400 reflects integration or anticipation processes. In the early

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