'NONETHELESS' CAN REVERSE PREDICTIONS IMMEDIATELY: EVIDENCE FROM ERPs

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UCL

INTRODUCTION

CONCESSIVE CONNECTIVES (CC)

such as 'Nonetheless" function to contrast current proposition with prior discourse[1], e.g.:

> "Elizabeth had a history exam on Monday. She took the test and **failed/aced** it. Nonetheless, she went home and **celebrated** wildly."

PREVIOUS ERP FINDINGS ON CC PROCESSING[2]

- Comprehenders use 'even so' to reverse expectations about upcoming words.
- N400 amplitude attenuation to coherent (under *failed*) critical words relative to incoherent (under *aced*) critical words.

IS THIS PREDICTION UPDATE FULLY INCREMENTAL?

- Related linguistic devices such as negation and quantifiers like 'few' and 'rarely' may not be processed fully incrementally.[3, but c.f. 4]
- Evidence suggests some predictive computations may take longer than others (e.g., using argument roles in verb prediction) [5].

QUESTION

How quickly can concessive connectives reverse predictions in real time?

METHODS

2 x 2 (Coherence x Distance) within participant design; n=27; RSVP (600ms SOA) 30 trials per condition (120 total) + 60 fillers. No commas in target sentences.
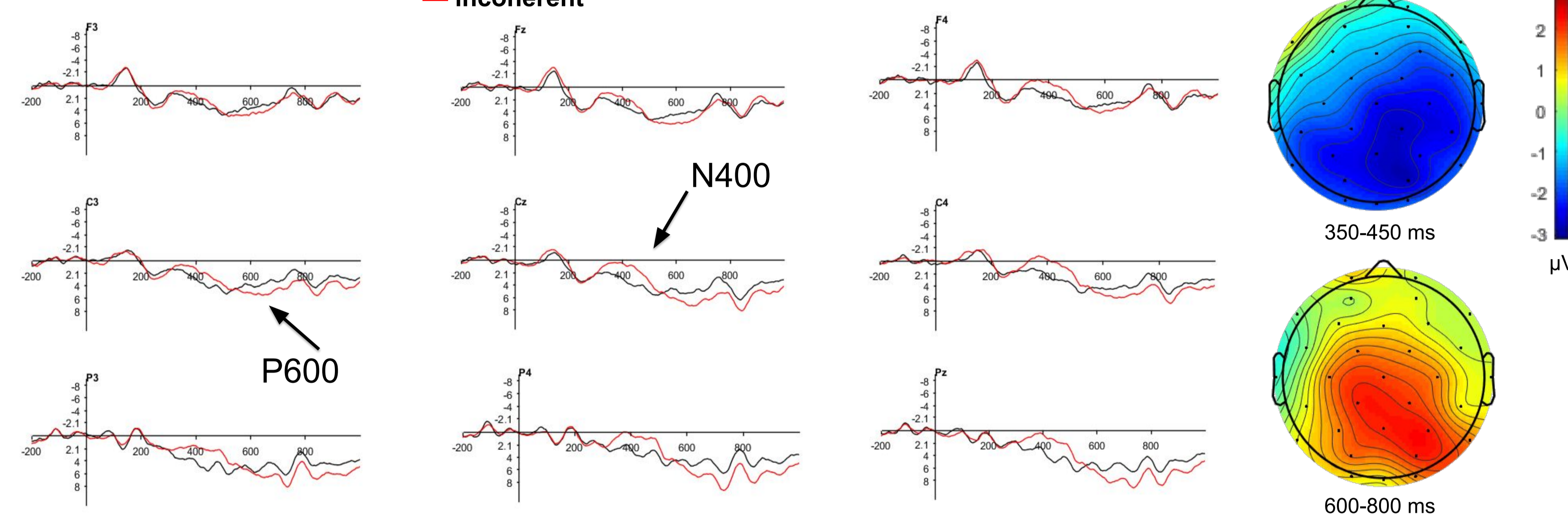
	Long	Short
Coherent	The tourist wanted to get back to his hotel. He had a map the city for directions. *Nonetheless he was lost in the city's winding streets.* 0.41(0.21)	The tourist wanted to get back to his hotel. He had a map of the city for directions. *He was nonetheless lost in the city's winding streets.* 0.37(0.21)
Incoherent	The tourist wanted to get back to his hotel. He couldn't find his map. *Nonetheless he was lost in the city's winding streets.* 0.02(0.04)	The tourist wanted to get back to his hotel. He couldn't find his map. *He was nonetheless lost in the city's winding streets.* 0.03(0.05)

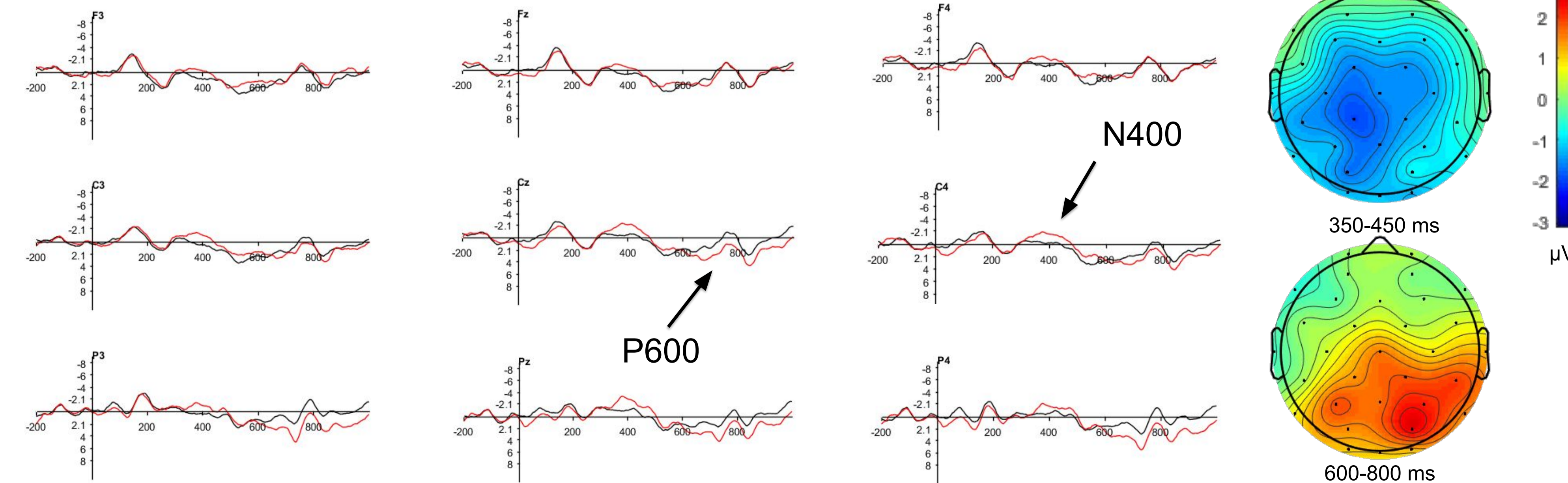Sample stimuli and average cloze probability (and standard deviation) of the target word

RESULTS

N400 and P600 effects observed for both types of stimuli, no significant coherence x distance interaction.
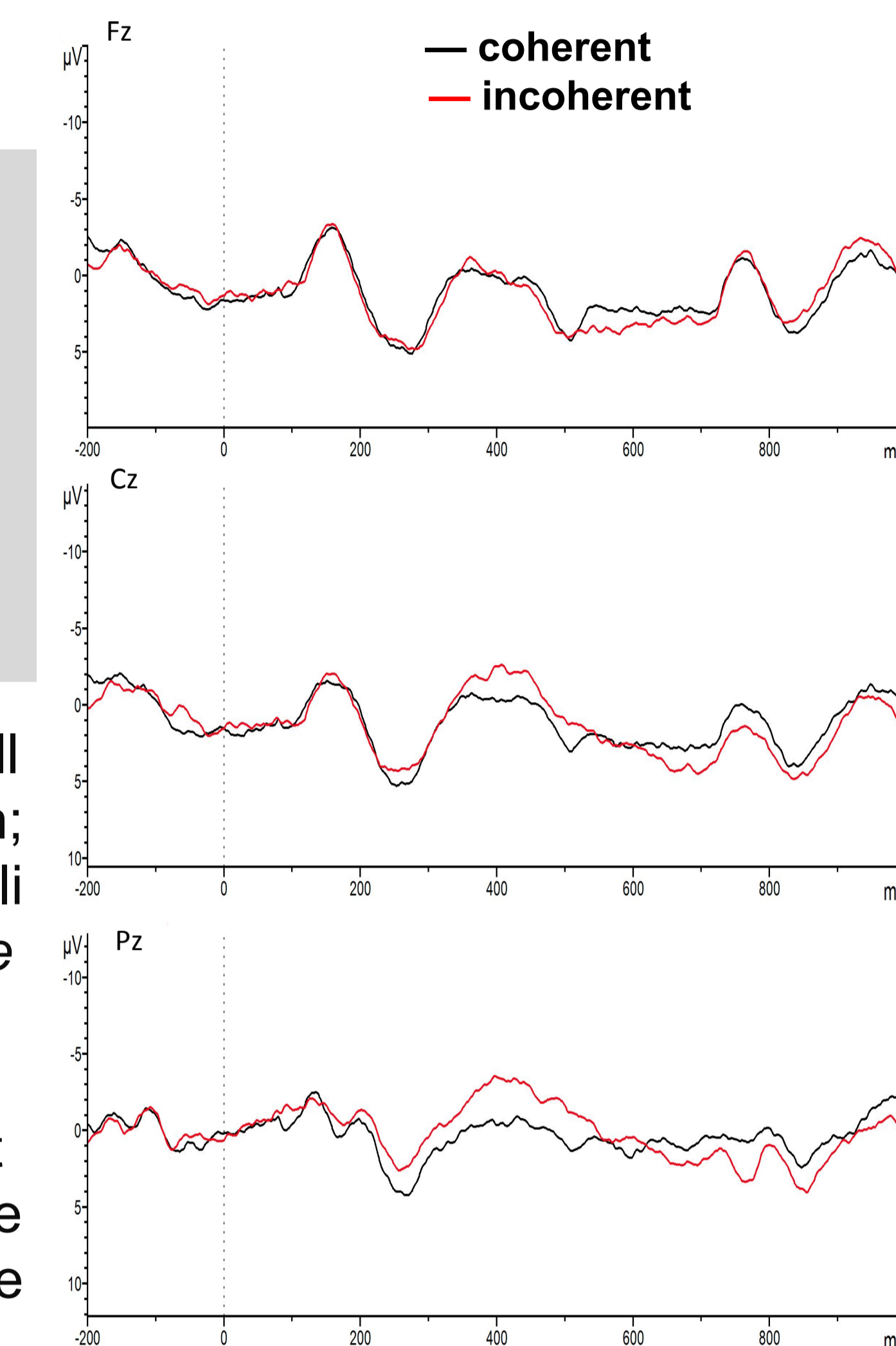
LONG DISTANCE

— coherent
— incoherent

N400
P600

350-450 ms

600-800 ms

µV

SHORT DISTANCE

— coherent
— incoherent

N400
P600

350-450 ms

600-800 ms

µV

FOLLOW-UP

Could the lack of distance x coherence interaction be due to the frequent occurrence of *Nonetheless* in the stimuli?

— coherent
— incoherent

METHODS   N=17. All stimuli in short condition; CC in half of the stimuli replaced with *Therefore* in place of *Nonetheless*.

RESULTS   Significant effect of Coherence in the N400 time window in the Nonetheless stimuli.

DISCUSSION

N400 EFFECT expectation reversal function of concessive connectives incrementally updates linguistic predictions about upcoming words.

P600 EFFECT incongruity detection, in line with previous functional interpretations of P600.[6]

Both effects are present even when the comprehender has no clear expectation of *Nonetheless* in the target sentence.

'Nonetheless' reverses predictions about upcoming words immediately.

Outstanding questions:
- Can other connectives be used to confirm or disconfirm predictions immediately?

References [1] **Blakemore, D.** (2002). Relevance and linguistic meaning: The semantics and pragmatics of discourse markers (Vol. 99). Cambridge University Press. [2] **Xiang, M., & Kuperberg, G.** (2015). Reversing expectations during discourse comprehension. Language, cognition and neuroscience, 30(6), 648-672. [3] **Urbach, T. P., & Kutas, M.** (2010). Quantifiers more or less quantify on-line: ERP evidence for partial incremental interpretation. Journal of Memory and Language, 63(2), 158-179. [4] **Nieuwland, M. S., & Kuperberg, G. R.** (2008). When the truth is not too hard to handle: An event-related potential study on the pragmatics of negation. Psychological Science, 19(12), 1213-1218. [5] **Chow, W. Y., Lau, E., Wang, S., & Phillips, C.** (2018). Wait a second! Delayed impact of argument roles on on-line verb prediction. Language, Cognition and Neuroscience, 1-26. [6] **Van Petten, C., & Luka, B. J.** (2012). Prediction during language comprehension: Benefits, costs, and erp components. International Journal of Psychophysiology, 83(2), 176–190