

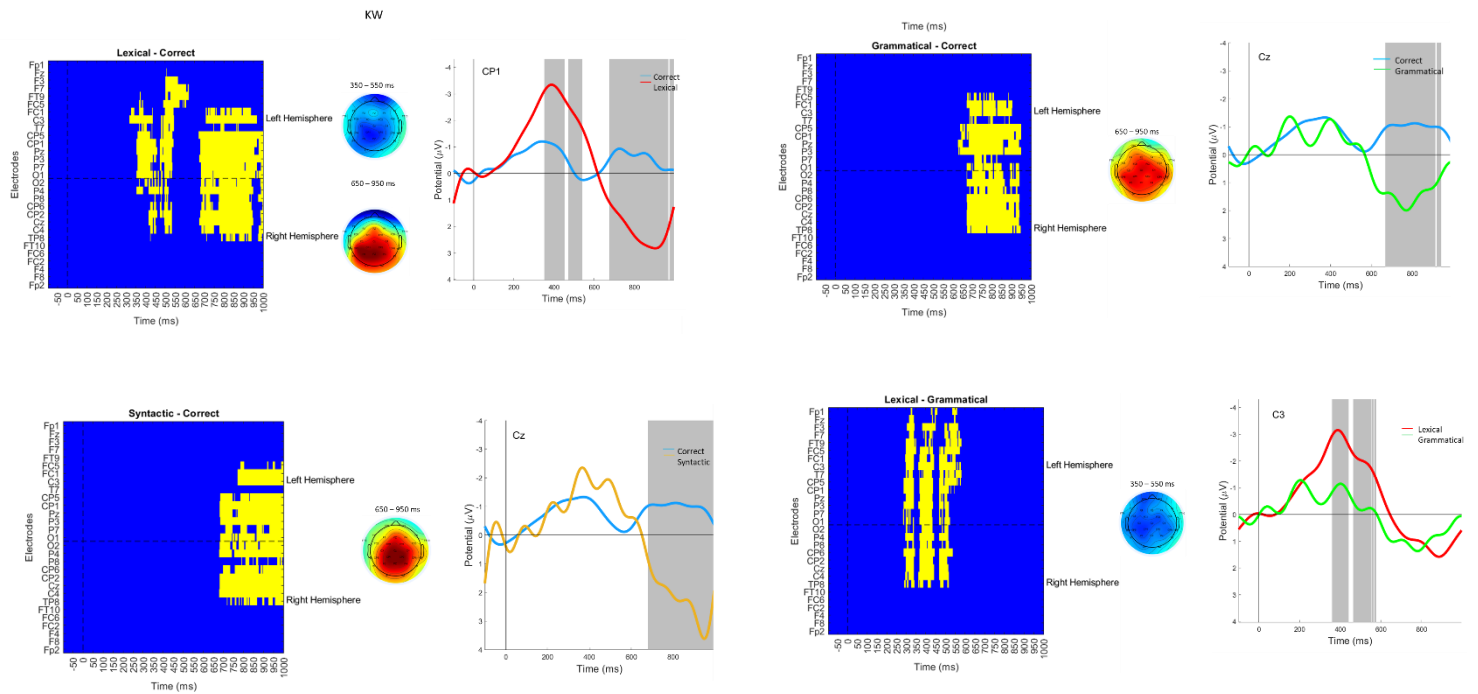
Sentential meaning integration: Evidence from ERPs in neurotypical brains and Williams syndrome

The interpretation of well-known N400 and late positive components (LPC) and their role in processes of meaning retrieval vs. integration has remained controversial (Delogu et al., 2019; Hagoort, 2020). This distinction is crucial for illuminating the semantic profile of people with Williams syndrome (Pinheiro et al., 2010). Here we explored a new paradigm primed by the unCartesian linguistics program (Hinzen & Sheehan, 2015) which motivates a dissociation between semantic conflicts arising ‘online’ during the construction of referential meaning and semantic conflicts derived from a collision with stored knowledge. Specifically, we compared three anomalous conditions against a baseline of correct sentences across five word positions within stimulus sentences: semantic anomalies that are lexically driven (*I arrived in a button last week*), semantic anomalies that are grammatically but not lexically driven (*I arrived in a London last week*), and formal-syntactic anomalies (*I arrived in a cities last week*). **In neurotypical adults, ERP results showed that (i) only the lexically-driven anomalies elicited N400 components, while (ii) all three anomalous conditions elicited LPCs** extending from the target word to subsequent word positions in the sentence, and (iii) these LPCs were all distinct in latency, amplitude and spatiotemporal topographies. These results accumulate support for a memory-restricted role of the N400 and provide initial evidence that the LPCs modulations triggered by grammar-level meaning are distinct from lexical modulations triggering LPCs. The hypothesis for WS was that it involves an atypical processing of meaning at the grammatical rather than at lexical level, causing deficits in referential anchoring. In line with this, results showed a preserved N400 for lexically anomalous sentences at the manipulated word. Syntactic violations did not show any ERP component significantly different from correct sentences at any word position, and grammatically-driven semantic anomalies showed no effects at the manipulated word position and an atypical biphasic right fronto-central pattern of temporally separated components in the subsequent word position. **The absence or atypicality of the LPCs suggests that people with WS process meaning integration at the sentential or global level in a highly atypical way, while leaving lexical semantics as such intact.** Both the neurotypical and WS results show the fruitfulness of distinguishing memory-related lexical vs. grammatically driven semantic processes, the latter related to establishing reference during online processing.

References

- Delogu, F., Brouwer, H., & Crocker, M. W. (2019). Event-related potentials index lexical retrieval (N400) and integration (P600) during language comprehension. *Brain and Cognition*, 135. <https://doi.org/10.1016/j.bandc.2019.05.007>
- Hagoort, P. (2020). The meaning-making mechanism(s) behind the eyes and between the ears. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 375. <https://doi.org/10.1098/rstb.2019.0301>
- Hinzen, W., & Sheehan, M. (2015). *The Philosophy of Universal Grammar*. Oxford University Press.
- Pinheiro, A. P., Galdo-Álvarez, S., Sampaio, A., Niznikiewicz, M., & Gonçalves, Ó. F. (2010). Electrophysiological correlates of semantic processing in Williams syndrome. *Research in Developmental Disabilities*, 31, 1412–1425. <https://doi.org/10.1016/j.ridd.2010.06.017>

NEUROTYPICAL ADULTS – ERPs at the critical word



WS adults – ERPs at the critical (A) and subsequent word (B)

