

Communicative efficiency and social biases modulate language learning in autistic and allistic individuals

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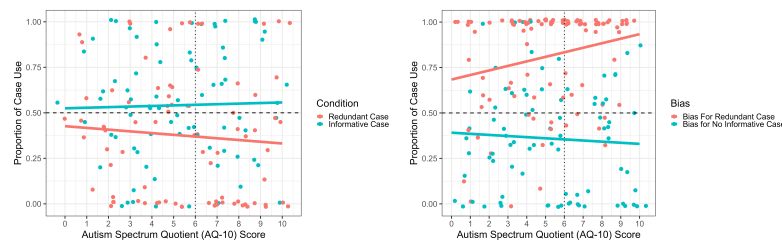
Communicative efficiency has been cited as driving many core features of linguistic systems, through a trade-off between communicative accuracy and production effort (Zipf, 1935; Roberts & Fedzechkina, 2018; Kurumada & Jaeger, 2015; Fedzechkina & Jaeger, 2020). This trade-off has been appealed to in explaining the relationship between whether a language uses case to mark grammatical roles and whether it has a fixed word order (Sinnemäki, 2008). Specifically, it has been argued that, where fixed word order alone is enough of a cue to grammatical role assignment, redundant marking with case is inefficient as it requires unnecessary production effort. On the other hand, where word order is flexible, the extra effort to produce case is warranted in order to maintain communicative accuracy. The role of social biases in modulating this trade-off have been investigated by Roberts and Fedzechkina (2018) and Fedzechkina, Hartley, and Roberts (2022), who find that learners are willing to put in more production effort, or sacrifice communicative accuracy, to meet social goals.

The study of communicative efficiency has, however, largely assumed an important degree of homogeneity amongst language users. Yet, it is increasingly clear that the assumption of homogeneity is incorrect, and that speakers vary in a multitude of ways, including in terms of neurotype. In the context of evolutionary linguistics, it is important to note that the majority of neurodivergent individuals are active members of their language communities and thus differences among individuals with different neurotypes could have an impact on language evolution as a whole. We focused on the impact of a specific neurotype – autism – on the relationship between social biases and communicative efficiency. We chose this because autism is formally characterised as a social-communicative developmental disorder (American Psychiatric Association, 2013), and differences in social and communicative skills are a key hallmark of day-to-day life for most autistic people. For example, many autistic people perform what is known as ‘masking’, where they hide their autistic traits in order to facilitate conversation with non-autistic people (Hull et al., 2017; Cook, Crane, & Mandy, 2023; Pearson & Rose, 2021)

In Experiment 1, we sought to determine whether autistic people displayed the communicative efficiency trade-off at all with regards to the negative relationship between fixed word order and case marking. We replicated the ‘no-bias’ conditions of Roberts and Fedzechkina (2018) and Fedzechkina et al. (2022) in both the autistic and non-autistic populations. In these conditions, participants learnt a simple artificial language in which object case was marked 50% of the time. In the informative case condition, word order was flexible, with 50% use of SOV and 50% use of OSV. In the redundant case condition, word order was fixed, with 100% use of SOV. We found that autistic people re-structured their input to be communicatively efficient in the same way as their allistic peers. Autistic people reduce the use of case in the redundant case condition, whilst they retain the use of case in the informative case condition, to the same degree as allistic people.

In Experiment 2, we introduced social biases into our paradigm by partially replicating the ‘bias’ conditions of Roberts and Fedzechkina (2018) and Fedzechkina et al. (2022). In the *bias for redundant case* condition, participants were told to favour a group of aliens who used object case marking 100% of the time in a fixed word order language. In the *bias for no informative case* condition, participants were told to favour a group of aliens who *did not* use object case marking in a flexible word order language. In this case, we found a clear difference between participants based on neurotype: autistic people in the *bias for redundant case condition* were more likely to increase their use of redundant case, despite it costing effort to produce, in order to meet a social bias. We argue that this reflects the fact that autistic people may put more effort into social situations through strategies such as masking in order to compensate for the difficulties they face in social interactions with allistic people.

Our results underscore the importance of considering the impact of neurotype in language evolution. In this case, our results illustrate that the strength of the effect of social biases varies across the population in ways that may impact language change. More generally, though, these results indicate that neurotype may interact in significant ways with the kinds of cognitive biases and mechanisms we appeal to in language evolution research.



(a) Case use across the two no bias conditions and its interaction with AQ-10 score. (b) Case use across the two bias conditions and its interaction with AQ-10 score

Acknowledgements

This work is in part supported by the UKRI Centre for Doctoral Training in Natural Language Processing, funded by the UKRI (grant EP/S022481/1), by the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No 757643 to the second author), and by funding from the University of Edinburgh, School of Informatics and School of Philosophy, Psychology, and Language Sciences, and the Centre for Language Evolution at the University of Edinburgh.

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