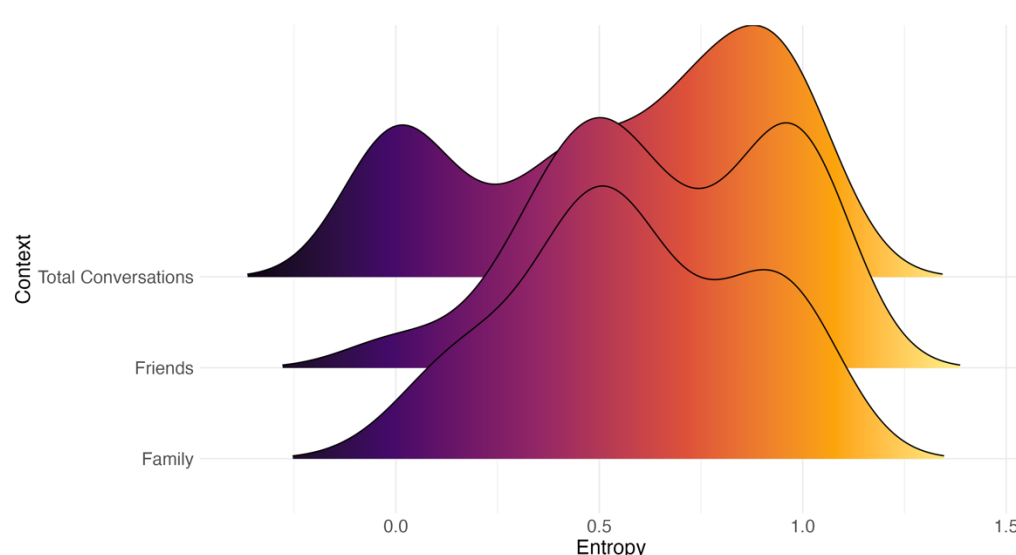
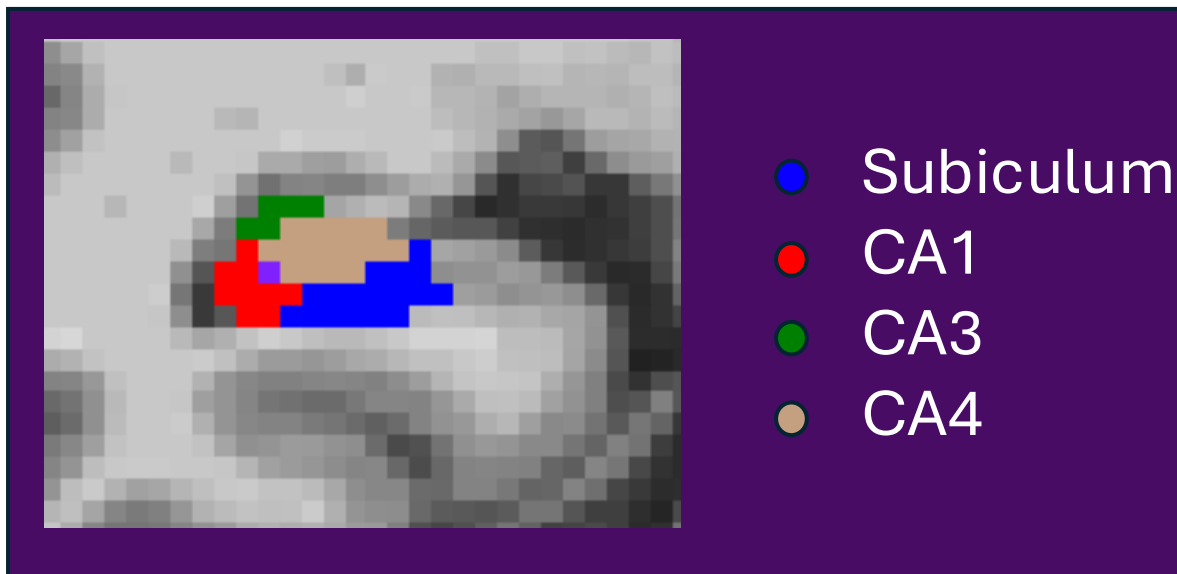
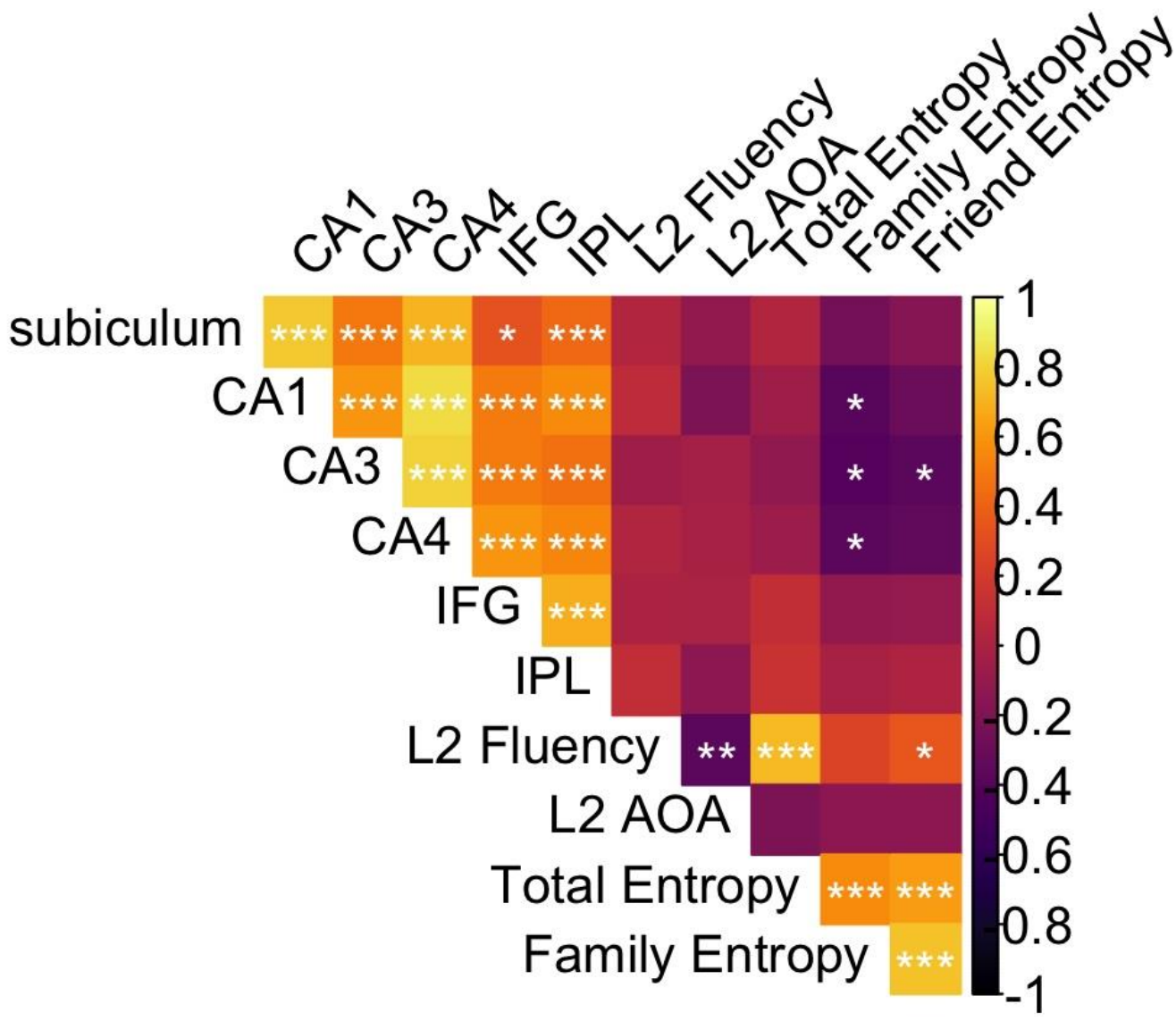
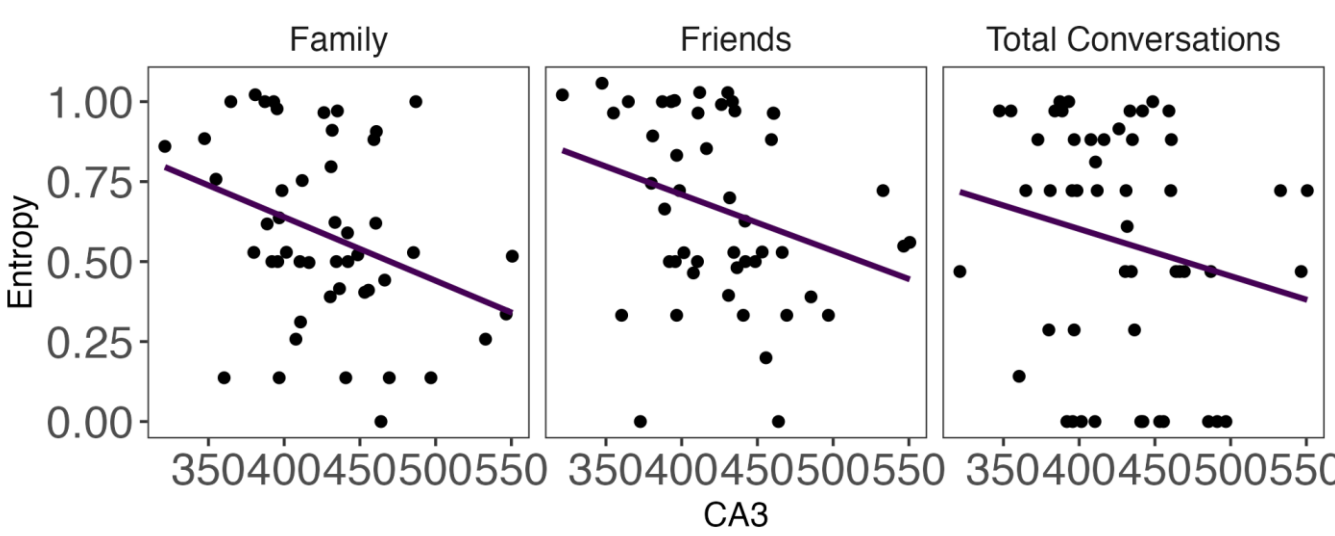


The Implications of Bilingual Language Experience for Cognitive and Brain Reserve

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Language usage patterns contribute to structural adaptations in the hippocampus, with more integrated use of the L2 (i.e., use of two languages within a single context) associated with smaller volume in CA1, CA3, and CA4, depending on social context.

INTRODUCTION	METHODS	RESULTS	CONCLUSIONS	REFERENCES
Unlike most research studying bilingual experience as a dichotomous variable (i.e., bilingual or not), we aimed to investigate whether continuous measures of bilingual language experience related to brain volume in older adults, particularly in hippocampal (HC) subfields, the inferior parietal lobule (IPL), and the inferior frontal gyrus (IFG). Here we focus on language entropy [1] as a measure of language experience.  Distribution of language entropy values in the sample. *0 represents compartmentalized use of language; 1 represents integrated use of both languages	Participants ($n = 54$) - French/English bilinguals; no other languages <i>Gender</i>: 37 Women 17 Men <i>L1</i>: 27 French 26 English 1 not identified <i>Age</i>: $M = 70.67$ years ($SD = 4.95$, range: 63 to 81) MRI Acquisition at 3T (Siemens Biograph mMR) T1w (1mm³) T2w of HC (0.4mm² x 2mm) Automatic Segmentation FreeSurfer Recon-all, followed by HC subfield segmentation [2,3,4] 	Correlation matrix between brain regions and language  Scatterplots of the CA3 subfield and entropy  A higher volume CA1/3/4 related with lower entropy. No relation with IPL/IFG. No other correlations were significant	Similar to correlations, stepwise multiple regressions controlling for age and estimated intracranial volume (implemented in Buildmer in R [5]) showed that higher entropy in the family context predicted lower volume in subiculum, CA1, CA3, and CA4. As would be expected, higher age predicted lower volume, in subiculum, CA1, IFG, and IPL. Entropy in social contexts may reflect a broader range of experiences that could influence reserve. Future analyses should consider the nature of the integrated use (e.g., lack of inhibition vs. enhanced flexibility).	[1] Gullifer, J. W., & Titone, D. (2019). Characterizing the social diversity of bilingualism using language entropy. <i>Bilingualism: Language and Cognition</i>, 23, 283–294. https://doi.org/10.1017/S1366728919000026 [2] Fischl, B. (2012). FreeSurfer. <i>NeuroImage</i>, 62(2), 774–781. [3] Fischl, B., Sereno, M. I., & Dale, A. M. (1999). Cortical surface-based analysis: I. Segmentation and surface reconstruction. <i>NeuroImage</i>, 9(2), 195–207. [4] Iglesias, J. E., Augustinack, J. C., Nguyen, K., Player, C. M., Player, A., Wright, M., ... & Fischl, B. (2015). A computational atlas for the cerebral cortex and hippocampus. <i>NeuroImage</i>, 115, 117–137. [5] Voeten, C. C. (2025). <i>buildmer: Stepwise Elimination and Term Reordering for Mixed-Effects Regression</i>. R package version 2.12, https://CRAN.R-project.org/package=buildmer.
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