Supplementary materials for: High-level cognition during story listening is reflected in high-order dynamic correlations in neural activity patterns

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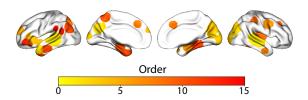
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September 9, 2019



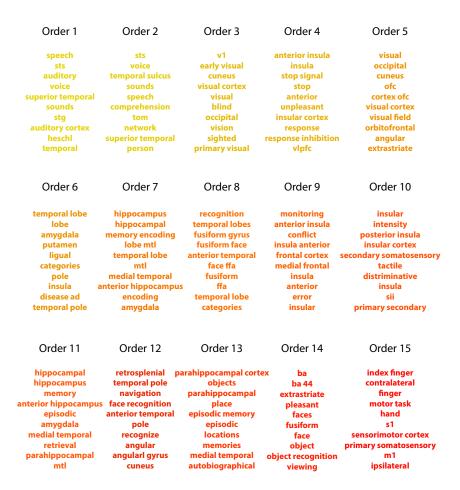
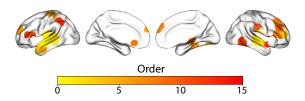
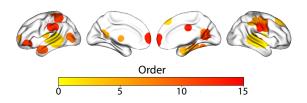


Figure S1: Top terms associated with the endpoints of the strongest correlations for the *intact* **experimental condition.** Each color corresponds to one order of inter-subject functional correlations. The inflated brain plots display the locations of the endpoints of the 10 strongest (absolute value) correlations at each order, projected onto the cortical surface (Combrisson et al., 2019). The lists of terms display the top 10 Neurosynth terms (Rubin et al., 2017) decoded from the corresponding brain maps for each order. (Also see Fig. 7, top row, in the main text.)



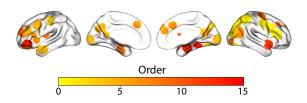
Order 1	Order 2	Order 3	Order 4	Order 5
auditory sounds speech auditory cortex superior temporal stg voice heschl pitch heschl gyrus	sounds auditory speech superior temporal voice stg auditory cortex planum spoken sts	sounds auditory superior temporal pitch speech planum auditory cortex stg temporale planum temporale	decision task visual stimulus recruited word pairs regardless respectively generally stimulus classic character	occipital inferior occipital dipfc visual thalamic lateral occipital cortex dipfc extrastriate dorsomedial dorsolateral prefrontal
Order 6	Order 7	Order 8	Order 9	Order 10
auditory stimuli	inferior frontal lobe mtl medial temporal frontal gyrus oarahippocampal cortes semantic dorsolateral prefrontal mtl lateral prefrontal concepts	inferior frontal	nucleus accumbens accumbens subgenual ventral striatum prediction dorsomedial perfrona prediction error outcome dorsomedial ventral premotor	prefrontal dorsolateral prefrontal precuneus posterior prefrontal cortex cortex precuneus dorsomedial dorsolateral medial precuneus posteral cingulate
Order 11	Order 12	Order 13	Order 14	Order 15
2 somatosensory touch somatosensory corte parietal junction tactile pain junction 1 somatosensory somatosensory s1	visual word form word form a word occipitotemporal	inferior parietal decision ips choice sulcus ips interior intraparieta maintenance intraparietal intraparietal sulcus decision making	anterior superior speech auditory listening spoken al frontal operculum temporal gyrus superior temporal thalamic sounds	sts temporal sulcus sulcus sts mental states dorsomedial dorsomedial prefrontal speaker medial superior temporal superior

Figure S2: Top terms associated with the endpoints of the strongest correlations for the *paragraph* **experimental condition.** This figure is in the same format as Figure S1, but displays results for the paragraph-scrambled story listening condition. (Also see Fig. 7, second row, in the main text.)



Order 1	Order 2	Order 3	Order 4	Order 5
speech sounds auditory voice superior temporal stg sts auditory cortex acoustic temporal	speech sts voice auditory superior temporal sounds stg auditory cortex audiovisual temporal	sts speech voice superior temporal auditory sounds stg temporal listening acoustic	semantic temporal lobe fronto temporal meaning sentences syntactic verb familiarity comprehension language	brainstem pain spoken fronto temporal speech perception speech repetition insular language comprehension anterior superior
Order 6	Order 7	Order 8	Order 9	Order 10
autobiographical posterior cingulate default pcc default mode medial supremarginal vmpfc mpfc supramarginal gyrus	anterior temporal amygdala fearful fear amygdala insula amygdala responses amygdala response neutral fearful faces neutral faces	memory retrieval episodic retrieval episodic memory recollection retrieved encoding thalamic lobe mtl memories	fusiform gyrus fusiform face fusiform face objects face ffa ffa occipitotemporal faces category	objects fusiform fusiform gyrus extrastriate object occipitotemporal visual field visual lateral occipital perception
Order 11	Order 12	Order 13	Order 14	Order 15
ventral premotor premotor cortex premotor tactile sensorimotor somatosensory anterior intraparietal motor inferior parietal production	medial prefrontal medial mpfc cortex mpfc prefrontal cortex prefrontal ipl default autobiographical default mode	retrosplenial retrosplenial cortex precuneus brainstem posterior cingulate personal medial medial prefrontal mpfc place	object objects face recognition lateral occipital precuneus tools mt v5 motion action observation	medial posterior cingulate pcc medial prefrontal corte precuneus autobiographical default default mode lateral parietal mpfc

Figure S3: Top terms associated with the endpoints of the strongest correlations for the *word* **experimental condition.** This figure is in the same format as Figure S1, but displays results for the word-scrambled story listening condition. (Also see Fig. 7, third row, in the main text.)



Order 1	Order 2	Order 3	Order 4	Order 5
parietal calculation ips intraparietal superior parietal tasks subtraction task action numbers	visual occipital v1 extrastriate motion sighted visual cortex object occiplical cortex visual field	network expectancy task ica additional networks load memory load spl parietal	autobiographical anterior temporal default network autobiographic default real scene mental retrosplenial dmn	dorsolateral dorsolateral prefrontal cognitive dlpfc memory load tasks working working memory lateral prefrontal load
Order 6	Order 7	Order 8	Order 9	Order 10
dorsomedial medial dorsomedial prefrontal cortex mpfc medial prefrontal mpfc memories temporal pole pole recollection	anterior insula insula frontal cortex anterior monitoring insular insula anterior picture error conflict	precuneus posterior visual cortex precuneus		person face ffa fusiform face dorsolateral prefrontal ffa production categories theory mind tpj speech
Order 11	Order 12	Order 13	Order 14	Order 15
1 somatosensory hippocampal hippocampus somatosensory cortex tactile s1 amygdala hippocampus somatosensory touch sensory	orthographic reading chinese visual word form word form word occipitotemporal written word	olfactory amygdala a taste insula disgust ratings amygdala respons painful food posterior insula	amygdala response mygdala hippocampus amygdala responses retrosplenial episodic retrieval e amygdala hippocampus emotional stimuli fearful	nucleus accumbens monetary incentive prediction error accumbens incentive striatum reinforcement monetary ventral striatum prediction

Figure S4: Top terms associated with the endpoints of the strongest correlations for the *rest* **experimental condition.** This figure is in the same format as Figure S1, but displays results for the resting state condition. (Also see Fig. 7, bottom row, in the main text.)

Supplemental references

Combrisson, E., Vallat, R., O'Reilly, C., Jas, M., Pascarella, A., I Saive, A., Thiery, T., Meunier, D., Altukhov, D., Lajnef, T., Ruby, P., Guillot, A., and Jerbi, K. (2019). Visbrain: a multipurpose GPU-accelerated open-source suite for multimodal brain data visualization. *Frontiers in Neuroinformatics*, 13(14):1–14.

Rubin, T. N., Kyoejo, O., Gorgolewski, K. J., Jones, M. N., Poldrack, R. A., and Yarkoni, T. (2017). Decoding brain activity using a large-scale probabilistic functional-anatomical atlas of human cognition. *PLoS Computational Biology*, 13(10):e1005649.