

THE NEUROLINGUISTIC CORRELATES OF PRAGMATIC INFERENCE AND COGNITIVE CONTEXT FORMATION

Egamberdiyeva Hilola Salimovna

PhD Candidate (3rd Year), Department of Uzbek Language, Journalism and Computational Linguistics

Samarkand State Institute of Foreign Languages, Samarkand, Uzbekistan.

Gmail: hilolae805@gmail.com

Abstract: pragmatic inference enables interlocutors to derive meanings that go beyond the literal signal, while cognitive context formation builds and maintains the situation model that constrains such inferences in real time. This article synthesizes neurolinguistic evidence to identify the brain networks and temporal dynamics that underlie these processes. Drawing on ERP and fMRI findings, we argue that pragmatic inference is realized through coordinated interactions between the left-hemisphere language network (left inferior frontal gyrus, middle/superior temporal regions) and social-cognitive circuits implicated in theory of mind (medial prefrontal cortex, temporoparietal junction, posterior superior temporal sulcus). Inferential integration typically elicits enhanced N400 responses for expectancy mismatch followed by late positivities (P600/LPC) indexing reanalysis and discourse updating; fMRI shows increased activation and connectivity among IFG–MTG and ToM nodes under higher inferential load. Executive control regions (ACC/DLPFC) support conflict monitoring and selection, while right-hemisphere contributions (prosody, global coherence) modulate context building. Cross-linguistic considerations (e.g., English vs. Uzbek) suggest shared neural architecture with culture-specific weighting of cues. We propose a unified model in which language, theory-of-mind, and control networks dynamically couple to construct, predict, and revise meaning during communication.

Keywords: neurolinguistics; Pragmatic inference; Implicature; Cognitive context formation; Theory of mind; N400; P600/LPC; Left inferior frontal gyrus (IFG); Temporoparietal junction (TPJ); Functional connectivity.

Understanding language involves more than decoding lexical and syntactic information: it requires grasping what speakers mean beyond what they explicitly say. Pragmatic inference—interpreting implicatures, irony, and indirect speech acts—relies on the listener’s ability to integrate linguistic input with cognitive models of context and shared knowledge. **Cognitive context formation**, in turn, constructs a dynamic “mental workspace” that tracks discourse entities, speaker intentions, and situational relevance. Together, these processes illustrate that language comprehension is as much a social–cognitive act as it is a linguistic one.

From a neurolinguistic standpoint, pragmatic inference and contextual construction recruit multiple interacting networks rather than a single “language center.” Classical left-hemisphere regions—**Broca’s** and **Wernicke’s areas**—enable syntactic and semantic processing, whereas **medial prefrontal** and **temporoparietal junction (TPJ)** areas implement theory-of-mind computations crucial for inferring communicative intent. Functional-connectivity and time-resolved electrophysiological studies demonstrate that pragmatic comprehension engages a distributed system linking the **left inferior frontal gyrus (IFG)** for semantic selection, the **middle temporal gyrus (MTG)** for semantic integration, and right-hemisphere homologues responsible for prosody and global coherence.

The temporal unfolding of these mechanisms is reflected in characteristic ERP signatures. The **N400** component indexes expectancy violations when contextual cues fail to predict the upcoming meaning; later **P600/Late Positive Complex (LPC)** effects mark re-analysis, inferential revision, and discourse updating. Such dynamics support the view that pragmatic

interpretation is a predictive process, continuously integrating new evidence into an evolving cognitive model of the communicative situation.

Despite extensive research, key questions remain unresolved:

1. How do the language and theory-of-mind networks cooperate to generate pragmatic inference in real time?
2. What are the neural correlates of building and maintaining cognitive context under varying inferential load?
3. Do these processes differ cross-linguistically—for instance, between English and Uzbek—given culturally distinct pragmatic norms?

Addressing these questions requires an interdisciplinary synthesis of **neurolinguistics**, **cognitive pragmatics**, and **social neuroscience**. The present paper seeks to integrate findings from electrophysiology (EEG/MEG), neuroimaging (fMRI), and psycholinguistics to propose a unified neurocognitive model of pragmatic inference and context formation. By mapping when and where these processes occur in the brain, we aim to clarify how human communication achieves meaning beyond words.

1. Language networks and dual-stream architecture

Contemporary neurolinguistics converges on a **dual-stream** organization linking temporal and frontal cortices (Hickok & Poeppel, 2007; Friederici, 2017). A **ventral stream** (anterior/mid-temporal → inferior frontal) supports semantic mapping and combinatorial meaning, while a **dorsal stream** (posterior temporal–parietal → premotor/IFG) supports sensorimotor mapping, hierarchical sequencing, and prediction for articulation/comprehension. Within this scaffold, the **left inferior frontal gyrus (LIFG/BA44–45)** mediates controlled semantic selection and conflict resolution; **MTG/STS** subserves semantic integration; **ATL** contributes to amodal conceptual hubs; **pSTG/TP** aids combinatorics and prosody–syntax interface. This architecture provides the substrate on which pragmatic operations must be integrated.

2. Pragmatic inference: from Grice to Relevance

In **Gricean pragmatics**, inference derives from conversational maxims and the **Cooperative Principle**; implicatures arise when literal content underdetermines intended meaning (Grice, 1975). **Relevance Theory** reframes this as cost–benefit optimization: listeners compute contextually “most relevant” interpretations with minimal effort (Sperber & Wilson, 1995). Cognitive-pragmatic accounts emphasize **predictive comprehension**: listeners generate hypotheses about intention, update them with incoming cues, and revise discourse models when predictions fail (Kutas & Federmeier, 2011). These theories predict graded processing costs indexed by neural signatures when context is weak, misleading, or pragmatically enriched (e.g., scalar implicatures, irony, metaphor, indirectness).

3. Theory of Mind (ToM) and social-cognitive circuitry

Deriving speaker intention recruits **ToM networks**: **medial prefrontal cortex (mPFC)** for belief/goal representation, **temporoparietal junction (TPJ)** for perspective-taking, and **posterior STS** for biological-motion/prosodic cue integration (Frith & Frith, 2006; Saxe & Kanwisher, 2003). Pragmatic tasks that require mental-state attribution (irony, indirect requests) reliably increase activity and connectivity between ToM regions and the core language network (IFG/MTG), suggesting **functional coupling** between semantic control and mentalizing during inference.

4. Temporal dynamics: ERP/MEG markers of inference

Time-resolved studies show a stereotyped cascade. The **N400** ($\approx 300\text{--}500$ ms) indexes expectancy/semantic integration difficulty, reliably enhanced for under-informative statements, unconventional metaphors, or ironic incongruities. **Late positivities (P600/LPC; $\approx 500\text{--}900$ ms)** mark reanalysis, integration, and discourse updating; they scale with inferential load and ambiguity (Van Berkum, 2008; Bambini et al., 2016). Time–frequency analyses often reveal **frontal theta** (control/monitoring), **posterior beta** (maintenance/integration), and **gamma** (semantic unification), consistent with a **prediction-error correction** account.

5. Hemispheric balance and prosody

While left-lateral systems deliver lexical–syntactic precision, **right-hemisphere homologues** (RIFG/RSTG) and **prosodic networks** contribute to global coherence, affect, irony, and figurative meaning (Mitchell & Crow, 2005). Damage to right temporal–parietal areas yields selective pragmatic deficits—literal comprehension preserved, but irony/metaphor/indirectness impaired—underscoring **context-sensitivity** as a right-leaning specialization that interfaces with left-dominant linguistic coding.

6. Executive control and working memory

Pragmatic computation is resource-dependent. **ACC/DLPFC** support conflict monitoring, set-shifting, and selection among competing interpretations; **parietal working-memory** buffers maintain discourse entities and common ground. Increased inferential complexity (weak/misleading context; multiple plausible implicatures) up-regulates this control circuitry and strengthens **IFG–ToM–DLPFC** coupling (Nozari & Novick, 2017).

7. Cross-linguistic considerations (English–Uzbek)

Cross-linguistic pragmatics predicts **shared neural architecture** with **culture-specific weighting of cues**. English often encodes pragmatic force lexically/syntactically (modal verbs, discourse markers), whereas Uzbek frequently leverages **context, politeness strategies, and prosody**. We therefore expect comparable N400/P600 profiles across languages, but **different reliance on ToM vs. language-control nodes** and prosodic/right-hemisphere contributions during irony/indirectness; bilinguals may show **transfer effects** (differential prefrontal coupling) depending on dominance and context norms.

8. A provisional integrative model

We adopt a **tri-network account**:

1. Language network (LIFG–MTG/STS–ATL; dual streams) computes form–meaning mappings and controlled selection.

2. ToM network (mPFC–TPJ–pSTS) encodes intentions/beliefs and supplies priors over communicative goals.

3. Control network (ACC–DLPFC–parietal WM) adjudicates competition, maintains context, and orchestrates updates.

Inference unfolds as **predict–integrate–revise**: language regions generate meaning candidates; ToM provides intention priors; control resolves conflict and updates the situation model. ERP indices (N400→P600) reflect prediction error and revision; fMRI connectivity (PPI/MVPA) tracks **moment-to-moment coupling** as a function of inferential load and context strength.

Figure (text description). A schematic shows bidirectional links: Ventral/dorsal language streams (MTG/STS ↔ LIFG) interfacing with ToM (mPFC, TPJ, pSTS). ACC/DLPFC sit atop as a control hub modulating gain/selection. Right-hemisphere STG/IFG nodes route prosodic/affective cues into ToM and language networks.

RQ1 (Temporal dynamics): What is the time course of pragmatic inference and context updating? **H1**: Pragmatically enriched interpretations (scalar implicature, irony, indirectness, novel metaphor) elicit **enhanced N400 (≈300–500 ms)** followed by **P600/LPC (≈500–900 ms)**, scaling with inferential load and weakened/misleading context.

RQ2 (Network cooperation): How do the language and ToM networks couple during inference?

H2: Inference > literal contrasts increase activity in **mPFC/TPJ/pSTS** and **LIFG/MTG**, with stronger **functional connectivity** (PPI) under high-load contexts.

RQ3 (Executive control): Which control mechanisms resolve competing interpretations?

H3: **ACC/DLPFC** activation and frontal **theta power** rise as ambiguity increases; greater DLPFC–IFG coupling predicts faster, more accurate inference.

RQ4 (Hemispheric balance and prosody): What is the role of right-hemisphere cues?

H4: Prosody-supported irony/indirectness increases **right STG/IFG** engagement and reduces N400/P600 amplitudes relative to monotone delivery.

RQ5 (Cross-linguistic weighting): Do English and Uzbek differ in neural weighting of cues?

H5: English: stronger reliance on LIFG/temporal control; Uzbek: stronger **ToM** and right-hemisphere contributions for context-driven inference.

H6 (Individual differences): Higher **ToM/empathy** and **working memory** predict lower neural effort (reduced amplitudes, faster RTs).

1 Participants

- **N = 72** right-handed adults (18–35), normal hearing/vision, no neuro/psych history.
- 2 language groups: **L1-English (n=36)**, **L1-Uzbek (n=36)**; matched by age, education.
- Screening & covariates: **Reading the Mind in the Eyes (ToM)**, **IRI (empathy)**, **OSPAN (WM)**, **AQ-short** (autistic traits), handedness.

2 Materials

- **Stimuli types** (balanced, normed for length, frequency, cloze):
 1. **Scalar implicatures** (“Some...” ⇒ not all)
 2. **Irony** (context incongruent praise/critique)
 3. **Metaphor** (novel vs. conventional)
 4. **Indirect requests** (mitigated politeness).
- **Context strength:** supportive vs. neutral vs. misleading.
- **Prosody** (audio): neutral vs. irony-marked intonation.
- **Cross-linguistic** parallel sets (validated translations; pilot cloze norms in both languages).

3 Tasks & Procedure

- **EEG session** (RSVP or auditory): sentence pairs (Context → Target).
 - Task: speeded **acceptability/truth-value** + confidence rating.
 - Time-lock ERPs to **critical word/phrase** (implicature trigger / ironic cue).
- **fMRI session** (event-related, separate day): same conditions; **language localizer** (sentences > nonwords) and **ToM localizer** (false-belief > photo stories).
- Optional **DTI** for dorsal/ventral language tracts and TPJ connectivity.

4 Data Acquisition & Preprocessing

- **EEG:** 64–128 channels; 0.1–40 Hz; ICA artifact removal; baseline –200–0 ms.
- **ERP windows:** N400 (300–500 ms); P600/LPC (500–900 ms); topographies & mass univariate/cluster permutation.
- **Time–frequency:** frontal **theta (4–7 Hz)**, posterior **beta (13–30 Hz)**, **gamma (30–50 Hz)**.
- **fMRI:** 3T, multiband EPI; GLM contrasts (Inference > Literal; Context Mismatch > Match; Prosody × Irony); **ROI** (LIFG, MTG/STS, ATL, mPFC, TPJ, pSTS, ACC/DLPFC) + **PPI**; **MVPA** to decode inference type.
- **Behavioral:** accuracy, RT; mixed-effects (subjects/items) with factors **Inference × Context × Prosody × Language**, covariates (ToM, WM, empathy).

5 Ethics & Preregistration

- IRB approval, informed consent, anonymized data; preregister hypotheses/analyses on **OSF**; share stimuli and code.

1 Behavioral

- **Main effects:** slower RTs and lower accuracy for inference > literal; **Context** facilitation (supportive < neutral < misleading).
- **Interactions:** Prosody eases irony; Language × Inference reveals group-specific strategies; individual differences predict performance.

2 EEG

- **N400:** larger for underinformative/ironic/novel metaphor targets, reduced by supportive context and irony-prosody.
- **P600/LPC:** increases with reanalysis/discourse updating, strongest under misleading context.
- **Time–frequency:** frontal **theta**↑ (control/monitoring), posterior **beta**↑ (integration), **gamma**↑ (unification) with load.

3 fMRI

- **Activation:** Inference > literal recruits **LIFG/MTG** (semantic control), **mPFC/TPJ/pSTS** (ToM), **ACC/DLPFC** (control).
- **Connectivity:** stronger **IFG–MTG ↔ mPFC/TPJ** coupling under high load; **Prosody** boosts right STG/IFG.
- **Cross-linguistic:** English > Uzbek in LIFG modulation; Uzbek > English in ToM/right-hemisphere engagement (predicted).

4 Brain–Behavior Links

- Lower N400/P600 and reduced BOLD in control regions correlate with **higher ToM/empathy** and **WM**, predicting faster RTs.

The present framework integrates temporal (EEG/MEG) and spatial (fMRI) evidence to argue that **pragmatic inference** and **cognitive context formation** emerge from **dynamic coupling** among three partially dissociable systems: a left-lateralized **language network** (LIFG, MTG/STS, ATL), a **theory-of-mind (ToM) network** (mPFC, TPJ, pSTS), and a **control network** (ACC/DLPFC/parietal WM). The predicted **N400 → P600/LPC** cascade supports a **predict–integrate–revise** account: when the incoming utterance underdetermines or conflicts with context, semantic expectations are violated (N400), then representations are reanalyzed and the discourse model is updated (P600/LPC). Time–frequency signatures (frontal theta; posterior beta/gamma) are consistent with increased monitoring and semantic unification under higher inferential load.

Crucially, the data pattern implies **cooperation rather than replacement** between ToM and language systems. Inferentially rich conditions (irony, indirect requests, scalar implicature, novel metaphor) should **simultaneously** recruit LIFG (semantic selection/inhibition) and ToM regions (belief/intent reasoning). Effective connectivity (PPI/MVPA) is expected to increase between **IFG–MTG and mPFC/TPJ**, indicating that the brain negotiates between candidate linguistic parses and inferred intentions in real time. This synergy explains why literal meaning can be preserved yet **overridden by intended meaning** when social cues warrant reinterpretation.

The **right hemisphere** emerges as a specialized contributor to **global coherence and prosody**, particularly for irony and affect-laden inference. Right STG/IFG engagement, together with pSTS sensitivity to biological and prosodic cues, suggests that prosody acts as a **top-down constraint** on pragmatic hypotheses, thereby attenuating N400/P600 costs when intonation pre-signals indirectness or sarcasm. This explains clinical observations: right-hemisphere damage often spares literal decoding yet impairs figurative/ironic comprehension.

Executive control (ACC/DLPFC) appears not merely epiphenomenal but **mechanistically necessary** when context is weak or misleading. Increases in frontal theta power and DLPFC BOLD under ambiguity support the view that pragmatic reasoning is **resource-dependent**, requiring selection among competing interpretations and maintenance of common ground in WM. Individual-difference analyses (ToM, empathy, WM) provide a convergent test: higher capacities predict **reduced neural effort** (smaller amplitudes, weaker control activation) and faster/more accurate inference, consistent with efficiency accounts of expert comprehension.

The **cross-linguistic dimension** (English vs. Uzbek) highlights that while the **neural architecture is shared**, the **weighting of cues** is culture-specific. Languages that lean on explicit lexical/syntactic marking (e.g., modal verbs, conventionalized discourse markers) may load more strongly on **LIFG/temporal control**, whereas languages that privilege **context, politeness norms, and prosody** may engage **ToM and right-hemisphere systems** more robustly during inference. For bilinguals, transfer effects—altered prefrontal coupling or shifted ERP amplitudes—are predicted as pragmatic norms from the dominant language modulate the other, offering a fertile arena for studying **neurocognitive plasticity** in pragmatics.

Methodologically, combining **ERP timing** with **fMRI localization/connectivity** strengthens causal interpretations. The field will benefit from **preregistered** designs, **stimulus norming** (cloze, prosodic naturalness, cultural appropriateness), and **multimodal** analyses (EEG–fMRI

fusion; representational similarity analysis) that trace how context priors constrain comprehension over milliseconds and seconds. Extending beyond controlled sentences toward **ecologically rich discourse** (dialogue, audiovisual narratives) will test the robustness of the tri-network model under naturalistic variability.

Limitations remain. ERP components are **functionally heterogeneous**, and P600/LPC may reflect multiple processes (reanalysis, integration, updating). fMRI connectivity is correlational; stronger **causal** inference would leverage **TMS/tDCS** perturbation of IFG or TPJ, or lesion-symptom mapping. Finally, cultural/pragmatic norms are multidimensional; isolating which aspect (politeness, indirectness, evidentiality) drives neural differences requires factorial manipulations and careful **sociolinguistic control**.

In sum, the discussion converges on a view of pragmatics as **neurocognitively distributed** and **predictive**: language regions propose form–meaning candidates; ToM supplies intentional priors; control circuitry arbitrates and updates the situation model. Prosody/right-hemisphere signals modulate this pipeline, enabling flexible, socially attuned interpretation.

Conclusion

This article advances a **unified neurolinguistic account** of pragmatic inference and cognitive context formation. Evidence across methods supports three central claims:

1. **Temporal dynamics:** Pragmatic enrichment unfolds as an **N400–P600/LPC** sequence reflecting prediction error and discourse revision, modulated by context strength and prosodic cues.
2. **Network cooperation:** Inference arises from **coupled activity** between the left-lateralized **language network** (IFG/MTG/STS) and **ToM circuitry** (mPFC/TPJ/pSTS), with **ACC/DLPFC** providing control under ambiguity.
3. **Hemispheric and cultural weighting:** **Right-hemisphere** prosody/global-coherence mechanisms shape inference, and **cross-linguistic norms** (e.g., English vs. Uzbek) tune the relative reliance on linguistic versus social-cognitive cues within a shared neural architecture.

The proposed **tri-network model**—language, ToM, and control—captures how the brain **constructs, predicts, and revises** speaker meaning in real time, explaining both universal signatures (ERP/fMRI patterns) and cultural variability. Practically, the account informs **language pedagogy** (teaching inference and prosody), **clinical assessment** (profiling pragmatic deficits in aphasia, ASD, right-hemisphere damage), and **human–AI dialogue systems** (integrating intent recognition with context modeling).

Future work should (i) employ **multimodal neuroimaging** and **causal perturbations** to test network interactions; (ii) expand to **naturalistic dialogues** and **multimodal cues** (gaze, gesture, prosody); and (iii) chart **developmental** and **bilingual** trajectories of pragmatic competence. By aligning timing, localization, and connectivity, neurolinguistics can illuminate how human brains achieve meaning **beyond the literal**, weaving language, mind, and culture into coherent communication.

References :

1. Bambini, V., Bertini, C., Schaeken, W., Stella, A., & Di Russo, F. (2016). Disentangling metaphor from context: An ERP study on figurative language processing. *Brain and Language*, 162, 37–51.
2. Baum, S. R., & Pell, M. D. (1999). The neural bases of prosody: Insights from lesion studies and neuroimaging. *Aphasiology*, 13(8), 581–608.
3. Bohrn, I. C., Altmann, U., & Jacobs, A. M. (2012). Looking at the brains behind figurative language—A quantitative meta-analysis of neuroimaging studies on metaphor, idiom, and irony processing. *Neuropsychologia*, 50(11), 2669–2683.

4. Cummings, L. (2015). *Pragmatics: A multidisciplinary perspective*. Routledge.
5. Degen, J., & Tanenhaus, M. K. (2015). Processing scalar implicature: A constraint-based approach. *Cognitive Science*, 39(4), 667–710.
6. Fedorenko, E., Behr, M. K., & Kanwisher, N. (2011). Functional specificity for high-level linguistic processing in the human brain. *PNAS*, 108(39), 16428–16433.
7. Friederici, A. D. (2017). *Language in our brain: The origins of a uniquely human capacity*. MIT Press.
8. Frith, C. D., & Frith, U. (2006). The neural basis of mentalizing. *Neuron*, 50(4), 531–534.
9. Grice, H. P. (1975). Logic and conversation. In P. Cole & J. Morgan (Eds.), *Syntax and semantics 3: Speech acts* (pp. 41–58). Academic Press.
10. Hagoort, P. (2005). On Broca, brain, and binding: A new framework. *Trends in Cognitive Sciences*, 9(9), 416–423.
11. Hagoort, P., & van Berkum, J. J. A. (2007). Beyond the sentence given. *Philosophical Transactions of the Royal Society B*, 362(1481), 801–811.
12. Hickok, G., & Poeppel, D. (2007). The cortical organization of speech processing. *Nature Reviews Neuroscience*, 8(5), 393–402.
13. Kuperberg, G. R. (2007). Neural mechanisms of language comprehension: Challenges to syntax. *Brain Research*, 1146, 23–49.
14. Kutas, M., & Federmeier, K. D. (2011). Thirty years and counting: N400, meaning, and context. *Annual Review of Psychology*, 62, 621–647.
15. Mitchell, R. L. C., & Crow, T. J. (2005). Right hemisphere language functions and schizophrenia: The forgotten hemisphere? *Brain*, 128(5), 963–978.
16. Nieuwland, M. S., & Van Berkum, J. J. A. (2006). When peanuts fall in love: N400 evidence for the power of discourse. *Journal of Cognitive Neuroscience*, 18(7), 1098–1111.
17. Nozari, N., & Novick, J. (2017). Monitoring and control in language production. *Cognition*, 168, 106–128.
18. Novick, J. M., Trueswell, J. C., & Thompson-Schill, S. L. (2005). Cognitive control and parsing: A role for Broca's area. *PNAS*, 102(21), 817–822.
19. Noveck, I. A., & Posada, A. (2003). Characterizing the time course of an implicature. *Brain and Language*, 85(2), 203–210.
20. Pylkkänen, L. (2019). The neural basis of combinatory syntax and semantics. *Science*, 366(6461), 62–66.
21. Pulvermüller, F. (2013). How neurons make meaning: Semantics in the brain. *Trends in Cognitive Sciences*, 17(5), 281–289.
22. Rapp, A. M., Mutschler, D. E., & Erb, M. (2012). Where in the brain is nonliteral language? A coordinate-based meta-analysis of functional magnetic resonance imaging studies. *NeuroImage*, 63(1), 600–610.
23. Saxe, R., & Kanwisher, N. (2003). People thinking about thinking people: The TPJ and theory of mind. *NeuroImage*, 19(4), 1835–1842.
24. Shibata, M., Toyomura, A., Itoh, H., & Abe, J. (2010). Neural substrates of irony comprehension: An fMRI study. *Brain Research*, 1308, 114–123.
25. Sperber, D., & Wilson, D. (1995). *Relevance: Communication and cognition* (2nd ed.). Blackwell.
26. Spotorno, N., Koun, E., Prado, J., van der Henst, J.-B., & Noveck, I. A. (2012). Neural evidence that utterance-processing involves mentalizing: The case of irony. *NeuroImage*, 63(1), 25–39.
27. Van Berkum, J. J. A. (2008). Understanding sentences in context: What brain waves say. *Current Directions in Psychological Science*, 17(6), 376–380.
28. Wilson, D., & Sperber, D. (2012). *Meaning and relevance*. Cambridge University Press.
29. Xu, Y., Gannon, P. J., Emmorey, K., Smith, J. F., & Braun, A. (2009). Symbolic gestures and spoken language are processed by a common neural system. *NeuroImage*, 49(3), 284–292.