CPAH Science Journal, Vol. 1 (2026), Article 001 ISSN: 3051-8393
DOI:https://doi.org/10.66741/ca.2026.001

Clinical Neuroscience: A 5-Phase Multimodal Model of Perception and Perceptual Errors

Fabiano de Abreu Agrela Rodrigues [1]*, Alano Dourado Meneses [2], Mirian Coden [3]

[1] Centro de Pesquisa e Análises Heráclito (CPAH), Portugal / UNIFRANZ, Bolivia.
[2] Universidade Federal do Piauí (UFPI), Brazil. [3] NORTUS – Institution for Human and Organizational Development, Brazil.

Author Note

Fabiano de Abreu Agrela Rodrigues https://orcid.org/0000-0002-5487-5852 Post-PhD in Neurosciences is the Scientific Director at the Centro de Pesquisa e Análises Heráclito (CPAH) and an Adjunct Professor at UNIFRANZ.

Alano Dourado Meneses is a Lawyer and Business Executive, with a Bachelor of Laws from the Universidade Federal do Piauí (UFPI).

Mirian Coden https://orcid.org/0000-0002-5058-7802 is a researcher at NORTUS – Institution for Human and Organizational Development, Scientific and Development Center, Brazil.

Conflicts of Interest: The authors declare no conflict of interest regarding the research, authorship, and/or publication of this article.

Correspondence concerning this article should be addressed to: * Fabiano de Abreu Agrela Rodrigues, Centro de Pesquisa e Análises Heráclito (CPAH), Portugal. Email: drfabianodeabreu@gmail.com. Additional correspondence can be directed to: Alano Dourado Meneses (alano.dm@gmail.com) and Mirian Coden (mirian@nortus.com.br).

Received: 15 February 2026 | **Accepted:** 01 April 2026 | **Published:** 22 April 2026

Abstract

Introduction: Several models of stimulus-response perception have been proposed in the neuroscientific literature; however, none has systematically integrated second-person neuroscience with the neuromaladaptive mechanisms, here defined as neural and cognitive patterns that deviate from adaptive functioning and impair environmental adjustment, that may emerge specifically in social interaction contexts. **Objective:** To propose a multiscale theoretical framework for understanding cognitive function and behavior through the sequential phases of perceptual processing described in the 5-Phase Multimodal Model of Perception. **Methodology:** This study constitutes a narrative theoretical review with structured literature search. Searches were conducted in PubMed and Web of Science using the terms "cognitive penetrability," "perceptual prediction error," "attention and perception," "interpersonal neural synchrony," and "inhibitory control," restricted to studies published between 2000 and 2024. Selection was based on theoretical relevance to the proposed model phases and was not intended as a systematic review with formal PRISMA screening. **Results and Discussion:** Existing cognitive models were integrated into a five-phase sequential framework combining theoretical synthesis with clinical observation. **Conclusion:** The proposed model offers a preliminary theoretical account of how dysfunction in perceptual neurocognition subfunctions (here termed perceptual errors) may contribute to a range of maladaptive behavioral patterns. Empirical validation is required before clinical applications can be drawn.

Keywords: *neuromaladaptive; perceptual errors; cognitive model; second-person neuroscience; cognitive penetrability.*

1. Introduction

Accumulating evidence underscores the role of social knowledge in how humans interpret the world and relate to one another. The ability to regulate perception, cognition, and behavior allows complex organisms to navigate uncertain environments, and cognitive flexibility, understood as the capacity to selectively switch mental processes to produce contextually appropriate responses, is compromised in several prevalent neurodevelopmental disorders (Vetter & Newen, 2014; Louie & Glimcher, 2017). Although several models of stimulus-response perception have been proposed, none has systematically integrated

secondperson neuroscience with the mechanisms that may arise specifically in social interaction contexts (Whitwell et al., 2021; Mera et al., 2022; Huang et al., 2024).

Three theoretical constructs are central to this article and require precise definition from the outset. First, *neuromaladaptive* refers to neural and cognitive patterns that deviate from adaptive functioning in ways that impair environmental or social adjustment. Second, *perceptual errors* , a term adopted from Raftopoulos (2016, 2017), designates instances of negatively modulated cognitive penetrability in which prior cognitive states distort perceptual content with negative behavioral consequences. Third, *superior attention* refers to a highcapacity, goal-directed attentional mode characterized by robust working memory support, sustained depth of focus, and relative freedom from value-driven attentional capture (VDAC), a construct related to but distinct from standard voluntary attention (Cocchi et al., 2013). These definitions are held constant throughout the manuscript.

The present model expands traditional perspectives on perception by incorporating neurotemporal, predictive, and social factors. Its primary aim is theoretical: to offer an integrative framework that may generate testable hypotheses for future empirical and clinical research, particularly in conditions involving perceptual dysfunction such as autism spectrum disorder, schizophrenia, and dissociative disorders (Huang et al., 2024).

2. Objective

This article proposes that a generative Bayesian approach to perception provides a useful framework for understanding how high-level social factors may influence low-level perceptual processes at their earliest stages. The central aim is theoretical: to demonstrate how different subfunctions of neurocognition co-occur within individuals and relate to distinct forms of behavior, consciousness-related phenomena, and neurodysfunctional connectome patterns that may carry future clinical relevance.

3. Methodology

This study constitutes a narrative theoretical review following a theory-based modeling approach. A structured literature search was conducted in PubMed and Web of Science using the following terms: "cognitive penetrability," "perceptual prediction error," "attention and perception," "interpersonal neural synchrony," and "inhibitory control." The search was restricted to studies published between 2000 and 2024 with no language restriction. This was

not a formal systematic review: no PRISMA protocol was applied, no quantitative synthesis was performed, and selection was guided by theoretical relevance rather than predefined inclusion algorithms. Findings should therefore be interpreted as theoretical propositions rather than empirically derived conclusions.

Inclusion of studies was based on three criteria: (a) experimental research with neuroimaging data (fMRI, EEG, or PET) examining mechanisms of perception or attention; (b) computational models of perceptual decision-making; and (c) clinical neuroscience studies on social perception, emotional regulation, or cognitive control. The theoretical model was further grounded in structured interviews with physicians, neuropsychologists, and healthcare professionals affiliated with CPAH, Heraclitus Research and Analysis Center, and in genetic-behavioral data derived from the GIP (Genetic Intelligence Project), alongside semi-structured interviews with volunteers. These empirical sources informed the clinical observations presented but do not constitute independent empirical validation of the model.

4. Results and Discussion

Studies analyzing performance on a single cognitive task cannot account for the influence of other cognitive subfunctions; conversely, battery-based studies treat each task as an independent measure, failing to capture the interplay between subfunctions that co-occur and are neurobiologically connected (Brooks & Freeman, 2019; Katahira et al., 2012). This limitation motivates the present multiphase framework.

Current computational models, including the Three-Stage Dynamic Brain-Cognitive Model by Huang et al. (2024), demonstrate that social and emotional categories become automatically activated when viewing another person's face, triggering conceptual associations that influence downstream processing. The drift-diffusion model (DDM) holds that a decision variable integrates evidence for two alternatives until reaching a threshold, while recurrent circuit models (RCMs) propose that early evidence carries greater weight on the final choice (Iigaya & Fusi, 2013; Whitwell et al., 2021).

The present framework differentiates three modes of cognitive modulation of perception: (1) *Negatively Modulated Cognitive Penetrability (NMP)*, that is, when prior cognitive states compromise the epistemic role of perception as a neutral basis for perceptual beliefs; (2) *Positively Modulated Cognitive Penetrability (PCMP)*, that is, when prior

knowledge renders certain features more salient, facilitating pattern recognition without vitiating perception's epistemic role; and (3) *Cognitive Impenetrability (CI)*, that is, when cognitive states do not affect the epistemic role of perceptual processes (Raftopoulos, 2016, 2017; Brogaard & Gatzia, 2017). Perceptual errors, as used in this article, designate cases of NMP with negative behavioral unfolding.

4.1 Theoretical Background

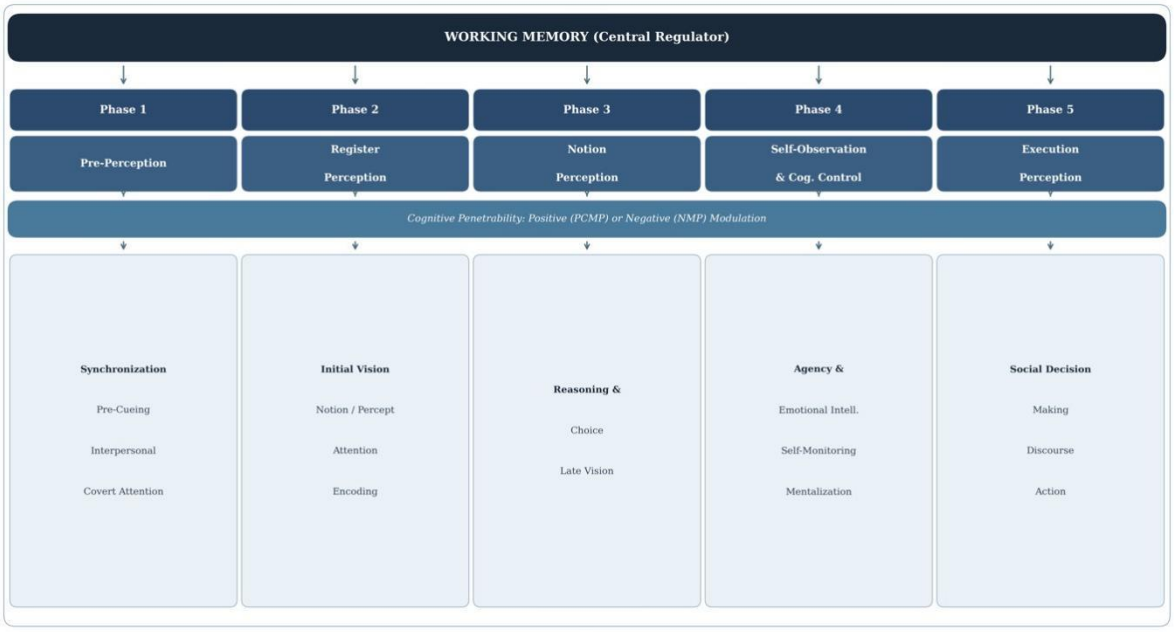
The Bayesian generative model of perception posits that the brain generates predictions about incoming stimuli based on prior memories and environmental expectations, with perception emerging from the interplay between bottom-up sensory inputs and top-down predictive processes (Vetter & Newen, 2014; Raftopoulos, 2016). Errors in this predictive mechanism may manifest across a wide spectrum, from benign phenomena such as déjà vu to clinically significant distortions such as delusions and hallucinations, although this continuum hypothesis requires further empirical specification. Temporal coding of perception occurs within approximately 200 to 500 ms, regulated by neural oscillations, with the entorhinal cortex and hippocampus playing documented roles in pattern detection (Vetter & Newen, 2014). Dopaminergic signals code stimulus salience and may bias perceptual inference (Cecchi, 2018), while cholinergic tone has been proposed to regulate the precision weighting of prediction errors.

4.2 5-Phase Multimodal Perception Model

Drawing on the ideal observer framework (Eckstein et al., 2009; Dricu & Frühholz, 2020) and global workspace theory (Whitwell et al., 2021; Mera et al., 2022), five sequential functional phases were constructed through theory-based modeling and clinical observation. Each phase is defined by a distinct functional criterion, specifically the type of processing operation predominantly characterizing that stage, rather than by strict temporal boundaries, which remain to be determined empirically.

Figure 1

Multimodal 5-Phase Model of Perception



Note. Source: Agrela FAR (2025).

4.2.1 Phase 1: Pre-Perception

Pre-perceptual processing encompasses social and attentional states present before a target stimulus reaches conscious processing. Functional criterion: social synchronization and attentional priming prior to stimulus onset. Interpersonal neural synchrony has been documented primarily through interbrain measurements, with areas showing synchrony including primary sensory regions, the superior temporal sulcus (STS), and prefrontal regions (Patin et al., 2018; Chen et al., 2017). Pre-cueing effects modulate early visual processing: object or feature pre-cueing increases anticipatory activity in neurons responsive to the cued stimulus; however, if the pre-cue does not affect scene information, it does not influence latevision evidence selection (Chen & Melara, 2009; Clark, 2016; Brogaard & Gatzia, 2017).

4.2.2 Phase 2: Register Perception

Functional criterion: initial sensory encoding and attentional selection. The ventral stream carries categorical semantic representations, while the dorsal stream carries visuomotor and audiomotor sequences stored in procedural memory (Rouault et al., 2023; Lee Masson et al., 2016). Early visual processing provides spatiotemporal and surface property information before top-down semantic involvement (Xiao et al., 2010; Juslin, 2013). Attentional mechanisms function as a selection filter and are themselves modified by learning: suppression

of task-irrelevant stimuli becomes more efficient with practice, persisting over several weeks (Tillman & Wiens, 2011; Fukuda & Vogel, 2009).

4.2.3 Phase 3: Notion Perception

Functional criterion: hypothesis formation and inferential processing. Hypotheses about object identity are formed and tested against proximal image information; confirmatory information is selected and disconfirmatory information suppressed (Yantis et al., 1991; Katahira et al., 2012). This selection process, when systematically biased by prior cognitive states, constitutes the functional locus at which perceptual errors are generated. Reasoning involves distributed activation of the left inferior frontal gyrus, bilateral middle frontal gyrus, superior parietal lobule, and left rostrolateral prefrontal cortex (Scherbaum et al., 2011). Social choices at three levels (for oneself, for others, and according to social norms) draw on LIP neurons in parietal cortex (Liang et al., 2016; Ramseyer et al., 2020).

4.2.4 Phase 4: Self-Observation and Cognitive Control

Functional criterion: monitoring and regulation of one's own perceptual and emotional processing. Cognitive control aligns stimulus-response processing with internal and external goals; the prefrontal cortex contributes contextual bias to resolve conflicts between competing representations, while the anterior insula and anterior cingulate cortex process bodily arousal during interpersonal emotional experiences (Liang et al., 2016). Neuroimaging evidence indicates that the amygdala responds to facial trustworthiness, with subregions increasing activation for faces judged as less trustworthy, a response that occurs even subliminally (Ramseyer et al., 2020). Agency is anchored neurally in anterior cingulate connectivity (for volition) and precuneus connectivity (for agency attribution), with intentional binding as its established behavioral measure (Akyüz et al., 2024; Anderson et al., 2011).

4.2.5 Phase 5: Execution Perception

Functional criterion: behavioral output in social decision-making contexts. Secondperson social decision-making studies consistently find greater engagement of medial prefrontal cortex (mPFC) mentalizing regions when a human partner is involved. The temporoparietal junction (TPJ) predicts a partner's actions, while the nucleus accumbens (NAc) influences trust decisions and the anterior insula and caudate nucleus are implicated in reciprocity decisions (Rouault et al., 2023; Toba et al., 2024). Deficits in working memory are

associated with difficulties applying knowledge of consequences to new situations, which may contribute to poorer social decision-making, though causal directionality requires longitudinal investigation.

4.3 Working Memory as Central Regulator

Working memory capacity correlates with the magnitude of attentional capture by salient but task-irrelevant stimuli, reflecting individual differences in the ability to resist distraction (Anderson et al., 2011). Vulnerability to VDAC covaries with working memory capacity and trait impulsivity at the individual level. In the present model, working memory is proposed as the central intrinsic regulator coordinating the sequential phases of perception and simultaneously influencing reward evaluation and memory encoding, consistent with established models of working memory as a control interface between perception and action (Fukuda & Vogel, 2009; Liang et al., 2016).

5. Positively Modulated Cognitive Penetrability (PCMP)

Familiarity effects in perceptual processing are consistent with contextual associations stored in early sensory areas as unconscious perceptual memories, which modify feedforward scanning and produce facilitatory effects that accelerate recognition without compromising perception's epistemic role (Fukuda & Vogel, 2011; Miller et al., 2023). Oxytocin plays a documented role in regulating affiliative bonds: it reduces firing frequency in the central amygdala, synergizes with dopamine in the ventral striatum to promote social bonding, and attenuates amygdala responses to emotionally valenced faces. These effects may represent neural substrates of PCMP in social contexts, though direct evidence linking oxytocin to early perceptual processes in naturalistic interactions remains limited (Patin et al., 2018; Chen et al., 2017).

6. Negatively Modulated Cognitive Penetrability (NMP)

Early sensory areas exhibit plasticity related to valence processing. Late negativity components in event-related potentials, appearing up to 200 ms post-stimulus, reflect higherlevel conflict monitoring associated with response choice discrimination; attentional modulation of occipital visual areas is delayed beyond 170 ms post-stimulus, suggesting that affective valence influences perceptual processing within this window (Raftopoulos, 2016,

2017). Impulsive choice, characterized by excessive preference for small immediate rewards over larger delayed rewards, is a prominent feature of several clinical conditions. Neural evidence implicates NAc dopamine signaling in the mechanisms underlying impulsive choice, though the precise causal chain from perceptual bias to impulsive behavior requires further investigation (Freitas et al., 2009; Dickman & Meyer, 1988).

7. Perceptual Errors

Anderson et al. (2011) demonstrated that task-irrelevant stimuli previously associated with monetary reward slow visual search for a target, indicating that stimuli imbued with value through prior learning can capture attention powerfully and persistently, independent of current goals. This value-driven attentional capture is proposed here as a potential mechanism underlying a class of perceptual errors in which prior reward associations distort the selection and weighting of evidence in perceptual inference.

Perceptual errors, as defined in this model, may manifest clinically as changes in interpersonal synchrony, processing reaction time disorders, decreased processing speed, absence of processing (as in parietal hemineglect), premature closure of perceptual phases (consistent with impulsivity), and intrinsic processing biases (as in the Stroop effect) (Freitas et al., 2009; Dickman & Meyer, 1988). It is important to emphasize that these links are theoretical: the model proposes that these phenomena share the functional structure of NMP, but empirical evidence directly demonstrating their common neural mechanism is still needed.

7.1 Perceptual Errors with Emotional Value Bias

The amygdala tags incoming sensory information with contextual relevance by working concurrently with sensory and higher-order cortices, and this tagging affects processing of the same stimulus in future encounters (Gonzalez-Rosa et al., 2013; Scherbaum et al., 2011). Five functionally distinct striatal zones have been linked to specific behavioral functions in neuroimaging studies: anterior caudate (incentive evaluation), posterior caudate (executive control), posterior putamen (sensorimotor), anterior putamen (social processing), and ventral striatum (stimulus value and motivational representation), with D1 receptor activation associated with approach/reward behaviors and D2 receptor activation associated with avoidance (Chen et al., 2017; Fukuda & Vogel, 2009).

In the parenting domain, the Barnum effect, understood as the tendency to accept universally applicable statements as personally relevant, may operate when caregivers apply non-individualized child-rearing prescriptions from unvalidated sources (Liang et al., 2016; Ramseyer et al., 2020). From the perspective of the present model, this constitutes a hypothetical case of perceptual error in which top-down belief systems distort the accurate observation of a child's specific needs, a proposition that would require empirical operationalization to be tested.

7.2 Perceptual Errors by Monetary Acquisition Value

The orbitofrontal cortex and amygdala jointly process economic, social, and emotional reward information (Katahira et al., 2012). The present model proposes that the fixation of VDAC on monetary stimuli, through habituation and associative encoding, could hypothetically sustain a state in which monetary cues persistently capture attentional resources, contributing to the pathogenesis of behavioral addiction to monetary acquisition (Anderson et al., 2011). This hypothesis is speculative and would require longitudinal behavioral and neuroimaging evidence to be evaluated.

8. Superior Attention

Superior attention, as defined in this model, refers to goal-directed attentional deployment characterized by high working memory support, sustained depth of focus, and relative freedom from VDAC bias. This construct is the functional complement of perceptual errors: whereas perceptual errors reflect processing dominated by prior value associations, superior attention reflects processing in which objects are encoded with reduced prior value contamination, increasing the accuracy of evidence evaluation (Cocchi et al., 2013; Ruiz et al., 2023).

In a neuromaladaptive state, the social brain may promote avoidance-motivated inattention , specifically attentional disengagement aimed at reducing exposure to threatening information, which could limit the executive capacity of intelligence, analogous to attentional tunneling under stress. States of cognitive and behavioral automatism driven by amygdala activity may compromise the updating function of working memory. Successful inhibition of responses to irrelevant stimuli has been empirically associated with sustained attention and

working memory capacity (Anderson et al., 2011; Cocchi et al., 2013; Ruiz et al., 2023), supporting the theoretical claim that superior attention relies on intact executive resources.

9. Conclusion

This article proposed a multimodal theoretical model integrating several mechanisms that may interfere with perception, combining a structured theoretical synthesis with clinical observations. The five-phase architecture offers a preliminary conceptual framework for understanding how different subfunctions of perceptual neurocognition co-occur within individuals and may relate to distinct behavioral patterns observed in clinical and social contexts.

Several important limitations must be acknowledged. First, the model is theoretical: none of the proposed phase transitions or their behavioral consequences have been directly tested in controlled empirical studies. Second, clinical applications are speculative propositions requiring operationalization and empirical validation before informing practice. Third, the review was narrative rather than systematic, introducing selection bias that future systematic reviews should address.

Future empirical work should test the functional boundaries between phases, develop behavioral paradigms to operationalize perceptual errors, and examine whether the proposed neuromaladaptive mechanisms are shared across otherwise distinct clinical presentations. As Anderson et al. (2011) demonstrate, value-driven attentional capture may provide a productive model for investigating cognitive control failures in clinical syndromes where the value attributed to stimuli conflicts with behavioral goals.

10. Declaration of Conflict of Interest

The authors declare that this study was conducted without any commercial or financial relationships that could be construed as a potential conflict of interest.

References

Akyüz, N., Barlas, Z., Kaçar, A., & Karşılar, H. (2024). Obedience induces agentic shifts by increasing the perceived time between own action and results. *Scientific Reports*, *14*(1), Article 16769. https://doi.org/10.1038/s41598-024-66499-8

Anderson, B. A., Laurent, P. A., & Yantis, S. (2011). Value-driven attentional capture. *Proceedings of the National Academy of Sciences*, *108*(25), 10367–10371. https://doi.org/10.1073/pnas.1104047108

Brogaard, B., & Gatzia, D. E. (2017). Is color experience cognitively penetrable? *Topics in Cognitive Science*, *9*(1), 193–214. https://doi.org/10.1111/tops.12221

Brooks, J. A., & Freeman, J. B. (2019). Neuroimaging of person perception: A social-visual interface. *Neuroscience Letters*, *693*, 40–43. https://doi.org/10.1016/j.neulet.2017.12.046

Cecchi, A. S. (2018). Cognitive penetration of early vision in face perception. *Consciousness and Cognition*, *63*, 254–266. https://doi.org/10.1016/j.concog.2018.06.005

Chen, S., & Melara, R. D. (2009). Sequential effects in the Simon task: Conflict adaptation or feature integration? *Brain Research*, *1297*, 89–100. https://doi.org/10.1016/j.brainres.2009.08.003

Chen, X., Jiang, Y., Pu, J., Chen, H., Tang, Y., Xu, P., & Wang, W. (2017). Within vs. between-subject effects of intranasal oxytocin on the neural response to cooperative and non-cooperative social interactions. *Psychoneuroendocrinology*, *78*, 22–30. https://doi.org/10.1016/j.psyneuen.2017.01.006

Clark, A. (2016). Attention alters predictive processing. *Behavioral and Brain Sciences*, *39*, Article e234. https://doi.org/10.1017/S0140525X15002472

Cocchi, L., Zalesky, A., Fornito, A., & Mattingley, J. B. (2013). Dynamic cooperation and competition between brain systems during cognitive control. *Trends in Cognitive Sciences*, *17*(10), 493–501. https://doi.org/10.1016/j.tics.2013.08.006

Dickman, S. J., & Meyer, D. E. (1988). Impulsivity and speed-accuracy tradeoffs in information processing. *Journal of Personality and Social Psychology*, *54*(2), 274–290. https://doi.org/10.1037/0022-3514.54.2.274

Dricu, M., & Frühholz, S. (2020). A neurocognitive model of perceptual decision-making on emotional signals. *Human Brain Mapping*, *41*(6), 1532–1556. https://doi.org/10.1002/hbm.24893

Eckstein, M. P., Pham, B. T., & Shimozaki, S. S. (2004). The footprints of visual attention during search with 100% valid and 100% invalid cues. *Vision Research*, *44*(12), 1193–1207. https://doi.org/10.1016/j.visres.2003.10.026

Eckstein, M. P., Drescher, B. A., & Shimozaki, S. S. (2009). Statistical decision theory to relate neurons to behavior in the study of covert visual attention. *Vision Research*, *49*(10), 1097–1128. https://doi.org/10.1016/j.visres.2008.12.008

Freitas, A. L., Azizian, A., Travers, S., & Clark, S. E. (2009). When cognitive control is calibrated: Event-related potential correlates of adapting to information-processing conflict despite erroneous response preparation. *Psychophysiology*, *46*(6), 1226–1233. https://doi.org/10.1111/j.1469-8986.2009.00864.x

Fukuda, K., & Vogel, E. K. (2009). Human variation in overriding attentional capture. *Journal of Neuroscience*, *29*(27), 8726–8733. https://doi.org/10.1523/JNEUROSCI.2145-09.2009

Fukuda, K., & Vogel, E. K. (2011). Individual differences in recovery time from attentional capture. *Psychological Science*, *22*(3), 361–368. https://doi.org/10.1177/0956797611398493

Gonzalez-Rosa, J. J., Inuggi, A., Blasi, V., Cursi, M., Kokinous, R., Comi, G., & Leocani, L. (2013). Response competition and response inhibition during different choicediscrimination tasks: Evidence from ERP measured inside MRI scanner. *International Journal of Psychophysiology*, *89*(1), 37–47. https://doi.org/10.1016/j.ijpsycho.2013.04.021

Huang, L., Dong, S., Hou, Y., Liu, X., & Huang, Y. (2024). Three-stage dynamic braincognitive model of understanding action intention displayed by human body movements. *Brain Topography*, *37*(6), 1055–1067. https://doi.org/10.1007/ s10548-024-01061-3

Iigaya, K., & Fusi, S. (2013). Dynamical regimes in neural network models of matching behavior. *Neural Computation*, *25*(12), 3093–3112. https://doi.org/10.1162/NECO_a_00522

Juslin, P. N. (2013). From everyday emotions to aesthetic emotions: Towards a unified theory of musical emotions. *Physics of Life Reviews*, *10*(3), 235–266. https://doi.org/10.1016/j.plrev.2013.05.008

Katahira, K., Okanoya, K., & Okada, M. (2012). Statistical mechanics of reward-modulated learning in decision-making networks. *Neural Computation*, *24*(5), 1230–1270. https://doi.org/10.1162/NECO_a_00264

Lee Masson, H., Wallraven, C., & Petit, L. (2016). Visual and haptic shape processing in the human brain: Unisensory processing, multisensory convergence, and top-down influences. *Cerebral Cortex*, *26*(8), 3402–3412. https://doi.org/10.1093/cercor/bhv170

Liang, X., Zou, Q., He, Y., & Yang, Y. (2016). Topologically reorganized connectivity architecture of default-mode, executive-control, and salience networks across working memory task loads. *Cerebral Cortex*, *26*(4), 1501–1511. https://doi.org/10.1093/cercor/bhu316

Louie, K., & Glimcher, P. W. (2017). Computational principles of value coding in the brain. In J.-C. Dreher & L. Tremblay (Eds.), *Decision neuroscience* (pp. 121–136). Academic Press. https://doi.org/10.1016/B978-0-12-805308-9.00010-5

Mera, Y., Rodríguez, G., & Marin-Garcia, E. (2022). Unraveling the benefits of experiencing errors during learning: Definition, modulating factors, and explanatory theories. *Psychonomic Bulletin & Review*, *29*(3), 753–765. https://doi.org/10.3758/ s13423-021-02022-8

Miller, L. N., Rauch, S. A. M., Liberzon, I., & Conybeare, D. (2023). Cumulative trauma load and timing of trauma prior to military deployment differentially influences inhibitory control processing across deployment. *Scientific Reports*, *13*(1), Article 21414. https://doi.org/10.1038/s41598-023-48505-7

Patin, A., Scheele, D., & Hurlemann, R. (2018). Oxytocin and interpersonal relationships. *Current Topics in Behavioral Neurosciences*, *35*, 389–420. https://doi.org/10.1007/7854_2017_22

Raftopoulos, A. (2016). Studies on cognitively driven attention suggest that late vision is cognitively penetrated, whereas early vision is not. *Behavioral and Brain Sciences*, *39*, Article e256. https://doi.org/10.1017/S0140525X15002484

Raftopoulos, A. (2017). Pre-cueing, the epistemic role of early vision, and the cognitive impenetrability of early vision. *Frontiers in Psychology*, *8*, Article 1156. https://doi.org/10.3389/fpsyg.2017.01156

Ramseyer, F., Ebert, A., Roser, P., Edemann-Callesen, H., Tschacher, W., & Brüne, M. (2020). Exploring nonverbal synchrony in borderline personality disorder: A doubleblind placebo-controlled study using oxytocin. *British Journal of Clinical Psychology*, *59*(2), 186–207. https://doi.org/10.1111/bjc.12240

Rouault, M., Lebreton, M., & Pessiglione, M. (2023). A shared brain system forming confidence judgment across cognitive domains. *Cerebral Cortex*, *33*(4), 1426–1439. https://doi.org/10.1093/cercor/bhac146

Ruiz, S. G., Brazil, I. A., & Baskin-Sommers, A. (2023). Distinct neurocognitive fingerprints reflect differential associations with risky and impulsive behavior in a neurotypical sample. *Scientific Reports*, *13*(1), Article 11782. https://doi.org/10.1038/ s41598-023-38991-0

Scherbaum, S., Fischer, R., Dshemuchadse, M., & Goschke, T. (2011). The dynamics of cognitive control: Evidence for within-trial conflict adaptation from frequency-tagged EEG. *Psychophysiology*, *48*(5), 591–600. https://doi.org/10.1111/ j.1469-8986.2010.01137.x

Scherbaum, S., Dshemuchadse, M., Ruge, H., & Goschke, T. (2012). Dynamic goal states: Adjusting cognitive control without conflict monitoring. *NeuroImage*, *63*(1), 126–136. https://doi.org/10.1016/j.neuroimage.2012.06.021

Tillman, C. M., & Wiens, S. (2011). Behavioral and ERP indices of response conflict in Stroop and flanker tasks. *Psychophysiology*, *48*(10), 1405–1411. https://doi.org/ 10.1111/j.1469-8986.2011.01203.x

Toba, M. N., Godefroy, O., Rushmore, R. J., Zavaglia, M., Maatoug, R., Hilgetag, C. C., & Foulon, C. (2024). Same, same but different? A multi-method review of the processes underlying executive control. *Neuropsychology Review*, *34*(2), 418–454. https:// doi.org/10.1007/s11065-023-09577-4

Vetter, P., & Newen, A. (2014). Varieties of cognitive penetration in visual perception. *Consciousness and Cognition*, *27*, 62–75. https://doi.org/10.1016/ j.concog.2014.04.007

Whitwell, R. L., Grierson, L. E. M., & Goodale, M. A. (2021). The ties that bind: Agnosia, neglect and selective attention to visual scale. *Current Neurology and Neuroscience Reports*, *21*(10), Article 54. https://doi.org/10.1007/s11910-021-01139-6

Xiao, X., Deng, Y., Wu, H., & Li, X. (2010). Temporal course of cognitive control in a picture-word interference task. *Neuroreport*, *21*(2), 104–107. https://doi.org/10.1097/ WNR.0b013e32833499ff

Yantis, S., Meyer, D. E., & Smith, J. E. K. (1991). Analyses of multinomial mixture distributions: New tests for stochastic models of cognition and action. *Psychological Bulletin*, *110*(2), 350–374. https://doi.org/10.1037/0033-2909.110.2.350