

Prediction errors for aversive events shape long-term memory formation through a distinct neural mechanism

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Manuscript Source: <https://www.biorxiv.org/content/10.1101/2021.03.19.436177v1>

Manuscript Authors: Felix Kalbe & Lars Schwabe

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Comments and Caveats:

- The sentence parsing is achieved using a prototype natural language processing pipeline written in Python and may include occasional errors in sentence segmentation.
- Depending on the source of the input text, the Sentence Audit may contain occasional html artefacts that are parsed as sentences (E.g. "Download figure. Open in new tab").
- Always consult the original research paper as the true reference source for the text.

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All queries, feedback or suggestions are also very welcome.

Research Paper Sections:

The sections of the research paper input text parsed in this audit.

[illegible]

Title **Prediction errors for aversive events shape long-term memory formation through a distinct neural mechanism**

S1 [001] SUMMARY

S1 [002] Prediction errors (PEs) have been known for decades to guide associative learning, but their role in episodic memory formation has been discovered only recently.

Prediction errors ...
... (PEs) ...
... have been known ...
... for decades ...
... to guide associative learning, ...
... but their role ...
... in episodic memory formation has been discovered ...
... only recently.

S1 [003] Using an encoding task in which participants learned to predict which stimuli are followed by aversive shocks, combined with univariate, multivoxel, and large-scale network analyses of fMRI data, we show that enhanced memory for events associated with negative PEs was linked to reduced hippocampal responses to PEs and increased crosstalk between the 'salience network' and a frontoparietal network commonly implicated in memory formation for events that are in line with prior expectation.

Using an encoding task ...
... in which participants learned ...
... to predict ...
... which stimuli are followed by aversive shocks, ...
... combined ...
... with univariate, ...
... multivoxel, ...
... and large-scale network analyses ...
... of fMRI data, ...
... we show ...
... that enhanced memory ...
... for events associated ...
... with negative PEs was linked ...
... to reduced hippocampal responses ...
... to PEs ...
... and increased crosstalk ...
... between the 'salience network' ...
... and a frontoparietal network commonly implicated ...
... in memory formation ...
... for events ...
... that are ...
... in line ...
... with ...
... prior expectation.

S1 [004] These PE-related effects could not be explained by mere changes in physiological arousal or the prediction itself.

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... by mere changes ...
... in physiological arousal ...
... or the prediction itself.

S1 [005] Our results suggest that superior memory for events associated with high PEs is driven by a distinct neural mechanism that might serve to set memories of high PE events apart from those with expected outcomes.

Our results suggest ...
... that superior memory ...
... for events associated ...
... with high PEs is driven ...
... by a distinct neural mechanism ...
... that ...
... might serve ...
... to set memories ...
... of high PE events apart ...
... from those ...
... with expected outcomes.

S2 [006] INTRODUCTION

S2 [007] Imagine meeting Barack Obama in the supermarket.

Imagine meeting Barack Obama ...
... in the supermarket.

S2 [008] Most likely, this event would deviate strongly from what you expected during your grocery shopping.

Most likely, ...
... this event would deviate strongly ...
... from what you expected ...
... during your grocery shopping.

S2 [009] Such a mismatch between expectation and experience is referred to as a prediction error (PE).

Such a mismatch ...
... between expectation ...
... and experience is referred ...
... to as a prediction error ...
... (PE).

S2 [010] PEs play a key role in many cognitive domains, from perception to attention or language (den Ouden et al., 2012; Rao & Ballard, 1999; Spratling, 2008), and the comparison of predictions against perceptual evidence has been proposed as a unifying principle of neural computation (Bar, 2009; Friston, 2010).

PEs play a key role ...
... in many cognitive domains, ...
... from perception ...
... to attention ...
... or language ...
... (den Ouden et al., 2012; ...
... Rao & Ballard, 1999; ...
... Spratling, 2008), ...
... and the comparison ...
... of predictions ...
... against perceptual evidence has been proposed ...
... as a unifying principle ...
... of neural computation ...
... (Bar, 2009; ...
... Friston, 2010).

S2 [011] Traditionally, PEs are considered a to be driving force in reinforcement learning, during which an organism learns incrementally how to achieve pleasant and avoid unpleasant states (Glimcher, 2011; Niv, 2009).

Traditionally, ...
... PEs are considered a ...
... to be driving force ...
... in reinforcement learning, ...
... during ...
... which an organism learns incrementally how ...
... to achieve pleasant ...
... and avoid unpleasant states ...
... (Glimcher, 2011; ...
... Niv, 2009).

S2 [012] Beyond driving incremental learning across multiple instances, it may be expected that single episodes encoded in the context of a high PE, such as meeting Barack Obama by chance, are also preferentially stored in episodic memory.

Beyond driving incremental learning ...
... across multiple instances, ...
... it ...
... may be expected ...
... that single episodes encoded ...
... in the context ...
... of a high PE, ...
... such as meeting Barack Obama ...
... by chance, ...
... are also preferentially stored ...
... in episodic memory.

S2 [013] Although the preferential storage of high-PE events in long-term memory would aid behavioral adaptation and optimal choice in the future (Gershman & Daw, 2017; Shohamy & Adcock, 2010), PEs received surprisingly little attention in episodic memory research (for early exceptions, see Henson & Gagnepain, 2010; Mizumori, 2013).

Although the preferential storage ...
... of high-PE events ...
... in long-term memory would aid behavioral adaptation ...
... and optimal choice ...
... in the future ...
... (Gershman & Daw, 2017; ...
... Shohamy & Adcock, 2010), ...
... PEs received surprisingly little attention ...
... in episodic memory research ...
... (for early exceptions, ...
... see Henson & Gagnepain, 2010; ...
... Mizumori, 2013).

S2 [014] Only very recently, behavioral evidence started to accumulate showing that PEs may extend into episodic memory and promote memory formation of nearby events (Ergo et al., 2020; Greve et al., 2017; Jang et al., 2019; Kalbe & Schwabe, 2020; Rouhani et al., 2018).

Only very recently, ...
... behavioral evidence started ...
... to accumulate showing ...
... that PEs ...
... may extend ...
... into episodic memory ...
... and promote memory formation ...
... of nearby events ...
... (Ergo et al., 2020; ...
... Greve et al., 2017; ...
... Jang et al., 2019; ...
... Kalbe & Schwabe, 2020; ...
... Rouhani et al., 2018).

S2 [015] A fundamental question concerns how PEs boost long-term memory formation.

A fundamental question concerns how PEs boost long-term memory formation.

S2 [016] One way through which PEs may promote episodic memory for surrounding events is by enhancing well-known mechanisms of long-term memory formation.

One way ...
... through ...
... which PEs ...
... may promote episodic memory ...
... for surrounding events is ...
... by enhancing well-known mechanisms ...
... of long-term memory formation.

End of Sample Audit

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