# Gambling on an empty stomach: Hunger modulates preferences for learned but not described risks

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The Manuscript Microscope Sentence Audit is a research paper introspection system that parses the text of your manuscript into minimal sentence components for faster, more accurate, enhanced proofreading.

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- Accelerated Proofreading: Examine long technical texts in a fraction of the usual time.
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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.

## Contact Information:

To get a Manuscript Microscope Sentence Audit of any other research paper, simply forward any copy of the text to John.James@OxfordResearchServices.com.

All queries, feedback or suggestions are also very welcome.

## Research Paper Sections:

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

| Section No. | Headings | Sentences |
|---|---|---|
| Section: 1 | Abstract | 9 |
| Section: 2 | Introduction | 18 |
| N/A | --- --- --- --- --- --- --- | 0 |
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| Title | **Gambling on an empty stomach: Hunger modulates preferences for learned but not described risks** |
|-------|---------------------------------------------------------------------------------|

## S1 [001] Abstract

**S1 [002]** We assess risks differently when they are explicitly described, compared to when we learn directly from experience, suggesting dissociable decision-making systems.

> We assess risks differently ...
> ... when they are explicitly described, ...
> ... compared ...
> ... to when we learn directly ...
> ... from experience, ...
> ... suggesting dissociable decision-making systems.

**S1 [003]** Our needs, such as hunger, could globally affect our risk preferences, but do they affect described and learned risks equally?

> Our needs, ...
> ... such as hunger, ...
> ... could globally affect our risk preferences, ...
> ... but do they affect described ...
> ... and learned risks equally?

**S1 [004]** On one hand, explicit decision-making is often considered flexible and contextsensitive, and might therefore be modulated by metabolic needs.

> On one hand, ...
> ... explicit decision-making is often considered flexible ...
> ... and contextsensitive, ...
> ... and ...
> ... might therefore be modulated ...
> ... by metabolic needs.

**S1 [005]** On the other hand, implicit preferences learned through reinforcement might be more strongly coupled to biological drives.

> On the other hand, ...
> ... implicit preferences learned ...
> ... through reinforcement ...
> ... might be more strongly coupled ...
> ... to biological drives.

**S1 [006]** To answer this, we asked participants to choose between two options with different risks, where the probabilities of monetary outcomes were either described or learned.

> To answer this, ...
> ... we asked participants ...
> ... to choose ...

... between two options ...

... with different risks, ...

... where the probabilities ...

... of monetary outcomes were either described ...

... or learned.

**S1 [007]** In agreement with previous studies, rewarding contexts induced risk-aversion when risks were explicitly described, but risk-seeking when they were learned through experience.

In agreement ...

... with previous studies, ...

... rewarding contexts induced risk-aversion ...

... when risks were explicitly described, ...

... but risk-seeking ...

... when they were learned ...

... through experience.

**S1 [008]** Crucially, hunger attenuated these contextual biases, but only for learned risks.

Crucially, ...

... hunger attenuated these contextual biases, ...

... but ...

... only ...

... for learned risks.

**S1 [009]** The results suggest that our metabolic state determines risk-taking biases when we lack explicit descriptions.

The results suggest ...

... that our metabolic state determines risk-taking biases ...

... when we lack explicit descriptions.

## S2 [010] Introduction

**S2 [011]** When we decide between options with uncertain outcomes, we factor risk into the decision.

When we decide ...

... between options ...

... with uncertain outcomes, ...

... we factor risk ...

... into the decision.

**S2 [012]** This is most commonly evaluated by asking people to decide between explicitly described, hypothetical choice scenarios (Allais, 1953; Arrow, 1951; Ellsberg, 1961; Kahneman and Tversky, 1979; Weber et al., 2004).

This is most commonly evaluated ...

... by asking people ...

... to decide ...

... between explicitly described, ...

... hypothetical choice scenarios ...

... (Allais, 1953; ...

... Arrow, 1951; ...

... Ellsberg, 1961; ...

... Kahneman ...

... and Tversky, 1979; ...

... Weber et al., 2004).

**S2 [013]** In these experiments, risk-taking is typically modulated by the magnitude and probability of outcomes, or by framing choices in a positive or negative context using words or diagrams.

In these experiments, ...

... risk-taking is typically modulated ...

... by the magnitude ...

... and probability ...

... of outcomes, ...

... or by framing choices ...

... in a positive ...

... or negative context ...

... using words ...

... or diagrams.

**S2 [014]** This contrasts with real life scenarios, in which humans usually make repeated choices, and learn about uncertain outcomes from experience.

This contrasts ...

... with real life scenarios, ...

... in which humans usually make repeated choices, ...

... and learn ...

... about uncertain outcomes ...

... from experience.

**S2 [015]** Several studies have reported that experienced-based choices differ from choices based on verbal or graphical descriptions (Hertwig et al., 2004; Hertwig and Erev, 2009; Niv et al., 2012).

Several studies have reported ...

... that experienced-based choices differ ...

... from choices based ...

... on verbal ...

... or graphical descriptions ...

... (Hertwig et al., 2004; ...

... Hertwig ...

... and Erev, 2009; ...

... Niv et al., 2012).

**S2 [016]** This observation is better known as the experience-description gap.

This observation is better known ...

... as the experience-description gap.

**S2 [017]** In particular, empirical studies have also shown that people are typically risk-seeking for negatively framed choices, but risk-averse for positively framed choices when outcomes are explicitly described (Kahneman and Tversky, 1979; Tversky and Kahneman, 1981).

> In particular, ...
>
> ... empirical studies have also shown ...
>
> ... that people are typically risk-seeking ...
>
> ... for negatively framed choices, ...
>
> ... but risk-averse ...
>
> ... for positively framed choices ...
>
> ... when outcomes are explicitly described ...
>
> ... (Kahneman ...
>
> ... and Tversky, 1979; ...
>
> ... Tversky ...
>
> ... and Kahneman, 1981).

**S2 [018]** However, when experiential choices are framed in a positive or negative context, risk attitudes are reversed compared to description-based decisions (Hertwig et al., 2004; Ludvig et al., 2014; Ludvig and Spetch, 2011).

> However, ...
>
> ... when experiential choices are framed ...
>
> ... in a positive ...
>
> ... or negative context, ...
>
> ... risk attitudes are reversed compared ...
>
> ... to description-based decisions ...
>
> ... (Hertwig et al., 2004; ...
>
> ... Ludvig et al., 2014; ...
>
> ... Ludvig ...
>
> ... and Spetch, 2011).

**S2 [019]** The effect of decision context is thought to be driven by anticipatory emotions (De Martino et al., 2006) as well as biological needs (Stephens, 1981).

> The effect ...
>
> ... of decision context is thought ...
>
> ... to be driven ...
>
> ... by anticipatory emotions ...
>
> ... (De Martino et al., 2006) ...
>
> ... as well ...
>
> ... as biological needs ...
>
> ... (Stephens, 1981).

**S2 [020]** Nevertheless, only a handful of studies has investigated the effect of physiological factors, such as hunger, on explicit risk-taking behaviour in humans, and suggest that hunger increases risk-seeking (Levy et al., 2013; Shabat-Simon et al., 2018; Symmonds et al., 2010), but the effect of hunger on experiential risk-taking has not yet been tested in humans.

> Nevertheless, ...
>
> ... only a handful ...
>
> ... of studies has investigated the effect ...
>
> ... of physiological factors, ...
>
> ... such as hunger, ...

**End of Sample Audit**