

# LaTeX template, with BibLaTeX and biber backend

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## Abstract

This thesis develops a framework for computationally recapitulating human emotion understanding. I argue that expression cues and contextual information mutually constrain inference over an intuitive theory of mind. Emotion concepts reflect computations in the space of inferred appraisals, and inferred appraisals function as latent causal explanations that link expressions, actions, preferences, beliefs, costs, and world states across time.

## 1 Introduction

My research highlights the critical role of context, and of prediction, in emotion understanding. Contextual information shapes forward predictions of how others will interpret external events in relation to their mental contents (beliefs, desires, moral values, costs, etc.). These forward predictions in turn constrain ill-posed inverse inferences, allowing people to explain others' expressions and behavior (Saxe & Houlihan, 2017). My results support the view that forward predictions guide inverse inferences about expressions. Contextual cues about what did happen, what could have happened, what someone wanted to happen, and what someone believed would happen, constrain the predictions generated by people's intuitive theory (Houlihan et al., 2018). The contextual shaping of forward predictions in turn constrains the emotions attributed to expressions (Anzellotti et al., 2021), and the prior experiences inferred from from expressions (Houlihan et al., 2022). Knowing specifically what situations people were reacting to changes the emotions attributed to their expressions (Anzellotti et al., 2021; Houlihan, 2022). Knowing merely what events *might* have transpired, but not what actually happened, also changes emotion attribution (Anzellotti et al., 2021; Houlihan et al., 2022).

## References

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- Houlihan, S. D. (2022). *A computational framework for emotion understanding* [Doctoral dissertation, Massachusetts Institute of Technology].

- Houlihan, S. D., Kleiman-Weiner, M., Tenenbaum, J. B., & Saxe, R. (2018). A generative model of people’s intuitive theory of emotions: Inverse planning in rich social games. *Proceedings of the 40th Annual Conference of the Cognitive Science Society*, 40.
- Houlihan, S. D., Ong, D., Cusimano, M., & Saxe, R. (2022). Reasoning about the antecedents of emotions: Bayesian causal inference over an intuitive theory of mind. *Proceedings of the 44th Annual Conference of the Cognitive Science Society*, 44, 854–861. <https://escholarship.org/uc/item/7sn3w3n2>
- Saxe, R., & Houlihan, S. D. (2017). Formalizing emotion concepts within a Bayesian model of theory of mind. *Current Opinion in Psychology*, 17, 15–21. <https://doi.org/10.1016/j.copsyc.2017.04.019>

# Supplementary Materials

## S1 Some Examples

Here are the supplementary materials. This is a dynamic input: 0.889 [0.880, 0.891].

### S1.1 Example Figure

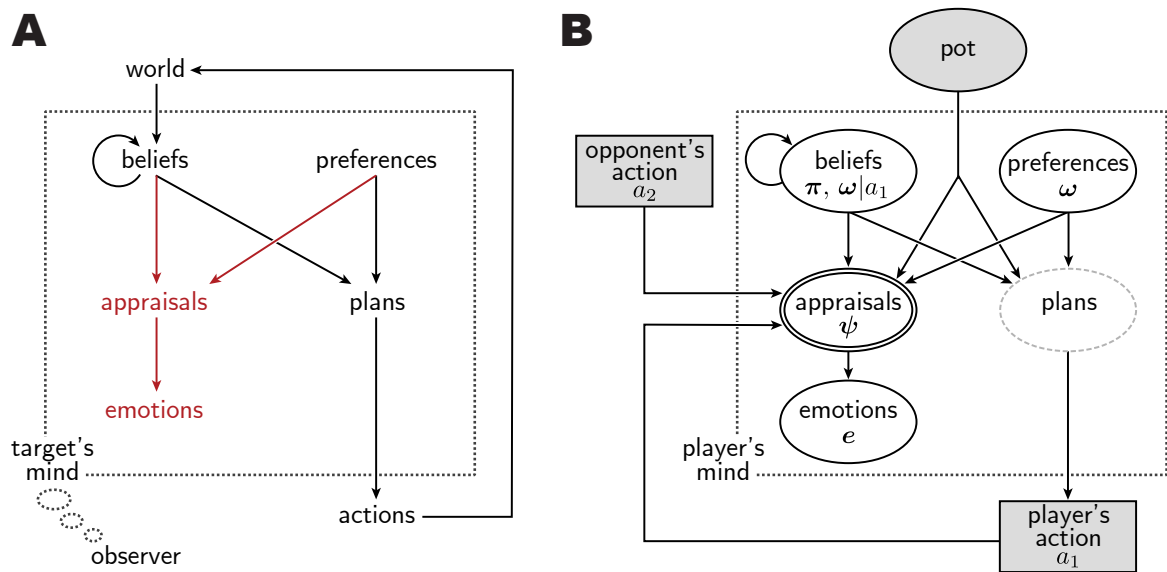


Figure S1: **Emotion prediction as inference over an intuitive Theory of Mind.** Hypotheses about how human observers reason about others' emotions can be formalized as probabilistic generative models.

### S1.2 Example Table

Table S1: Sample table title.

Error type	Example
Take smaller	63 - 44 = 21
Always borrow	96 - 42 = 34
0 - N = N	70 - 47 = 37
0 - N = 0	70 - 47 = 30