

Improving Language Models for Emotion Analysis: Insights from Cognitive Science

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Contributions

To improve **emotion analysis**, we propose integrating various theories from cognitive sciences with NLP. We explain why and how emotion analysis should use psychological theories of emotion, especially the **integrated framework**, as well as theories from cognitive pragmatics, especially the **detective analysis**. This leads to the development of potential new **annotation scheme** and **evaluation** of language models.

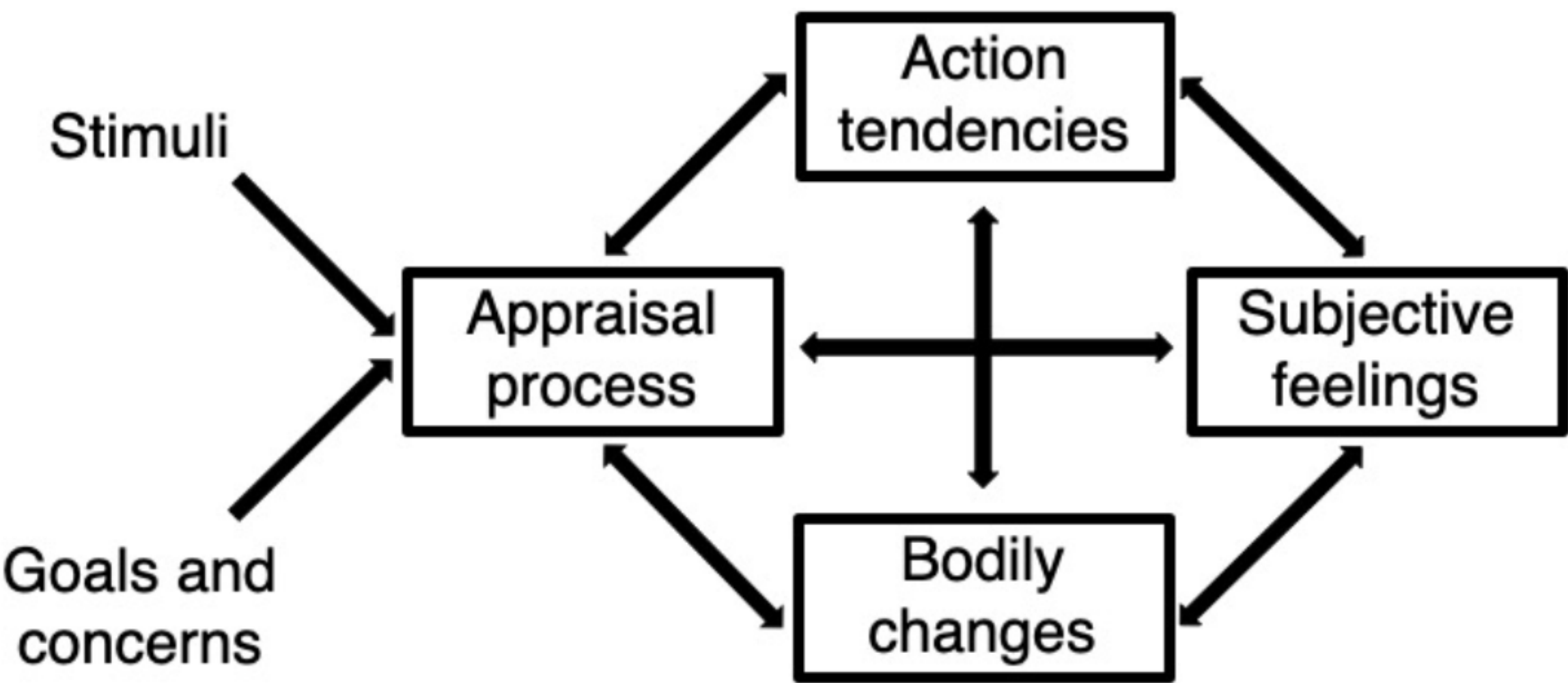
Emotion analysis in text

Psychological theories	In the text, the emotion is...	Example
Basic emotions theory [3]	a category	"I love philosophy." → <i>joy</i>
Constructivist theories [7, 2]	a continuous value with an affective meaning	"His voice soothes me." → <i>valence</i> (4/5), <i>arousal</i> (1/5)
Appraisal theory [1]	a continuous value with a cognitive meaning	"I received a surprise gift." → <i>sudden</i> (4/5), <i>against social norms</i> (0/5), <i>control</i> (0/5)
	composed of semantic roles	"Louise (<i>experiencer</i>) was angry (<i>cue</i>) towards Paul (<i>target</i>), because he didn't inform her (<i>cause</i>)."

Limitations: Different emotion theories lead to divergences in how to annotate them in the text, the process of verbalizing emotion is little considered, and there is no *benchmark* that evaluate the richness of the emotional phenomenon.

Integrated framework for emotion theories

Emotional episodes are synchronized and causally interconnected changes in four components [8]



Emotion expression modes

Which verbal signs are used to infer expressed emotions?

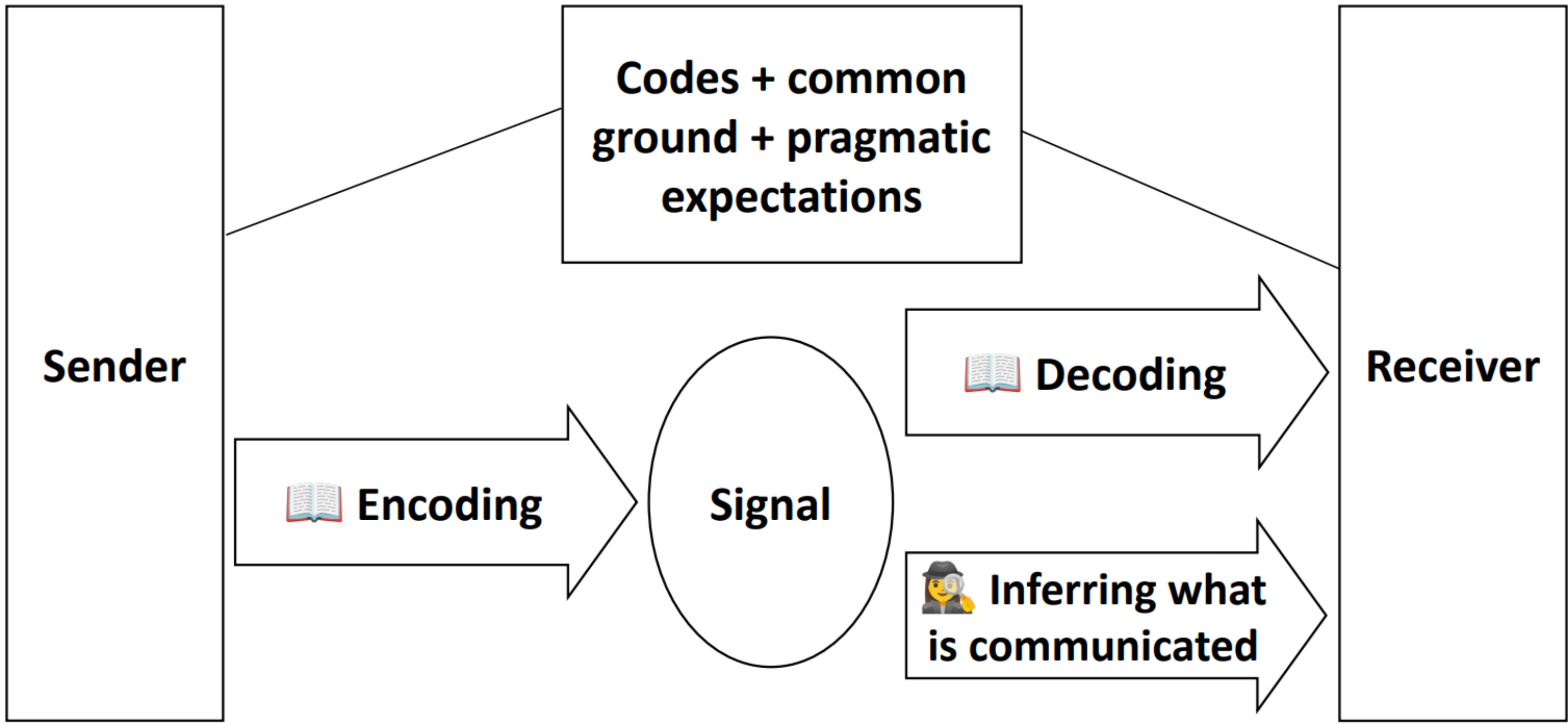
Raphaël Micheli categorizes a range of linguistic markers into three emotion expression modes [6]. The emotion can be:

- **labeled** explicitly with an emotional term ("I am *sad*")
- **shown** with utterance features such as interjections and punctuations ("Ah! That's great!")
- **suggested** with the description of a situation which generally, in a given sociocultural context, leads to an emotion ("She gave me a gift")

→ Different emotion expression modes are more or less difficult to interpret.

Detective analysis in pragmatics

What are the psychological mechanisms used to infer what is communicated? [5]



Possible research directions

- Based on the integrated framework, construct a **unified annotation scheme** to capture the emotional phenomenon better and benefit from knowledge transfer between tasks.
- Build **benchmarks** that evaluate various aspects of the emotional phenomenon based on emotion expression modes in linguistics [4] and detective analysis in pragmatics.
- Develop new **prompting** methods based on detective analysis to improve performance and explainability of models.

References

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