

# Epistemic beliefs as predictors of epistemic emotions: Extending a theoretical model

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## Theory

- **Epistemic beliefs:** Conceptions about knowledge and knowing, often with regard to a certain domain or field (Hofer & Pintrich, 1997; Kuhn, 1991)
  - *Absolutism:* A view of scientific knowledge as simple and certain: An ultimate truth exists and experts can ultimately get to it.
  - *Multipism:* A view of scientific knowledge as complex but subjective: Truth does not exist, knowledge is an assembly of “opinions”.
  - *Evaluativism:* Contextually adaptive view: “Viewpoints can be compared and evaluated to assess relative merits” (Hofer & Pintrich, 1997, p. 104): Evaluating and integrating competing claims is central when dealing with (scientific) knowledge.
- **Epistemic emotions:** Emotions “caused by cognitive qualities of task information and of the processing of such information” (Pekrun & Linnenbink-Garcia, 2012, p. 262)
  - e.g., surprise, curiosity, anxiety, enjoyment, or frustration that may arise when individuals are confronted with specific learning tasks or contents (Muis, et al., 2015).
- **Cognitive incongruity:** Cognitive state that arises when an individual’s epistemic beliefs are incompatible with the epistemic nature of learning tasks (Muis et al., 2015)
  - Cognitive incongruity has negative effects on epistemic emotions, which in turn affect the use of learning strategies and learning outcomes
  - e.g., absolute beliefs ⚡ complex/contradictory learning materials → 😞
  - **“Cognitive Incongruity Model of Epistemic Beliefs and Emotions”** (Muis et al., 2015)

## Extending the Cognitive Incongruity Model

- Cognitive incongruity not only depends on the learning materials as such, but also on how individuals act on these learning materials → **Individual epistemic actions** (resolving vs. not resolving contradictions) as a **moderator** in the cognitive incongruity model.
- Reason: The epistemic nature of contradictory learning materials might be perceived differently depending on whether individuals resolve (or integrate) contradictory claims or not.
- **Hypothesis:** If (and only if) students resolve contradictory scientific claims (e.g., by identifying moderating factors), more advanced epistemic beliefs (e.g., evaluativism) have positive emotional effects (**H1a**) and less advanced epistemic beliefs have negative emotional effects (**H1b**).

## Method

### Participants and Procedure

- Field-experimental study with  $N = 86$  psychology students
- **Reading task:** Participants were presented controversial evidence on gender stereotyping from 18 different (fictional) studies. All contradictions could be resolved by identifying the contextual factors (e.g., subject matter) that a certain type of stereotype discrimination occurs in (“**resolvable controversies**”).

### Reading Task – Sample Text Snippets

In a study by Meier et al. (2015), 250 physics teachers graded physics tests. Even though all tests had been completed by boys, half of the tests were tagged with girls’ names. Independently of teachers’ sex, tests allegedly completed by girls received significantly lower grades than tests allegedly completed by boys.

Mertes et al. (2014) had 224 German teachers grade essays from secondary school students. Allegedly, the essays were written either by boys or girls. Even though all essays had been written by the researchers themselves, essays allegedly written by boys received significantly lower grades than those allegedly written by girls.

Feldmann et al. (2016) instructed 240 history teachers to grade history exams (secondary school level). All exams were originally written by girls. However, the researchers tagged half of the exams with boys’ names. Exams that were allegedly written by boys were neither graded better nor worse than those allegedly written by girls.

- **Writing task:** After reading, students were instructed to write a short essay on gender stereotyping. Writing instructions differed across three experimental groups:
  - *Resolution instruction:* explicit instruction to resolve the controversies (e.g., focus on the conditions under which boys respectively girls are discriminated) → **experimental group**
  - *Summary instruction:* instruction to write a detailed summary but not to integrate diverging findings → **control group 1**
  - *One-sided-argument instruction:* instruction to choose one position and defend it (e.g., “boys are being discriminated”) → **control group 2**

### Measures and Data Analysis

- **Epistemic beliefs** (measured prior to reading and writing): Scenario-based, topic-specific instrument with three subscales (absolutism, multipism, evaluativism), based on the FREE questionnaire (Krettenauer, 2005)
- **Epistemic emotions:** Epistemic Emotions Scales (EES); seven emotions (surprise, curiosity, enjoyment, frustration, confusion, anxiety, boredom) pertaining to the writing task (Pekrun, Vogl, Muis, & Sinatra, 2016)
- **Data analysis:** multiple regression analysis using dummy coding in PROCESS 2.16 (Hayes, 2013)

## Results and conclusions

- Students with higher **absolute beliefs** reported more negative task-oriented epistemic emotions (confusion, frustration, anxiety) when instructed to resolve the textual controversies, especially in contrast to students instructed to write a one-sided argumentative essay.
- No significant effects regarding **multiplistic beliefs**.
- Students with higher **evaluativistic beliefs** reported less confusion, surprise, and frustration when instructed to resolve the controversies – compared to both control groups.
- **Conclusion:** Individual epistemic actions (resolving vs. not resolving contradictions), together with students’ epistemic beliefs, are central to the emotional reactions regarding contradictory learning materials. Extending the cognitive incongruity model might prove worthwhile.

## References

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