

# A Crosslinguistic Database for Combinatorial and Semantic Properties of Attitude Predicates

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# Preliminaries

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Attitude predicates are 'picky' as to the kinds of clauses they select:

- (1) Declaratives vs. interrogatives
  - a. Al knows/remembers/... {that, whether, what} Jo ate.
  - b. Al believes/hopes/... {that, \*whether, \*what} Jo ate.
  
- (2) Constituent vs. *whether* interrogatives
  - a. I'm surprised what they serve for breakfast.
  - b. \*I'm surprised whether they serve soup for breakfast.

Their semantic properties are argued to explain such patterns:

- **Factives** can select declaratives or interrogatives.
- **Emotive factives** can't select *whether* clauses.
- **Neg-raising** predicates can't select interrogatives.

These generalizations. . .

- have exceptions: *I can't believe who, I was hoping whether. . .*
- have mostly only been studied on the basis of English

We present a database that references the semantic and combinatorial properties of  $\pm 50$  predicates in 16 languages.

- It contains machine readable data in a table format, and notes about finer-grained aspects of attitude reports per language.
- This allows the assessment of existing generalizations and the formulation of new ones in a cross-linguistically informed way.

## Semantic properties: Examples

We include a sample of semantic properties proposed to correlate with different combinatorial properties.

- (3) a. **Veridicality**  
Alice is surprised that it's raining.  $\rightsquigarrow$  It's raining.  
Alice thinks that it's raining.  $\not\rightarrow$  It's raining.
- b. **Projective under negation**  
Alice isn't surprised that it's raining.  $\rightsquigarrow$  It's raining.
- c. **Q-to-P distributivity**  
Alice is surprised who was at the party.  
 $\Rightarrow$   
 $\exists x$  s.t. Alice is surprised that  $x$  was at the party.
- d. ...

# Semantic properties: Full list

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## Semantic properties

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Veridicality<sup>†</sup>

Conjunction with negation of the complement

Conjunction with the complement

Complement projection/reversal through negation<sup>†</sup>

Neg-raising<sup>†</sup>

Subject's  $\left\{ \begin{array}{l} \text{likelihood} \\ \text{unlikely} \\ \text{equal likelihood} \end{array} \right\}$  estimation towards complement

Subject's  $\left\{ \begin{array}{l} \text{certainty} \\ \text{counter-certainty} \\ \text{uncertainty} \end{array} \right\}$  towards complement

Subject's  $\left\{ \begin{array}{l} \text{preference} \\ \text{opposition} \\ \text{indifference} \end{array} \right\}$  towards complement

Focus sensitivity

Grammatical gradability with declaratives

Belief/ignorance implications w.r.t. interrogatives<sup>†</sup>

Grammatical gradability w.r.t. interrogatives

Q-to-P veridicality<sup>†</sup>

Q-to-P distributivity<sup>†</sup>

P-to-Q distributivity<sup>†</sup>

## Response options

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veridical, anti-veridical, neither  
contradictory, redundant, neither

contradictory, redundant, neither

projective, reversive, neither

neg-raising, non-neg-raising

always implies, typically implies,  
compatible, incompatible

always implies, typically implies,  
compatible, incompatible

always implies, typically implies,  
compatible, incompatible

focus-sensitive, non-focus-sensitive  
gradable, non-gradable, undecided

belief-, ignorance-implying, neutral  
gradable, non-gradable, undecided

veridical, anti-veridical, neither

distributive, non-distributive

distributive, non-distributive

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<sup>†</sup> indicates properties with a graded response: typically/always {veridical, projective, neg-raising...}

- (4) a. **Finite declarative**  
Alice is surprised that it's raining.
- b. **Non-finite declarative**  
Alice wants it to rain
- c. **Finite polar interrogatives**  
Alice knows whether it's raining.
- d. **Finite alternative interrogatives**  
Alice knows whether it's sunny<sup>↑</sup> or raining<sup>↓</sup>.
- e. ...

(*Whether*-interrogatives as a cover term for both polar and alternative interrogatives)

## Combinatorial properties: Full list for English

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### Combinatorial properties

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### Response options

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Finite & non-finite declaratives;  
Finite & non-finite interrogatives  
(polar, alternative, *which*, *who/what*);  
Concealed questions; Intransitive use

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✓, \*, ?/??/???, \*(X), undecided

Response options:

- ✓: acceptable
- \*: unacceptable
- ?/??/???: degraded
- \*(X): extra material (preposition/particle/etc.) required
- undecided

Some languages make fewer or additional clause-type distinctions (e.g., mood or complementizer distinctions).



## **Methods (of data collection)**

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## Predicates: 48 English predicates from various semantic classes

<b>Class</b>	<b>Verbs</b>
Communication	<i>accept, announce, argue, assert, claim, complain, deny, explain, inform, tell, whisper, write</i>
Doxastic	<i>agree, assume, believe, (be) certain, (be) convinced, doubt, expect, forget, know, learn, prove, (be) right, suspect, think, (be) unaware, (be) wrong</i>
Perception	<i>see</i>
Directive	<i>decide, demand, order, propose</i>
Emotive	<i>fear, (be) happy, hope, pray, prefer, regret, (be) surprised, want, (be) worried</i>
Inquisitive	<i>ask, (be) curious, inquire, investigate, wonder</i>
Relevance	<i>care</i>

Currently, the database has 16 languages from different families:

- Dutch, English, German, Swedish
- Catalan, French, Italian, Spanish
- Greek
- Hindi
- Polish
- Turkish
- Hebrew
- Japanese
- Kĩĩtharaka (Niger-Congo > Bantu, Kenya)
- Mandarin

Data collection ongoing:

Akan (Niger-Congo > Kwa, Ghana), Hungarian

Consultants first translate English predicates into their language.

- If no direct translation exists, they were encouraged to consider predicates similar in meaning.

Then they annotate predicates' semantic & combinatorial properties

- Using a questionnaire and predicate-specific notes that we designed (<https://osf.io/vd8mg/>)
- Each consultant spent 60 to 100 hours and met regularly with at least one of the authors during this process in order to clarify difficult judgments or resolve possible complications

## **Results and case study**

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Each language in the database has a folder containing:

- a README file: language-specific information
- a table: a wide format csv
- a text document: relevant linguistic examples and discussions

Accessible at:

<https://wuegaki.ppls.ed.ac.uk/mecore/mecore-databases/>

Table:

Predicate	English translation	Veridicality/ Anti-veridicality	...	Finite declaratives	Finite which interrogatives	...
<i>vergeten</i>	<i>forget</i>	always veridical	...	acceptable	acceptable	...
<i>ongelijk hebben</i>	<i>be wrong</i>	always anti-veridical	...	acceptable	acceptable	...
<i>geloven</i>	<i>believe</i>	neither	...	acceptable	unacceptable	...
<i>zich afvragen</i>	<i>wonder</i>	NA	...	unacceptable	acceptable	...
...	...	...	...	...	...	...

Text document:

## 37 Vergeten ‘forget’

### 37.1 Semantic properties

*Vergeten* is **always veridical w.r.t. declaratives**: sentence (1260) always implies that Peter teaches syntax on Tuesday.

(1260) Anne is vergeten dat Peter op dinsdag syntax geeft.  
Anne is forgotten that Peter on Tuesday syntax gives  
‘Anne forgets that Peter teaches syntax on Tuesday.’

## A generalization proposed in the literature

Emotive factives\* are incompatible with polar and alternative questions

\*Operationalization: A predicate is an **emotive factive** if it is (i) veridical, (ii) projective, (iii) focus sensitive, (iv) gradable, and (v) it entails that the subj believes the complement. (e.g., *be happy*; *be surprised*).



## A case study: Emotive factives and whether-questions

**A systematic counterexample crosslinguistically:** predicates of relevance (e.g., *care* in English), which are characterised by lack of **Q-to-P distributivity** (5), can take polar questions (6).

(5) Alice cares which player won the race.

$\not\Rightarrow$

$\exists x$  s.t. Alice cares that  $x$  won the race.

(6) Alice cares whether Mary won the race.

### Refined cross-linguistic generalization

Emotive factives **which are Q-to-P distributive** are incompatible with polar and alternative questions.

The case study shows how the database can help assess and refine cross-linguistic generalizations.

- Our database complements existing resources in allowing for:
  - crosslinguistic comparison
  - within-subject comparison across properties
  - assessment and exploration of crosslinguistic generalizations
  - fine-grained qualitative investigation based on accompanying text documents
- Some limitations of the current database:
  - low numbers of languages, native speakers per language, and predicates; diversity of language families sampled
  - translation-based procedure: interesting predicates in the target language might be overlooked
- Further contribution/collaboration very welcome!

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