

# Actuality entailments and aspect

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  - Which means are used to bind event variables in the structure?
- ⇒ sheds light on fundamental issues of compositionality

- verbs have an argument slot for events in their structure

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- which must be bound at some point

(e.g., Davidson 1967, Carlson 1984, Krifka 1992, Maienborn 2008, 2019, Filip 2000, 2005)

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- by aspect operator (Kratzer 1998, Pancheva & von Stechow 2004, von Stechow & Beck 2015)

$$(2) \quad \llbracket \text{Perfective} \rrbracket = \lambda P. \lambda t. \lambda w. \exists e [ \text{time}(e) \subseteq t \wedge P(e)(w) = 1 ]$$

the interaction of events with:

- aspectual
- modal
- temporal meaning



## Sample of languages

	French, Polish	Hausa	German
Grammatical Aspect	✓	✓	x
Grammatical Tense	✓	x	✓

- Actuality Entailments

## Two phenomena

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- uncancelable inference that the modalized event took place in the actual world:

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(3) Jane a pu soulever cette table, #mais elle  
Jane can-past-**pfv** lift this table, #but she  
ne l'a pas soulevée.  
didn't it lift  
'Jane was able to lift this table, # but she didn't do it.'

(French, Hacquard 2009, p.288)

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- AE in an aspectless language: Experimental studies
- Discussion

- ability modal is marked for (Past) Perfective (Bhatt 1999)

(4) **Boresa**            na tu   miliso                            (#ala den tu  
CAN.pst-pfv.1s NA him talk.non-pst-pfv.1s but    NEG him  
milisa)  
talk.pst-pfv  
'I was able to talk to John (but I didn't talk to him).'

(Modern Greek, Bhatt 1999, p.175)

- no AE with Imperfective aspect

(5) **Borusa** na sikoso afto to trapezi ala den to sikosa.  
CAN.ipfv.1s NA lift.non-past-pfv this the table but NEG it lift.ipfv  
'(In those days), I could lift this table but I didn't lift it.'

(Modern Greek, Bhatt 1999, p.175)

- it extends to all **root modals** (Hacquard, 2006, 2009)

## Goal-oriented possibility:

- (6) a. Jane **a pu** prendre le train pour aller à Londres,  
Jane can-past-pfv take the train to go to London,  
#mais elle a pris l'avion.  
#but she took the plane
- b. Jane **pouvait** prendre le train pour aller à Londres,  
Jane can-past-impf take the train to go to London,  
mais elle a pris l'avion.  
but she took the plane

'Jane was able to take the train to go to London, but she took the plane.'

(French, Hacquard 2009, p.288)

## Goal-oriented necessity:

- (7) a. Jane **a dû** prendre le train pour aller à Londres,  
Jane must-past-pfv take the train to go to London,  
#mais elle a pris l'avion.  
#but she took the plane
- b. Jane **devait** prendre le train pour aller à Londres,  
Jane must-past-impf take the train to go to London,  
mais elle a pris l'avion.  
but she took the plane

'Jane had to take the train to go to London, but she took the plane.'

(French, Hacquard 2009, p.288)

## Not with epistemic modality:

- (8) Bingley **a (bien) pu** aimer Jane, comme il a (bien) pu  
Bingley can-past-pfv (well) love Jane, like he can-past-pfv (well)  
ne pas l'aimer.  
not her love.  
'Bingley may (well) have loved Jane, just as he may (well) not have loved  
her.'

(French, Hacquard 2009, p.290)



## Hacquard's (2006, 2009) generalizations

	Epistemic modal	Root modal
Perfective	no AE	<b>AE</b>
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## Assumptions about modality

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- Root (but not epistemic) modals scope lower than aspect

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(9)  $\text{Modal}_{epist} > \text{Tense} > \mathbf{Aspect} > \mathbf{Modal}_{root} > \text{VP}$

- Modals are anchored to events and take an event argument

(10)  $\llbracket \text{can}_{circ} \rrbracket^{w,B,\leq,c} = \lambda P_{\langle \text{set} \rangle} . \lambda e_{\langle e \rangle} . \exists w' \text{ compatible with circumstances in } w \text{ such that } P(w')(e)$



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(12)  $[[\text{Pfv}]]^{w,B,\leq,c} = \lambda P_{\langle et \rangle} . \lambda t_{\langle i \rangle} . \exists e [\underline{e} \text{ in } w \ \& \ \tau(e) \subseteq t \ \& \ P(e)]$   
(adapted from Kratzer 1998)

- (13) Jane a pu prendre le train pour aller à Paris.  
*Jane was able to take the train to go to Paris.*

## Past Perfective + root modality in French

- (13) Jane a pu prendre le train pour aller à Paris.  
*Jane was able to take the train to go to Paris.*

$[[[(13)]]^{w,B,\leq,c}$  = is true iff  $\exists e$  [**e in w** &  $\tau(e) \subseteq t \{t < t^*\}$  &  $\exists w'$   $\text{Acc}(w)$   
& J-go-to-P. in  $w'$ : take-train(e,J,w')]

'True iff there is an **actual past event** such that in some circumstantially accessible world where Jane goes to Paris, that event is a train-taking by Jane.'



## Assumptions about Imperfective Aspect

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- Imperfective comes with its own modal meaning component
- ⇒ no AE even with root modals

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- 'the AE is triggered when the eventuality described by the infinitive is the only one which can satisfy the 'Boundedness Constraint' associated to the perfective.' (Mari & Martin 2007)
- (Root) modals denote unbounded eventualities; they have to be coerced into a bounded interpretation when combining with PFV (Homer 2011,2020)

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- A unified (Kratzerian) semantics for modals can be maintained
- Perfective plays a crucial role in deriving AEs

Perfective aspect:

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- anchors the modalized event to the actual world (Haquard 2006, 2009)
- forces the event to be part of the (counterparts of) the subject's circumstances in the actual world (Kratzer 2011)
- imposes a temporal boundedness requirement that (sometimes) forces an actualistic interpretation (Mari & Martin 2007, Homer 2011, 2020)

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### German

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### German

- Descriptively aspectless (Czochralski 1975; Zifonun et al. 1997; Bott and Hamm 2014; Flecken et al. 2014, a.o.)
- Formal analysis of aspectual reference ???

## Experiment 1

- We tested Hacquard's predictions regarding the emergence of AEs in a language which descriptively lacks aspect

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- We tested Hacquard's predictions regarding the emergence of AEs in a language which descriptively lacks aspect
- In particular, whether root (possibility) modals give rise to an actuality inference, comparing them to epistemic (possibility) modals

## Participants

- We tested 33 adults, native speakers of German (11 women, 21 men, 1 other)



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- We tested 33 adults, native speakers of German (11 women, 21 men, 1 other)
- 11 participants were excluded from analysis for not passing 6/8 controls

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## Procedure

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- participants were presented with the sentence
- and were asked to answer the question of whether the event actually took place with  
ja ('yes'), nein ('no'), nicht sicher ('*not sure*')

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- modal type (root vs. epistemic)
- modal flavour (goal-oriented vs. ability) — within the root modals



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*'Maria may have taken the train to go to Berlin yesterday.'*

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**Epistemic modal:**

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*'Maria may have taken the train to go to Berlin yesterday.'*

**Question:** Hat Maria den Zug genommen? (*'Did Maria take the train?'*)

ja ('yes')

nein ('no')

nicht sicher ('not sure')

(15) **Ability root modal:**

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Katharina kann gestern durch den ganzen See geschwommen sein.

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**Epistemic modal:**

Katharina kann gestern durch den ganzen See geschwommen sein.  
*'Katharina may have swum through the whole lake yesterday.'*

**Question:** Ist Katharina durch den See geschwommen? (*'Did Katharina swim through the lake?'*)

ja ('yes')

nein ('no')

nicht sicher ('not sure')

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  - 12 epistemic modals (6 lexicalizations matched goal oriented modals and 6 ability modals)
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  - 8 positive sentences eliciting clearly 'yes' responses

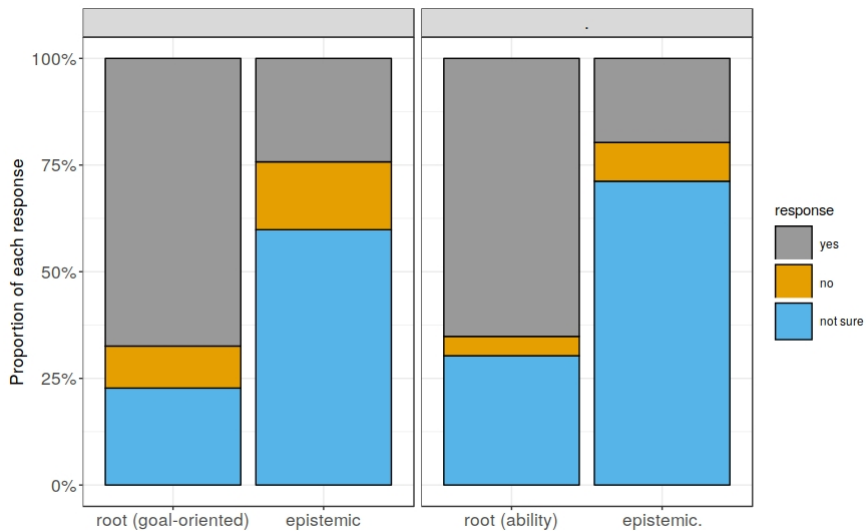
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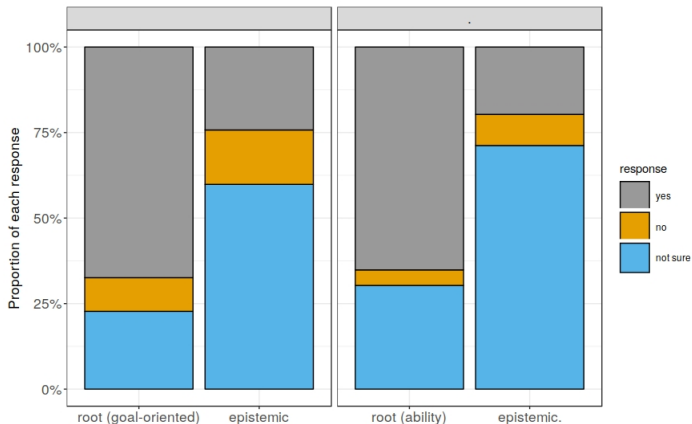
## Distribution of AEs (Hacquard, 2006, 2009)

	Epistemic modal	Root modal
Perfective aspect	no AE	<b>AE</b>
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# Results



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Logit model fitted to the data revealed:

- significant effect of modal type ( $\chi^2 = 28, p < 0.001$ ):  
⇒ participants were more likely to draw the actuality inference in the case of root than epistemic modality



- the results of the experiment suggest that there is an actuality inference in German
- **Immediate Question:** Does the actuality inference found with root modals qualify as an entailment?

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**Table:** Distribution of AEs (Hacquard, 2006, 2009)

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- (16) Darcy a eu la possibilité de rencontrer Lizzie.  
Darcy had-pfv the possibility to meet Lizzie  
'Darcy had the possibility to meet Lizzie.' (Hacquard 2006, 16)

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- (16) gives rise to the inference that Darcy met Lizzie
- however, this inference is cancelable, i.e., the continuation *but he didn't meet her* is not contradictory

- We examined whether the actuality inference in German is an implicature by testing for the cancellation of the actuality inference in sentences with root modals and the corresponding modal nouns

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- online-based experiment
- acceptability judgment task:
- participants were presented with the sentence
- and were asked to decide whether the target sentence sounds contradictory or not

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(17) **Modal verb:**

Maria **konnte** gestern den Zug nehmen um nach Berlin zu fahren, aber sie hat nicht den Zug genommen.

*'Maria could take the train to go to Berlin yesterday, but she didn't take the train.'*

(17) **Modal verb:**

Maria **konnte** gestern den Zug nehmen um nach Berlin zu fahren, aber sie hat nicht den Zug genommen.

*'Maria could take the train to go to Berlin yesterday, but she didn't take the train.'*

**Modal noun:**

Maria hatte gestern **die Möglichkeit** den Zug zu nehmen um nach Berlin zu fahren, aber sie hat nicht den Zug genommen.

*'Maria had the possibility to take the train to go to Berlin yesterday, but she didn't take the train.'*

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**Question:** Ist der Satz widersprüchlich? (*'Is the sentence contradictory?'*)

ja ('yes')

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(18) **Modal verb:**

Katharina **konnte** gestern durch den ganzen See schwimmen, aber sie ist nicht durch den See geschwommen.

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**Modal noun:**

'Katharina hatte gestern **die Kraft** durch den ganzen See zu schwimmen, aber sie ist nicht durch den See geschwommen.'

*'Katharina had yesterday the forces to swim through the whole lake, but she didn't swim through the whole lake.'*

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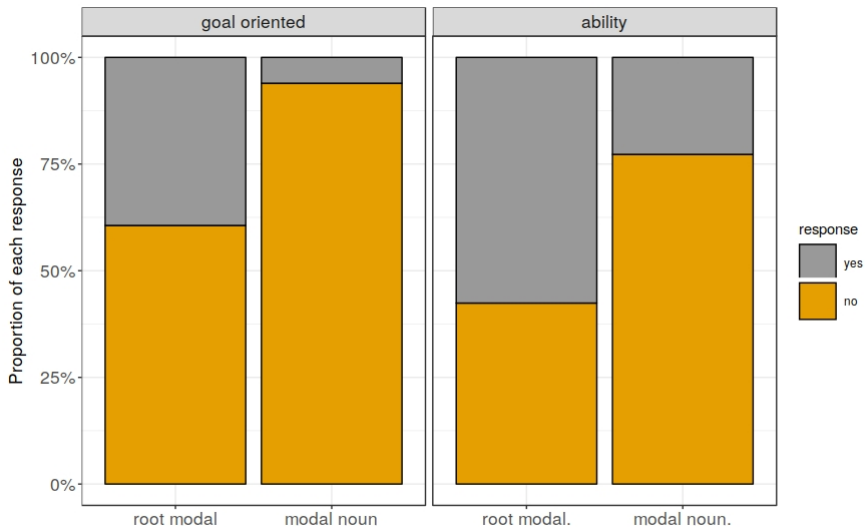
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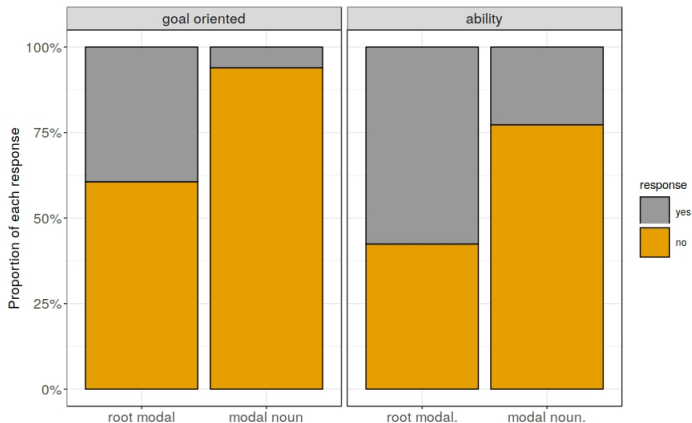
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Logit model fitted to the data revealed:

- significant effect of modal expression ( $p < 0.0001$ ):  
⇒ The participants were more likely to judge as contradictory sentences in which the modality was conveyed by verbs than by nouns.

## Discussion

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- more experimental work is needed (which is planned in our future research)

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Unexpected if...

1. German is a genuinely aspectless language AND
2. AEs are grammatically derived from the semantics of (Perfective) aspect

## Discussion and further research

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    - Temporally 'bleached' semantic aspect

$$(19) \quad \llbracket \text{Asp} \rrbracket^{w,B,\leq,c} = \lambda P_{\langle \epsilon t \rangle} . \lambda t_{\langle i \rangle} . \exists e [e \text{ in } w \ \& \ \tau(e) = t \ \& \ P(e)] \text{ tiny}$$

(adapted from Matthewson 2012)

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- ⇒ reconsider the idea that the event variable is bound by aspect (at least in German)

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  - which causes challenges for all the analyses of AE & the analysis of German aspectual system
  - and directly influences an answer for the questions of where the event variable is bound in the structure



Thank you!

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## Materials: Fillers — Experiment 1

(20)

**Positive sentence:**

Louis hat vor drei Tagen seinen Führerschein abgeholt.

*'Three day ago Louis picked up his driving license'*

**Question:** Did Louis pick up his driving license?

(21)

**Counterfactual:**

Theo hätte neulich eine Jacke einpacken können, um nicht nass zu werden.

*'Theo could have packed his jacket in order not to get wet.'*

**Question:** Did Theo pack his jacket?

(22)

**Conjunctive:**

Michael könnte letzten Monat eine Diät begonnen haben.

*'Michael might have started a diet last month.'*

**Question:** Did Michael start a diet?