

The licensing of discourse particles in complex questions: Evidence from graded judgments and event-related potentials

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Background

Question-sensitive discourse particles = **Q-DiPs** in German: *denn* (lit. then), *nur* (lit. only), *schon* (lit. already), *wohl* (lit. well)...

Q-DiPs:

- enrich the pragmatic impact of questions, modifying illocutionary force
- need to be licensed by interrogative clause type / mood

Syntactic licensing constraints:

- licensed by a c-commanding licensor in the FORCE projection
- licensor must be locally accessible: either minimally c-commanding the DiP, or c-commanding the DiP via a wh-chain [1]

*Wer_i hat t_i (denn) gesagt, dass Peter (*denn) kommt?*
Who has (DiP) said that Peter (DiP) comes?

Semantic scope of Q-DiP depends on its surface position:

Was_i denkt er (schon), t_i dass Susi (schon) t_i mitgekriegt hat?
What thinks he (DiP) that Susi (DiP) understood has?
„What does he think that Susi has understood?“

-> **New type of long-distance dependency with an interplay of syntactic, semantic and pragmatic licensing constraints**

Research Questions

What are the exact licensing conditions for Q-DiPs?

How are licensing violations for Q-DiPs reflected in the EEG?

What are the effects of failed licensing of the Q-DiP *denn* if

- the interrogative element (here a wh-phrase) is missing altogether?
- the interrogative element c-commands the DiP while the DiP is not locally accessible ('too far away')?

Discussion

Q-DiP licensing in questions is subject to syntactic licensing constraints, graded reduction in acceptability for inaccessible compared to absent licensors -> 'less acceptable' or 'illusory licensing'? We assume the former.

ERP for Q-DiP vs. non-Q-DiP:

root clauses: ERP effects are surprisingly weak, no N400 for unlicensed Q-DiP.

embedded clauses: - no licensor: no N400, but P600

- inaccessible licensor: no N400, but P600.

- descriptive contrast for embedded clauses matches behavioral data.

Q-DiPs in declaratives receive bad acceptability ratings.

In EEG measurements, there are no N400 to reflect this (as could be expected with failed licensing).

-> The licensing failure is not caused by problems in lexical retrieval.

-> EEG patterns match the processing of syntactic and possibly semantic/pragmatic dependencies

Link to negative polarity items

Negative polarity items = **NPIs**, English: *ever, any*; German: *jemals*

- may enrich the pragmatic impact of negation (strengthening)
- licensed in the semantic scope of negation (c-commanded by licensor, occasionally excluding long-distance licensing)
- behavioral: *intrusive licensing* by present, but inaccessible licensor: higher acceptance rates for inaccessible licensors than absent licensors [2]

ERP effects for licensed vs. nonlicensed NPI:

German: N400 [4]

N400 + P600, N400 amplitude decreased for inaccessible licensor [2] (see [5] for discussion of illusory licensing)

English: no N400, but P600; amplitude decreased for inaccessible licensor [6] (also for discussion of illusory licensing)

Questions: Mechanisms behind illusory licensing?

Reason for discrepancy between languages?

Relationship of our findings to NPI literature:

Our findings for embedded clauses are more similar to findings for English NPI than for German NPI:

- no N400 in conditions without licensor
- P600 for absent or inaccessible licensor (descriptively weaker for inaccessible licensors)

This suggests that contrast between findings for English and German NPIs do not reflect a general contrast between processing of long-distance dependencies in both languages.

Experiments

Stimuli

40 items in 8 different conditions (2x2x2 design), factors: CLAUSE TYPE (declarative or question), DiP (denn vs jetzt), DiP position (root or embedded).

CLAUSE TYPE	
declarative	question
Manche von diesen Leuten... Some of these people ...	Welche von diesen Leuten... Which of these people

DiP POSITION	DiP TYPE	
	DENN	JETZT
root clause	... haben denn gesagt, dass der Koch die Zwiebeln anbraten soll. ... have DiP said that the cook the onions fry should. ... have THEN said that the cook should fry the onions.	... haben jetzt gesagt, dass der Koch die Zwiebeln anbraten soll. ... have NOW said that the cook the onions fry should. ... have NOW said that the cook should fry the onions.
embedded clause	... haben gesagt, dass der Koch die Zwiebeln denn anbraten soll. ... have said that the cook the onions THEN fry should. ... have said that the cook should THEN fry the onions.	... haben gesagt, dass der Koch die Zwiebeln jetzt anbraten soll. ... have said that the cook the onions NOW fry should. ... have said that the cook should fry the onions now.

Experiment 1: Acceptability ratings

Magnitude Estimation task, 57 participants

Analysis: LMM, fixed eff. CLAUSE TYPE*DiP*POSITION, random terms PARTICIPANT (rand. slope DiP*POSITION+CLAUSE TYPE*DiP) and ITEM.
-> CLAUSE TYPE:DiP:POSITION $t=9.12, p<.001$

Separate analyses for *jetzt* and *denn*: fixed eff. CLAUSE TYPE*POSITION, random terms PARTICIPANT (rand. slope CLAUSE TYPE*POSITION) and ITEM.

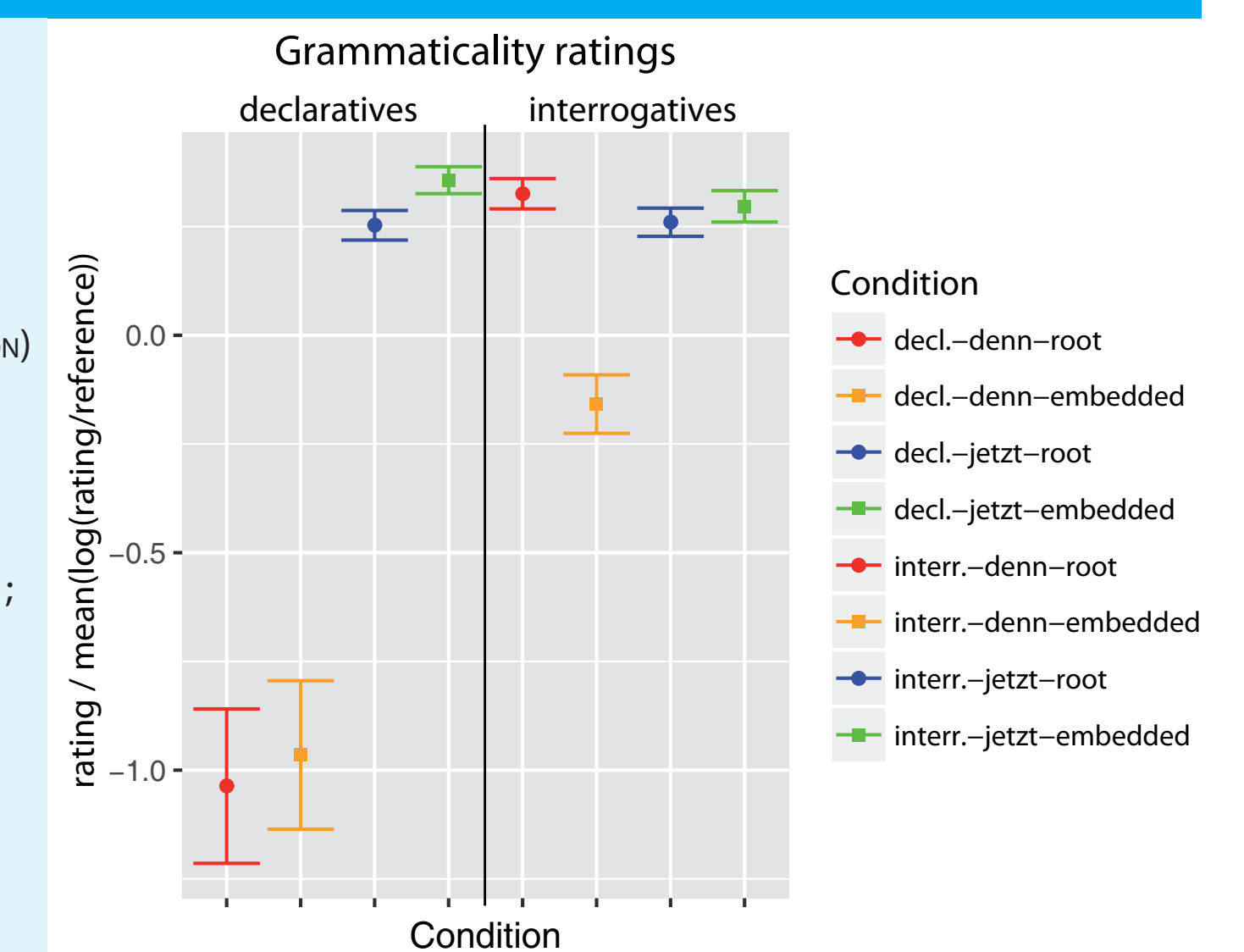
jetzt: POSITION:CLAUSE TYPE $t=-3.2, p<.01$
root clauses: CLAUSE TYPE not sign.
embedded clauses: CLAUSE TYPE $t=-3.9, p<.001$

denn: POSITION:CLAUSE TYPE $t=-7.9, p<.001$
root clauses: CLAUSE TYPE $t=7.6, p<.001$
embedded clauses: CLAUSE TYPE licensor $t=5.0, p<.001$;

-> Unlicensed *denn* is rated worse than *jetzt*.

-> *denn* with present, but inaccessible licensor is rated worse than other interrogatives, but better than unlicensed *denn*.

-> *jetzt* conditions make good baseline for *denn* conditions



Experiment 2: EEG

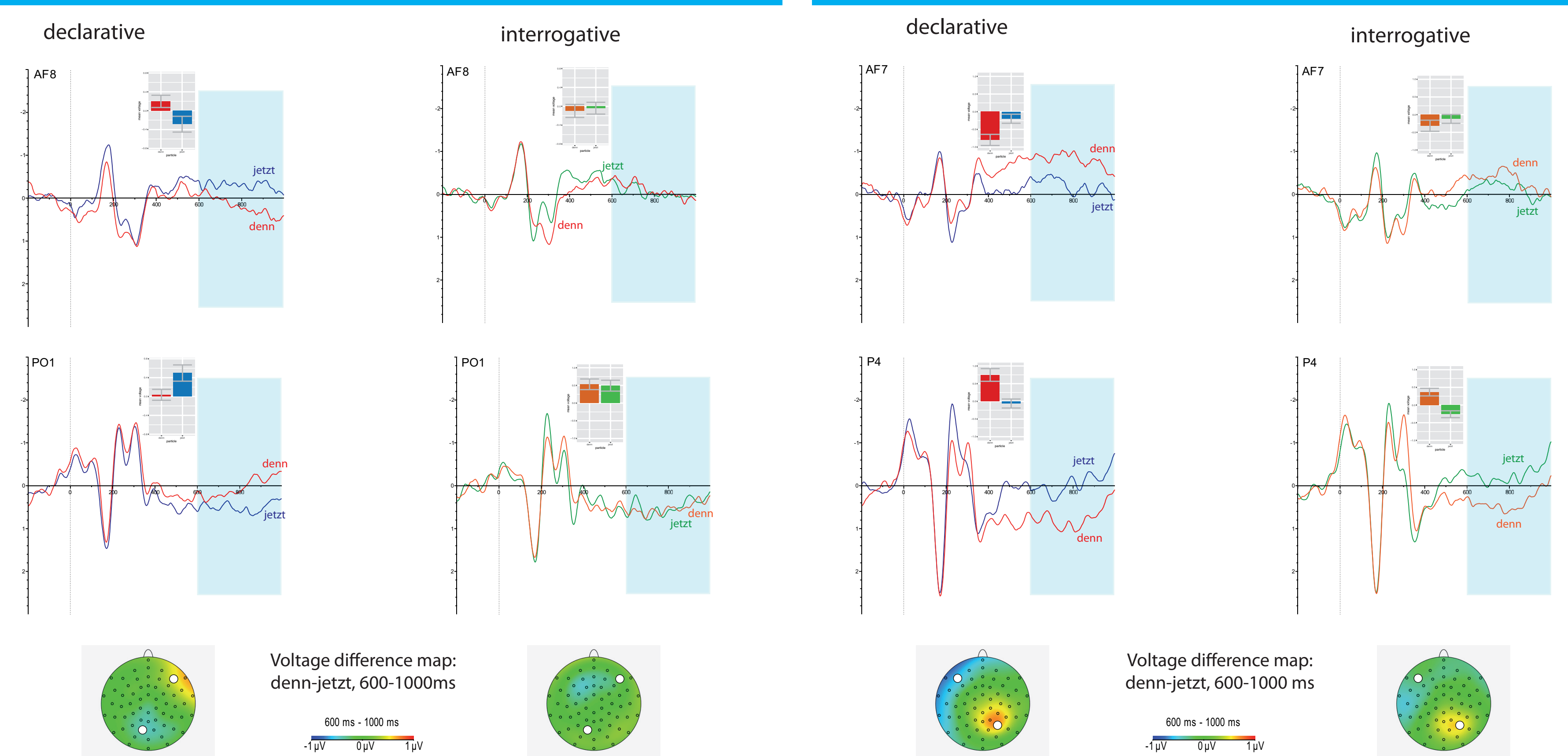
visual stimulus presentation, chunked or word-by-word, 800 ms for single words, 200 ms blank screen ISI

22 participants, 64 electrodes, filtered bandpass 0.5-70Hz before segmentation

Analysis: 25 electrode subset, 5 anterior-posterior positions, 5 medial-lateral positions; separate ANOVA for positions (root clause and embedded clause), mean amplitude in time window for CLAUSE TYPE*DiP*MEDIA LATERAL*ANTERIOR POSTERIOR

selected time window for analysis: 600-1000 ms, presented separately for root clauses and embedded clauses

(1) Root clauses



CLAUSE TYPE:DiP:ANT.POST $F(4,84) = 4.9, p < .05$

declaratives: PARTICLE:ANT.POST $F(4,84) = 4.4, p < .05$

- more positive-going for *denn* than *jetzt* at right-anterior sites,
- more negative-going for *denn* than *jetzt* at central-posterior sites.

interrogatives:

no statistically significant effects or interactions of CLAUSE TYPE OF DiP.

-> No difference between Q-DiPs and non-Q-DiPs in root clauses when licensing constraints are met.

-> No N400 for unlicensed Q-DiPs

Root clause effects are surprisingly weak, they do not reflect acceptability ratings.

(2) Embedded clauses

DiP:MED.LAT:ANT.POST $F(16,336) = 3.9, p < .01$,

no statistically significant main effects or interactions of CLAUSE TYPE.

declaratives: DiP:MED.LAT:ANT.POST $F(16,336) = 2.4, p < .05$

interrogatives: DiP:MED.LAT:ANT.POST $F(16,336) = 3.1, p < .01$

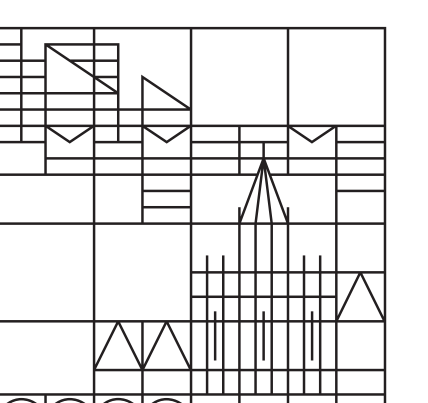
For both declaratives and interrogatives:

- more positive-going for *denn* than *jetzt* at posterior sites
- more negative-going for *denn* than *jetzt* at left-anterior sites

Descriptively weaker for interrogatives than declaratives.

-> P600 for unlicensed Q-DiP relative to non-Q-DiP

-> P600 for Q-DiP with inaccessible licensor



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