Result, Purpose and Reason – 'so' what?

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(1) **RESULT, EXPLICIT 'SO':** You are often out of your office, *so* your desk tends to be piled high with papers when you return. (BNC: EVF 650)

(2) **RESULT, IMPLICIT 'SO':** Parties are rather a state of mind. If you are born to give parties, you give parties. (PDTB: 13/wsj_1367.pdtb-3386..3435)

(3) **PURPOSE, EXPLICIT 'SO':** Ford said owners should return the cars to dealers, *so* the windshields can be removed and securely reinstalled. (PDTB : 04/wsj_0451.pdtb-890..945)

Research Question 1:
Is the difference between Explicit and Implicit *'so'* quantitative or qualitative ?

Research Question 2:
What features disambiguate between PURPOSE 'so' and RESULT 'so' ?

Background The connective *'so'* marks RESULT relations, but also more specific PURPOSE and REASON relations. World knowledge about the relationship between events helps us interpret *'so'* correctly, but there may also be linguistic cues

Further, speakers can communicate RESULT relations without using any explicit connective. But can they also communicate a PURPOSE relation implicitly? What linguistic features are associated with explicit and implicit 'so'?

Corpus study

500 random examples of the connective *'so'* from the written sections of the British National Corpus (all genres)

All 1053 instances of Explicit and Implicit uses of *'so'* in Penn Discourse Treebank (PDTB 2.0, newswire only)

	BNC	PDTB		Total
		Explicit	Implicit	
RESULT	472	211	801	1484
can	7	5	20	32
could	0	3	21	25
PURPOSE	28	41	0	69
can	12	14	0	28
could	5	8	0	13
Total	500	252	801	1553

Use of *'so'* in the BNC and PDTB. PDTB counts also include **Implicit uses**, i.e. texts spans without a connective that are best understood as related by the connective *'so'*.

Corpus results

- *'So'* marks RESULT **95% of the time**
- PURPOSE much less frequent
- *can* and *could* more frequent in PURPOSE. 59% vs. 0.04%, **important PURPOSE marker**?
- No Implicit PURPOSE
- No sentence-initial 'so'

Experiments

Experiments: 2 x 2 designs, factors **Connective** (no connective vs. 'so') **Can/could** (with or without 'can' or 'could' (with present or past tense) **Items** created to have PURPOSE relation between events, with intention, + agentivity.

'so' + can
a. Bill usually sits in the front row, **so** he **can** hear everything clearly.

'so'+ no can
b. Bill usually sits in the front row, **so** he hears everything clearly.

no connective + can
c. Bill usually sits in the front row. He **can** hear everything clearly.

no connective + no can
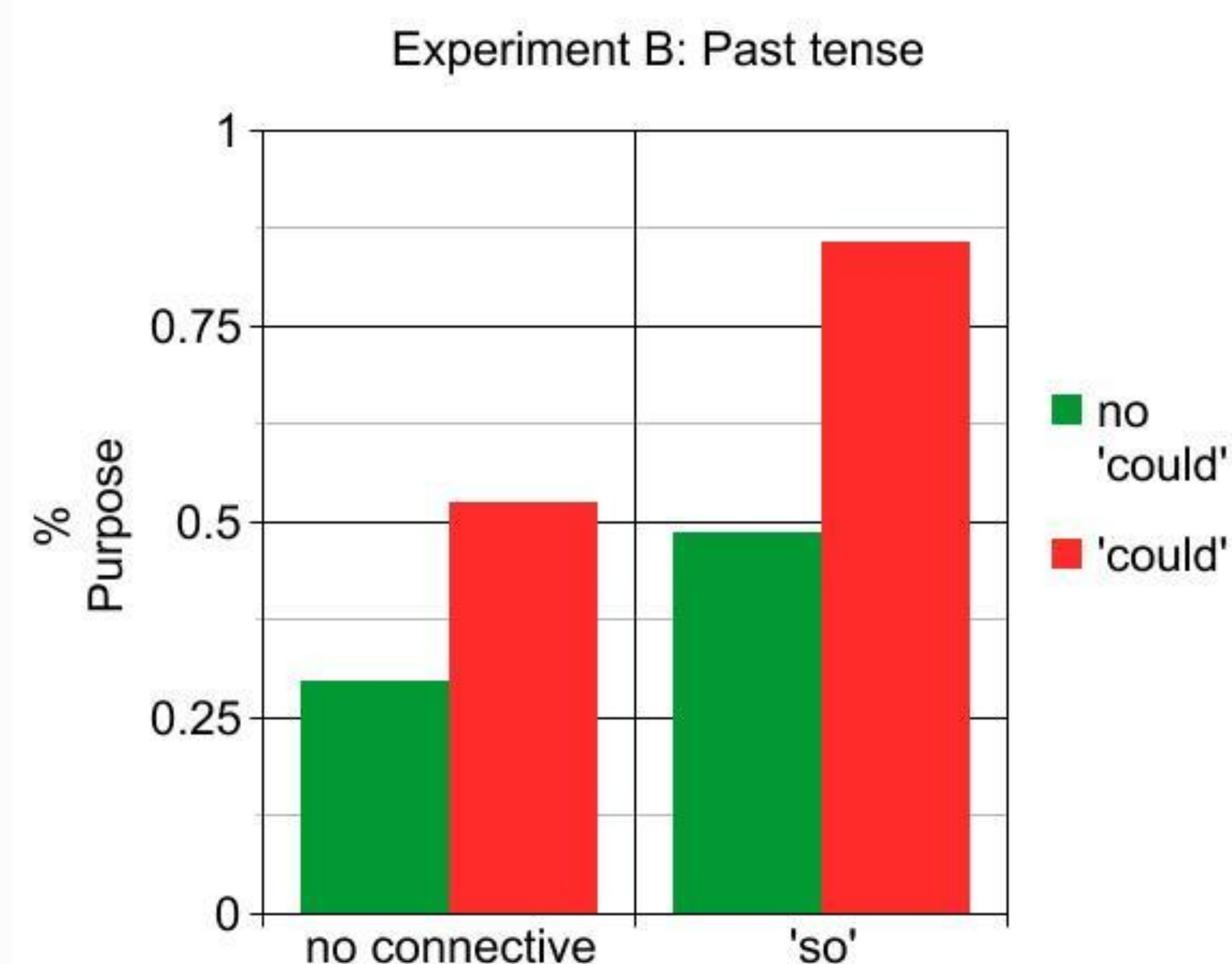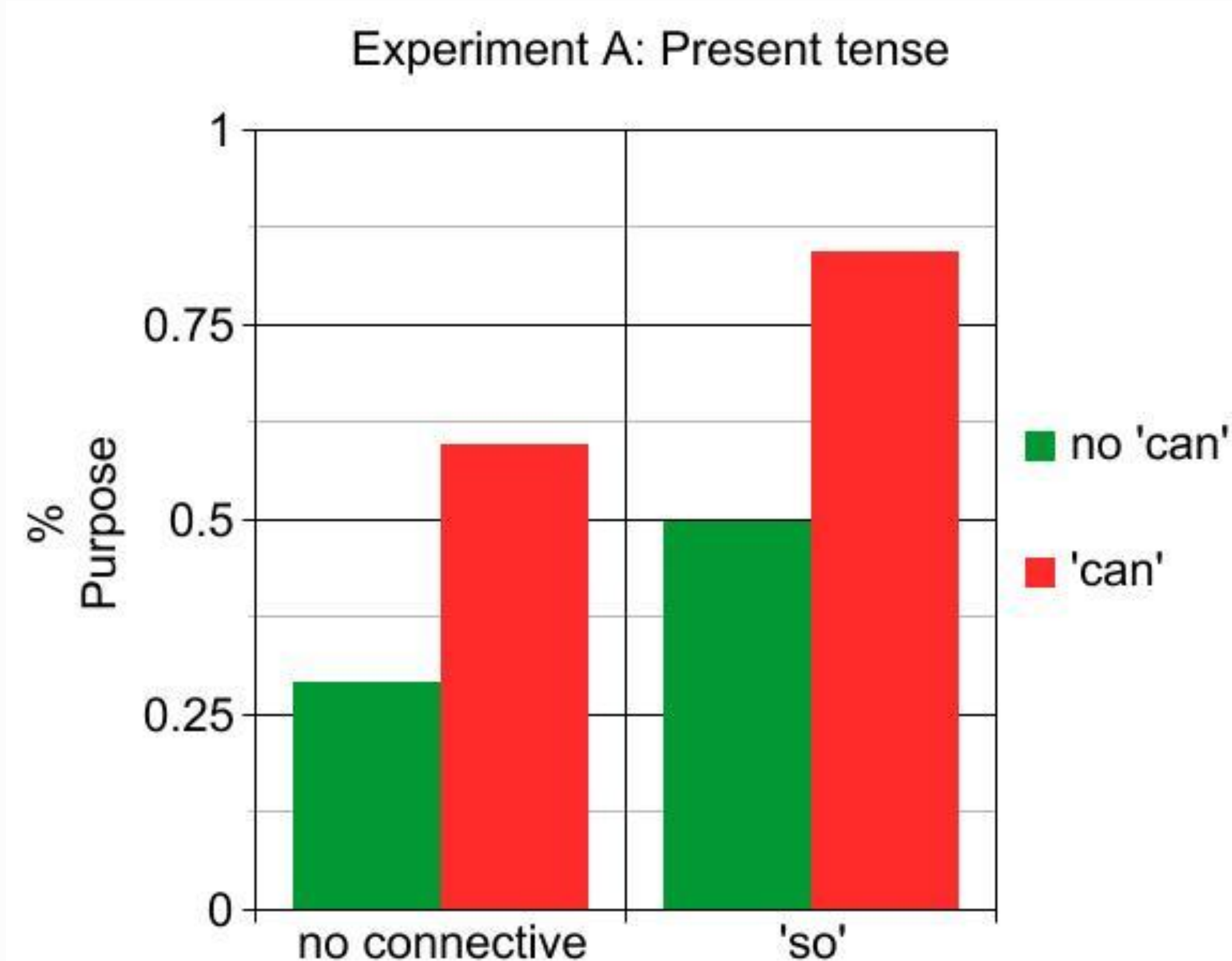d. Bill usually sits in the front row. He hears everything clearly.

Materials: Balanced, 16 target items plus 16 fillers in a random order.

Experiment 1: Present tense, can **Subjects:** 31 native English speaking subjects recruited via Amazon's Mechanical Turk Service (AMT).

Experiment 2: items rewritten in past tense, with 'could'. **Subject:** 31 new native English speakers (from AMT).

Experiment A: Present tense

Experiment B: Past tense

Future Work: *'So'* also used for REASON: *The meeting was early in the morning, so/for this reason/*as a result Jack arrived the day before.* In pilot experiment 65% of Implicit and 60% 'so' marked relations were recognized as REASON. More experiments needed. Features: Plan to test if other features help identify Explicit and Implicit *'so'* as PURPOSE. May use machine learning.

Experiment Results

- **Items with 'so' were significantly more likely to be interpreted as PURPOSE (p<.000).** (within subjects and within items, in both experiments)
- **Items with 'can' or 'could' significantly more likely to get a PURPOSE interpretation.**
- **(p <.000).** (both within subjects and within items in both studies)
- Past tense does not lead to more RESULT interpretations.
- approx 30% of items with no marking interpreted as PURPOSE

Discussion

✓Speakers/Writers always mark PURPOSE; may need to be marked to distinguish from RESULT
✓People can interpreted Implicit (unmarked) PURPOSE examples, but need linguistic features
✓**'can'** and **'could'** good markers of PURPOSE

✓PURPOSE *'so'* can only be clause-initial = attachment possibilities more local (however, both *in order to* and *to* + infinitive, which also mark PURPOSE sometimes sentence-initial).
✓PURPOSE always intentional/agentive and future-oriented. The high frequencies of *can/could* (potential force or energy, *Sweetser 1990*) in the so-clause, implies future result

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