Presence-absence asymmetries in predictive perception

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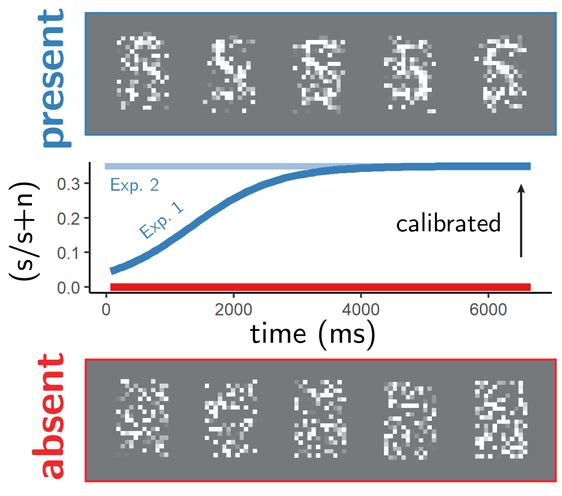
1. Absence is inferred: We decide that something is absent when we believe we would have perceived it if it were present.

2. Expectation can sharpen perception: We perceive things more readily when they are expected.

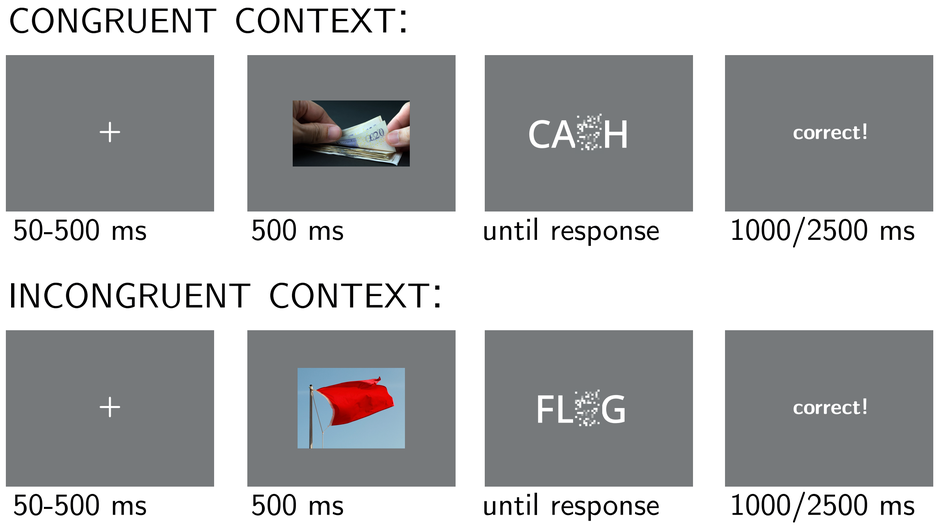
3. Here we asked: do people use (2) to more readily infer absence when perception would be facilitated by expectation?

Methods: contrasting the timing of decisions about absence in congruent and incongruent contexts.

Exp. 1: osf.io/tbqz4
Exp. 2: osf.io/nh46f



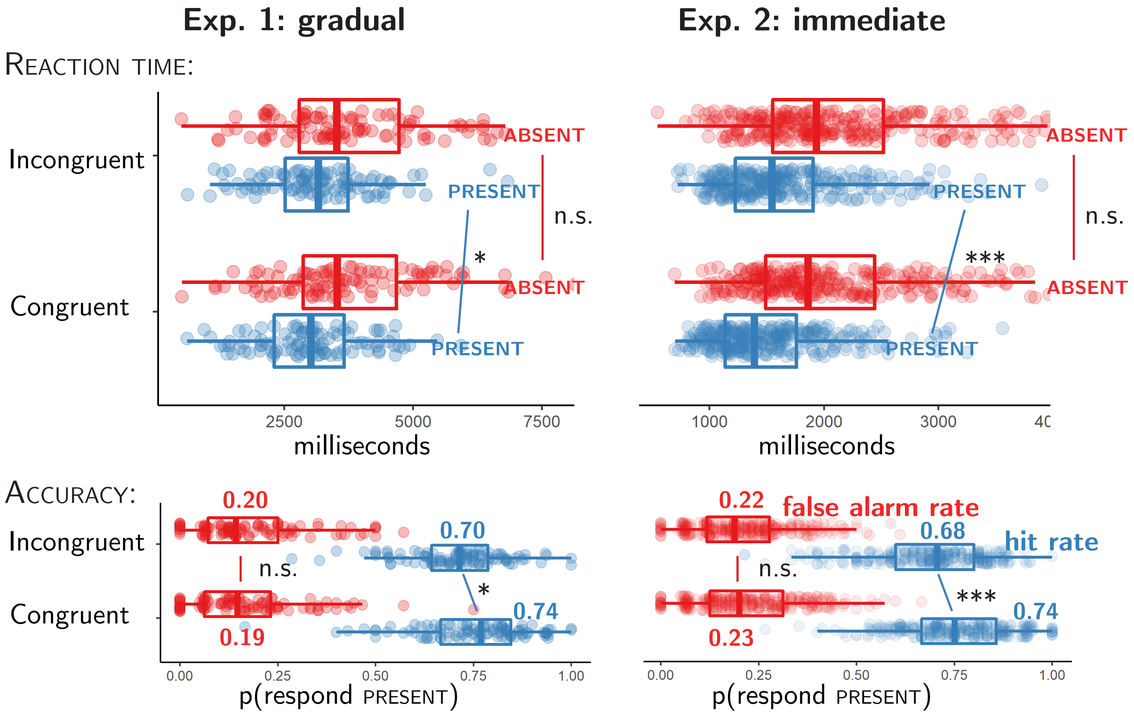
Was the 'S' present in the dynamic noise?



Targets appear in congruent or incongruent contexts on different trials.

- The target letter is A or S, on different blocks (2 blocks of 16 trials per letter).
- Letter visibility on 'present' trials gradually increases (Exp. 1), or stays constant (Exp. 2). Always 0 on 'absent' trials.
- N=100 (Exp. 1), 300 (Exp. 2).

Results: replicating previous findings, decisions about presence are affected by context. However, decisions about absence are not.

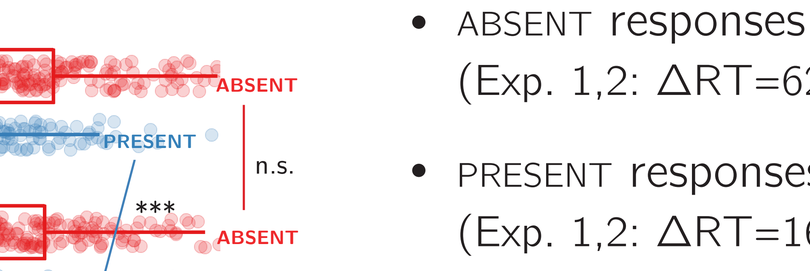


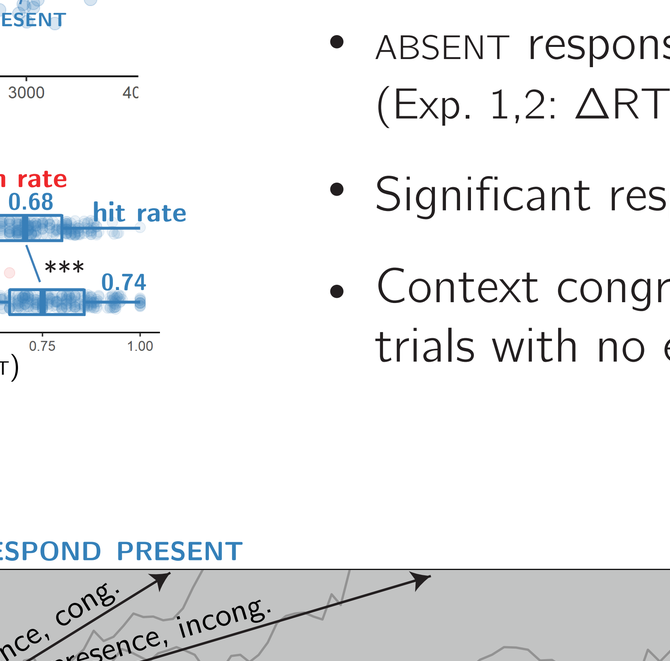
- ABSENT responses are slower than PRESENT responses (Exp. 1,2: ΔRT=620,510 ms).
- PRESENT responses are faster in a congruent context (Exp. 1,2: ΔRT=160 ms.)
- ABSENT response times not affected by context (Exp. 1,2: ΔRT= 0,40 ms, Exp. 2: p=.10).
- Significant response/congruency interaction.
- Context congruency increases accuracy in presence trials with no effect on accuracy in absence trials.

Computational modelling

Our qualitative accuracy and RT results are captured by an asymmetric model where evidence is accumulated for presence, and absence is inferred when the accumulator reaches a collapsing boundary ("*I should have reached the upper boundary by now*").

Congruency affects the drift rate for presence, but not the boundary, which is under subjects' metacognitive control.





Conclusions

- Although objects are more easily found in congruent contexts, subjects were not able to use this fact to make more efficient inferences about absence.
- This may be due to the absence of a metacognitive insight into context effects on perception, or due to an inability to flexibly adjust a decision rule between trials.