

Cumulative semantic interference without decay

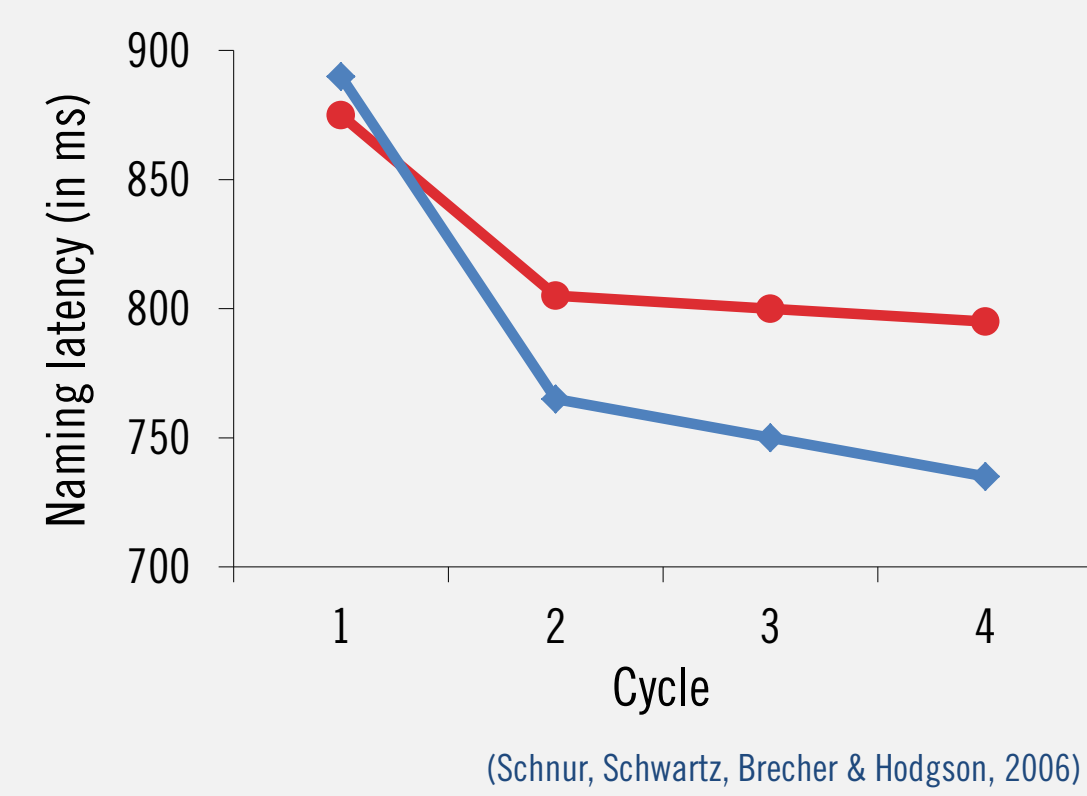
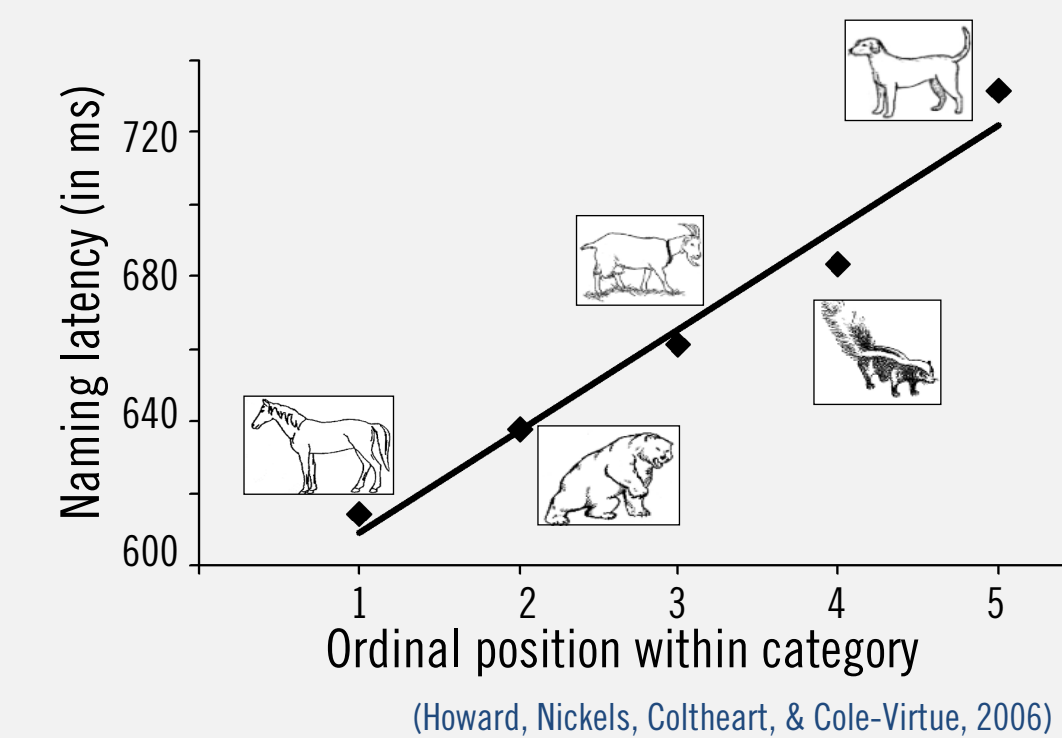
Gary M. Oppenheim

goppenheim@crl.ucsd.edu

Center for Research in Language, UCSD

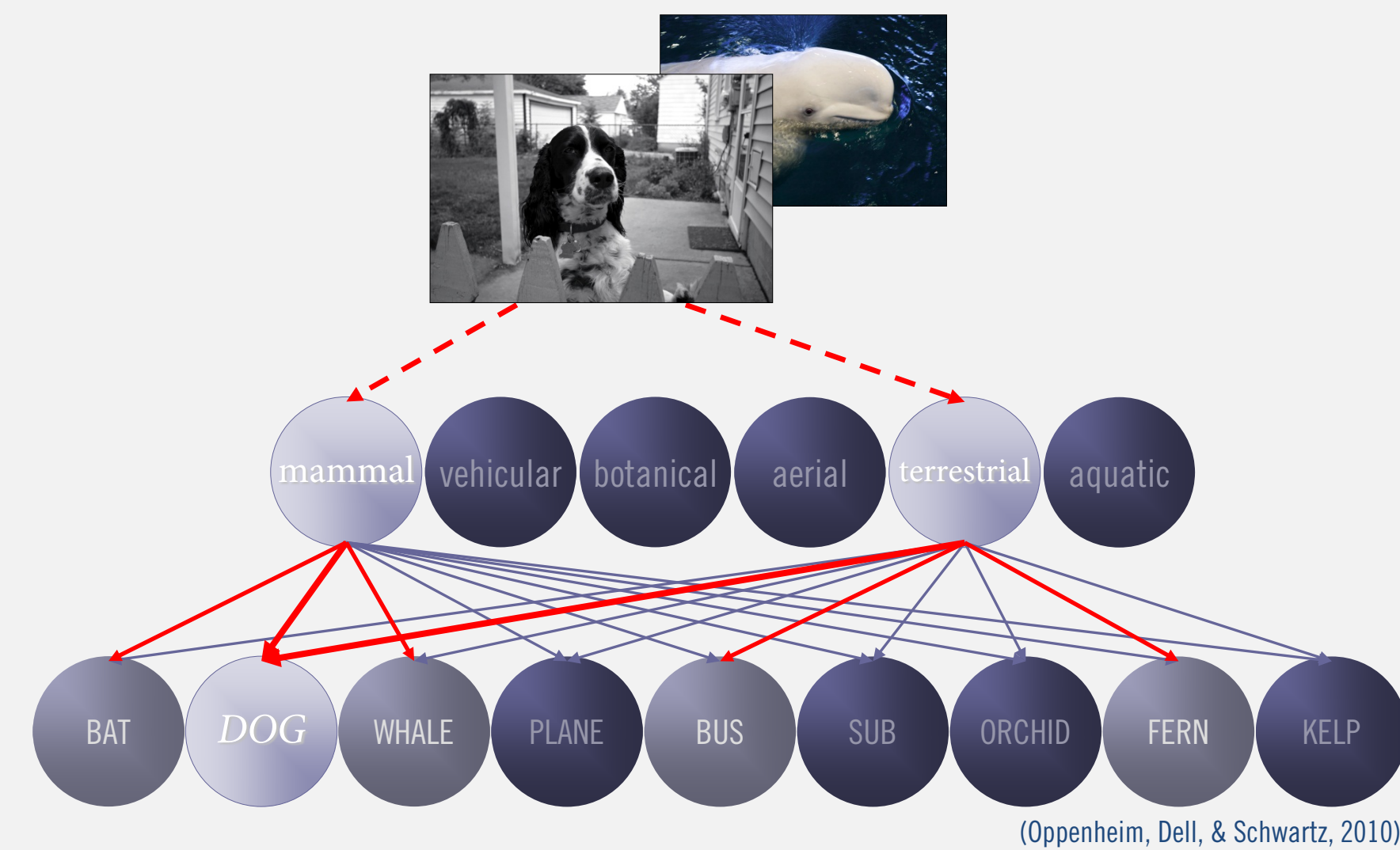
Cumulative semantic interference refers to the fact that retrieving a certain word (e.g. DOG) becomes more difficult after retrieving other semantically related words (e.g. GOAT).

It manifests as an incremental interference effect when naming several tokens from the same semantic category...



... and a semantic blocking effect when repeatedly naming a small set of related tokens (compared to an unrelated baseline).

Since the interference survives longer than a few seconds, some have suggested that it reflects incremental learning during lexical access.



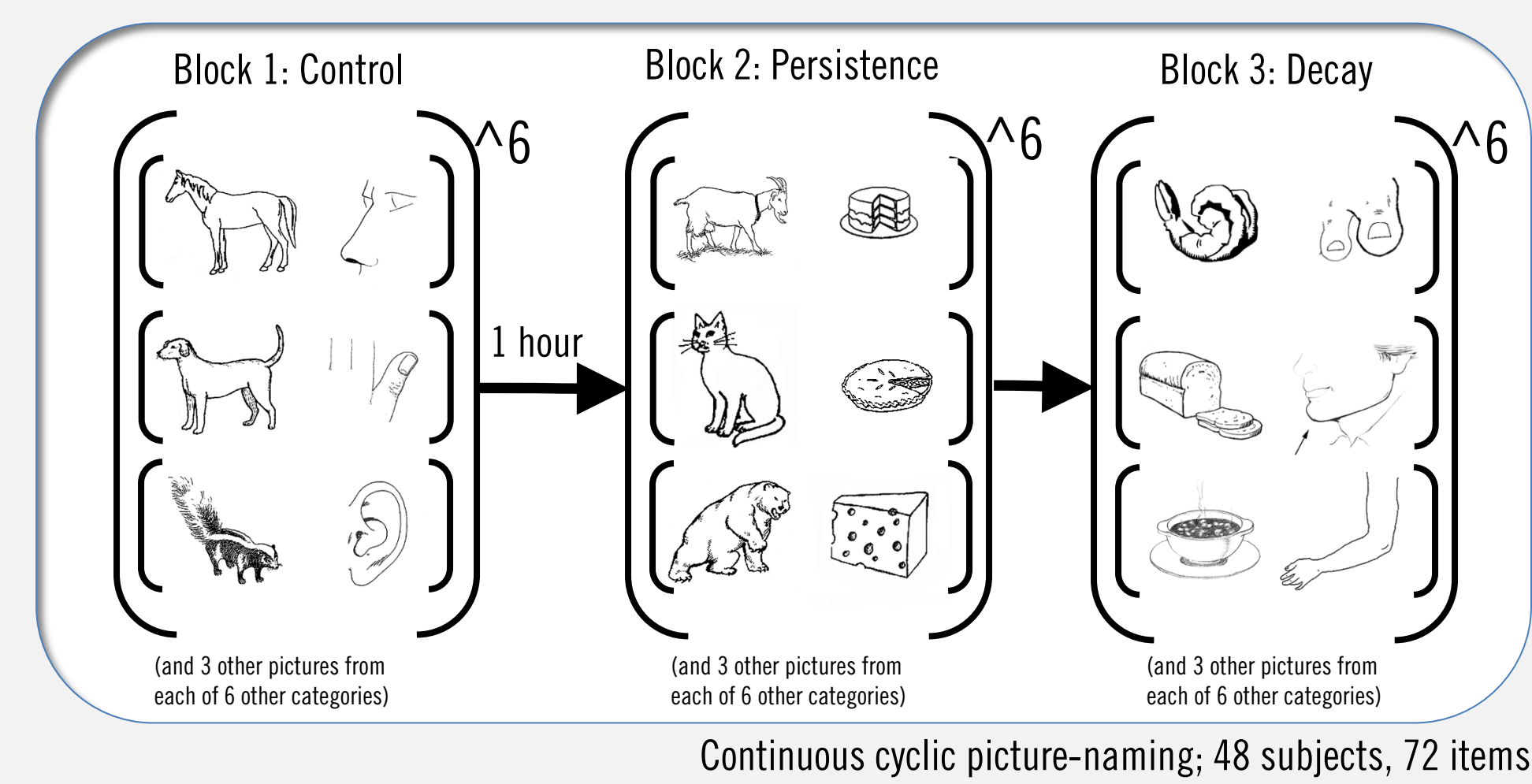
By default, incremental learning accounts assume that interference should last indefinitely, but there is little empirical support for this assumption. In fact, the experimental literature has generally assumed that interference must dissipate in less time than it takes to boil an egg.

How far can we actually get with the strong assumption that cumulative semantic interference persists indefinitely?

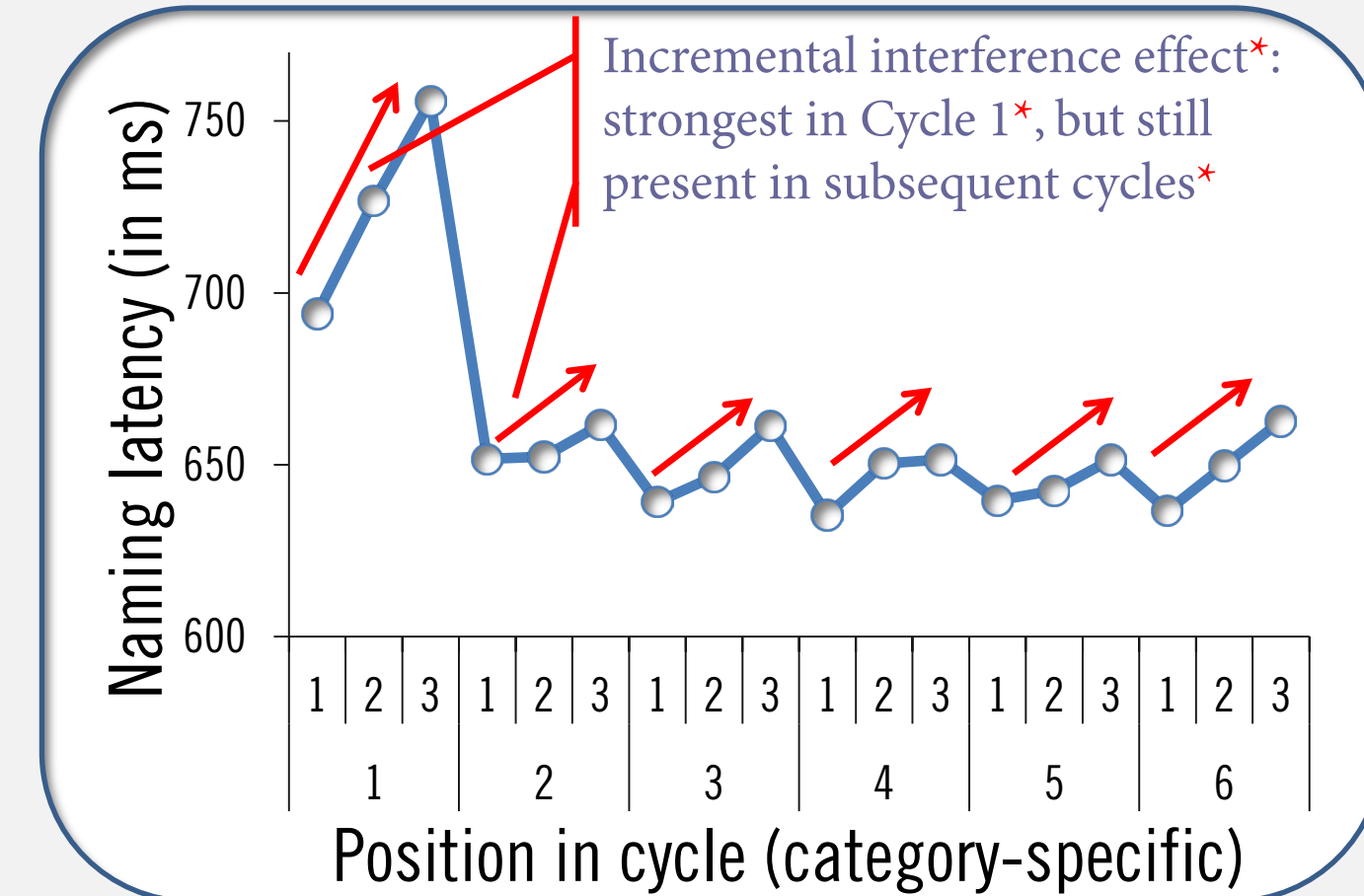
Experiment 1: Persistence and decay

Once interference accumulates, how long does it last?

Long lasting interference should slow target retrieval, even an hour later; but if interference is subject to temporal decay, then recently named competitors should provide more interference than competitors named an hour earlier.

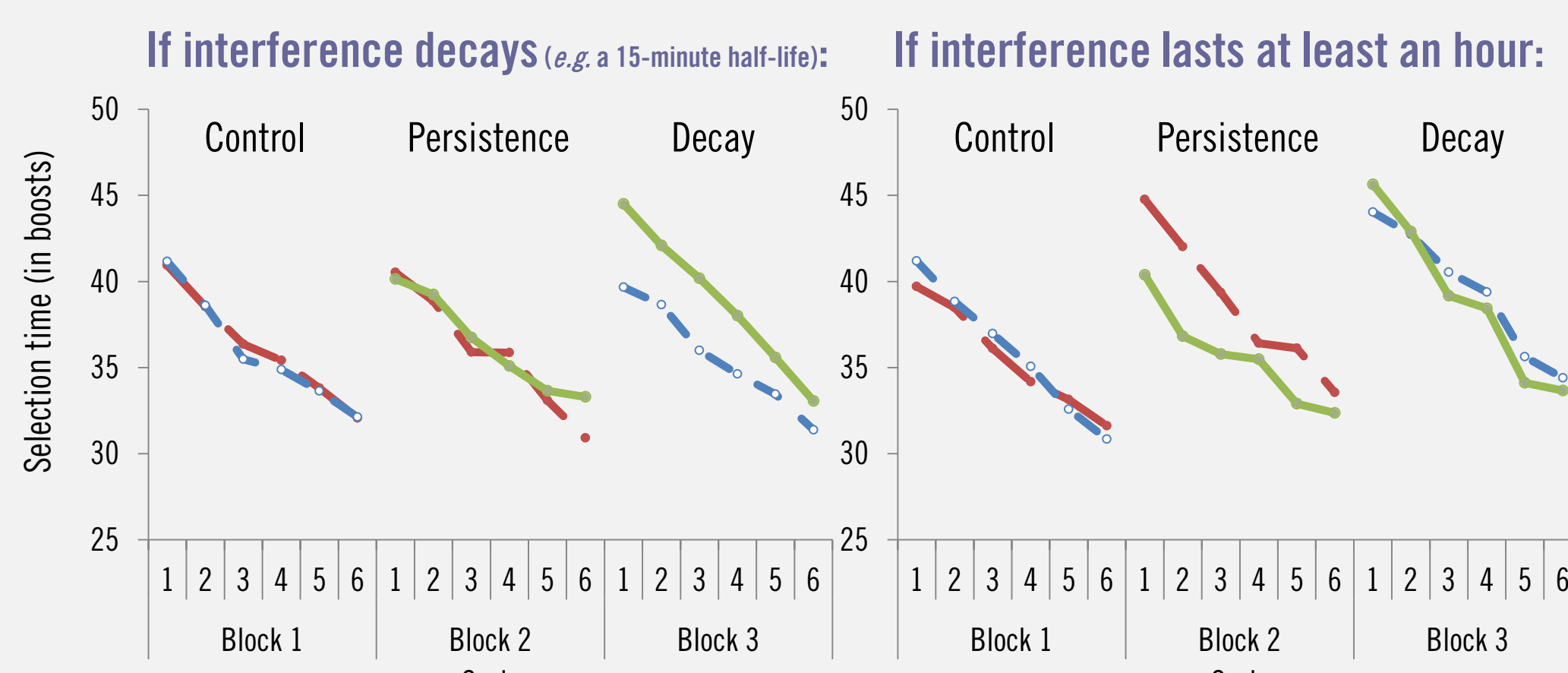


Ancillary results:

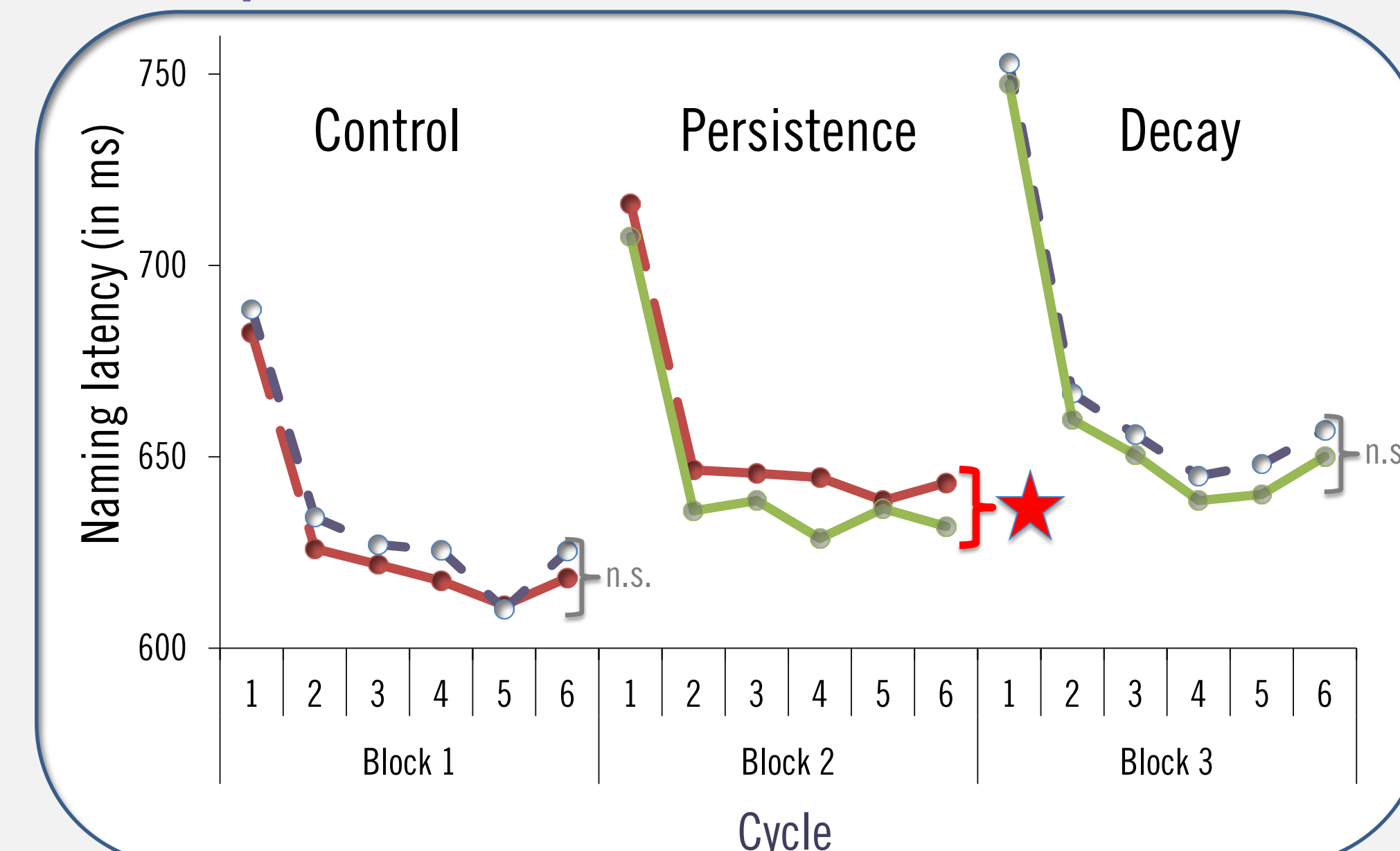


Model predictions:

(based on Oppenheim et al., 2010)



Main empirical results:

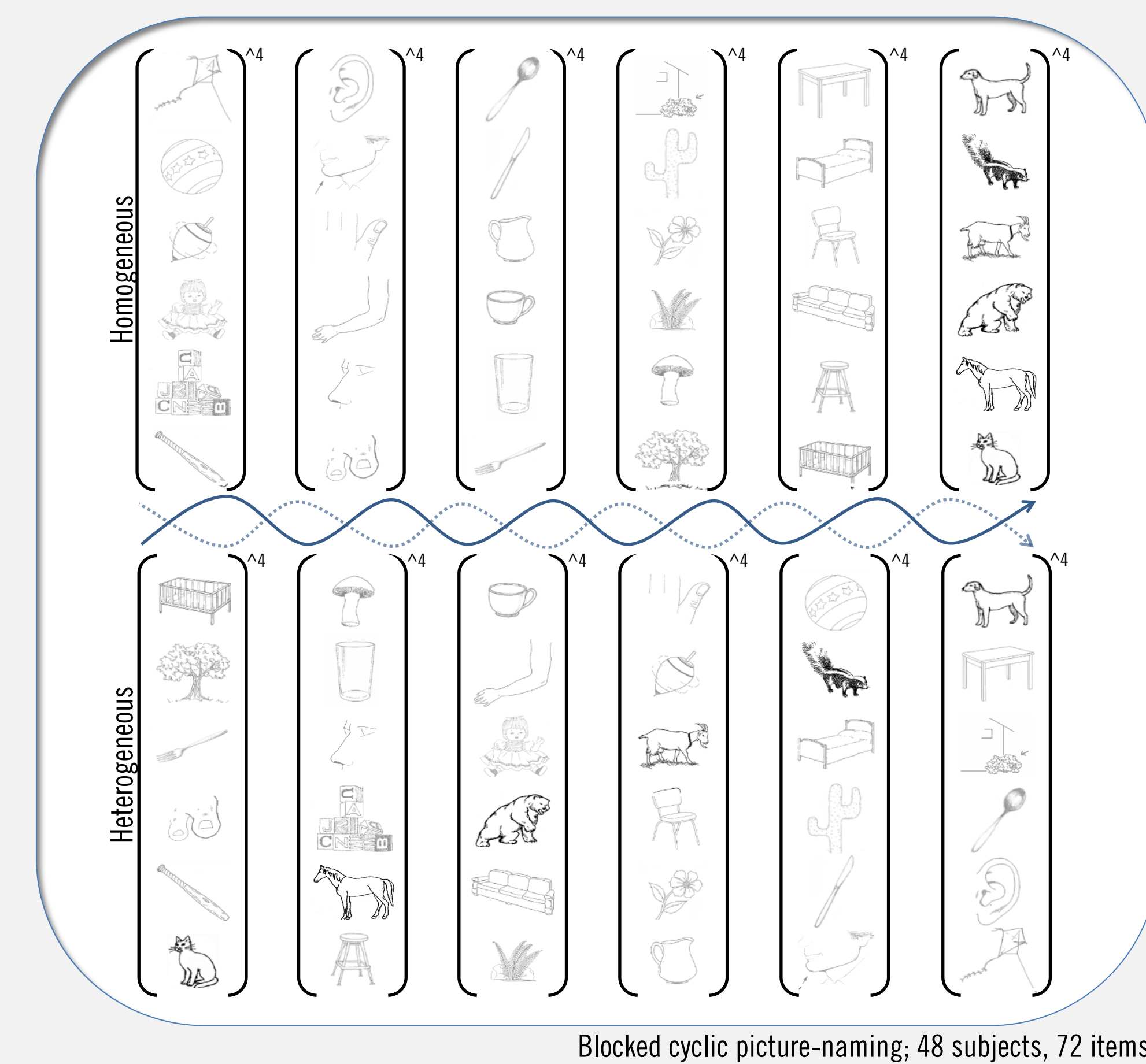


Interference remains detectable after one hour and does not seem to decay with time

Experiment 2: Interference across blocks

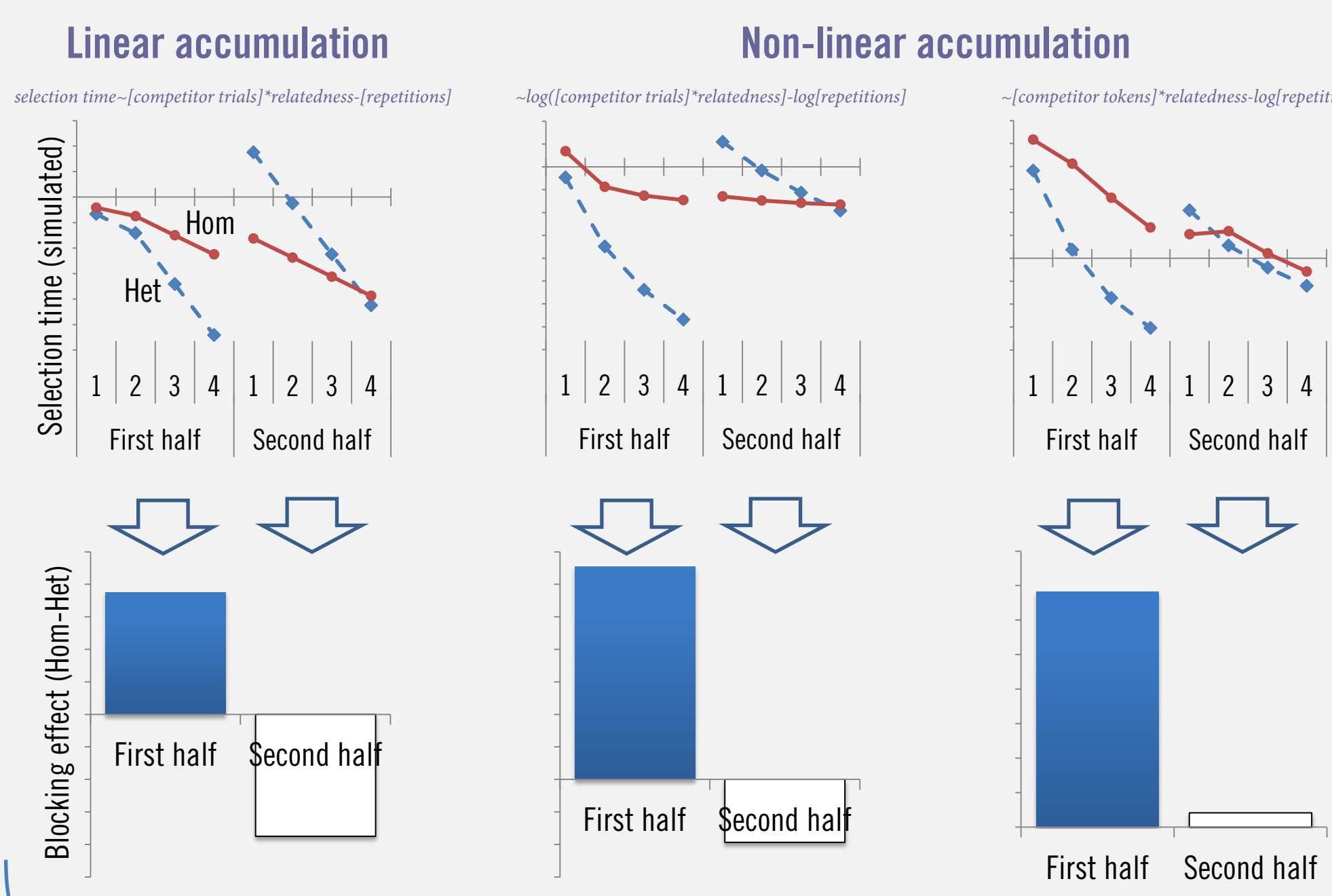
How does persistent interference manifest in blocked-cyclic naming?

If interference persists and accumulates across blocks, then it should diminish or even reverse the semantic blocking effect over the course of an experiment.



A few micro-simulations:

(informal calculations loosely based on Oppenheim et al., 2010; you can try these at home!)



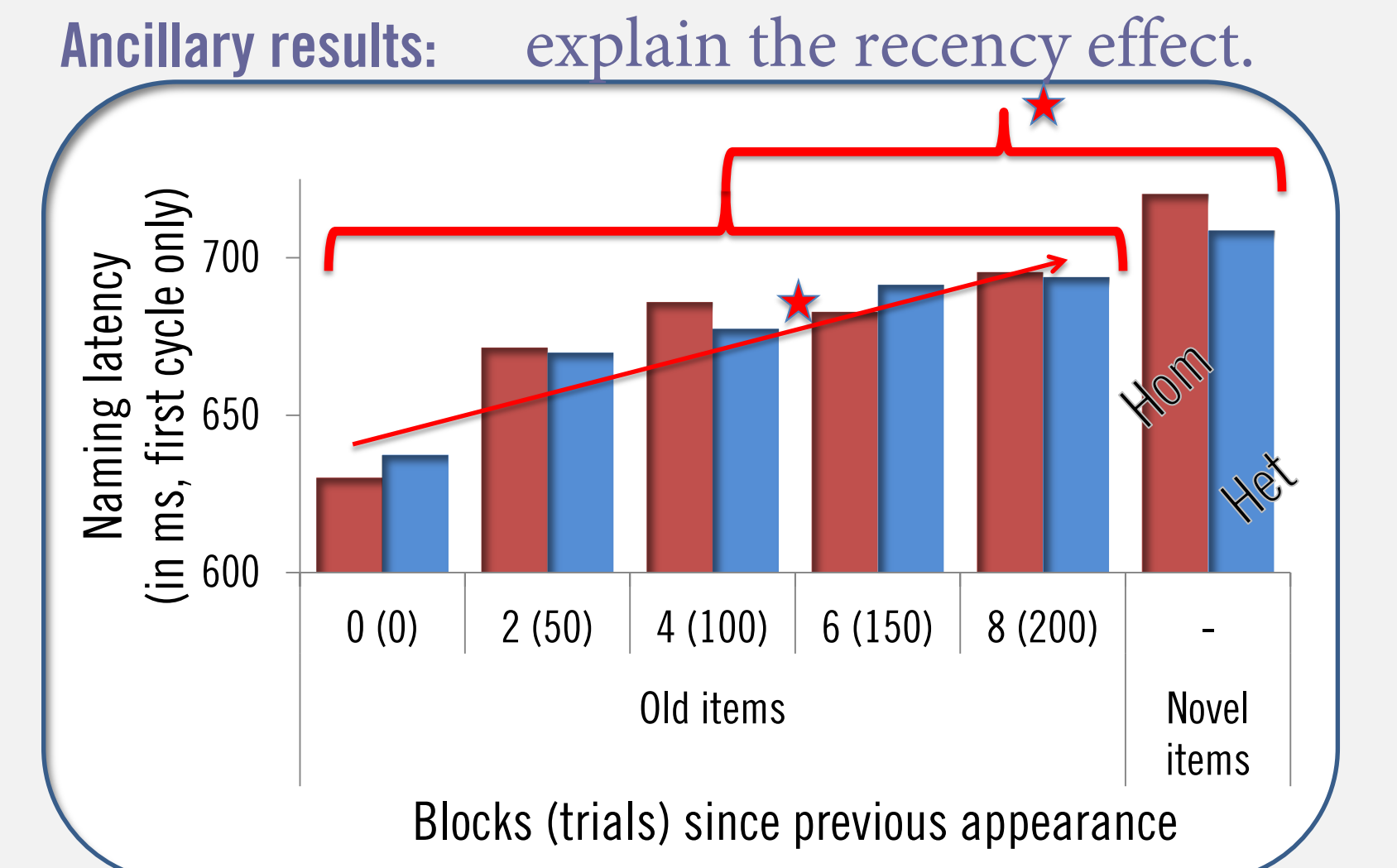
All predict that the blocking effect should diminish over the course of an experiment... but does it really?

Bonus points:

Cross-block interference could also help explain two curious findings:

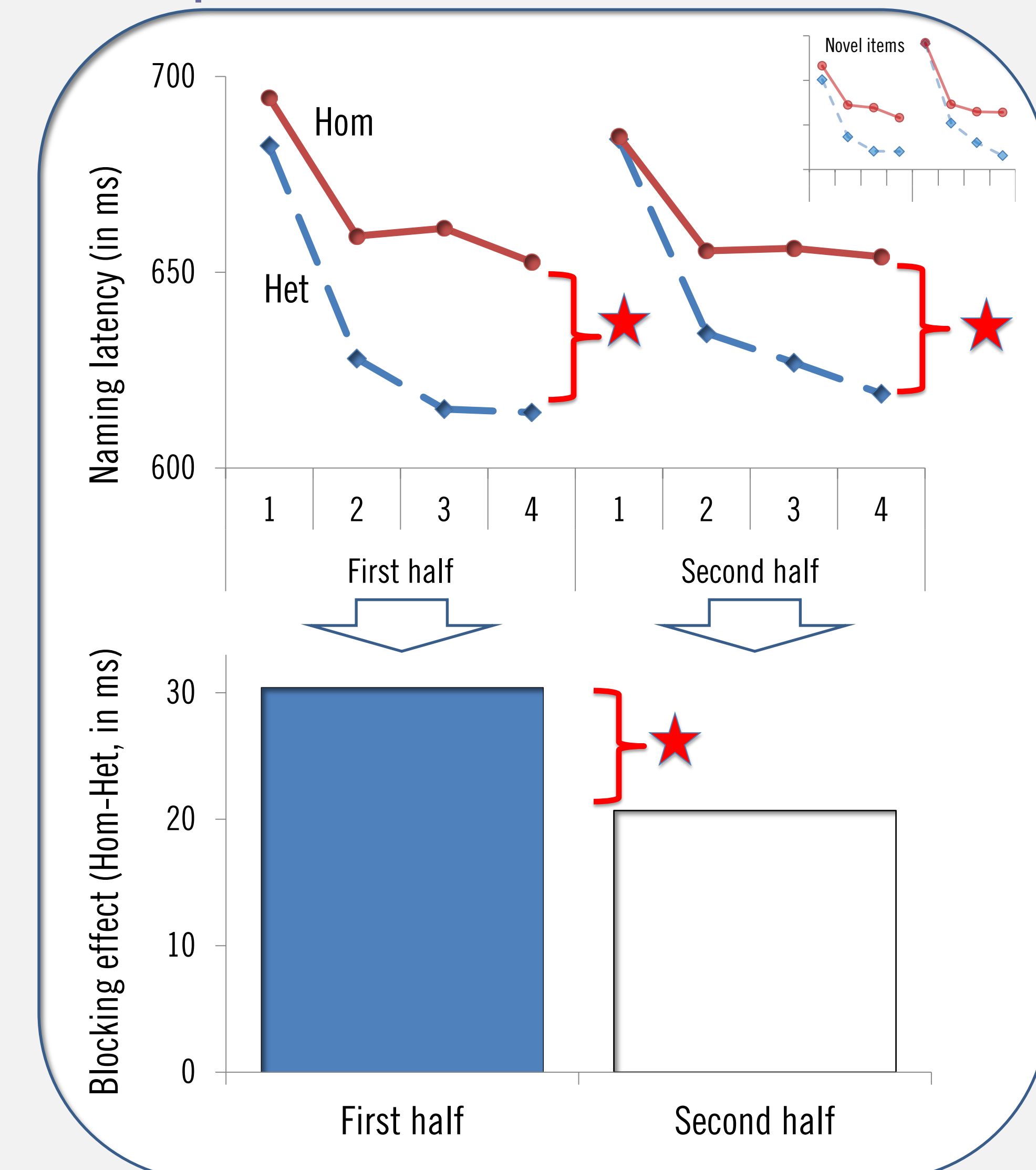
- The initial semantic "facilitation" often reported in blocked cyclic paradigms could arise when averaging together earlier and later blocks
- Semantic blocking effects are smaller than one might expect from the magnitudes reported for incremental interference effects. Cross-block interference in the Heterogeneous 'baseline' could contribute to this discrepancy.

Repetition priming clearly persists across blocks, and semantic interference *could* explain the recency effect.



Is there more direct evidence for semantic interference across blocks?

Main empirical results:



Conclusions:

- Cumulative semantic interference lasts much longer than previously thought. Such persistence firmly establishes it as a learning-based effect.
 - Interference does not noticeably decay over time, though the learning that contributes to it may be partly bound to a particular experiential context.
- The incremental interference effect may accumulate nonlinearly over repetitions.
- Interference accumulating over the course of an experiment diminishes the semantic blocking effect by contaminating the baseline Heterogeneous condition.
 - The blocking effect does not require rapid decay, and recognizing persistent consequences of interference could resolve puzzling results from the semantic blocking paradigm.