# Fast re-mapping in semantically driven word production

## lingering consequences show that CSI in BCN is not episodic RIF

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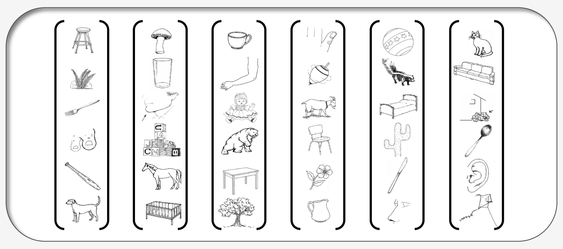
**Given the same picture of a glass, some people will call it a *glass*, but others will say *cup* or *uh*.** Speakers don't always volunteer the labels we want, so we "familiarize" picture names before an experiment. We correct their *cup*s to *glass*es and treat the resulting *cup*→*glass*es in our experiments like normal *glass*es. But are these "coerced" names and volunteered names really comparable? Or might our corrections turn "simple" picture naming into something more like an explicit memory task, testing retrieval of novel cue-response associations?

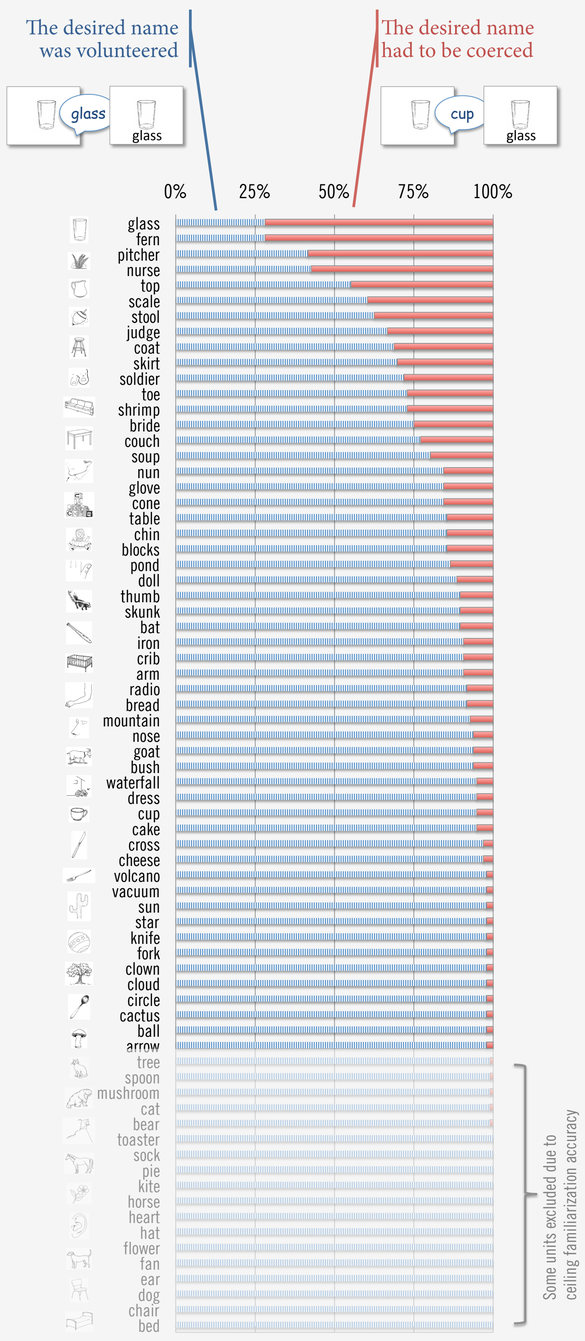
### The general approach

Data come from two large blocked-cyclic picture naming experiments. I noticed the patterns during exploratory analyses of the first experiment, and then ran the second experiment to confirm them. All analyses are within-subjects and –items, to directly compare a coerced *glass* to a volunteered *glass* (for example).

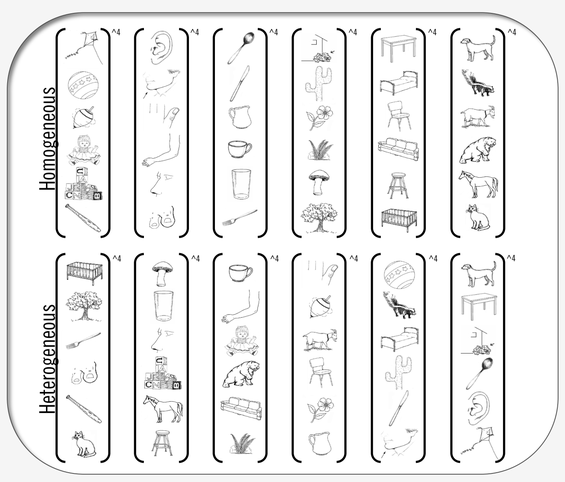
### "Accuracy" during familiarization…



- Continuous picture naming with feedback; desired names appeared after voicekey trigger or 5000ms timeout
- 2 experiments X 48 subjects X 72 items X 1 cycle → ~7k trials, 685 errors (12.5%)
- Any response other than the desired name was coded as an error, including omissions and reasonable alternatives
- Accuracy was assessed for each item:subject (not simple name agreement)

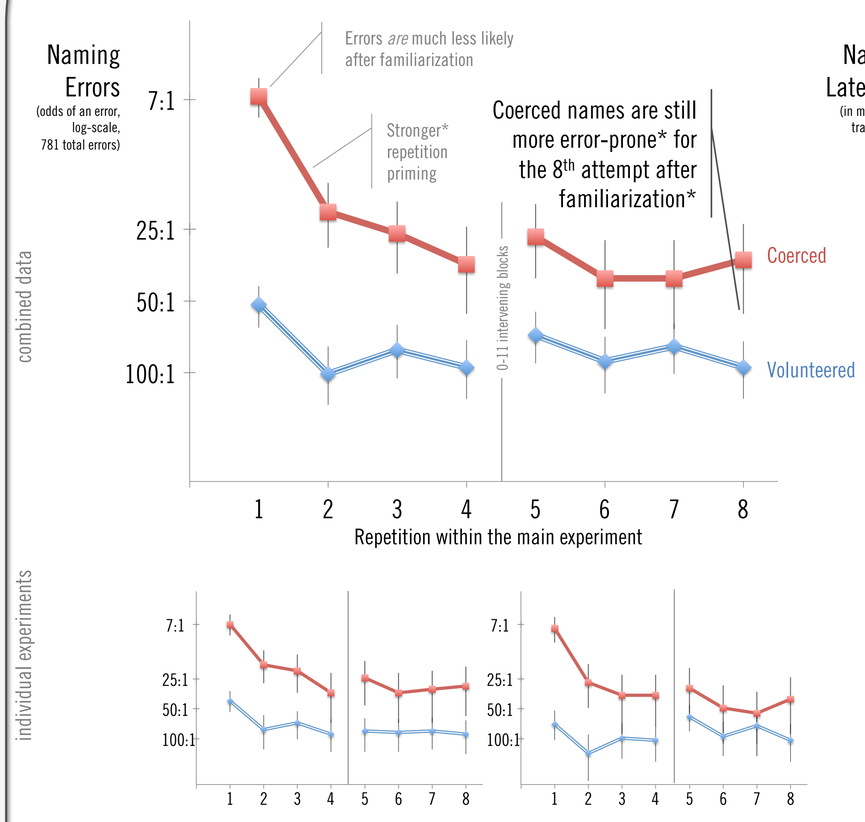


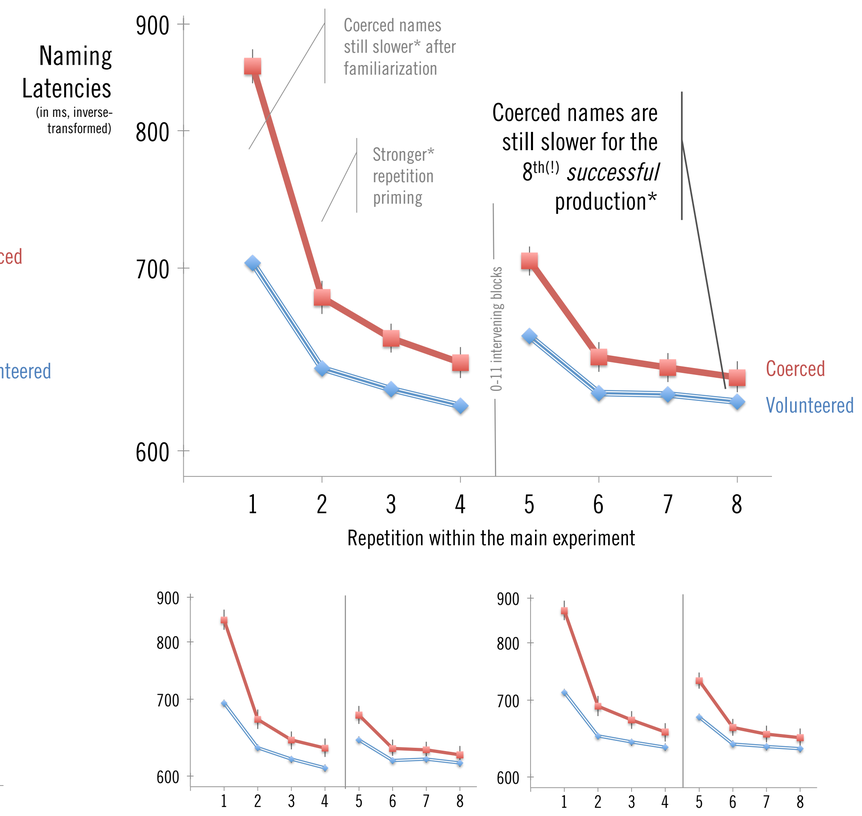

### … predicts errors and RTs at test




- Blocked cyclic picture naming
- 2 experiments X 48 subjects X 72 items X 4 cycles X 2 conditions → ~55k trials
- ~10k trials dropped due to per-unit ceiling accuracy during familiarization
- ~7k "coerced" trials (15%; more data than many standalone experiments), 38k "volunteered" trials
- Error analyses included 781 error trials (39% coerced; 1.7% total error rate)
- RT analyses further restricted to the ~39k trials where a subject always named the picture correctly in the test phase (to promote independence of error and RT patterns), but equivalent results emerge if including these items
- Within-subjects and -items analyses evaluate the effect of accuracy/correction within each unit, so these aren't just individual differences (e.g. name agreement)

## Familiarization doesn't produce effortless lexical alignment; It can get people to use certain words, but the costs of coercion remain




Subjects *did* adopt my desired names for all but 8 of their 865 familiarization errors. Their success reveals an impressive ability to fast re-map from line-drawings to dispreferred words. But coerced names also remained much more error–prone, even on the eighth attempt. This error difference remains even if excluding those items that a subject failed to adopt our desired name.

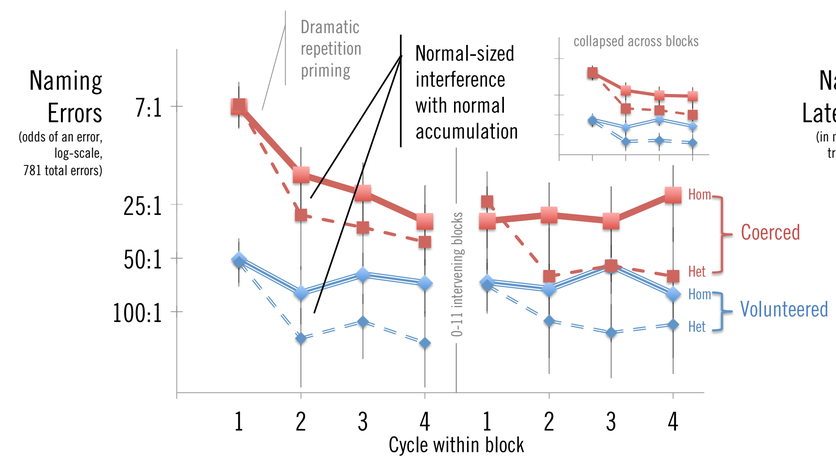
These persistent costs of coercion suggest that something a bit different is happening when speakers produce a coerced name. Maybe that difference is episodic memory: for coerced names, familiarization changes simple picture naming into a task where successful production requires choosing one's responses according to specific episodic cue-response associations.

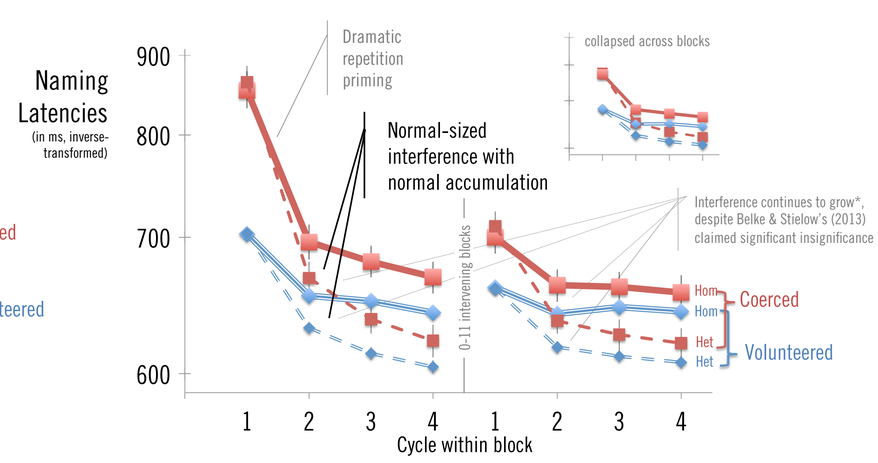

## But Zubicaray *et al.*'s (2014; in press) idea is wrong: Cumulative semantic interference isn't an episodic memory effect

Producing a coerced name seems to require retrieving an episodically paired association. That's useful because it lets us test Zubicaray *et al.'s* (2014; in press) recent idea (misattributed to Oppenheim *et al.*, 2010) that cumulative semantic interference primarily reflects an ***explicit*** memory effect, neurally indistinguishable from the episodic retrieval-induced forgetting seen in an episodic paired associates task. If Zubicaray *et al.*'s (2014; in press) idea is correct, then producing coerced names should elicit exaggerated interference.

Of course, Oppenheim, Dell, & Schwartz (2010) actually argued that cumulative semantic interference in picture naming primarily reflects an ***implicit*** incremental learning process.

In their model, explicit memory effects like episodic retrieval-induced forgetting (as opposed to semantic retrieval-induced forgetting) are considered analogous to cumulative semantic interference instead of homologous by default. Whether or not our 2010 model predicts the same type and amount of cumulative semantic interference for coerced names as volunteered names really depends on how exactly the coerced names are being retrieved. If the interference for coerced names is really, deeply, the same semantic interference that our 2010 paper described – and this looks like the case here – then its presence suggests that, whatever else is going on, producing a coerced name still involves the same semantic→lexical mapping.




These 781 errors offer very little evidence to suggest that cumulative semantic interference might be stronger when producing coerced names (coercion x context: β=-0.01±0.32, p=.94; coercion x context x cycle: β=0.05±0.28, p=.68).

Coerced and volunteered names show similarly strong interference (coercion x context: β=~.1ms±6.7, p=.98; coercion x context x cycle: β=~1.8ms±4.8, p=.49), and confidence intervals show that any possible differences in interference would be too small to support Zubicaray *et al.*'s (2014; in press) idea that explicit episodic memory drives cumulative semantic interference in normal picture naming.

## Theoretical conclusions

Corrective familiarization can be amazingly successful at getting participants to produce our desired names when cued. But that success may come from invoking additional processes that lie beyond the scope of many production models, and beyond the scope of what many researchers think they are researching. Familiarization doesn't make coerced names comparable to volunteered names. Even when participants appear to align their lexicons with our requests, producing a coerced name remains slower and more error-prone with its own repetition priming curve. It can take on elements of an episodic paired-associates task that may be less typical of normal meaning-driven production.

Cumulative semantic interference in picture naming isn't an explicit episodic memory effect (contra Zubicaray *et al*'s (2014; in press) idea). Despite large and lasting differences in their base RTs and error rates, coerced and volunteered names show similarly strong cumulative semantic interference – not the much larger effect that we'd expect if cumulative semantic interference were typically driven by explicit episodic memory contributions to the picture naming process.

## Practical suggestions (discussion encouraged)

1. Use name agreement ratings to select pictures. We need to ensure that every participant is doing exactly what we expect on every trial, especially when using measures and analyses that preclude trial-by-trial analyses.
2. Use familiarization to elicit volunteered names for each subject and item, including feedback to reduce uncertainty and omissions (which could affect subsequent trials, e.g. as post-error slowing).
3. Use your familiarization data to exclude coerced names from your analyses. At best coerced names may pollute our data with noise and idiosyncrasies that would be difficult to covary out; at worst they may lead us to wrong conclusions by invoking nontarget processes in addition to or in place of those that we are targeting.
4. Don't include alternative names in your analyses (they have different semantic, lexical, phonological, articulatory, and acoustic properties), but do consider allowing participants to use alternative names during an experiment.

Works cited: Belke, E., & Stielow, A. (2013). Cumulative and non-cumulative semantic interference in object naming: Evidence from blocked and continuous manipulations of semantic context. Quarterly Journal of Experimental Psychology, 37–41. • de Zubicaray, G. I., Johnson, K., Howard, D., & McMahon, K. L. (2014). A perfusion fMRI investigation of thematic and categorical context effects in the spoken production of object names. Cortex. • de Zubicaray, G. I., McMahon, K. L., & Howard, D. (in press). Perfusion fMRI evidence for priming of shared feature-to-lexical connections during cumulative semantic interference in spoken word production. Language and Cognitive Processes. • Oppenheim, G. M., Dell, G. S., & Schwartz, M. F. (2010). The dark side of incremental learning: a model of cumulative semantic interference during lexical access in speech production. Cognition, 114(2), 227–252.