**Passive association / naïve exemplar storage:**

* Exp 4:
  + Explains why there is a lot of PR when pen is in mouth during test since the only time this talker was seen with this pen in the mouth during exposure, the talker produced *shifted* pronunciations.
  + Explains why there is little to no PR when pen is in hand during test since the time this talker was seen with this pen in the hand during exposure, the talker produced *typical* pronunciations.   
      
    *But* one might have to assume that memory is noisy (since otherwise *no* PR would be expected), *unless* that follows from differences in the phonetic properties of the first ten vs. second ten typical tokens. Additionally, SH- and S-biased exposure had different *numbers* of typical tokens for s and sh.
* Exp 3:
  + Fails to explain lack of boost to PR when pen location during test matched pen location during exposure (but one might argue that this is a null effect; though we replicated it).
* Exp 1a-c:
  + Explains effects of pen during test under assumption that listeners draw on most similar previous experiences: i.e., instances of other talkers with a pen (or similar object) in the mouth.
* Exp 2:
  + Would seem to struggle explaining the fact that the pen effect is blocked even when it’s clear that the pen was in the mouth. However, if one is willing to consider that the mouth shape—rather than the pen location itself—is the relevant context, then one can reconcile Exp 2 with this explanation.  
      
    Yet another—though perhaps far-fetched—possible explanation would be that the black box itself constitutes a novel context, for which listeners have little to no experience, and that this is what blocks the pen effect.

**Causal inference:**

* Exp 1a-c: compensation
* Exp 2: follows if one is willing to assume that effects of pen on articulators need to be actively observed *during* the production of the fricative (or, more generally, during the time window during which the relevant acoustic cues for the phonological contrast are produced).
* Exp 3: when the pen is in the mouth during exposure, exposure should have the same effects as the 1st half of exposure in Exp 4:
  + When s is shifted (with pen in mouth) the observed acoustics match expectations (because the s sounds “sh”-like) and:
    - expectations about the effects of a pen in the mouth are met, and potentially even strengthened.
    - Additionally, *if adaptation happens over compensated/normalized percepts (rather than raw acoustic inputs)*, the acoustics are at least partially or even fully explained by the pen, and there is no talker-specific characteristics to adapt to (since sh is also typical). 🡪 **predicts that the pair of red lines should be identical to Exp 1c.**
  + When sh is shifted (with pen in mouth) the observed acoustics mismatch expectations (because the sh sounds “s”-like) and:
    - expectations about the effects of a pen in the mouth are violated, and thus potentially revised to not hold during test. But—unlike in Experiment 4—participants never get evidence that the talker is typical. Participants should thus maintain uncertainty about the cause for the shifted pronunciation.
    - Additionally, *if adaptation happens over compensated/normalized percepts (rather than raw acoustic inputs)*, the acoustics should appear hyper shifted for this talker during the first half of the experiment. 🡪 if this shifts the acoustics too far, this **predicts fewer word-responses during exposure**.
* Exp 4:
  + When s is shifted (with pen in mouth) the observed acoustics match expectations (because the s sounds “sh”-like) and:
    - expectations about the effects of a pen in the mouth are met, and potentially even strengthened.
    - Additionally, *if adaptation happens over compensated/normalized percepts (rather than raw acoustic inputs)*, the acoustics are at least partially or even fully explained by the pen, and there is no talker-specific characteristics to adapt to (since sh during the first half, and both s and sh during the second half of exposure are also typical). 🡪 **predicts that the pair of red lines should be identical to Exp 1c & compared to Exp 3, there is more evidence that the pen is responsible for the atypical pronunciations.**
  + When sh is shifted (with pen in mouth) the observed acoustics mismatch expectations (because the sh sounds “s”-like) and:
    - expectations about the effects of a pen in the mouth are violated, and thus potentially revised to not hold during test. Indeed, the 2nd half exposure then provides participants with evidence that the talker sounds more or less typical, so it must have been the pen that works differently than expected.
    - Additionally, *if adaptation happens over compensated/normalized percepts (rather than raw acoustic inputs)*, the acoustics should appear hyper shifted for this talker during the first half of the experiment. 🡪 if this shifts the acoustics too far, this **predicts fewer word-responses during exposure**.
  + 🡪 **predicts interaction between Condition.Exposure.LexicalLabel and Condition.Test.Pen.**