The RMC/OCP as source confusion: morphological parallels to repetition blindness

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Menn & MacWhinney (1984) give abundant evidence for the Repeated Morph Constraint or RMC in (1):

1. *XY, where X and Y are adjacent surface strings such that both could be interpreted as manifesting the same underlying morpheme through regular phonological rules, and where either:
   a) X and Y are both affixes, or
   b) either X or Y is an affix, and the other is a (proper subpart of a) stem.

See Table *1* for a single example. Yip (1995a) attributes this effect to a refinement of the Obligatory Contour Principle or OCP in Optimality-theoretic terms which Yip (1995b) renames as *REPEAT:

2. OCP/*REPEAT: Output must not contain two identical elements.

Walters (2007) has recently revived interest in the RMC/OCP with her proposal to reduce it to independently motivated functional restrictions on the perception and production of repeated material.

In this paper, we further explore the possibility of a perceptual explanation for the RMC/OCP based on research into repetition blindness:

> Human observers are remarkably adept at identifying and reporting short lists of letters, words, or pictures displayed in rapid-serial-visual-presentation (RSVP; Forster, 1970). However, if two of the display items are identical, one of them often fails to be reported, and when observers are questioned further, they deny having seen the repetition. This robust phenomenon is known as repetition blindness (RB; Kanwisher, 1987). [Morris et al. (2009:339)]

Huber (2008) has recently assimilated repetition blindness to the neurocomputational model of immediate priming known as Responding Optimally with Unknown Sources of Evidence or ROUSE, introduced in Huber et al. (2001). One of the goals of ROUSE was to solve the problem of source confusion, which is the tendency to mix up what happened when and where:

> … consider a detector that responds to a certain feature in the world regardless of when or where that feature appears. For instance, through practice as a child, you learned to tell the difference between a P and an R presumably because your R detector is highly sensitive to the presence of a diagonal line protruding from a rounded top. Furthermore, your ability to detect Rs works well regardless of when or where you see an R, how large it is, the font color, and so on. Presumably you did not need to learn every conceivable version of R separately. Instead, you have developed a more centralized detection process that readily generalizes to many situations. Such a generalized detector is termed a type detector because it is sensitive to the generic identification of a stimulus (e.g., any R) rather than specific instantiations of a stimulus (e.g., an R that is in 22-point gray Times Roman font and appears 0.75 degrees to the left of the fovea at 3:21 p.m.). However, there is a downside to this generalized type detection ability. Because type detection responds to any R, it suffers from source confusion and has trouble discriminating between an R that was flashed in the word PRIME 100 ms ago versus one that was flashed 50 ms ago in the word TARGET. [Huber (2008:326)]

What ROUSE does is reduce source confusion (the unknown sources of evidence) by assigning a feature that is known to have been primed a lower level of evidence in a Bayesian inference system, because the prime rather than the target may have been the source. For instance, if an R is perceived and it is known that the prime contained one, then R still counts in favor of a choice for a target such as TREAT but less so than if the prime did not contain one. Such discounting constitutes the optimal response and produces a perceptual system that is primarily sensitive to the onset of new events. This of course turns into a disadvantage if the current event is not new, which is the cause of repetition blindness.

To implement ROUSE in a neurologically plausible manner, Huber & O'Reilly (2003) design a three-level model with the result that a neuron at one level has a larger receptive field than a neuron at the layer immediately below it. It is within such a larger receptive field that source confusion takes place.

Returning to the RMC/OCP, our hypothesis is that: (a) repeated morphs impose a burden on the perceptual system analogous to that of RSVP, (b) the three levels of analysis in ROUSE map onto the standard three levels of morphophonology, and (c) the RMC/OCP describes source confusion at the phonological level. In this way, the cognitive system is simplified by the reduction of a morphophonological process to an independently justified perceptual one.

There are at least two problems with this analysis: (i) it is not clear whether source confusion should hold within a morph (consonant repetition in gemination vs. lack of consonant repetition in Arabic trilateral roots, see Pierrehumbert (1993)), and (ii) it does not explain why source confusion can fail to hold between root and affix, see *mouse's* or *Katz's* in Table *1*.

We take the first problem to show the difference between language and the lists of random words used in priming experiments. We assume that source confusion should in principle hold with a morph, but that lexical information about the phonological contents of a morph can override it. Discounting applies when an upcoming item is unpredictable, but if a lexical entry stipulates the upcoming item, then it is no longer unpredictable. Technically, the morphological layer should provide additional top-down excitation to the phonological layer in Fig. **Error! Reference source not found.** to counterbalance perceptual discounting within a morpheme. It follows that it is only where the lexicon fails to supply information about the upcoming sequence, namely at the transition from morph to morph, that discounting processes operate unimpeded.

The only solution to the second problem must appeal to a similar mechanism, since there is no other. It must be that English rules in the formation of plurals and possessives with roots that end in a sibilant by decreasing the discounting of the affix sibilant. Whether this is intrinsic to the phonological layer or is achieved by top-down excitation from the morphological layer is unclear to us at present, but either way, it would be the neurological correlate of reducing the ranking of *REPEAT.

Table 1. English plural haplology as an example of the RMC/OCP

Singular	Plural	Possessive Sg.	Possessive Pl.
child	children	child's	children's
mouse	mice	mouse's	?mice's
cat	cats	cat's	cats', *cats's
Katz	Katzes	Katz's	Katzes', *Katzes's
coreopsis	*coreopsises	coreopsis's	*coreopsises's