Semantic Satiation and Delayed Recognition among Lexically-Ambiguous Words

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Narrative

In the present experiment I propose to examine the endurance of the effect of semantic satiation across a delayed recognition test.

Semantic satiation, historically, has referred to the loss or distortion of meaning of a word at the subjective, conscious level (Severance & Washburn, 1911; Bassett & Warne, 1919). First demonstrated by Severance and Washburn's experiments, they described the effect as "the loss of familiarity in [a word's] appearance" causing it to "take on a curiously strange and foreign aspect" (1911). In these early experiments, participants were often asked to observe a word for a period of time and describe the subjective changes that it appeared to undergo.

Although this methodology was understandably lacking a certain amount of rigor and objectivity, studies of semantic satiation have persisted with the effect ultimately defined as the decrease in ability to, following the repetition of a given word or concept, (1) access the meaning of that word and (2) access related words and meanings. (Or, simply put, if you repeatedly see a word, you will be slower in identifying related words.) However, despite this, little research has been devoted to the study of this effect as it appears among homographs—i.e., a word with a single spelling but multiple and distinct semantic meanings. (E.g., CALF can mean either a part of the leg or a young cow.) Moreover, the minimal research that has directly examined the effect in this context (namely Black, 2001) lacks the controls necessary to adequately identify any differential effects that emerge as a function of meaning relatedness among ambiguous words, presented without any contextual clues to otherwise influence meaning selection.

Indeed, given a review of existing literature, Black, to use terminology coined by Tian and Huber (2010), only measured meaning satiation and not association fatigue. That is, the repeated cue word was never present in the decision pair (and thus, the participants never made an association between the meaning of the fatigued word and the meaning of the cue word—a significant departure from a more standardized methodology). For example, a participant may have repeatedly been shown the word KIDNEY. Following this, the participant would be asked whether ORGAN and HEART were related thematically. However, in a typical methodology, the participant would have been shown ORGAN repeatedly and asked then to make the same judgment between ORGAN and HEART.

Further, there is no indication given of how items were assigned a biased or unbiased condi-

tion[1]: indeed, looking the most-cited example in the paper—ORGAN[2]—via the University of South Florida Free Association Norms (Nelson, McEvoy, & Schreiber, 2004), we see that participants respond with each meaning of the word (PIANO, KIDNEY) with approximately equal frequencies. Hereby, it cannot necessarily be expected that participant response times for dominant or subordinate homograph meaning (the meaning accessed more frequently or less frequently) relatedness judgments will significantly differ.

In a related experiment, Balota and Black (1997) manipulated the strength of semantic association between cue and target: that is, although all words were unambiguous, the strength of association between the to-be-satiated cue word and its related target pairmate were manipulated. Here, Balota and Black found that among low-strength associate words, reaction time was increased relative to high-strength associate words[3], demonstrating a significant effect of strength of association on retrieval times of semantic meaning. Given this, although prior investigations of semantic satiation among ambiguous words have relied heavily on balanced homographs, it may be inferred that wordlists composed of unbalanced or biased homographs would produce significant differences in either priming effects or in satiation in a relatedness judgment (cf. Kuhl & Anderson, 2011 for evidence of the impact of strength of association on reaction times using a stem completion task).

Given these considerations, I am interested in replicating and extending Balota and Black's (1997) and Black's (2001) research by strictly controlling the bias of the ambiguous words used (here, using only biased homographs whereas prior research has relied on balanced). Further, existing research has solely examined priming and semantic satiation among NOUN—NOUN pairings, although semantic distance research suggests that there exists entirely separate stores for different parts of speech (e.g., the meaning of DUCK as an animal would be encoded in a different store than would that of [to] DUCK as a verb) and that multiple meanings that are all of the same part

[1]A word is considered biased if individuals produce one of its meanings significantly more frequently than another of its meanings. For instance, given the word CALF, most people will first think to themselves 'cow' and only a few will think 'leg': hereby, we call CALF a biased word.

[2]Regrettably, no complete word list was published by the author, nor were additional examples given in the body of the research. Given this, we are unable to assess whether Black failed to control for meaning bias throughout or if this was an arbitrarily-chosen exemplar.

[3]Here, strength of association refers to how closely related two words are, thematically. This is similar to the definition of biased words given previously. Two words are said to be high strength associates if one is commonly given in response to the other: for instance, given the word ROYALTY, an individual is more likely to respond 'queen' and only rarely will respond 'duke.' Hereby, we can call QUEEN a high strength associate of ROYALTY and DUKE a low strength associate.

of speech are more accessible than multiple meanings of different parts of speech (Mirman et al., 2010).

Given this, in two experiments, I examined three issues. First, I controlled for bias among homographs, selecting only biased homographs using the University of South Florida Free Association Norms (Nelson, McEvoy, & Schreiber, 2004). Because one meaning of each homograph selected is produced at a significantly higher frequency than the other, I expected to see significant differences in response times not observed in prior research (Black, 2001).

Second, I controlled for the type of homograph: noun-noun or noun-verb. In Experiment 1, only homographs whose two meanings were each nouns were selected. In Experiment 2, I included both homographs whose two meanings were nouns and those for which one meaning was a noun and the second was a verb. Given semantic distance research, I expected response times to noun-verb homograph relatedness judgments to be significantly longer than those for noun-noun homographs. Moreover, one would expect the response time for a subordinate meaning of a noun-verb homograph to be significantly longer than that for the dominant meaning of the noun-verb homograph and significantly longer than either dominant or subordinate meaning of a noun-noun homograph. Third, I sought to demonstrate an effect of satiation by repeating the to-be-satiated homograph cue either 3 (priming effect) or 30 (satiation effect) times.

Notably, however, in both of my existing experiments and in the whole of the literature preceding this (with the exception of Kuhl & Anderson, 2011), fundamentally no research has taken a proper zero-repetition baseline. That is, in my two previous experiments and in the bulk of the literature in the field, participants respond to a word after a few number of repetitions (usually 2 or 3), or many (usually 28-30; Smith, 1984; Smith & Klein, 1990; Balota & Duchek, 1991). However, this provides an incomplete picture: notably, it shows a participant's response time after a prime (2 or 3 repetitions) and after fatigue (30 repetitions); yet, it provides no indication of a true baseline: what would be a participant's response time if presented the CUE—TARGET pairing out of the blue, so to speak, without any prior repetitions of the cue. In this way, semantic satiation literature has observed only the two extremes of priming and satiation, and, partly as a result from this, has conflicted greatly in not only how to define the actual effect of semantic satiation, but moreover how to interpret it in both a theoretical and practically meaningful context.

Further, there has been no examination of the duration of the effects of satiation using an

accepted measurement paradigm. (Kuhl and Anderson (2011) did test this; however, it was using a non-standard testing methodology that has not previously been used in the related literature.) Moreover, if we are to use a delayed relatedness test, this affords the opportunity (as stated previously) to include zero-repetition items. In previous experiments, the relatedness judgement was made immediately after the cue was repeated: including a zero-repetition item would have been an obvious outlier to participants.

Hereby, as in my two prior experiments, participants will be presented with two words in each trial: a to-be-satiated cue word and a target pairmate. The to-be-satiated cue is presented in the center of an LCD monitor and shown 0, 3 or 30 times. For each repetition, the cue is presented on the screen for 600ms. Following this, and prior to the next repetition, the screen is left blank for a 300ms intertrial period. After the final repetition (either the third or the thirtieth) of the cue, the screen is cleared for a final 300ms. This process repeats until approximately 18 cue words have been shown.

Participants then move to a relatedness judgment task where a previously-seen cue word appears on the screen next to a yet-unseen target word. Participants then press the 'C' key to indicate that the two words are unrelated or the 'M' key to indicate that they are related. A 300ms intertrial interval follows the participant's relatedness judgment. All trial words are presented in upper case, 36-point Arial font in black text in a well-lit room.

Participants are seated approximately 50cm away from the LCD screen. During the experiment, the experimenter remains with the participant to ensure that the participant fully understands the experimental procedure. Participants are encouraged to answer as quickly and accurately as possible. The duration of the experiment ranges from 35 to 45 minutes.

Following completion of this project, results of this and the preceding two experiments shall be submitted for publication in a peer-reviewed academic journal. Material from this experiment will additionally be submitted for a talk at the Midwestern Psychological Association Conference and presented at John Carroll's Celebration of Scholarship.

This experiment is covered under the IRB approval 2013-047 and does not need further institutional approval before data collection may begin.

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Timetable

Task	**Completion Date**
Completed word list	16 September
Draft proposal submission	20 September
Final proposal submission	27 September
Run participants	7 October (start)
Run participants	4 November (end)
Analyze data	8 November
Manuscript submission	18 November
If and as needed:	
Revisions	29 November
Resubmission	2 December

NB: Meetings with SHP advisor are scheduled to occur no fewer than once per two weeks and are thus not here included.