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RESEARCH REPORT

Is Semantic Priming (Ir)rational? Insights From the Speeded Word Fragment Completion Task

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Semantic priming, the phenomenon that a target is recognized faster if it is preceded by a semantically related prime, is a well-established effect. However, the mechanisms producing semantic priming are subject of debate. Several theories assume that the underlying processes are controllable and tuned to prime utility. In contrast, purely automatic processes, like automatic spreading activation, should be independent of the prime's usefulness. The present study sought to disentangle both accounts by creating a situation where prime processing is actually detrimental. Specifically, participants were asked to quickly complete word fragments with either the letter *a* or *e* (e.g., *sh_ve* to be completed as *shave*). Critical fragments were preceded by a prime that was either related (e.g., *push*) or unrelated (*write*) to a prohibited completion of the target (e.g., *shove*). In 2 experiments, we found a significant inhibitory priming effect, which is inconsistent with purely "rational" explanations of semantic priming.

Keywords: semantic priming, speeded word fragment completion, automatic versus controlled processes

Semantic priming is one of the most studied phenomena in (experimental) psychology (see McNamara, 2005, for a review). One of the main reasons for its popularity is that it is thought to provide insight into the structure of people's mental lexicon. Throughout the years, several models of semantic priming have been proposed, perhaps none more influential than Collins and Loftus's (1975) spreading activation theory. Not only does the notion of automatic spreading activation resurface in other priming accounts (e.g., Neely & Keefe's, 1989, hybrid three-process theory), it also remains a hot topic in the literature (De Wit & Kinoshita, 2015; Heyman, Hutchison, & Storms, 2015).

The idea behind spreading activation is that the prime (e.g., *cat*) preactivates related concepts (e.g., *dog*, *animal* . . .), which are processed faster when they are subsequently presented. However, a critical assumption of spreading activation theory is that activation spreads regardless of whether it is actually beneficial. That is to say, spreading activation could just as easily result in an inhibitory effect when changing the context or the design of the experiment (e.g., Stroop interference).

In contrast to automatic accounts of semantic priming, such as the spreading activation theory described above, (semi-) strategic accounts emphasize making use of the prime to aid performance. Priming can, for instance, arise as a result of expectancy generation (Becker, 1980). Given the prime *cat*, participants may produce a set of potential targets such as *dog*, *animal*, *pet*, and the like, which aids target identification if the candidate set contains the actual target. Critically, expectancy generation is not an obligatory process and it is argued to depend on the proportion of related prime–target pairs in the experiment (Neely & Keefe, 1989; Stolz, Besner, & Carr, 2005). The higher the relatedness proportion (henceforth RP), the more likely it is to be deployed because it *helps* performance more often (Stolz et al., 2005).

The idea of a useful prime also appears in Bodner and Masson's (2001, 2014) memory-recruitment account. The central premise of this account is that initial processing of the (masked) prime is retrospectively recruited upon target presentation. It is important to note that Bodner and Masson (2014) claimed that the cognitive

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system will recruit prime processing in *aid* of processing the target. Furthermore, this process is argued to depend on the validity of the prime, such that prime recruitment increases when RP increases (Bodner & Masson, 2003). The concept of retrospectively using the prime based on utility has also been applied in studies examining moderators of semantic priming effects. For instance, the finding that semantic priming is enhanced when targets are visually degraded, is attributed to greater reliance on the prime to aid in identifying difficult (i.e., degraded) targets (Balota, Yap, Cortese, & Watson, 2008). Similarly, participants with less vocabulary knowledge showed larger priming effects especially for low-frequency words, presumably because they relied more on prime information to help recognize these difficult words (Yap, Tse, & Balota, 2009).

Taken together, these (semi-) strategic processes all assume, implicitly or explicitly, that it makes sense to use the prime, especially under certain circumstances (e.g., when targets are visually degraded, when RP is high). In that regard, they are *rational* explanations of the semantic priming effect. Given the ongoing debate about the role of automatic versus (semi-) strategic processes, we designed a study that attempts to disentangle both explanations of facilitatory semantic priming. Concretely, both accounts make opposite predictions about situations where prime processing is actually detrimental. On the one hand, (semi-) strategic processes should play no role in such contexts, because they are flexibly tuned to the utility of the prime. In contrast, automatic processes should operate regardless of prime utility. As such, this study seeks to demonstrate the existence of a nonadaptive, automatic component of semantic priming, which, to be clear, can coexist with a rational component under more traditional paradigms (e.g., unmasked primes, lexical decision on the targets, and a high RP).

In the present study, participants performed a two-alternative speeded word fragment completion task (Heyman, De Deyne, Hutchison, & Storms, 2015). This task involves completing words, from which one letter was omitted, as quickly as possible (e.g., *tom_to*). There were two response options, the letters *a* and *e*, and only one of them would yield an existing word (*tomato* in this example). In a recent norming study, Heyman, Van Akeren, Hutchison, and Storms (2015) found that responses to fragments with an alternative, yet prohibited, completion were slower than responses to fragments without an alternative completion. For instance, some word fragments, like *sh_ve*, have only one correct completion when participants must choose between the letters *a* and *e* (i.e., *shave* in this example). However, if all letters were allowed as a response option, the fragment could also be completed as *shove*. Responses to such fragments are slower, presumably because the distractor(s) (*shove* in this example) competes with the actual target (*shave*) during selection.

Here, we exploit this effect to gain more insight into semantic priming. More specifically, we pit a purely rational explanation of semantic priming against a nonadaptive, automatic explanation. To this end, we will present primes (e.g., *push*) that are related, not to the actual target (*sh_ve* to be completed as *shave*), but to the distractor (*shove*). If the traditional facilitatory priming effect is (partly) the result of an automatic process, we predict that the prime will increase the competition between target and distractor. From a spreading activation perspective, one can, for instance, envision the preactivation of *shove* to fuel the competition with *shave*. On the other hand, if the prime is never predictive of the actual target, which was the case in the present experiments, it would be "irrational" to rely on the prime. Quite the opposite, if anything, the prime could hinder completion of the target, so it makes sense to ignore the prime.

Experiment 1

Method

Participants. Sixty-four students from Montana State University (21 men, 43 women, mean age = 20 years) participated for partial completion of a requirement for an introductory psychology course.

Materials. A total of 100 word fragments were created by deleting the letter *a* or the letter *e* from an existing word. There was always only one correct answer, meaning that a fragment like *b_ll* could not be used because both responses yield an actual word (i.e., *ball* and *bell*). The letter *a* was omitted in half of the fragments (i.e., 50), the letter *e* in the other half. To assure that every word fragment had a unique correct response, we relied on the SUBTLEX-US norms (Brysbaert & New, 2009). Every target fragment, presented in lowercase, was preceded by an unfragmented prime, presented in uppercase. There were 30 critical prime–target pairs, which consisted of a target (e.g., *sh_ve*, to be completed as *shave*) with an alternative, yet prohibited, completion (e.g., *shove*) and a prime that was related to this distractor (e.g., *push*).

All stimuli were chosen from the Semantic Priming Project database (Hutchison et al., 2013), which features 1,661 primary associates (e.g., *yolk–egg*) and 1,661 other associates (e.g., *protein–egg*). The 30 critical pairs were constructed by selecting primary associates from which the target could be adapted to fit the present purposes. That is, *push–shove* was one of the primary associates used by Hutchison et al. (2013) that was ultimately selected because the target *shove* could be transformed into a word fragment suitable for the *a/e* speeded word fragment completion task (i.e., *sh_ve*). Hence, the Hutchison et al. target stimulus was the distractor stimulus in the present design. Stimulus characteristics of the critical items are summarized in Table 1. The Appen-

Table 1
Stimulus Characteristics of the Critical Items (N = 30)

Factor	*M*	*SD*
Prime length	5.07	1.60
Prime contextual diversity	2.87	0.66
Prime frequency	3.18	0.89
Distractor length	3.97	0.96
Distractor contextual diversity	3.01	0.61
Distractor frequency	3.30	0.83
Target contextual diversity	2.48	0.91
Target frequency	2.74	1.07
Prime–distractor forward association strength	0.41	0.20
Prime–distractor backward association strength	0.29	0.25

Note. Contextual diversity is the log-transformed number of contexts in which a certain word occurs (Brysbaert & New, 2009). Word frequency is the log-transformed total number of occurrences. Forward and backward association strength was taken from Hutchison et al. (2013). Target length is equal to distractor length.

dix lists all prime–distractor–target–word fragment quadruplets (e.g., *push–shove–shave–sh_ve*).

An additional 70 filler items were also derived from Hutchison et al. (2013), but the selection procedure was different. The 70 primes were picked from the remaining primary associate primes. Each corresponding target was created by deleting the letter *a* or *e* in one of the remaining primary associate targets, making sure that there was only one correct completion (e.g., *_gg*, to be completed as *egg*) and that the resulting prime–target pairs were unrelated (e.g., *beauty–egg*).

Procedure. Critical targets in the experiment were preceded by a prime that was either related or unrelated to the prohibited completion (e.g., *push–sh_ve* or *write–sh_ve*). Two lists were created such that half of the critical fragments were preceded by a related prime in List 1 and by an unrelated prime in List 2 and vice versa for the other half. Consequently, half of the participants received List 1 and the other half List 2. List assignment was randomly counterbalanced over participants. Of the 30 critical fragments, 15 required an *a* response and 15 an *e* response. In List 1, 8 out of 15 fragments in the related condition required an *a* response and 7 an *e* response. The reverse was true for List 2. Unrelated pairs were formed by randomly recombining primes and targets with the restriction that primes were always associated with the same target response. For instance, *push* was always followed by *sh_ve* (correct response is *a* yielding *shave*) in List 1 and by *r_t* (correct response is also *a* yielding *rat*) in List 2.

On every trial, participants first saw the prime, which was shown for 150 ms. Then, a blank screen appeared for 650 ms followed by the presentation of the target. This procedure thus resulted in a stimulus onset asynchrony of 800 ms. Both prime and target stimuli were displayed in the center of the screen and the target remained present until a response was made. The intertrial interval was 1,000 ms and all stimuli were presented using PsychoPy (Peirce, 2007).

The main experiment, which consisted of 100 trials, was preceded by a practice block comprising 20 different filler trials. Participants were told to pay attention to the uppercase word (i.e., the prime, although this term was never used in the instructions) and to complete the lowercase word fragment as fast and accurately as possible. They were also informed that the missing letter was always either an *a* or an *e* and that there was only one correct solution. There was no mention of potential alternative, but prohibited, completions, nor of any relation between prime and target. To respond, participants had to press the left arrow key if they thought that the letter *a* was missing or the right arrow key if they thought that the letter *e* was missing. The entire experiment lasted approximately 5 to 10 min.

Results

Response times to the critical targets were analyzed after removing errors and outliers. For the latter, we used Van Selst and Jolicoeur's (1994) nonrecursive procedure yielding a separate cutoff criterion for every participant. This led to the exclusion of 13.5% of the data (11.3% due to errors, 2.2% due to outliers).[1]

To assess whether there was evidence for an inhibitory priming effect, we performed mixed effects analyses on the remaining response times following the suggestions from Barr, Levy, Scheepers, and Tily (2013). The variable of interest is relatedness, which has two levels indicating whether or not the prime was related to an alternative completion of the target fragment. The potential role of relatedness was examined by comparing two models that had the same random structure, but either did or did not include a fixed effect of relatedness. Both models featured random participant and item (i.e., the 30 word fragments) intercepts as well as by-item and by-participant random slopes for relatedness. Critically, the fixed part of one model only consisted of a general intercept, whereas a fixed effect of relatedness was added to the other model. The question was whether the latter model would fit the data significantly better than the "null" model. Analyses, carried out in R (Version 3.1.2; R Development Core Team, 2014) using the lme4 package (Bates, Maechler, Bolker, & Walker, 2014), revealed that this was indeed the case, $\chi^2(1) = 4.88$, $p = .027$. The magnitude of the inhibitory priming effect, based on the point estimates of the fixed effects, was 84 ms, 95% confidence interval (CI) [14, 154]. More specifically, the expected response time to critical fragments in the related condition (e.g., *push–sh_ve*) was 1,584 ms compared with 1,500 ms in the unrelated condition (e.g., *write–sh_ve*). Repeating the analyses for log-transformed response times yielded a similar outcome, $\chi^2(1) = 4.18$, $p = .041$. Taken together, these results provide clear evidence for an inhibitory priming effect.

In addition, multilevel logistic regression analyses were performed to examine the error rates. The analyses were completely analogous to the ones reported above, but with accuracy as a binary dependent variable. The results revealed no significant effect of relatedness, $\chi^2(1) = 0.12$, $p = .727$, even though the error rate was numerically higher in the related condition (i.e., 11.7%) than in the unrelated condition (i.e., 10.9%). It is thus safe to assume that the response time effects were not driven by a speed–accuracy trade-off.

Discussion

As argued in the Introduction, an automatic priming account like spreading activation would attribute the observed inhibitory priming effect to preactivation of the unallowable alternative completion. On the other hand, more strategic accounts of the regular facilitatory priming effect cannot readily explain the inhibitory effect. The latter accounts emphasize that prime reliance depends on utility: the magnitude of the priming effect is determined by the prime's usefulness. However, in the present design, the prime is never useful. Instead, the results show that prime processing can be detrimental in that target responding is slower when the prime is related to an alternative completion. Hence, these findings are inconsistent with a *pure* utility-based explanation of semantic priming.

It should be noted, though, that the proportion of related prime–target pairs in the present study was rather low. More specifically,

[1] In the original analyses, reported in an earlier version of the manuscript, outlier removal was done in two stages. First, response times below 250 ms and above 4,000 ms were removed. Then, response times more extreme than 3 *SD*s above each participant's average response time were omitted. Even though we applied these exclusion criteria in previous studies (Heyman, De Deyne, et al., 2015; Heyman, Van Akeren, et al., 2015), we were advised to use the more principled method proposed by Van Selst and Jolicoeur (1994). Note, however, that both procedures yielded very similar outcomes.

only 15 out of 100 word fragments were preceded by a prime that was related to an alternative completion. One could say that the low number of related pairs leaves participants with very few learning opportunities. To address this issue, we conducted a second experiment, in which the RP was .65 instead of .15.[2] Increasing the RP typically increases the magnitude of the facilitatory priming effect (for an overview, see Hutchison, 2007). As discussed in the Introduction, (semi-) strategic accounts assume that (the probability of) prime recruitment is positively related with the RP because primes become more useful as the RP increases. How does this translate to the design used here, where the prime becomes more *detrimental* when RP increases? Increasing the RP in this context, might prompt people to ignore the prime and thus *decrease* the probability of prime recruitment. Such an account would therefore predict a *smaller* inhibitory priming effect when RP is higher.

Alternatively, participants in Experiment 1 may have considered the prime to be useful, despite the fact that prime processing/recruitment actually slowed down responses to the target. If that were true, then it is conceivable that the perceived usefulness of the prime increases with RP, thus yielding a *larger* inhibitory priming effect. In contrast, if the inhibitory priming effect is the result of an automatic process like spreading activation, one would expect *no* RP effect (i.e., the magnitude of the priming effect is the same whether the RP is .15 or .65). These predictions were tested in a second experiment.

Experiment 2

Method

Participants. Sixty-four different students from Montana State University (38 men, 26 women, mean age = 21 years) participated for partial completion of a requirement for an introductory psychology course.

Materials. Stimulus selection was analogous to Experiment 1. The stimulus set again consisted of 30 critical word fragments and 70 fillers. The critical targets plus their corresponding primes were the same as in Experiment 1. Out of the 70 filler prime–target pairs, 20 were completely unrelated (taken from Experiment 1). In addition, 50 new filler pairs of the form *push-sh_ve* were created (e.g., *maggot–w_rm*, to be completed as *warm* with alternative completion *worm*). The latter filler targets were always preceded by the prime related to the alternative completion, whereas critical targets were preceded by an unrelated prime half of the time. This thus led to a relatedness proportion of .65.

Procedure. The procedure was exactly the same as in Experiment 1.

Results

Errors and outliers were removed using the same criteria as in Experiment 1. In total, 13.8% of the data were excluded (11.6% due to errors, 2.2% due to outliers). Again, we took the same model comparison approach to assess whether there was an inhibitory priming effect. Like in Experiment 1, the analyses indeed revealed a significant priming effect, $\chi^2(1) = 4.76$, $p = .029$, and $\chi^2(1) = 5.90$, $p = .015$ for untransformed and log-transformed response times, respectively. The point estimates of the untransformed response times' analysis yielded a priming effect of 82 ms, 95% CI [10, 154]. The expected response time to critical fragments in the related condition was 1,565 ms versus 1,483 ms in the unrelated condition. Similar to the results of Experiment 1, the error rate was numerically higher in the related condition (i.e., 11.9%) than in the unrelated condition (i.e., 11.1%), but the effect was not statistically significant, $\chi^2(1) = 0.32$, $p = .574$. This finding does indicate that the inhibitory priming effect seen in the response times was not due to a speed–accuracy trade-off (if anything, the effect seems to go in the same direction when looking at the error rates). Consequently, we will only focus on the response time data hereafter.

The main goal of Experiment 2 was to test whether RP had an impact on the magnitude of the priming effect. In other words, we sought to evaluate the evidence for a Relatedness × Experiment interaction. To this end, the data from both experiments were analyzed and two more complex models were compared. The random part of both models included random participant and item intercepts, by-item and by-participant random slopes for relatedness, by-item random slopes for experiment, and by-item random slopes for Relatedness × Experiment. The fixed part of both models contained main effects of relatedness and experiment. Critically, the more complex model also contained a Relatedness × Experiment interaction. The question was whether this more complex model would fit the data significantly better. The results showed that this was not the case, $\chi^2(1) = 0.00$, $p = .997$, and $\chi^2(1) = 0.11$, $p = .739$ for untransformed and log-transformed response times, respectively.[3]

To further examine this so-called null effect, we also took a Bayesian model comparison approach. An important advantage of such a Bayesian approach is that it allows quantifying evidence for or against a null effect. Concretely, all models, from the most complex model described above to an empty model (i.e., only a general intercept), were compared. The sole restriction was that interaction terms were only allowed if the lower-order effects were also included. Relative evidence for one model versus another is expressed in terms of Bayes Factors. More specifically, the Bayes Factor gives the probability of the data under one model relative to that under another model (Kass & Raftery, 1995). For the present purposes, we used the default settings of the generalTestBF function from the BayesFactor package (Morey & Rouder, 2015), which compares every model against a general-intercept-only model. This then allowed us to rank order models based on the resulting Bayes Factors. In the interest of brevity, we will only report the top four models and use the preferred model as the baseline. The results, summarized in Table 2, showed that the preferred model was the one with random item and participant intercepts and a fixed effect of relatedness. Critically, we found

[2] It is common for studies examining RP effects to use .25 and .75 as low and high RPs, respectively (see Hutchison, 2007). We opted to maintain the same typical RP increase of .5 between conditions, which resulted in a high RP of .65 that is somewhat lower in comparison to some previous high RP conditions.

[3] Note that omitting the main effect of relatedness does have an impact on model fit. Consider the model with the main effects of relatedness and experiment. Removing the main effect of relatedness significantly worsens model fit, $\chi^2(1) = 9.88$, $p = .002$ and $\chi^2(1) = 9.26$, $p = .002$, for untransformed and log-transformed response times, respectively, which again provides evidence for an inhibitory priming effect.

Table 2
Bayesian Model Comparison Using Both Response Times (RT) and Log-Transformed Response Times (LogRT)

Model	Bayes factor (RT)	Bayes factor (logRT)
Relatedness + item + participant	—	—
Relatedness + experiment + item + participant	8	8
Item + participant	39	25
Relatedness + experiment + relatedness × experiment + item + participant	144	133

Note. Only the top four models are shown and the preferred model (i.e., relatedness + item + participant) is used as the baseline to derive Bayes factors. Bayes factors greater than 3 entail substantial or positive evidence, whereas Bayes factors greater than 10 or 20 reveal strong evidence (Kass & Raftery, 1995; Wetzels et al., 2011).

compelling evidence for the inhibitory priming effect, but no evidence for an RP effect (see Table 2).

In a final analysis, we sought to further explore the inhibitory priming effect by conducting a response time distribution analysis. The idea is that distributional analyses provide a richer picture of how the relatedness manipulation has its effect. We took a similar approach as De Wit and Kinoshita (2015) and estimated four quantiles per participant and per condition (i.e., four in total: Relatedness × Experiment), thereby using the default quantile function from the stats package (R Development Core Team, 2014). After averaging across participants, one can compare the unrelated with the related response time distribution to examine how the priming effect evolves over quantiles. The latter is visualized in Figure 1 for both experiments separately.

There are two noteworthy observations: (a) there appears to be an inhibitory priming effect at every quantile and (b) the effect seems to increase across the quantiles when the RP is low, whereas it remains relatively stable when the RP is high. However, repeating the analysis with six rather than four quantiles showed more of an inverted U-shaped pattern in the low RP condition. As a consequence, we are hesitant to draw any firm (theoretical) conclusions from the present response time distribution analysis.

Discussion

Taken together, both frequentist and Bayesian analyses indicate that there is an inhibitory priming effect. Furthermore, this effect is not modulated by RP as there is no (significant) Relatedness × Experiment interaction. As discussed above, an automatic priming account like spreading activation can readily explain such a pattern. A prime preactivates associated targets independent of the proportion of related prime–target pairs. On the other hand, if priming were solely determined by prime utility, one would expect an RP effect. Hence, the present findings provide evidence against pure (semi-) strategic accounts of semantic priming.

General Discussion

The present study sought to examine whether semantic priming is truly "rational." To this end, we created a situation where reliance on the prime would be detrimental. Interestingly, we obtained an inhibitory, "irrational," priming effect that was not modulated by the proportion of related prime–target pairs. Broadly speaking, we see two ways to explain these findings. Either, the inhibitory priming effect is the result of (an) automatic process(es), or the so-called (semi-) strategic processes are not as "rational" as typically portrayed. Put differently, the present results are not compatible with a pure utility-based explanation of priming. If facilitatory priming solely depends on the degree to which the prime is useful, one would expect no priming effect in the present paradigm. As the latter was not the case, it seems that prime utility is not necessarily the driving force behind semantic priming in general.

There is an interesting parallel between the inhibitory semantic priming effect observed here and semantic Stroop interference

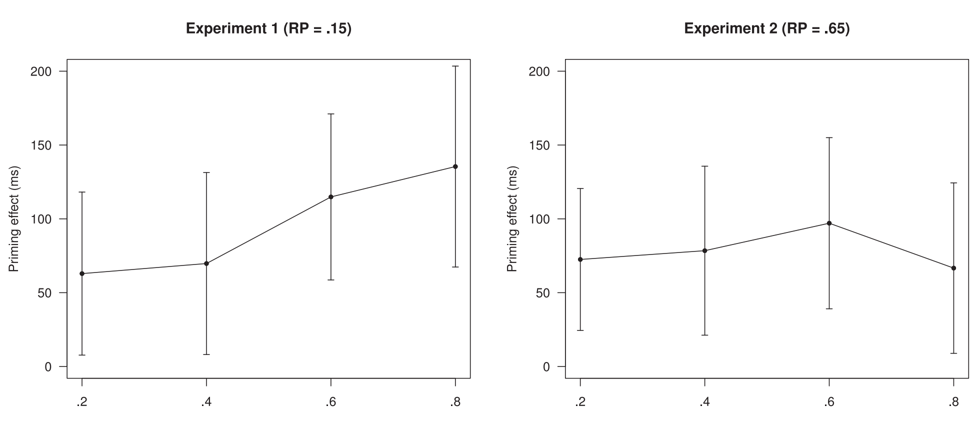

Figure 1. Inhibitory priming effect as a function of quantile and relatedness proportion (RP). Error bars represent the standard errors of the means.

(Augustinova & Ferrand, 2014; Manwell, Roberts, & Besner, 2004). The latter effect entails that identifying the ink color in which a word is printed is slower when the word is associated with a different color than when the word is color-neutral. For instance, participants are slower to respond to the word *sky* printed in green than to the word *ship* printed in green, presumably because *sky* is strongly associated to the incongruent color *blue*. The word *sky*, in this example, might play a similar role as the "related" primes in our experiments (e.g., *push* in *push–sh_ve*), as they are both semantically related to a distractor (i.e., *sky* to *blue* and *push* to *shove*, respectively). Furthermore, Augustinova and Ferrand (2012) found that including additional *congruent* stimuli had no significant effect on semantic Stroop interference, which fits nicely with the lack of an RP effect on inhibitory semantic priming in our study. One could thus speculate that the same processes underlie both phenomena. Moreover, there is also a potential parallel with "regular" Stroop interference. That is, Cheesman and Merikle (1986), using a Stroop-priming task, observed that a masked color word inhibited the subsequent naming of an incongruent color patch *independent* of the proportion of congruent trials.

In this regard, it is noteworthy that facilitatory semantic priming and (semantic) Stroop interference have largely been separated in the literature (but see Neely & Kahan, 2001; Schmidt, Cheesman, & Besner, 2013). However, they are both thought to provide insight into important issues such as the automaticity of reading and the structure of semantic memory. The paradigm introduced in this study can also be a helpful tool to investigate these topics as it is actually a mixture between semantic priming and semantic Stroop.

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Appendix

All Critical Prime–Distractor–Target–Word Fragment Quadruplets

Prime	Distractor	Target	Word fragment
push	shove	shave	sh_ve
time	clock	clack	cl_ck
grape	vine	vane	v_ne
even	odd	add	_dd
write	print	paint	p_int
pig	hog	hag	h_g
key	lock	lack	l_ck
decay	rot	rat	r_t
cloud	sky	say	s_y
repair	fix	fax	f_x
disgusting	gross	grass	gr_ss
pro	con	can	c_n
amaze	wonder	wander	w_nder
quarter	dime	dame	d_me
plates	dishes	dashes	d_shes
dawn	dusk	desk	d_sk
daughter	son	eon	_on
many	few	fee	fe_
against	for	foe	fo_
have	own	owe	ow_
center	middle	meddle	m_ddle
quack	duck	deck	d_ck
speed	fast	east	_ast
display	show	shoe	sho_
paste	glue	glee	gl_e
shape	mold	meld	m_ld
cap	hat	eat	_at
soil	dirt	dire	dir_
halt	stop	step	st_p
tablet	pill	pile	pil_

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