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The Effect of Grammatical Gender and Semantic Context on Lexical Access in Italian Using a Timed Word-Naming Paradigm

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The effects of sentence context and grammatical gender on lexical access were investigated in Italian using a timed word-naming paradigm. Large main effects of both sentence context and the gender of the article were observed; the interaction between gender and semantics was significant over subjects. Strong facilitation by both gender and semantics was observed, relative to a neutral-control baseline condition. Results are compared with (1) a prior study with the same design, using a picture-naming paradigm, except that objects described by written words were replaced by pictures (Bentrovato, Devescovi, D'Amico, & Bates, 1999); (2) a separate norming study of timed word reading in a list format, using the same stimuli (D'Amico, Devescovi, & Bates, 2001); and (3) a prior study of German comparing word and picture naming in short, semantically neutral phrases (Jacobsen, 1999). Differences in methodology and in findings between the Italian word naming and the German word naming are compared and discussed. Findings of the present study are interpreted in support of interactive-activation models in which different sources of information are combined on-line to predict, anticipate, or preactivate lexical targets.

KEY WORDS: Lexical access; word reading; sentence priming.

INTRODUCTION

Grammatical gender priming appears to be a robust phenomenon (for Italian see Bates, Devescovi, Hernandez, & Pizzamiglio, 1996; Bentrovato, Devescovi, D'Amico, & Bates, 1999; for French, Grosjean, Dommergues, Cornu, Guillelmon, & Besson, 1994; for German, Hillert, & Bates, 1996; Jacobsen 1999;

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for Russian, Akhutina, Kurgansky, Polinsky, & Bates, 1999). Nevertheless, the interpretation of what this priming effect means is still controversial. A central issue in these studies, and in the present study, is the question of how and when prior gender information affects the processing of the subsequent word: Is gender priming a prelexical phenomenon (resulting in prior activation of gender-appropriate continuations or suppression of gender-inappropriate continuations), or a postlexical phenomenon (restricted to the point at which an accessed lexical item is integrated into the phrase or sentence context)?

In this study we investigate the interaction between grammatical gender and sentence context priming in Italian using a timed word-reading paradigm. We show how grammatical gender and sentence meaning affect the time required to name (or read) a word presented visually at an unpredictable point within a two-sentence auditory context. We will also assess both *facilitative* and *inhibitory* effects of sentence context relative to a neutral-control baseline, when gender and semantics converge (a facilitative context), and when gender or semantics context do not match the target word (an inhibitory context).

The present study uses an experimental design similar to that of two previous studies in Spanish (Wicha, Bates, Hernandez, Orozco-Figueroa, Reyes, & Gavaldón de Barreto, 1997) and Italian (Bentrovato *et al.*, 1999). It is, in fact, an exact copy of the Bentrovato *et al.* (1999) design, except that target pictures are replaced by written words. As we shall see, results of this experiment will confirm in many aspects the results of our previous picture-naming studies, despite this change in target type.

Different results were found by Jacobsen (1999), who compared picture naming and word naming in German. In the Jacobsen experiments, pictures or words were presented after short sentence fragments that offered little semantic context compared with the sentence contexts used in the present experiment. In that study, picture naming elicited facilitation relative to a neutral baseline, but word naming did not. Based on certain differences between the two forms of naming, Jacobsen concluded that his results were compatible with a unidirectional and postlexical account (Levelt, 1989) in which some information about words (in this case the gender information) can be accessed only in a second step, after that noun lemma is accessed. In that model, the basic assumption is that the language-information-processing flow is unidirectional and not interactive. Jacobsen's results (and his conclusions regarding picture vs. word naming) motivated us to repeat our study using the word-naming paradigm. The results that we demonstrate for word naming are compatible with interactive-activation accounts in which different sources of information are used, quickly and in parallel, to predict the target word (Elman, 1990; MacWhinney & Bates, 1989; VanPetten, Coulson, Rubin, Plante, & Park, 1999). Based on diagnostics proposed by Hernandez, Bates, and Avila (1996), these results suggest that gender priming may be a prelexical phenomenon.

EXPERIMENT

Method

Participants

Twenty-five native Italian speakers (12 women) participated in this experiment; none had participated in the Bentrovato *et al.* (1999) experiment. All participants were undergraduate students at the University of Rome "La Sapienza," and were paid the equivalent of $5 for their participation. Their average age was 22.8 (range = 19–27).

Materials

Materials (including word targets and auditory sentence contexts) were exactly those employed in the Bentrovato *et al.* (1999) study, except that in this experiment the pictures were replaced by words representing the names of the objects drawn in the pictures. Every stimulus comprised a brief two-sentence discourse in the Italian language, presented auditorily, and a target word presented visually at some point within one of the two sentences (target positions were varied within and between sentences).

Word targets. A total of 110 word targets were used, each viewed and named only once by any individual participant; all were names of common objects. The words replaced 110 picture targets used in Bentrovato *et al.* (1999), which were all line drawings of common objects (Abbate & LaChapelle, 1984a, b; Dunn & Dunn, 1981; Goodglass, Kaplan, & Weintraub, 1983; Snodgrass & Vanderwart, 1980). The original 110 picture targets were chosen from a larger list of 520 pictures from an international picture-norming study (Bates *et al.*, in press). Based on results for 50 native speakers of Italian, pictures were selected on the following criteria: a single name was provided by at least 80% of the picture-norming participants, no more than four different names were provided by these participants, the primary name for the target was not plural, did not begin with a vowel or a fricative consonant, and did not belong to a small class of exception words for grammatical gender (e.g., words like "mano," for "hand," which is feminine in Italian but ends in "-o," the typical ending for masculine words).

The 110 words break down as follows: 56 masculine (44 ending with the phonologically transparent masculine vowel "-o," 12 with the phonologically ambiguous vowel "-e") and 54 feminine (46 ending with the phonologically transparent feminine vowel "-a," 8 with the phonologically ambiguous vowel "-e"). To obtain an approximate but representative balance by noun gender and suffix type, we had to ease our criteria for two words: "cassaforte" (which means "safe" or "strongbox") elicited a total of six different names, and "botte" (which means

"keg"), which was named by only 76.6% of participants in the naming study. The mean length in letters of the 110 words was 6.5, with a range from 4 to 11 (note that words tend to be substantially longer in Italian than English); mean length in syllables averaged 2.7, with a range from 2 to 4. Most words represented inanimate objects that are frequently encountered in everyday life; 6 figures represented parts of the human body or human characters (e.g., *regina*, "queen"), while another 15 were animals with a fixed grammatical gender that was independent of the animal's biological sex (e.g., *tigre*, a feminine noun meaning "tiger"; *ragno*, a masculine noun meaning "spider"). Within each sentence stimulus, the target word appeared immediately after the article (zero interval from offset of the auditory article to onset of the visual word target).

Auditory sentence contexts. A total of 550 two-sentence contexts were prepared, 440 for use within the factorial gender-by-semantics design, and another 110 neutral controls containing no semantic or gender constraints designed to work equally well with any target word. The 440 sentence contexts represent four variations each of 110 contexts designed to favor production of one target word, with the target placed in either the first or the second sentence. For example, for the target picture/name *libro* ("book"), the following context was generated (where the target word with its target name is represented in capital letters):

> *Quando vado a letto prima di addormentarmi leggo sempre un* LIBRO; *per questo mia mamma mi ha regalato una collezione di romanzi gialli.*
> *When I go to bed before falling asleep I always read a* BOOK; *for this reason, my mother gave me a collection of murder mysteries.*

To create a gender-incongruent version of the same stimulus, the article before the target (which is an integral part of the sentence auditory context) was switched to the opposite gender. Approximately half the targets were preceded by the indefinite article (*un* in masculine, *una* in feminine, as in the above example). The remaining targets were preceded by the definite article (*il* in masculine, *la* in feminine). There was an approximately equal percentage of feminine and masculine articles preceding the target. It is important to emphasize that the article is an integral part of the auditory sentence context. In the example above, this would involve a switch from *un* (masculine indefinite article) to *una* (feminine indefinite article). In other examples, a switch might involve substituting the feminine definite article *la* with the masculine definite article *il*, or vice versa. Because reaction times are measured from the onset of the target noun (after the preceding matching or mismatching article is complete), slight variations in the length of the article between masculine and feminine, definite and indefinite, should not affect reaction times.

Once the 110 base sentences were created (with their 110 gender-incongruent variants), semantically incongruent versions were assembled by

selecting from the 110 target words an item of the same gender that was a highly implausible completion based on meaning (these assignments were made on subjective grounds, rather than through random assignment, to ensure that a similar degree of implausibility would result across items). For example, the above sentence context designed to elicit *libro* ("book") was coupled with the picture *topo* ("mouse") in the target position, as in

Quando vado a letto prima di addormentarmi leggo sempre un TOPO . . . .
When I go to bed before falling asleep I always read a MOUSE . . . .

The fourth and final version of each sentence context was created by switching the gender of the article before the implausible alternative, as in

Quando vado a letto prima di addormentarmi leggo sempre una (FEM) TOPO (MASC) . . . .

We will refer to the four versions of each stimulus with the following symbols: G + S + refers to items that are congruent in both gender and semantics, G − S + to items that are incongruent in gender only, G + S − to items that are incongruent in semantics only, and G − S − to items that are incongruent along both dimensions.

In addition to the 440 experimental items (4 each for 110 pictures), we also developed a set of 110 sentence contexts (following Wicha *et al.*, 1997) that were equivalent in length and complexity to the experimental contexts without providing relevant gender or semantic constraints. Take for example

Silvia ha fatto un test in inglese in cui doveva ripetere LIBRO *per cinque volte. L' insegnante ha detto che è l'unico modo per migliorare la pronuncia.*
Sylvia took a test in English in which she had to repeat BOOK *five times. The teacher said that was the only way to improve her pronunciation.*

These 110 contexts served as the within-experiment neutral baseline, used to assess whether any of the gender-by-semantics conditions resulted in facilitation or inhibition of the target picture name (a complete list of items can be provided on-line by the authors on request).

List construction. To ensure that no single participant ever heard the same sentence or saw the same picture twice in the course of the experiment, five lists were prepared. In the first list, the 110 pictures were assigned quasirandomly to one of the five experimental conditions (G + S +, G − S +, G + S −, G − S −, neutral control), until five conditions with 22 items each were obtained, with no repetitions of words or their associated sentences. Items were then rotated across the five conditions, one condition per list (e.g., "book"

might occur in G − S + in List 1, G + S + in List 2, G + S − in List 3, G − S − in List 4, and neutral in List 5).

Procedure

Auditory stimuli for the main experiment had been digitally recorded in a soundproof chamber and transferred onto a Macintosh computer as individual SoundEdit 1.0 files. They were then converted into individual PsyScope files (Cohen, MacWhinney, Flatt, & Provost, 1993) for experimental presentation. The average length of the sentences (excluding the interval in which pictures were presented) was 11.24 seconds (range = 8.13 – 15.37 seconds).

The word targets were words in black on a white background; they were visually presented in the middle of a 15-inch screen. We used lowercase letters, the font was Times New Roman, and the size was 48-point. Individual files were created for each word, so that they could be called into the appropriate sentence during on-line presentation. The time between offset of the auditory context and onset of the target word was zero.

Testing. Participants were tested one at a time in a quiet testing room. Stimuli were presented on a Macintosh Performa 6214CD, using PsyScope presentation software (Cohen, *et al.*, 1993). Participants wore headphones, with adjustable volume, that were connected to the sound amplifier port of the Performa. Response times were collected in milliseconds using the CMU button box, which was connected to the modem port of the computer. The experimenter also wore headphones and hand-recorded all naming errors on a score sheet during testing.

Participants were randomly assigned to one of the five lists based on their participant number. At the beginning of each session, a summarized version of the instructions appeared on the screen. Before the main experiment, participants were given a brief practice session comprising 10 stimuli (structurally similar but different in content from those used in the main experiment), two each from each of the five conditions that would be encountered in the main experiment. In the experimental section the sentences were randomly presented in a continuous sequence. During the auditory presentation, a fixation point (++) appeared in the center of the screen. At some point in the sentence, a word appeared on the screen in place of the fixation point, and the auditory presentation was momentarily halted. Participants were instructed to read the word out loud as quickly as possible upon presentation. The word remained on the screen for 5 seconds or until the participant responded, whichever came first. The word disappeared as soon as the microphone picked up the onset of a response, followed by a 500-millisecond delay, then the auditory stimulus continued accompanied by a blank screen. There was a 3-second delay between the end of each sentence and initiation of the next trial. The entire experimental session lasted approximately 45 minutes.

Except for the substitution of written words for picture targets, all these procedures are identical to those employed by Bentrovato *et al.*

Word-Reading Norming Study

A separate set of 50 subjects participated in a norming study designed to assess features of the word-reading times for 520 words, including the 110 that were chosen for this experiment (D'Amico, research in progress). In this study, the 520 words were presented to each participant in 1 of 10 randomized orders. Words were presented out of context, and subjects were instructed to read the words accurately and as quickly as possible. The experimental apparatus, mode of presentation, recording and checking the errors were identical to those adopted in the present experiment. Although a number of dependent variables were used in the norming study, we based our comparisons here on mean reaction time for those trials in which participants in the norming study produced the target word.

RESULTS AND DISCUSSION

A total of 2.27% of the trials were eliminated because the participants failed to respond, participants made an irrelevant noise before responding, the voice key failed to register the response, or participants produced an alternative response (very few cases). Reaction time analyses were based on the remaining 97.73% of trials with a correct response.

Response times were first subjected to a 2 (matching gender, nonmatching gender) $\times$ 2 (semantically congruent, semantically incongruent) within-subject ANOVA over subjects (F_1) and over items (F_2); comparisons with neutral-control condition were reserved for post hoc analyses.

Collapsed across the four experimental conditions the mean RT was 479.86 milliseconds (SD 31.05, SE 3). In the 2 $\times$ 2 analysis, there were significant main effects of both gender and semantics, reflecting faster RTs in the matching-gender conditions [$F_1(1,24) = 18.564$, $p < .0002$; $F_2(1,436) = 20.474$, $p < .0001$], and in the semantically congruent conditions ($F_1(1,24) = 28.664$, $p < .0001$; $F_2(1,436) = 31.263$, $p < .0001$]. The interaction between gender and semantics was significant by subjects but not by items [$F_1(1,24) = 4.490$, $p < .0446$; $F_2(1,436) = 1.832$, $p < .1766$]. Table I presents the mean RTs, standard deviations, and standard errors for each condition plus the neutral-control condition. Figure 1 displays the interaction between gender and semantics, comparing performance in all four experimental conditions with two different baselines (where the dotted lines indicate performance in the neutral-condition baseline within

Table I. Results for Picture Naming (from Bentrovato *et al.*, 1999) Versus Word Naming (present study). The last column on the right refers to the Norming Study*

		Reaction time in millisecond (ms).					
		Matching Gender, Semantically Congruent (G + S +) (ms)	Matching Gender, Semantically Incongruent (G + S −) (ms)	NonMatching Gender, Semantically Congruent (G − S +) (ms)	NonMatching Gender, Semantically Incongruent (G − S −) (ms)	Internal Neutral Condition Baseline (ms)	Norming Study (ms)
Picture naming	Mean	703	841	852	879	829	944
	SD	106	146	146	136	131	145
	SE	21	29	29	27	26	14
Word naming	Mean	456	484	480	497	502	533
	SD	58	65	66	72	68	35
	SE	11	13	13	14	13	3

*Picture Naming out of sentence context and Word Naming out of sentence context (D'Amico *et al.*, 2001).

the experiment, as well as reaction times on the same items outside of context, in the norming experiment for word-reading times).

To explore the gender-by-semantics interaction further, simple one-way *F*tests were run comparing each of the conditions to the others, over subjects and items. In each relevant comparison, the fully congruent condition (G + S +) was significantly faster than the other three, although each of these effects was only significant over items [G + S + vs. G + S − $F_1(1,48) = 2.565$ *n.s.*, $F_2(1,218) = 28.808$, $p < .0001$; G + S + vs. G − S + $F_1(1,48) = 1.791$ *n.s.*, $F_2(1,218) = 18.464$, $p < .0001$; G + S + vs. G − S − $F_1(1,48) = 4.708$ *n.s.*, $F_2(1,218) = 48.527$, $p < .0001$]. However, two of the three conditions that contained some form of incongruence did not differ significantly from one another [G + S − vs. G − S + $F_1(1,48) = 0.055$ *n.s.*, $F_2(1,218) = 0.715$ *n.s.*; G + S − vs. G − S − $F_1(1,48) = 0.3963$ *n.s.*, $F_2(1,218) = 4.514$ *n.s.*]. The comparison between G − S + versus G − S − was significant by items [$F_1(1,48) = 0.718$ *n.s.*, $F_2(1,218) = 8.004$, $p > .0051$].

To determine whether these results reflect facilitation or inhibition, each of the four conditions was compared with performance in the neutral-sentence contexts, again using simple one-way ANOVA over both participants and items. Responses significantly faster than baseline reflect facilitation, and responses significantly slower than baseline reflect inhibition.

There was robust evidence for contextual facilitation in the fully congruent condition (G + S +), compared to the neutral baseline, over both items

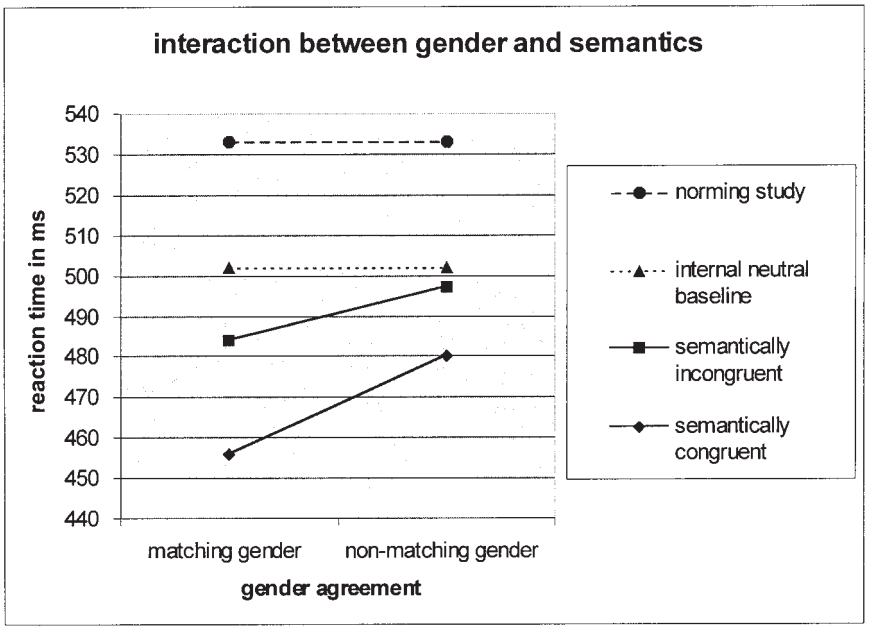

Fig. 1. Interaction between gender agreement and semantic congruence in Word Reading (straight lines). Comparison between neutral condition baseline in word reading and norming study, word reading out of sentence context (dotted lines).

and subjects [$F_1(1,48) = 6.509$, $p < .0140$; $F_2(1,218) = 46.743$, $p < .0001$]. As Table I shows, this facilitative effect was very large, reflecting a mean RT difference of 45.824 milliseconds. We did not find evidence for significant contextual inhibition, inhibition in the condition where the target was maximally incongruent (G − S −), compared to the same neutral baseline [$F_1(1,48) = 0.074$ *n.s.*, $F_2(1,218) = 0.228$ *n.s.*]. The two remaining conditions (in which one source of information is congruent, whereas the other is not) did not differ significantly from the neutral baseline over subjects but did differ over items, suggesting that a small amount of facilitation can be observed if only one dimension (gender or semantics) is incongruent (G + S − vs. baseline, $F_1(1,48) = 0.27$ *n.s.*, $F_2(1,218) = 5.997$, $p < .0151$; G − S + vs. baseline, $F_1(1,48) = 1.345$ *n.s.*, $F_2(1,218) = 9.55$, $p < .0023$).

We did not conduct statistical analyses comparing our experimental conditions with the neutral condition from the norming study (i.e., performance by a separate set of participants in the word-naming task, for words presented out of context). However, inspection of Fig. 1 clearly indicates that all our experimental conditions were substantially faster than the out-of-context word-naming

times observed with a separate sample of Italian speakers. Although one must interpret a reaction time difference over two different groups of participants with caution, these results suggest that some linguistic context is better than no context at all for the word-reading task.

To summarize, this study revealed significant main effects of gender agreement and sentence context, due primarily to response facilitation when both sources of information converge (G + S +). Gender and semantics can interact to affect response times in a word-naming paradigm, even if the interaction is statistically significant only in the analysis over subjects, a discrepancy that may be due to the fast (near floor) RTs obtained in reading word targets in context. The interaction involves a large degree of facilitation (when both sources of information converge) but little or no effect of inhibition (when both sources of information lead to the wrong answer). When only *one* dimension is discordant with the word target, responses differ from the neutral baseline (which provides no gender or semantic constraints) not significatively (by subjects) suggesting that speakers in this condition do not have to start from scratch when part of their expectations are disconfirmed; instead, they can use the correct source of information that is available for a fast processing, responding significantly faster than they do in the neutral-control condition and in the condition where both sources of information are discordant. It seems from these results that either source of information is equally helpful, compared with no information at all regarding the identity of the word target.

Comparison with Prior Studies

A comparison between the above results for word naming (WN) and earlier results by Bentrovato *et al.* (1999) for picture naming (PN) shows that word-naming times are much faster than picture-naming times in an otherwise identical design (Table I). Word-reading RTs are, on average, 338 milliseconds faster than the picture-naming RTs, collapsed across the five conditions in both cases. The fact that the word-reading RTs are so fast may explain why some of the interactions observed by Bentrovato *et al.* (1999) with picture naming fell below significance here. Nevertheless, comparisons with baseline conditions suggest that gender priming can have a prelexical (anticipatory) effect on word reading. In the original PN study, gender facilitation was observed only when semantics and gender were *both* congruent; if either semantics or gender was incongruent, reaction times were indistinguishable from baseline. In the present study using a word-naming paradigm, gender facilitation reached significance not only in the semantically congruent condition (significant over both participants and items) but also in the semantically incongruent condition (albeit over items only). Hence, if anything, the facilitative effects of gender are more consistent in the reading task, despite

the fact that all latencies are very fast (and hence close to the floor) when word reading is the dependent variable.

The respective word- and picture-naming tasks differ in several ways that may be important for both gender and semantic priming. First, the use of written word targets instead of picture targets may have reduced the impact of semantic factors. To test for this possibility, we can compare the different distribution of errors in the two tasks. In picture naming, 5.78% of all trials were eliminated, 2.58% of them due to technical errors and another 3.3% reflecting alternative responses including frank semantic errors in naming the picture (1.6%) and semantically correct synonyms (1.7%) that changed the gender of the noun and thereby turned a nonmatching gender condition into a matching one (e.g., a speaker might produce *il barile*, "masculine *keg*," when *la botte* "feminine *barrel*" was the target). A chi-square analysis of these picture-naming errors showed that the distribution over errors across conditions significantly deviated from chance, with the highest number of these errors in the G − S + and G − S − conditions. In word reading, only 2.27% of the trials were eliminated; most of these were technical errors, and their distribution across conditions is not statistically significant.

The second interesting comparison between the two tasks is relative to the effect of "single violation" conditions in which one source of information is congruent while the other is not, relative to the neutral baseline (G + S − vs. the neutral baseline and G − S + vs. the neutral baseline). In the picture-naming study, neither of these comparisons reached significance, thus providing no evidence for inhibition or facilitation when a single dimension is violated. In the word naming, both of these comparisons were significant over items, indicating that some context (gender match despite a semantic mismatch; semantic match despite a gender mismatch) is better than a neutral-control context with no useful semantic or grammatical information.

These results for Italian, using richer semantic contexts, also differ from the word- and picture-naming comparisons reported by Jacobsen (1999). In his word-reading paradigm for German, Jacobsen (1999) found strong inhibition from gender incongruence but no facilitation from a congruent gender cue. This strong inhibition has been interpreted to reflect postlexical and unidirectional processes (Friederici, Garrett, & Jacobsen, 1999a, b; Hernandez, *et al.* 1996). We think that the difference between Jacobsen's results and ours for word naming can be explained by differences in method and materials. In Jacobsen's experiment, subjects were exposed two times to the same target words in the same experimental section. In the training phase, words were presented out of context; in the main experiment the same words were presented after a short sentence context. In both cases subjects were instructed to read the words accurately and as quickly as possible. The materials consisted of very short sentence fragment primes auditorily presented:

Dies ist der . . . <word>
congruent masculine/incongruent feminine and neuter
This is the (masc) . . . <word>
Bitte sage jetzt . . . <*word*>
Neutral baseline
Please say now . . . <word>.

With this procedure (including preexposure to all targets), Jacobsen obtained strong contextual inhibition (syntactic context only) but no facilitation in word naming (facilitation and inhibition were both significant for picture naming). In contrast, with a combination of semantic and syntactic context and no preexposure, we obtained strong facilitation (with gender and semantics combined) but relatively weak inhibition in word naming. Our results were weaker than our own findings for picture naming, but in the same direction. In short, we have shown that gender facilitation, semantic facilitation, and strong facilitation from the two combined can be demonstrated in word naming under some conditions.

The facilitation observed in G + S − and G − S + conditions, relative to neutral baseline, shows that the linguistic system is able to use different sources of information in parallel and, if necessary, to switch between two different sources of information if one of them is wrong, basically within the same amount of time (the difference between G + S − and G − S + is just 4.4 milliseconds). But when the system can use both sources of correct information in parallel (matching gender and congruent semantics), it is very fast (G + S + is 28 milliseconds faster than G + S − and G + S + is 24 milliseconds faster than G − S +; both these comparisons were significant).

If the word-naming task does provide a better test of automatic priming than picture naming (Jacobsen, 1999), our new results with word reading provide support for an interactive-activation account in which different sources of information are used, quickly and in parallel to predict the target word. Following the diagnostics proposed by Neely (1991), Hernandez, *et al.* (1996), and Bates, *et al.* (1996), we suggest that the main effects of gender and semantics in this experiment (and their interaction, although it is statistically weak) are compatible with the claim that gender priming is prelexical, in the sense that it involves preactivation or at least a prelexical bias in favor of one set of words over another. If the effects were due entirely to postlexical factors (e.g., the time required to integrate the word into a context), we would expect inhibitory effects from incongruent items, but no facilitation. In their overview of gender priming, Friederici *et al.* (1999b) dispute this argument, claiming that all the gender-priming effects reviewed in their paper can be explained in terms of postlexical integration interpretation (see also Friederici & Schriefers, 1994; Wright & Garrett, 1984). In particular, they underscore that gender facilitation was not observed (at that writing) in a visual word-naming task—a task that (in their

view) provides the most faithful test of "true" automatic priming. One might argue that contextual facilitation has its primary effect on the time required to integrate target words into the phrasal context. But if that is the case, why is performance in this condition so much faster than word reading in a list format, which requires no contextual integration whatsoever? Because we have observed gender facilitation here in a word-reading task, we suggest that the case for true gender priming is enhanced, in the usual sense of spreading activation that lowers word thresholds before word recognition (see also Allopenna, Magnuson, & Tanenhaus, 1998).

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