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Gender Stereotypes in Spoken Word Recognition

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Abstract

Two experiments were conducted to determine the role of gender stereotyping in individual spoken words. There were similar results for a phoneme monitoring (Experiment 1) and lexical decision (Experiment 2) task, with overall faster responses to the female speaker saying gendered words. Further analyses show highly significant interactions between speaker voice and word gender in both experiments, going against the initial hypothesis of male-masculine and female-feminine advantages. Future research could explore gender stereotyping in speech within a larger, more semantically rich environment, such as sentences.

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GENDER STEREOTYPES IN SPOKEN WORD RECOGNITION

By

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Introduction

Stereotyping in general has been a very controversial subject, leading to racial profiling and gender prejudice in its more severe manifestations and simple social assumptions in its arguably less harmful forms. But viewed from an objective standpoint, stereotyping can be seen as a development of strictly automatic associations in cognitive processing. And while some continue to fret over aspects of common stereotypes and the veracity of such assertions, virtually no one questions the knee-jerk response of the doctor's reflex hammer, an automatic physical reaction to a stimulus that bears close resemblance to the processing of stereotypes in everyday human functioning.

The current research explores the area of gender stereotypes involved in human speech. The purpose was to test the hypothesis of stereotyping as an automatic process involving a reflection of social interactions and to determine the extent to which certain strongly masculine- or feminine-associated words are effective (i.e., facilitative in processing) when produced by a speaker of either sex, as compared to a speaker of the opposite sex.

Researchers (predominantly in social psychology) have already found correlations between the activation of words and the triggering of their inherent gender associations through picture priming (Lemm, Dabady, & Banaji, 2005), word judgments of specific classes of socially gendered roles and occupations (Oakhill, Garnham, & Reynolds, 2005), and a variety of other experimental tasks. In the realm of spoken word recognition, Goldinger (1996) found evidence that voice attributes involved in spoken words were retained in listeners' memories through episodic memory traces. These results support the idea that, given that males and females are more prone to discuss matters strongly affiliated with their genders, the co-occurrence of a male or female voice speaking masculine or feminine words (respectively) will yield a number of representative memory traces for the average human, assuming a Hebbian model of learning (Hebb, 1949). A larger number of gender stereotypical traces for words, compared to gender-atypical traces, should facilitate the recognition of gender stereotypical words spoken by a voice of the matching gender compared to a voice of the mismatching gender. This is the focal hypothesis of the proposed study.

Methods

Participants

Participants for both experiments included native English-speaking undergraduate FSU students participating in exchange for class credit. Experiment 1 (phoneme monitoring) had 20 male and 22 female participants, while Experiment 2 (lexical decision) contained 8 male and 20 female participants.

Materials

The stimuli in both experiments consisted of words from Crawford et al. (2004), which were surveyed based on gender relatedness in various regions of the United States, as well as judged by 42 FSU participants (who did not participate in the actual experiments) based on gender-relatedness. A set of the highest-rated 12 masculine-related words, 12 feminine-related words, and 12 neutral-related words (with comparable word length and frequency of use) was used in both experiments, with Experiment 2 adding 23 nonwords for the lexical decision task (see Appendix 1 for full list of stimuli). Certain high-rated words were excluded from the experiment because of their roles being overtly occupied by one gender—words such as aunt/uncle, mother/father, husband/wife were highly rated being feminine/masculine, but were also exclusively occupied by females/males.

Procedure

The stimuli words, already judged in terms of gender association (masculine versus feminine) and self-reported spoken frequency (to substantiate an interpretation of instance theory set forth by Brooks, 1978), were presented to participants aurally within both a phoneme-monitoring task (Experiment 1) and a lexical decision task (Experiment 2), designed to elicit online processing of the stimuli. Stimuli were presented by a human speech simulating software program (Cepstral, available at *http://www.cepstral.com/*) in order to control for the wide range of inherent differences among speakers. Because of the difficulty involved in finding a prototypical male or female speaker and the many dialects understandable by English speakers, the synthesized nature of Cepstral's voices helped to form a controllable stimuli presentation that aimed to reduce the impact of idiosyncratic features from a recorded human speaker on the participant.

The phoneme-monitoring task performed by the participants in Experiment 1 involved a judgment of whether a certain target consonant was present in the stimulus word and was manipulated by speaker gender (male and female) and word type (masculine, feminine, and neutral). This method, as compared to the lexical decision task, was intended to help participants more easily tap into online linguistic processing (Frauenfelder & Sergui, 1989). By placing the focus on the phoneme level, the task required a more involved cognitive function than simply judging the existence of a word in English. In addition, this task discouraged participants from consciously judging aspects of gender present in both the semantic and auditory quality of the words: Participants would activate the definition of the presented words in the mental lexicon, but would focus their response on the spoken sounds; however, the targeted phonemes were consonants, so the variation found in vowels, which is a dominant source of gender discrimination in speech perception (across genders: Bladon, Henton & Pickering, 1984, Gelfer & Mikos, 2005; across languages: Johnson, 2006), would not be the focus of the participants' task.

The lexical decision task in Experiment 2, using the 36 experimental stimuli from Experiment 1 plus 23 nonwords, involved the participants judging whether the spoken words were real words in the English language and the stimuli were manipulated again by speaker gender and word type.

Results

Reported results are based on correct judgments, excluding experimental items with response accuracies lower than 60% (Experiment 1: 3 of 36 items removed; Experiment 2: 10 of 59 items removed—see Appendix 4) and participants with accuracies lower than 70% (3 participants from both experiments). In Experiment 1, all participants responded significantly more quickly to the female speaker saying masculine words than to the female speaker saying feminine words, $t(41) = 1.83$, $p < .001$. This effect switched in the male speaker (slower for masculine compared to feminine words), though the difference was slight and not significant. Additionally, overall, participants responded significantly more quickly to both feminine and masculine words in the female speaker compared to the masculine speaker (feminine between speakers: $t(41) = 1.46$, $p < .01$; masculine between speakers: $t(41) = 4.13$, $p < .001$).

Experiment 2 showed a similar pattern of results to Experiment 1, with feminine and masculine words faster overall in participants' responses to the female speaker compared to the male speaker (feminine between speakers: $t(30) = 1.23$, $p < .001$; masculine between speakers:

$t(30) = 3.32$, $p < .001$). However, with the lexical decision task, the effect between masculine and feminine words within speakers was found to be significant in the male speaker, $t(30) = 1.43$, $p < .001$, with slower responses to masculine words said by a male speaker compared to feminine words. And although responses to the female speaker were slower in the feminine words compared to the masculine words, it was not a significant effect.

Comparisons between groups

An ANOVA was used to determine whether there were significant effects or interactions between and within participants grouped by gender. For Experiment 1, a 2 x 2 analysis of word (masculine/feminine) and participant gender (male/female) proved to be a significant interaction, $F(1,40) = 16.20$, $p < .0001$. However, an analysis of speaker voice, word, and participant gender was not significant, thus excluded from further analysis. Additionally, an analysis of voice and word was significant, $F(1,41) = 31.585$, $p < .0001$. And of much interest here is the significant interaction of word and female participants, $F(1,41) = 53.719$, $p < .0001$, while the same analysis between word and male subjects was not significant.

Experiment 2 saw a significant effect of voice and word, $F(1,26) = 35.222$, $p < .0001$, but did not have significant interactions among word and participant gender, nor among voice, word, and gender. Of considerable interest here, too, are the interactions within subjects, with both an analysis of word and male subjects, $F(1,27) = 35.841$, $p < .0001$, and an analysis of word and female subjects, $F(1,27) = 6.447$, $p < .017$, being significant.

Discussion

Both experiments showed a similar pattern of results: overall responses to the female speaker saying gendered words (either masculine or feminine) were significantly faster compared to the male speaker saying the same words. The findings do not support a general Hebbian model of learning applied to representative episodic memory traces possessed by the participants.

Indeed, a sort of reverse effect seems to be taking place, with response times for masculine words in the female speaker being generally lower than for feminine words, and feminine words in the male speaker having a slight advantage over masculine words. Subjects could have been experiencing a heightened awareness towards relatively unique situations (e.g., a female mentioning "hockey" or "hammer") and focusing in on those stimuli. Additionally, although the stimuli were also rated and sorted by previous respondents' self-reports of how often they themselves spoke the word, there could exist intricate discrepancies among the stimuli along the lines of the "husband/wife" complication, where a word like "wife" could be very strongly rated as feminine, although females would most likely use the word much less frequently than males. Also, the power of the words used in the experiment differed, with feminine words being rated as being more strongly associated with females than masculine words were for males.

Regardless of such issues, of considerable interest here is the highly significant interaction of voice and word among both male and female participants. Although the overall findings went counter to the hypothesis of male speaker-masculine word and female speaker-feminine word advantages, the interacting elements of voice and word bias introduce an interesting component of a significant advantage for female participants (compared to males) in response to female speakers saying feminine words. Females responding to a male speaker saying feminine words produced only a slight, non-significant difference, and the effect is lost for female speakers on masculine words. This element of the results indicates a potential for a

Hebbian learning-type model of gender elements in spoken word recognition that should be explored in future research.

Possible forms of future research should include spoken production of gendered words in sentences, which would allow for a more easily anticipated and understood environment for listeners. Such experiments could manipulate word gender, speaker gender, and even perceived speaker gender, as homosexual and transgendered speakers greatly affect people's responses to speaker gender identification and spoken words (homosexual: Marsh, Cook & Hicks, 2006; transgendered: Gelfer & Mikos, 2005). Additional research could explore overlapping speaker frequencies in gender identification and stereotyping, with lower-range female speakers and higher-range male speakers, to see what sort of social distinctions or stereotyping could play into spoken language.

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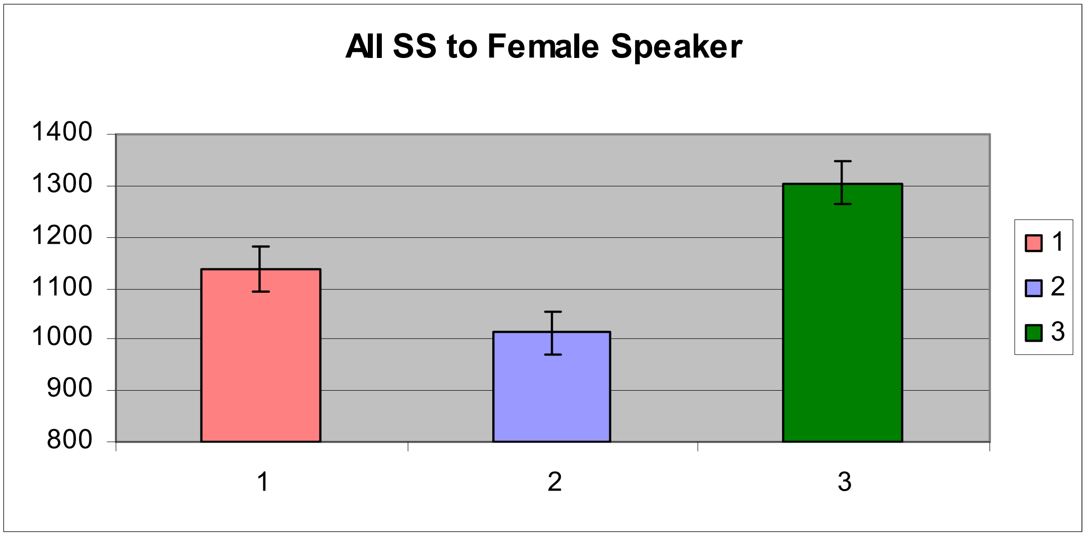
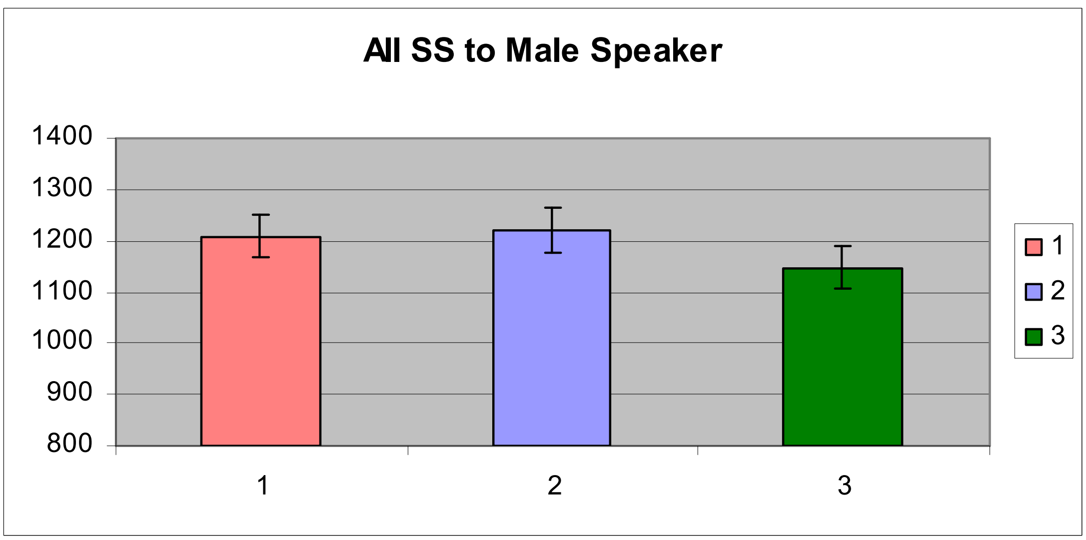
Appendix 1. Experimental stimuli for Exp. 1 (first three columns) and Exp. 2 (all).

Feminine Words	**Masculine Words**	**Neutral Words**	**Nonwords**	
bikini	bicep	Algae	blit	blick
blouse	boxing	Catsup	bosting	burvest
bouquet	cologne	Ferment	chokken	crodine
cosmetic	hammer	Hideaway	drump	desty
doll	hockey	kiosk	flagin	flince
earrings	mechanic	malaria	freggy	grash
makeup	necktie	pandemic	loptap	mubbel
manicure	pirate	refill	luvious	norch
mascara	poker	schema	mosty	pistic
necklace	sheriff	token	pust	plue
ponytail	umpire	trauma	stroobs	slimp
skirt	veteran	zealous	tarbed	

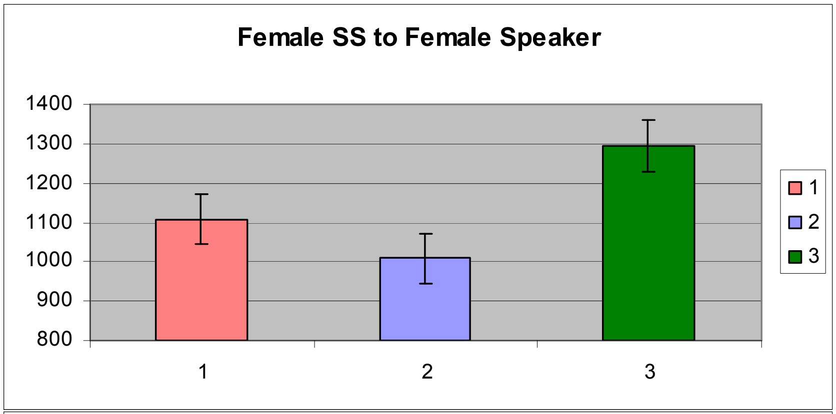
Appendix 2. Results (in milliseconds) for Experiment 1.

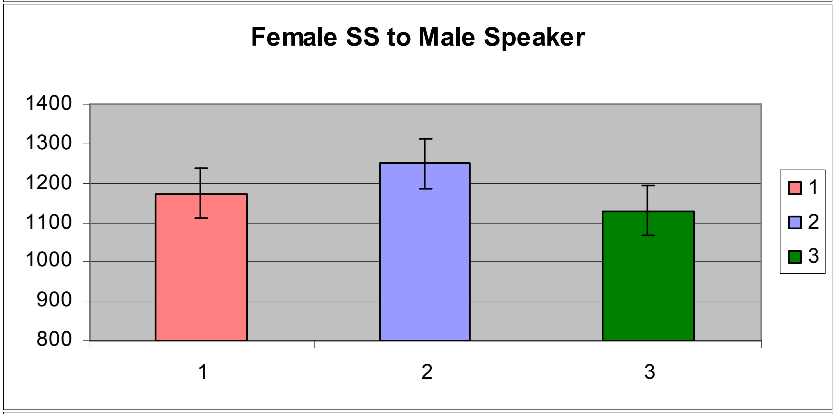


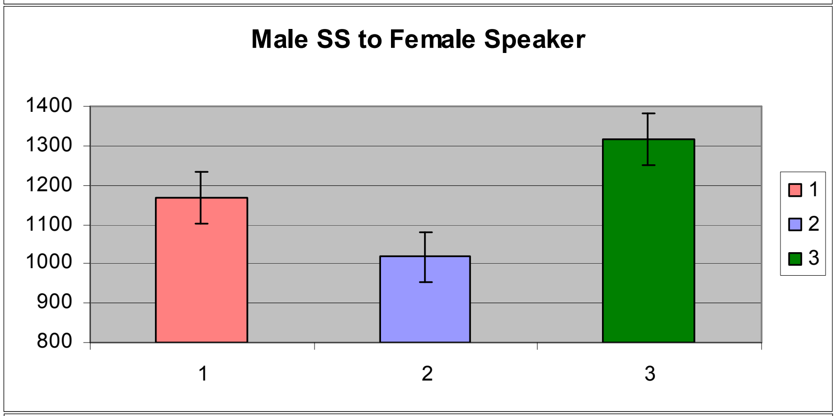


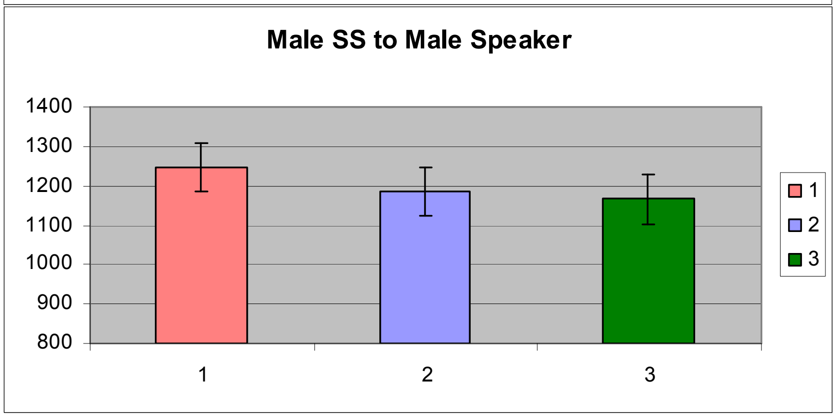
For All Graphs:

1 (Pink) = Feminine Words
2 (Blue) = Masculine Words
3 (Green) = Neutral Words

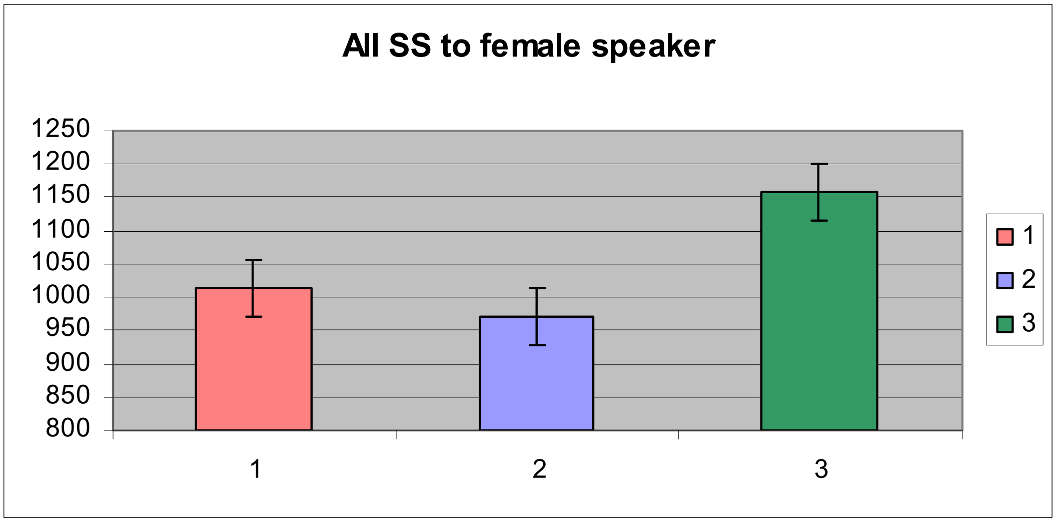

Female SS to Female Speaker
1400
1300
1200
1100
1000
900
800
1
2
3
1
2
3

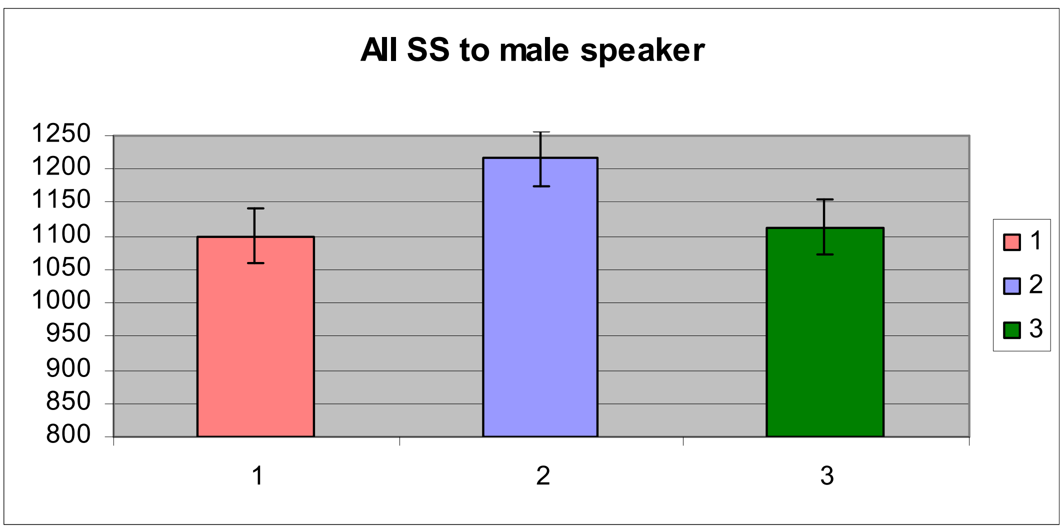

Female SS to Male Speaker
1400
1300
1200
1100
1000
900
800
1
2
3
1
2
3

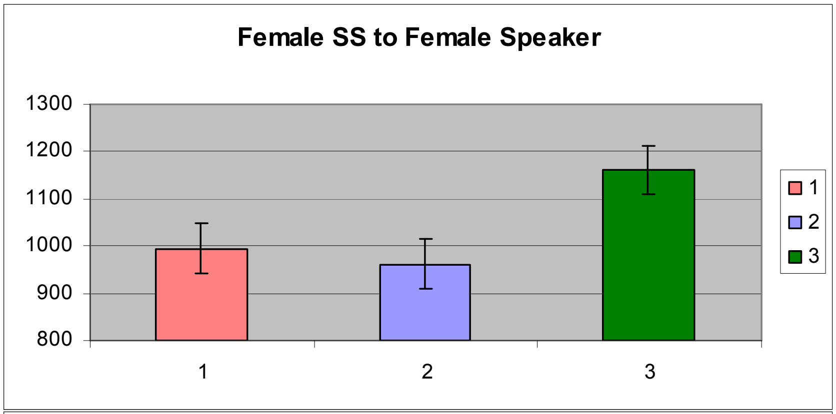

Male SS to Female Speaker
1400
1300
1200
1100
1000
900
800
1
2
3
1
2
3

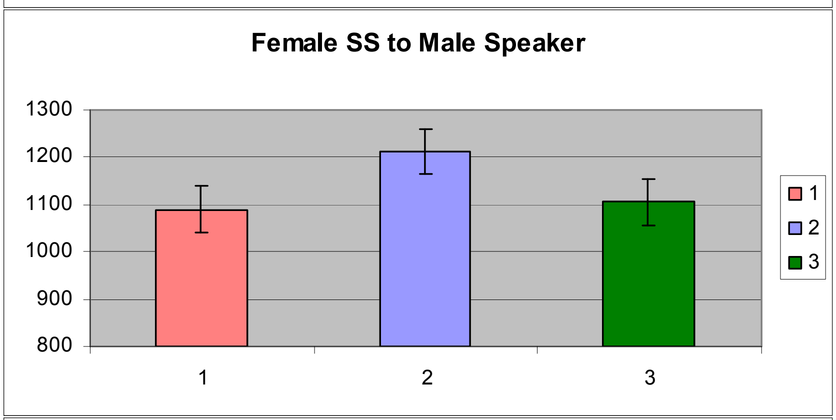

Male SS to Male Speaker
1400
1300
1200
1100
1000
900
800
1
2
3
1
2
3

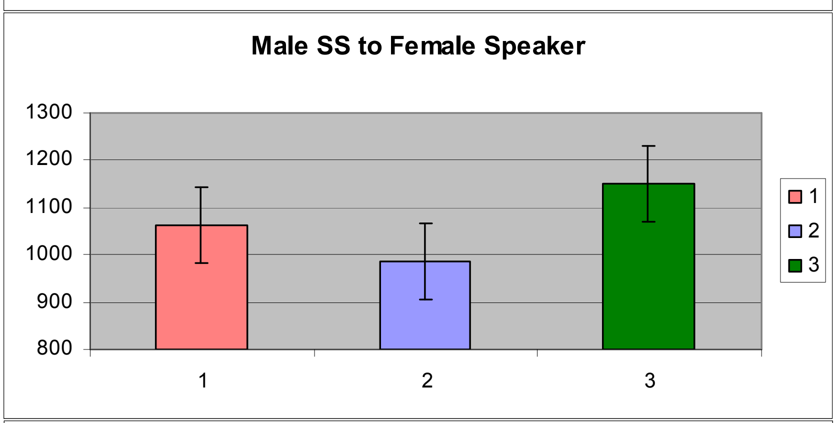
Appendix 3. Results (in milliseconds) for Experiment 2.

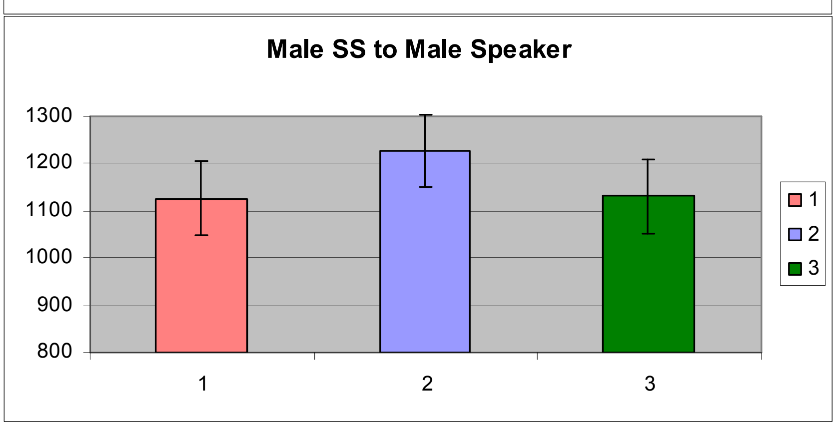





Female SS to Female Speaker
1300
1200
1100
1000
900
800
1
2
3
1
2
3


Female SS to Male Speaker
1300
1200
1100
1000
900
800
1
2
3
1
2
3


Male SS to Female Speaker
1300
1200
1100
1000
900
800
1
2
3
1
2
3


Male SS to Male Speaker
1300
1200
1100
1000
900
800
1
2
3
1
2
3

Appendix 4. Omitted stimuli.

Experiment 1:

Hammer (masculine)
Catsup (neutral)
Hideaway (neutral)

Experiment 2:

Hammer (masculine)
Poker (masculine)
Skirt (feminine)
Hideaway (neutral)
Schema (neutral)
Ferment (neutral)
Drump (nonword)
Pust (nonword)
Grash (nonword)
Mubbel (nonword)