# Appendix

For “Kurumada, C., & Buxó-Lugo, A. Intonation adaptation to multiple talkers”

## Appendix I: Exposure and test stimuli

The stimuli used in the current study were identical to those used in Xie et al., (2021). The information provided here are based on Experiment 2 and Appendix I in Xie et al., (2021). A male and female native talker of American English were recruited from the University of Rochester community. Both talkers were in their 20s. The male talker was from Long Island (NY) and the female talker was from Florida. They recorded the six types of utterances used in the current study as well as 18 other items all in the form of “It’s X-ing”. The other items were used for the acoustic analysis mentioned in General Discussion.

Acoustic resynthesis of exposure and test stimuli followed the technique described in Kurumada et al., (2017). The recordings (two tokens per item) were first segmented into three regions corresponding to three syllables (i.e., *It’s* | *X-* | *ing*) as in Experiment 1. To achieve best results in resynthesis, we paid attention to both a turning point in the F0 contour within the “X-ing” portion as well as the segmental information to delineate the last two syllables. The F0 of each region was sampled at 20 equi-spaced time points, and measures from each time point were aggregated across items to derive mean F0 contours for statement and question contours, following Isaacs & Watson (2010). Similarly, the durations of each region were averaged across items by contour type. Mean F0 contours and durations were then derived by interpolating between values within each region and manipulating F0 and duration of each recording to match the interpolated values using the pitch-synchronous overlap-and-add algorithm implemented in Praat (Boersma & Weenink, 2012; Moulines & Charpentier, 1990).

We conducted a norming experiment to assess whether the stimuli created for both talkers spanned the continuum from question to statement, and to ascertain the most ambiguous continuum step. Stimuli created from the female talker were normed by 120 self-reported native speakers of American English, recruited through Amazon Mechanical Turk. 12 participants (10%) were excluded for providing the identical responses to all tokens, leaving 108 participants for analysis. Stimuli created from the male talker were normed by 60 participants recruited in the same manner. 3 participants (5%) were excluded, leaving 57 participants for analysis.

Participants provided two alternative forced choice (2AFC) responses to 12 tokens of “*It’s X-ing*,” to each of the six lexical items at two different continuum steps. Six lists were created by varying the nouns at each continuum step to mitigate the potential of item-specific effects. For example, one list used the verb *booting* as Steps 0 and 6, while another list used Steps 2 and 8 for the same item. Order of presentation was randomized across participants. Participants did not receive feedback on their responses.

Results of the norming study are presented in Fig. A1. As expected, listeners’ responses were almost categorical at the two continuum ends, gradually shifting from statement (Step 0) to question (Step 11). We identified Step 7 and Step 8 to be the *a priori* most ambiguous items for the female and the male talker (46.7% and 55.3%), respectively. We also determined that responses given to Steps 0 and 1 were more or less identical, and therefore truncated the continuum to 11 steps (Steps 1-11 in the Norming Studies).

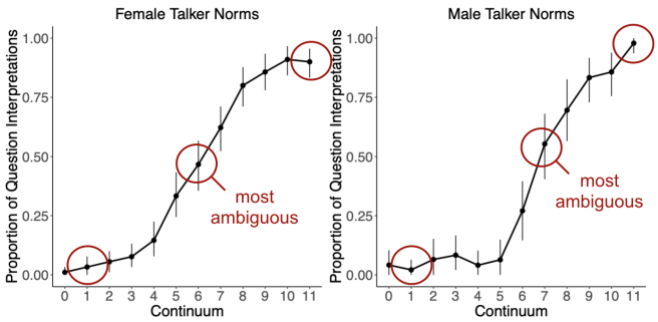


Fig. A1. Proportions of question (as opposed to statement) responses by continuum steps in the Norming study. Error bars indicate bootstrapped 95% confidence intervals. Circles indicate continuum steps used in the exposure phase of Study 2. For both the female and the male talker, steps 1 and 11 were selected as typical statement and question realizations, respectively. Step 6 of the female talker and Step 7 of the male talker were selected as maximally ambiguous token.

## Appendix II: Recency effects in Experiment 1

We examined the effect of recency of exposure in Experiment 1. Specifically, we tested if there is any significant difference between (1) the cases when testing occurred immediately after exposure vs. (2) those in which testing occurred after an intervening talker.

To this end, we created a new fixed effect variable coding recency of exposure (immediate = -1, intervening = 1). We then added this to the generalized linear mixed-effects logistic regression (glmer) model reported in the manuscript. This model predicts listeners' responses (1 = question vs. 0 = statement), based on 5 fixed effect factors: (a) exposure condition (sliding difference-coded with two orthogonal contrasts. Contrast 1: statement-biasing = -1 vs. no-bias = 1; Contrast 2: no-bias = -1 vs. question-bias = 1), (b) block (sum-coded, pre = -1 vs. post = 1), (c) the match vs. mismatch between exposure and test talkers ("talker match", sum-coded, mismatch = -1 vs. match = 1), (d) test block (sum-coded, first block = -1, second block = 1), (e) continuum steps (step 1–11, mean-centered, coded as a continuous variable), and interactions between them. The analysis originally included the maximum random effect structure justified by the data (by-participant intercepts and slopes for block, test talker voice, and the interaction between them as well as continuum). However, some of the random effect variables were removed due to convergence failure. The final model included by-subject intercepts and slopes block, recency, and continuum step. The summary of the analysis is provided in Table A1.

**Table A1.** Summary of the generalized linear mixed-effects logistic regression model examining the recency of exposure in Experiment 1.

| | Estimate | Std. Error | z value | Pr(>\|z\|) | |
|---|---|---|---|---|---|
| (Intercept) | -0.973 | 0.06 | -16.205 | 0 | *** |
| Condition (Contrast 1 * no-bias vs. statement-biasing) | 0.127 | 0.144 | 0.885 | 0.376 | |
| Condition (Contrast 2 * question-biasing vs. no-bias) | 0.565 | 0.141 | 3.995 | 0 | *** |
| Block (Post test vs. Pre test) | 0.12 | 0.037 | 3.248 | 0.001 | ** |
| TalkerMatch (Match vs. Mismatch) | 0.026 | 0.039 | 0.661 | 0.508 | |
| TestBlock (Second block vs. First block) | -0.075 | 0.04 | -1.907 | 0.057 | . |
| Continuum | 1.325 | 0.045 | 29.644 | 0 | *** |
| Condition (Contrast 1) * Block | 0.378 | 0.087 | 4.328 | 0 | *** |

| | | | | | |
|---|---|---|---|---|---|
| Condition (Contrast 2) * Block | 0.276 | 0.086 | 3.21 | 0.001 | ** |
| Condition (Contrast 1) * TalkerMatch | 0.085 | 0.094 | 0.901 | 0.367 | |
| Condition (Contrast 2) * TalkerMatch | -0.188 | 0.092 | -2.033 | 0.042 | * |
| Block* TalkerMatch | 0.038 | 0.02 | 1.862 | 0.063 | . |
| Condition (Contrast 1) * TestBlock | -0.067 | 0.094 | -0.716 | 0.474 | |
| Condition (Contrast 2) * TestBlock | -0.185 | 0.092 | -2.001 | 0.045 | * |
| Block* TestBlock | -0.014 | 0.02 | -0.707 | 0.48 | |
| TalkerMatch* TestBlock | 0.084 | 0.059 | 1.424 | 0.155 | |
| Condition (Contrast 1) * Continuum | -0.01 | 0.104 | -0.093 | 0.926 | |
| Condition (Contrast 2) * Continuum | -0.007 | 0.103 | -0.063 | 0.95 | |
| Block* Continuum | 0.022 | 0.009 | 2.493 | 0.013 | * |
| TalkerMatch* Continuum | -0.015 | 0.009 | -1.734 | 0.083 | . |
| TestBlock* Continuum | -0.02 | 0.009 | -2.265 | 0.024 | * |
| Condition (Contrast 1) * Block* TalkerMatch | -0.08 | 0.05 | -1.606 | 0.108 | |
| Condition (Contrast 2) * Block* TalkerMatch | 0.064 | 0.048 | 1.337 | 0.181 | |
| Condition (Contrast 1) * Block* TestBlock | 0.049 | 0.05 | 0.981 | 0.326 | |
| Condition (Contrast 2) * Block* TestBlock | -0.055 | 0.048 | -1.136 | 0.256 | |
| Condition (Contrast 1) * TalkerMatch* TestBlock | -0.061 | 0.144 | -0.421 | 0.674 | |
| Condition (Contrast 2) * TalkerMatch* TestBlock | 0.032 | 0.141 | 0.229 | 0.819 | |
| Block* TalkerMatch* TestBlock | 0.01 | 0.036 | 0.269 | 0.788 | |
| Condition (Contrast 1) * Block* Continuum | 0.026 | 0.021 | 1.229 | 0.219 | |
| Condition (Contrast 2) * Block* Continuum | -0.019 | 0.021 | -0.922 | 0.356 | |
| Condition (Contrast 1) * TalkerMatch* Continuum | -0.036 | 0.021 | -1.683 | 0.092 | . |
| Condition (Contrast 2) * TalkerMatch* Continuum | 0.025 | 0.021 | 1.221 | 0.222 | |
| Block* TalkerMatch* Continuum | 0 | 0.008 | -0.042 | 0.966 | |
| Condition (Contrast 1) * TestBlock* Continuum | -0.026 | 0.021 | -1.237 | 0.216 | |
| Condition (Contrast 2) * TestBlock* Continuum | -0.045 | 0.021 | -2.189 | 0.029 | * |
| Block* TestBlock* Continuum | -0.012 | 0.009 | -1.393 | 0.164 | |
| TalkerMatch* TestBlock* Continuum | 0.005 | 0.043 | 0.106 | 0.916 | |
| Condition (Contrast 1) * Block* TalkerMatch* TestBlock | 0.132 | 0.087 | 1.516 | 0.129 | |
| Condition (Contrast 2) * Block* TalkerMatch* TestBlock | -0.176 | 0.086 | -2.053 | 0.04 | * |
| Condition (Contrast 1) * Block* TalkerMatch* Continuum | -0.033 | 0.021 | -1.615 | 0.106 | |
| Condition (Contrast 2) * Block* TalkerMatch* Continuum | 0.051 | 0.02 | 2.492 | 0.013 | * |
| Condition (Contrast 1) * Block* TestBlock* Continuum | -0.028 | 0.021 | -1.336 | 0.182 | |
| Condition (Contrast 2) * Block* TestBlock* Continuum | 0.036 | 0.02 | 1.765 | 0.078 | . |
| Condition (Contrast 1) * TalkerMatch* TestBlock* Continuum | -0.107 | 0.104 | -1.03 | 0.303 | |
| Condition (Contrast 2) * TalkerMatch* TestBlock* Continuum | 0.231 | 0.103 | 2.232 | 0.026 | * |
| Block* TalkerMatch* TestBlock* Continuum | -0.011 | 0.009 | -1.25 | 0.211 | |
| Condition (Contrast 1) * Block* TalkerMatch* TestBlock* Continuum | -0.037 | 0.021 | -1.739 | 0.082 | . |
| Condition (Contrast 2) * Block* TalkerMatch* TestBlock* Continuum | -0.04 | 0.021 | -1.922 | 0.055 | . |

## Appendix III: Simple effect analysis for the interaction between exposure conditions and test talker in Experiment 2

To further examine the effect of the infarction between exposure bias and test talker in Experiment 2, we constructed a generalized linear mixed-effect logistic regression model to evaluate the simple effects of the two levels of test talker. The model predicted "question" responses (1 = question, 0 = statement). We tested effects of three fixed effect variables: (a) exposure condition (sum-coded, male S-biasing = -1, male Q-biasing = 1), (b) test talker (sum-coded, female = -1, male = 1), (c) continuum (1-11, centered) and the interaction between them. The model included the maximum random effect structure justified by the data (by-subject intercepts and slopes for the test talker voice and continuum).

**Table A2.** Summary of the generalized linear mixed-effects logistic regression model examining the simple effects of the two levels of the fixed effect test talker in Experiment 2.

| | Estimate | Std. Error | z value | Pr(>\|z\|) | |
|---|---|---|---|---|---|
| (Intercept) | -0.109 | 0.126 | -0.868 | 0.385 | |
| Male talker (vs. Female talker) | -0.401 | 0.06 | -6.674 | 2.49e-11 | *** |
| Continuum | 1.216 | 0.052 | 23.59 | < 2e-16 | *** |
| Male talker * Male Q-biasing | 0.357 | 0.128 | 2.798 | 0.005 | ** |
| Female talker * Male Q-biasing | 0.025 | 0.145 | 0.169 | 0.865 | |
| Male talker * Continuum | 0.109 | 0.029 | 3.747 | 0.0002 | *** |
| Male talker * Male Q-biasing * Continuum | -0.112 | 0.056 | -2.018 | 0.044 | * |
| Female talker * Male Q-biasing * Continuum | -0.133 | 0.051 | -2.605 | 0.009 | ** |

The simple effect of the male test talker was significant ($\hat{\beta} = .357, z = 2.798\, p. < .006$) while that of the female test talker was not ($\hat{\beta} = .025, z = 0.169$). This demonstrated that the interaction between exposure bias and test talker reported for Experiment 2 was mainly due to the responses to the male talker stimuli. However, the three way interaction between Female talker * Male Q-biasing * Continuum suggests that there was a shift in the expected direction for the female stimuli towards the higher end of the continuum ($\hat{\beta} = -.133, z = -2.605,\ p. < .009$). This could be partly due to the fact that the Q-biasing, upward shift of the categorization function was capped by ceiling for the male stimuli.

## Appendix IV: Recency effects in Experiment 2

We constructed a generalized linear mixed-effects logistic regression (glmer) model to predict listeners' responses (1 = question vs. 0 = statement). We have four fixed effect variables: (a) exposure bias (sum-coded, S-biasing = -1, Q-biasing = 1), (b) test talker (sum-coded, female talker = -1 vs. male talker = 1), (b) test block (sum-coded, first block -1, second block = 1), (d) last exposure (sum-coded, no = -1 vs. yes = 1), (e) continuum steps (1–11, mean-centered, coded as a continuous variable), and the interactions between them. The random effect structure of the final model included by-subject intercepts. The summary of the analysis is provided in Table A3.

**Table A3.** Summary of the generalized linear mixed-effects logistic regression model examining the effect of recency of exposure in Experiment 2. The fixed effects included test voice, exposure bias, 1st test voice

match, and continuum. The shaded cells indicate those that show a significant simple effect of the male test talker voice.

| | Estimate | Std. error | z-value | Pr (> \|z\| ) | |
|---|---|---|---|---|---|
| (Intercept) | -0.114 | 0.094 | -1.212 | 0.226 | |
| ExposureBias: Q-biasing (vs. S-biasing) | 0.158 | 0.034 | 4.674 | 2.96e-06 | *** |
| MaleTalker (vs. FemaleTalker) | -0.313 | 0.034 | -9.27 | < 2e-16 | *** |
| TestBlock: Second (vs. First) | -0.021 | 0.034 | -0.617 | 0.537 | |
| LastExposure (vs. FirstExposure) | -0.013 | 0.034 | -0.393 | 0.694 | |
| Continuum | 0.935 | 0.019 | 48.804 | < 2e-16 | *** |
| ExposureBias * MaleTalker | 0.181 | 0.094 | 1.925 | 0.054 | . |
| ExposureBias * TestBlock | -0.038 | 0.094 | -0.402 | 0.687 | |
| MaleTalker * TestBlock | 0.025 | 0.094 | 0.269 | 0.788 | |
| ExposureBias * LastExposure | 0.368 | 0.094 | 3.902 | 9.53e-05 | *** |
| MaleTalker * LastExposure | 0.206 | 0.094 | 2.186 | 0.029 | * |
| TestBlock * LastExposure | -0.134 | 0.094 | -1.425 | 0.154 | |
| ExposureBias * Continuum | 0.009 | 0.017 | 0.555 | 0.579 | |
| MaleTalker * Continuum | 0.117 | 0.017 | 6.891 | 5.54e-12 | *** |
| TestBlock * Continuum | -0.002 | 0.017 | -0.094 | 0.925 | |
| LastExposure * Continuum | -0.008 | 0.017 | -0.473 | 0.636 | |
| ExposureBias * MaleTalker * TestBlock | 0.002 | 0.034 | 0.052 | 0.959 | |
| ExposureBias * MaleTalker * LastExposure | 0.131 | 0.034 | 3.885 | 0.0001 | *** |
| ExposureBias * TestBlock * LastExposure | -0.047 | 0.034 | -1.395 | 0.163 | |
| MaleTalker * TestBlock * LastExposure | -0.071 | 0.034 | -2.111 | 0.035 | * |
| ExposureBias * MaleTalker * Continuum | -0.102 | 0.019 | -5.494 | 3.92e-08 | *** |
| ExposureBias * TestBlock * Continuum | -0.037 | 0.019 | -1.98 | 0.048 | * |
| MaleTalker * TestBlock * Continuum | -0.149 | 0.019 | -8.006 | 1.19e-15 | *** |
| ExposureBias * LastExposure * Continuum | 0.042 | 0.019 | 2.287 | 0.022 | * |
| MaleTalker * LastExposure * Continuum | 0.069 | 0.019 | 3.684 | 0.000230 | *** |
| TestBlock * LastExposure * Continuum | 0.01 | 0.019 | 0.559 | 0.576 | |
| ExposureBias * MaleTalker * TestBlock * LastExposure | -0.203 | 0.094 | -2.15 | 0.032 | * |
| ExposureBias * MaleTalker * TestBlock * Continuum | -0.03 | 0.017 | -1.75 | 0.08 | . |
| ExposureBias * MaleTalker * LastExposure * Continuum | 0.013 | 0.017 | 0.766 | 0.444 | |
| ExposureBias * TestBlock * LastExposure * Continuum | -0.029 | 0.017 | -1.712 | 0.087 | . |
| MaleTalker * TestBlock * LastExposure * Continuum | 0.006 | 0.017 | 0.34 | 0.734 | |
| ExposureBias * MaleTalker * TestBlock * LastExposure * Continuum | -0.059 | 0.019 | -3.132 | 0.002 | ** |

## Appendix V: Simple effect analysis for the interaction between exposure conditions and test talker in Experiment 3

To further examine the effect of the infarction between the test talker voice and exposure bias in Experiment 2, we constructed a generalized linear mixed-effect logistic regression model to evaluate the simple effects of the two levels of test talker. The model predicted “question” responses (1 = question, 0 = statement). We tested effects of three fixed effect variables: (a) exposure condition (sum-coded, male S-biasing = -1, male Q-biasing = 1), (b) test talker (sum-coded, female = -1, male = 1), (c) continuum (1-11, centered) and the interaction between them. The model included the maximum random effect structure justified by the data (by-subject

intercepts and slopes for the test talker and continuum). The results are similar to the corresponding analysis for Experiment 2 (Table A2).

**Table A4.** Summary of the generalized linear mixed-effects logistic regression model examining the simple effects of the two levels of the fixed effect test talker in Experiment 2.

| | Estimate | Std. Error | z value | Pr(>\|z\|) | |
|---|---|---|---|---|---|
| (Intercept) | -0.143 | 0.101 | -1.412 | 0.158 | |
| Male talker (vs. Female talker) | -0.34 | 0.067 | -5.064 | 4.11e-07 | *** |
| Continuum | 1.11 | 0.043 | 25.729 | < 2e-16 | *** |
| Male talker * Male Q-biasing | 0.316 | 0.113 | 2.802 | 0.005 | ** |
| Female talker * Male Q-biasing | -0.084 | 0.124 | -0.681 | 0.496 | |
| Male talker * Continuum | 0.124 | 0.032 | 3.885 | 0.000102 | *** |
| Male talker * Male Q-biasing * Continuum | -0.101 | 0.05 | -2.006 | 0.045 | * |
| Female talker * Male Q-biasing * Continuum | -0.016 | 0.044 | -0.37 | 0.712 | |

## Appendix VI: Recency effects in Experiment 3

We constructed a generalized linear mixed-effects logistic regression (glmer) model to predict listeners' responses (1 = question vs. 0 = statement). We have four fixed effect variables: (a) exposure bias (sum-coded, S-biasing = -1, Q-biasing = 1), (b) test talker (sum-coded, female talker = -1 vs. male talker = 1), (b) test block (sum-coded, first block -1, second block = 1), (d) continuum steps (1–11, mean-centered, coded as a continuous variable), and the interactions between them. The random effect structure of the final model included by-subject intercepts. The summary of the analysis is provided in Table A5.

**Table A5.** Summary of the generalized linear mixed-effects logistic regression model examining the recency of exposure in Experiment 3.

| | Estimate | Std. Error | z value | Pr(>\|z\|) | |
|---|---|---|---|---|---|
| (Intercept) | -0.13 | 0.096 | -1.353 | 0.176 | |
| ExposureBias: Q-biasing (vs. S-biasing) | 0.23 | 0.061 | 3.76 | 0.00017 | *** |
| Talker1 | -0.317 | 0.061 | -5.183 | 2.18e-07 | *** |
| TestBlock1 | -0.149 | 0.06 | -2.481 | 0.013 | * |
| Continuum.c | 1.074 | 0.042 | 25.782 | < 2e-16 | *** |
| Q-biasing * Talker1 | 0.115 | 0.095 | 1.214 | 0.225 | |
| Q-biasing * TestBlock | -0.157 | 0.095 | -1.646 | 0.1 | . |
| MaleTalker * TestBlock | 0.055 | 0.095 | 0.578 | 0.563 | |
| Q-biasing * Continuum.c | -0.066 | 0.017 | -3.895 | 9.84e-05 | *** |
| MaleTalker * Continuum.c | 0.111 | 0.017 | 6.545 | 5.94e-11 | *** |
| TestBlock * Continuum.c | 0.021 | 0.016 | 1.312 | 0.19 | |
| Q-biasing * MaleTalker * TestBlock | 0.083 | 0.06 | 1.37 | 0.171 | |
| Q-biasing * MaleTalker * Continuum.c | -0.077 | 0.04 | -1.937 | 0.053 | . |
| Q-biasing * TestBlock * Continuum.c | -0.01 | 0.04 | -0.248 | 0.804 | |
| MaleTalker * TestBlock * Continuum.c | 0.006 | 0.04 | 0.14 | 0.888 | |
| Q-biasing * MaleTalker * TestBlock * Continuum.c | 0.025 | 0.016 | 1.569 | 0.117 | |

## Appendix VII: Response times during exposure in Experiment 2 and Experiment 3

**Table A6.** Mean response times (ms) of responses during the exposure phase by exposure bias * test talker * ambiguity of stimulus in Experiments 2 and 3. The numbers in the parentheses indicate the standard deviation of the mean.

| | Ambiguity | Experiment 2 (Blocked) | | Experiment 3 (Interleaved) | |
|---|---|---|---|---|---|
| | | Female | Male | Female | Male |
| Male Q-biasing condition | Ambiguous | 934 (811) | 1036 (1787) | 869 (671) | 963 (711) |
| | Unambiguous | 876 (1336) | 1075 (2070) | 679 (665) | 722 (493) |
| Male S-biasing condition | Ambiguous | 733 (872) | 920 (1311) | 933 (1044) | 933 (909) |
| | Unambiguous | 713 (979) | 820 (3636) | 751 (686) | 719 (618) |

## Appendix VIII: Response accuracies during exposure in Experiment 2 and Experiment 3

We constructed a generalized linear mixed-effect logistic regression model to predict the accuracy of responses (1 = correct, 0 = incorrect)) We tested effects of give fixed effect variables: (a) experiment (sum-coded, Experiment 2 = -1, Experiment 3 = 1), (b) exposure bias (sum-coded, male S-biasing = -1, male Q-biasing = 1), (c) exposure talker (sum-coded, female = -1, male = 1), (d) stimulus ambiguity (sum-coded, ambiguous = -1 vs. unambiguous = 1), and the interaction between them. The model included the maximum random effect structure justified by the data (by-subject intercepts and slopes for the interaction between test talker and stimulus).

**Table A7.** Summary of mixed-effects logistic regression predicting the response accuracies in the exposure phase of Experiments 2 and 3. The fixed effects included test talker, stimulus, exposure bias, and experiment, as well as the interactions between them. The shaded cells indicate those that show significant effects of “experiment”.

| | Estimate | Std. Error | z value | Pr(>\|z\|) | |
|---|---|---|---|---|---|
| (Intercept) | 2.717 | 0.085 | 32.051 | < 2e-16 | *** |
| Experiment 3 (vs. Experiment 2) | -0.204 | 0.073 | -2.795 | 0.005 | ** |
| MaleQ-biasing (vs. Male S-biasing) | -0.441 | 0.074 | -5.998 | 1.99e-09 | *** |
| MaleTalker (vs. FemaleTalker) | -0.232 | 0.069 | -3.385 | 0.001 | *** |
| AmbiguousStimulus (vs. UnambiguousStimulus) | -1.081 | 0.065 | -16.554 | < 2e-16 | *** |
| Experiment 3 * MaleQ-biasing | 0.001 | 0.073 | 0.01 | 0.992 | |
| Experiment 3 * MaleTalker | 0.043 | 0.053 | 0.815 | 0.415 | |
| MaleQ-biasing * MaleTalker | 0.326 | 0.053 | 6.099 | 1.07e-09 | *** |
| Experiment 3 * UnambiguousStimulus | -0.426 | 0.048 | -8.918 | < 2e-16 | *** |
| MaleQ-biasing * UnambiguousStimulus | -0.104 | 0.048 | -2.139 | 0.032 | * |

| | | | | | |
|---|---|---|---|---|---|
| MaleTalker * UnambiguousStimulus | 0.081 | 0.068 | 1.189 | 0.235 | |
| Experiment 3 * MaleQ-biasing * MaleTalker | 0.028 | 0.052 | 0.542 | 0.588 | |
| Experiment 3 * MaleQ-biasing * UnambiguousStimulus | -0.112 | 0.047 | -2.356 | 0.018 | * |
| Experiment 3 * MaleTalker * UnambiguousStimulus | -0.054 | 0.052 | -1.041 | 0.298 | |
| MaleQ-biasing 3 * MaleTalker * UnambiguousStimulus | -0.148 | 0.053 | -2.789 | 0.005 | ** |
| Experiment * MaleQ-biasing * MaleTalker * UnambiguousStimulus | -0.027 | 0.052 | -0.527 | 0.598 | |

## Appendix IX: The "heard" vs. "unheard" male talker in Experiment 3 and Experiment 4

Was there any difference between the cases where listeners provided their post-test responses to the male talker from the exposure phase vs. to the previously unheard male talker? We constructed a generalized linear mixed-effect logistic regression model to predict the "question" responses (1 = question, 0 = statement) including two fixed effect variables: (a) experiment (sum-coded, Experiment 3 = -1, Experiment 4 = 1), (b) exposure bias (sum-coded, male S-biasing = -1, male Q-biasing = 1), (c) continuum (centered), and the interactions between them. The model included the maximum random effect structure justified by the data (by-subject intercepts and slopes for the continuum).

**Table A8.** Summary of mixed-effects logistic regression predicting the "question" responses to the male test voices ("heard" in Experiment 3 and previously "unheard" in Experiment 4). The data from Experiment 3 have been subset to those where the male test voice was presented during the first block of the post-test phase.

| | Estimate | Std. Error | z value | Pr(>\|z\|) | |
|---|---|---|---|---|---|
| (Intercept) | -0.578 | 0.097 | -5.939 | 2.87e-09 | *** |
| Experiment 4 (vs. Experiemnt 3) | -0.169 | 0.094 | -1.798 | 0.072 | . |
| MaleQ-biasing (vs. Male S-biasing) | 0.335 | 0.094 | 3.554 | 0.0004 | *** |
| Continuum | 1.258 | 0.065 | 19.421 | < 2e-16 | *** |
| Experiment 4 * MaleQ-biasing | -0.068 | 0.094 | -0.726 | 0.468 | |
| MaleQ-biasing * Continuum | 0.08 | 0.057 | 1.394 | 0.163 | |
| MaleQ-biasing * Continuum | -0.049 | 0.057 | -0.871 | 0.384 | |
| Experiment 4 * MaleQ-biasing * Continuum | 0.079 | 0.057 | 1.397 | 0.162 | |