Short Research Report

When Fluency Matters: The Interplay between Categorization Fluency and Gender Atypicality on Gaydar Judgments

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Abstract

Perceiving a male speaker as gender atypical increases the chances of categorizing him as gay. The perception of how fluent the categorization process is can also play a role. Listeners categorized gay and straight speakers' sexual orientation, reported their perceived categorization fluency, and rated speakers' gender atypicality. When categorization fluency was high, gay speakers perceived as gender atypical were more likely categorized as gay. When categorization fluency was low, gender atypicality increased the likelihood of categorizing straight speakers as gay.

Keywords

sexual orientation, auditory gaydar, fluency, gender atypicality, voice

Sexual orientation (SO) is a social category that is perceptually ambiguous, and it cannot be verified without an individual's direct confirmation. Nonetheless, the belief that individuals can categorize others' SO based on their voices exists. This phenomenon is called auditory gaydar. Auditory gaydar judgements can be influenced by various factors. While speakers' features such as gender atypicality (Kachel et al., 2020) have been widely studied, little is known about factors concerning listeners' experience in auditory gaydar. This research examines how gay and straight speakers' characteristics (i.e., perceived gender atypicality), listeners' experience (i.e., categorization fluency), and their interplay contribute to the listeners' likelihood of categorizing speakers as gay (i.e., gaydar judgments).

Auditory Gaydar and Gender Atypicality

Auditory gaydar has been proven accurate in some studies (Gaudio, 1994; Valentova & Havlíček, 2013), but inaccurate in others (Kachel et al., 2018; Fasoli et al., 2022; Sulpizio et al., 2015). Part of this inaccuracy can be explained by how listeners engage in the so-called 'straight categorization bias' (Lick & Johnson, 2016; Painter et al., 2021), namely the tendency to consider heterosexuality as the 'reference' category and avoid a gay categorization. However, when stereotypical cues are involved, such as when a speaker sounds gender atypical, the likelihood of categorizing speakers as gay increases.

Gay men are stereotyped as feminine and similar to the opposite gender (Kachel et al., 2016; Kite & Deaux, 1987). Consequently, people use gender atypical features to infer others' SO based on voice (Kachel et al., 2020; Rieger et al., 2010). Studies have shown that attributing gender atypicality to speakers is positively associated with the categorization of these individuals as gay (Fasoli et al., 2022), and that men who self-perceive as feminine-sounding believe that their voices trigger a gay categorization (Fasoli et al., 2018). This evidence shows that stereotypes, in the form of a speaker's perceived gender atypicality, play a key role in auditory gaydar judgements.

Based on this literature, two hypotheses were advanced. First, we expected an overall higher likelihood of categorizing speakers as straight than gay (i.e., straight categorization bias, *H1*). Second, we predicted gay speakers to be perceived as more gender atypical than straight speakers (*H2a*) and perceived gender atypicality to positively predict the speakers' likelihood to be categorized as gay (*H2b*).

Categorization Fluency

Social categorization is a probabilistic process that depends on multiple factors (Johnson et al., 2015). Moreover, listeners' experience of this process can influence its outcomes. Processing fluency, defined as 'the ease of the perceptual and mental operations' (Olszanowski et al., 2018, p. 132; Oppenheimer, 2008) that lead to social judgements, is associated with evaluative reactions that vary from trait attribution to prejudice (Alter & Oppenheimer, 2009; Dragojevic & Giles, 2016). In the case of gaydar, we refer to categorization fluency as the processing ease associated with the SO categorization.

Studies in the context of visual gaydar indicated that targets categorized as gay were processed less fluently (i.e., categorized more slowly) than those categorized as straight (Lick & Johnson, 2013). In the auditory gaydar context, a decision-making measure (MouseTracker) showed that listeners were hesitant to categorize speakers as gay (Sulpizio et al., 2015). However, these studies assessed fluency merely in terms of categorization speed or processing, leaving the listeners' (self-reported) perceived categorization fluency unexplored. Indirect evidence that perceived categorization fluency influences gaydar judgements can be found when examining variables usually linked with a fluent experience (Alter & Oppenheimer, 2009). Indeed, self-reported confidence in visual gaydar was associated with a stronger straight categorization bias (i.e., lower likelihood to categorize targets as gay; Brewer & Lyons, 2016, 2017).

Based on the foregoing, we explored whether self-reported categorization fluency is negatively associated with the likelihood of categorizing speakers as gay *(RQ1).* Moreover, since

previous work (Sulpizio et al., 2015) has shown listeners' hesitancy in categorizing gay speakers as gay but confidence in categorizing straight speakers as straight, we explored whether categorization fluency differs between gay and straight speakers (*RQ2*). Next, we tested the possibility that the impact of categorization fluency on gaydar judgements varied according to the speakers' SO (*RQ3*).

The Interplay between Categorization Fluency and Gender Atypicality

The subjective experience of fluency relate to the perception of targets' features often considered when categorizing others (see Hehman et al., 2017). Yet, the relationship between speakers' perceived gender atypicality and listeners' categorization fluency has not been studied. A linear relationship between these two variables may exist, since low gender atypicality is a common attribute of perceived heterosexuality (i.e., the 'reference' category), and this may be linked with a higher categorization fluency. However, one could argue that this relationship is curvilinear. Categorization fluency may be high with extreme perceptions of speakers as gender typical/atypical as gender (a)typicality represents a stereotypical cue that shapes listeners' gaydar judgements (Fasoli et al., 2022). Furthermore, fluency may be low when gender atypicality is moderate since that would create ambivalence. Thus, we tested whether and in what manner fluency and gender atypicality relate to one another (*RQ4*).

Moreover, categorization fluency and gender atypicality could jointly influence gaydar judgements. At a cognitive level, fluency moderates the relationship between a target object's perceived atypicality and its categorization (Oppenheimer & Frank, 2008). Following this rationale, in the auditory gaydar context, the extent to which speakers' gender atypicality is utilized as a cue for gaydar judgements may vary according to listeners' perceived categorization fluency. For instance, when listeners perceive high fluency, they might rely to a greater extent on speakers' perceived gender atypicality as a cue leading to a gay categorization; whereas, when fluency is low, gender atypicality would not be a valid cue for a gay categorization. However, if a curvilinear relationship between gender atypicality and categorization fluency exists, the two variables could

relate nonlinearly with gaydar judgements; thus, this possibility should be considered. Therefore, we explored the joint impact of gender atypicality and fluency on gaydar judgements (*RQ5*).

The Study

The study involved a voice-based SO categorization task in which participants listened to gay and straight male speakers. We assessed gaydar judgments (i.e., SO categorization on a binary choice), perceived categorization fluency, and perceived speakers' gender atypicality. We tested our hypotheses concerning the straight categorization bias (*H1*), speakers' gender atypicality differences (*H2a*), and the association between gender atypicality and gaydar judgments (*H2b*). We also explored the association between fluency and gaydar judgments (*RQ1)*, the factors related to a fluent categorization (*RQ2*, *RQ4*), and the conditions increasing the likelihood of categorizing a speaker as gay (*RQ3*, *RQ5*).[1]

Method

Listeners

Seventy-nine university students participated in the study (see Table 1). A G*Power sensitivity analysis suggested that this sample size was sufficient to detect a medium effect size of *OR* = 3.90 (Cohen, 1988) with *p1* = .50, power = 80%, and alpha = .05 in a binomial regression.

Materials

Speakers. We selected four straight and four gay British male speakers who were recorded in a quiet room uttering the following sentence: 'The English course starts on Monday'. We conducted a pre-test (*N* = 91, British straight listeners) to check whether gay/straight speakers were perceived differently in terms of SO. Their perceived SO was judged on a Kinsey-like scale (1 = exclusively heterosexual – 7 = exclusively gay). Gay (*M* = 3.82, *SD* = 1.06) and straight speakers (*M* = 2.48, *SD*

= .98) were perceived as relatively different from each other, $t(90) = 10.98$, $p < .001$. These voice samples maximized the likelihood of a 'correct' gaydar judgement.

Gaydar judgements. Participants judged the speakers' SO on a binary choice (gay/straight).

Categorization fluency. Six items were created to assess the categorization easiness (e.g., 'It took a great deal of effort to judge the sexual orientation of the speaker', reverse-coded; answers: 1 = not at all – 7 = very much; ω = .95; see S1 for all items). The ratings were averaged. Higher scores indicated a higher degree of perceived categorization fluency.

Gender atypicality. Four items assessed perceived speakers' gender atypicality (e.g., 'This speaker's voice is line with the stereotype of a female voice'; answers: 1 = not at all - 7 = very much; ω = .87; see S1). The ratings were averaged. Higher scores indicated a stronger perception of the speaker as gender atypical (i.e., feminine-sounding).

Procedure

Participants were asked to self-isolate and set their audio system to an adequate volume. Then, they completed a two-block online voice-based impression formation study in which speakers were presented in a randomized order. In the first block, listeners rated the speakers on different evaluative dimensions (see S2). In the second block, for each speaker, listeners completed the measures about gaydar judgements, categorization fluency, and gender atypicality. Before participants were debriefed, we assessed sexual prejudice, stereotype endorsement, and demographics (Table 1).

Results

Gaydar Judgements

Straight ($M = 84\%$, $SD = 20\%$, $t(78) = 15.33$, $p < .001$, $d = 3.47$) and gay speakers ($M = 58\%$, $SD = 18\%$, $t(78) = 4.05$, $p < .001$, $d = .92$) were both accurately categorized above the chance level (50%). Using signal detection theory (SDT, see Lick & Johnson, 2016), we calculated the overall

response bias towards the opposite category (M_c = .32, SD_c = .19). A positive value indicated a greater bias towards the straight category, while 0 indicated no bias at all. A *t*-test against 0 confirmed the presence of the straight categorization bias (*H1*), $t(78) = 8.90$, $p < .001$, $d = 2.02$.

Gender Atypicality

In a linear mixed model, speaker SO was added as a fixed factor and the listeners' identifier as a random intercept. Supporting *H2a*, gay speakers (*EMM* = 1.90, *SE* = .08) were rated more gender atypical than straight speakers (*EMM* = 1.51, *SE* = .08), *B* = .19, *SE* = .02, $t(552) = 7.86$, $p < .001$.

Fluency and Gender Atypicality

To address *RQ2* and *RQ4*, we performed a quadratic regression, inputting speaker SO and orthogonal polynomials of gender atypicality (i.e., linear and quadratic terms are forced to be uncorrelated), as well as their interaction terms, as predictors of fluency (see Table 2), and the listeners' identifier as a random intercept.

Answering *RQ2*, speaker SO did not predict differences in fluency, *B* = .03, *SE* = .11, $t(572) = -.30$, $p = .76$. Answering *RQ4*, the linear relationship between gender atypicality and fluency was significant and negative, *B* = -4.63, *SE* = 1.97, $t(619) = -2.35$, $p = .02$. Moreover, the quadratic term was significant, positive, and stronger than the linear term, *B* = 9.30, *SE* = 2.05, $t(617) = 4.53$, $p < .001$. When gender atypicality was low, fluency was moderate. When gender atypicality was moderate, fluency was low. When gender atypicality was high, fluency was high. This quadratic effect was qualified by a significant interaction with speaker SO, *B* = -7.10, *SE* = 2.25, $t(600) = -3.21$, $p = .001$. The curvilinear pattern was more pronounced for straight than for gay speakers (see Figure 1).

INSERT FIGURE 1 ABOUT HERE

Fluency and Gender Atypicality as Predictors of Gaydar Judgements

Generalized mixed models were performed to predict gaydar judgements because these models are better suited for repeated measures experiments and more effective than STD (*B* is conceptually equal to SDT's *d*; see DeCarlo et al., 1998; Wright et al., 2009). The listeners' identifier was treated as random intercept. The dependent variable, gaydar judgement, was operationalized as the likelihood of speakers being categorized as gay.

Our previous analysis suggested that a curvilinear relationship between gender atypicality and categorization fluency exists. One could therefore imply that fluency and/or gender atypicality relate nonlinearly with gaydar judgements. To explore this possibility, we compared the fit indices (AIC, BIC) of models accounting for linear and/or curvilinear effects in predicting gaydar judgements (see S4). The model with speaker SO, gender atypicality, categorization fluency as linear effects, and their interactions, showed the best fit (see Tables 3 and 4).

A significant main effect of speaker SO showed that gay speakers were more likely to be categorized as gay than straight speakers. In line with *H2b*, gender atypicality was significantly and positively associated with gay categorization. Answering *RQ1*, fluency was significantly and negatively associated with gay categorization. Moreover, the interaction of fluency and speaker SO was significant. Addressing *RQ3*, the results showed that high fluency decreased the likelihood of a gay categorization for straight speakers, $B = -.60$, $OR = .55$, *95% CI* [.43, .70], $Z = -4.78$, $p < .001$, but did not influence the categorization of gay speakers, $B = .01$, $OR = 1.00$, *95% CI* [.86, 1.18], $Z = .07$, $p = .95$. Interestingly, concerning *RQ5*, the three-way interaction between speaker SO, categorization fluency, and gender atypicality was significant (see Figure 2). The influence of gender atypicality on gaydar judgement was moderated by fluency, but this influence differed with speakers' SO. When fluency was high, gender atypicality positively predicted the likelihood of categorizing gay speakers as gay, $B = 1.52$, $OR = 4.57$, *95% CI* [2.53, 8.24], $Z = 5.05$, $p < .001$, but it did not influence the categorization of straight speakers, $B = .36$, $OR = 1.43$, *95% CI* [.57, 3.60], $Z = .76$, $p = .45$. When fluency was low, gender atypicality increased the likelihood of categorizing

straight speakers as gay, *B* = .56, *OR* = 1.74, *95% CI* [1.04, 2.92], *Z* = 2.12, *p* =.03, but did not influence the categorization of gay speakers, *B* = .31, *OR* = 1.36, *95% CI* [.89, 2.60], *Z* = 1.43, *p* =.15.

INSERT FIGURE 2 ABOUT HERE

Discussion

We asked participants to categorize the SO of male speakers who self-identified as either gay or straight. In line with *H1*, we observed a straight categorization bias indicating that listeners preferred the straight category when making gaydar judgements. Contingent to each speaker's categorization, we assessed perceived speakers' gender atypicality and categorization fluency. Overall, gay speakers were perceived more gender atypical than straight speakers (*H2a*), but they were associated with similar levels of fluency (*RQ2*). Remarkably, fluency showed a curvilinear relationship with speakers' gender atypicality (*RQ4*). When speakers were perceived moderately gender atypical, fluency was at its lowest compared to when speakers were perceived as gender typical or atypical, and this was particularly the case for straight speakers. When observing the relationship between these variables and gaydar judgements, we found gender atypicality to increase the likelihood of a gay categorization and fluency to decrease it, supporting *H2b* and answering *RQ1* respectively. Interestingly, a fluent categorization decreased the likelihood that a straight speaker was categorized as gay but did not affect the categorization of gay speakers (*RQ3*). However, this effect needs to be considered in relation to perceived gender atypicality. Indeed, the interaction between fluency, gender atypicality, and speakers' SO shows that a fluent categorization increased the likelihood that gender atypicality triggered the categorization of gay speakers as gay, whereas a disfluent categorization did the same for straight speakers (*RQ5*).

This is the first study examining categorization fluency in the context of auditory gaydar. Previous findings reported that fluency-related variables affect the outcomes of gaydar judgement

when facial cues are involved, such as familiarity (Brambilla et al., 2013) or self-confidence (Brewer & Lyons, 2016). However, these studies did not include voices. Here we showed that fluency was a predictor of the decision to not categorize speakers as gay. These results reconcile with those showing listeners' hesitation when categorizing others as gay (Sulpizio et al., 2015). This is also in line with visual gaydar findings (Alt et al., 2020) in which a cognitive load manipulation (likely a source of disfluency) reduced the incidence of the straight categorization bias. However, our research shows that categorization fluency may play a significant role in reducing the straight categorization bias for straight more than for gay speakers. Future studies should expand our work by manipulating fluency like in language attitudes studies (i.e., Dragojevic, 2020; Dragojevic & Giles, 2016) to further assess its role in gaydar judgements.

Our results demonstrate the necessity to integrate speaker-related cues and listeners' experiences when examining social categorization processes (Hehman et al., 2017). In fact, it was the interplay between categorization fluency and speakers' gender atypical features that affected the likelihood of categorizing speakers as gay. When the categorization fluency was experienced as high, gender atypicality was employed to a greater extent as a cue leading to the categorization of gay speakers as gay. These results can be interpreted in the same manner as those of gaydar beliefs which rely on stereotypes. For instance, telling people that gaydar exists – which is likely to elicit fluency – causes individuals to rely on stereotypes more (Cox et al., 2016). Similarly, listeners who believe categorizing others' SO is a straightforward task often stigmatize gay speakers (Fasoli et al., 2021). Therefore, future studies should address the interplay between fluency and auditory gaydar beliefs.

Furthermore, this research provides evidence that listeners' fluent categorization is related to perceived speakers' gender atypicality. We imagine that moderate perceived speakers' gender atypicality could have elicited a sense of ambiguity which rendered categorization disfluent, particularly for straight rather than gay speakers. Meanwhile, when gender-related cues were perceived as 'clear' (i.e., highly typical or atypical), fluency was higher. In this relationship, it is

conceivable that fluency can operate also as a mediator of the effect of gender atypicality on gaydar judgements. For example, the more a speaker is perceived as strongly gender atypical/typical (i.e., aligned with the stereotypes associated with gay/straight speakers), the more fluent the categorization will be, potentially affecting gaydar judgements. Future experiments should evaluate this alternative process and test which factor is the antecedent of the other.

Our results should be considered cautiously. Our gay speakers, even if correctly categorized most of the time, were not perceived as gay in 'absolute' terms in the pretest. Thus, they were not extremely representative of the 'gay' category. This may have impacted the pattern of results and range of the observed variables. Future studies should consider larger and diverse voice samples.

To conclude, our investigation showed that merely contemplating speaker-related features is insufficient to fully comprehend how listeners make gaydar judgements. In fact, examining the easiness of the categorization process helped understand how speakers' gender atypicality is used to categorize their SO.

Note

1. Data and analyses are available on OSF at https://osf.io/6fdv3/

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Table 1. Demographics of the sample. For continuous variables (age, homonegativity, stereotype endorsement) unstandardized mean is reported (standard deviations in parenthesis).

Variable	*N = 79*
Age	19.53 (1.75)
Gender	
Male	9
Female	66
Not reported/Others	4
Ethnicity	
Caucasian/White	61
Asian	2
Black	1
Others (e.g., Mixed ethnicity, Arabic)	14
Sexual orientation	
Straight	51
Gay/Lesbian	1
Bisexual	17
Others (e.g., Queer, Questioning)	10
Sexual interests and behaviors (Kinsey-like scale)	
Heterosexual (Exclusively – Predominantly)	52
Equally heterosexual/gay	12
Gay (Exclusively-Predominantly)	15
Modern Homonegativity Scale - Gay Men (12 items; 1 = Strongly disagree-5 = Strongly agree, Morrison & Morrison, 2002)	1.89 (.68)
Endorsement of Stereotype Beliefs (8 items; 1= Strongly disagree -7 = Strongly agree, Moore, 2012)	3.63 (.97)

Table 2. Predicted values (95% CI in parentheses) of fluency according to speaker SO (gay vs. straight) and representative values of gender atypicality. Variables were mean-centered.

	Gender atypicality		
Speaker SO	Mean	+2SD	+4SD
Gay	-.15 (-.41, .11)	-.19 (-.56, .18)	.60 (-.31, 1.52)
Straight	-.43 (-.72, -.13).	-.80 (-1.38, -.22)	2.33 (.06, 4.60)

notes: *fluency*: positive scores correspond to a fluent categorization; *gender atypicality*: positive scores correspond to a speaker perceived as gender atypical. To highlight the quadratic relationship, we report representative values of gender atypicality at which the relationship with fluency changes decisively.

Table 3. Results of the analysis on the likelihood that a speaker was categorized as gay (straight answer = 0). Binary variables were dummy coded and continuous variables mean-centered before the analysis.

Predictors	*B*	*OR*	*95 % CI*	*Z*	*p*
Speaker SO (straight speaker = 0)	2.24	9.40	5.85 – 15.10	9.27	<.001
Fluency	-.60	.55	.43 – .70	-4.76	<.001
Gender Atypicality	.48	1.62	.99 – 2.64	1.94	.053
Speaker SO X Fluency	.60	1.83	1.36 – 2.46	4.02	<.001
Speaker SO X Atypicality	.44	1.56	.87 – 2.79	1.50	.133
Fluency X Atypicality	-.05	.95	.66 – 1.36	-.29	.773
Speaker SO X Fluency X Atypicality	.43	1.54	1.00 – 2.36	1.98	.048

notes: *fluency*: greater scores correspond to a categorization perceived as fluent; *gender atypicality*: greater scores correspond to a speaker perceived as gender atypical.

Table 4. Predicted probabilities of being categorized as gay expressed in decimals (95%CI in parentheses) for each type of speaker (gay vs. straight) according to representative values of fluency and gender atypicality.

	Fluency					
	-1SD		Mean		+1SD	
Gender typicality	Straight	Gay	Straight	Gay	Straight	Gay
-1SD	.19 (.12, .30)	.51 (.39, .63)	.09 (.05, .14)	.38 (.30, .47)	.04 (.02, .09)	.27 (.17, .38)
Mean	.28 (.21, .36)	.58 (.49, .65)	.13 (.09, .18)	.58 (.52, .64)	.05 (.03, .10)	.58 (.48, .67)
+1SD	.39 (.26, .53)	.64 (.52, .74)	.18 (.11, .29)	.75 (.67, .82)	.07 (.02, .21)	.84 (.71, .92)

notes: *fluency:* positive scores correspond to a fluent categorization; *gender atypicality:* positive scores correspond to a speaker perceived as gender atypical.

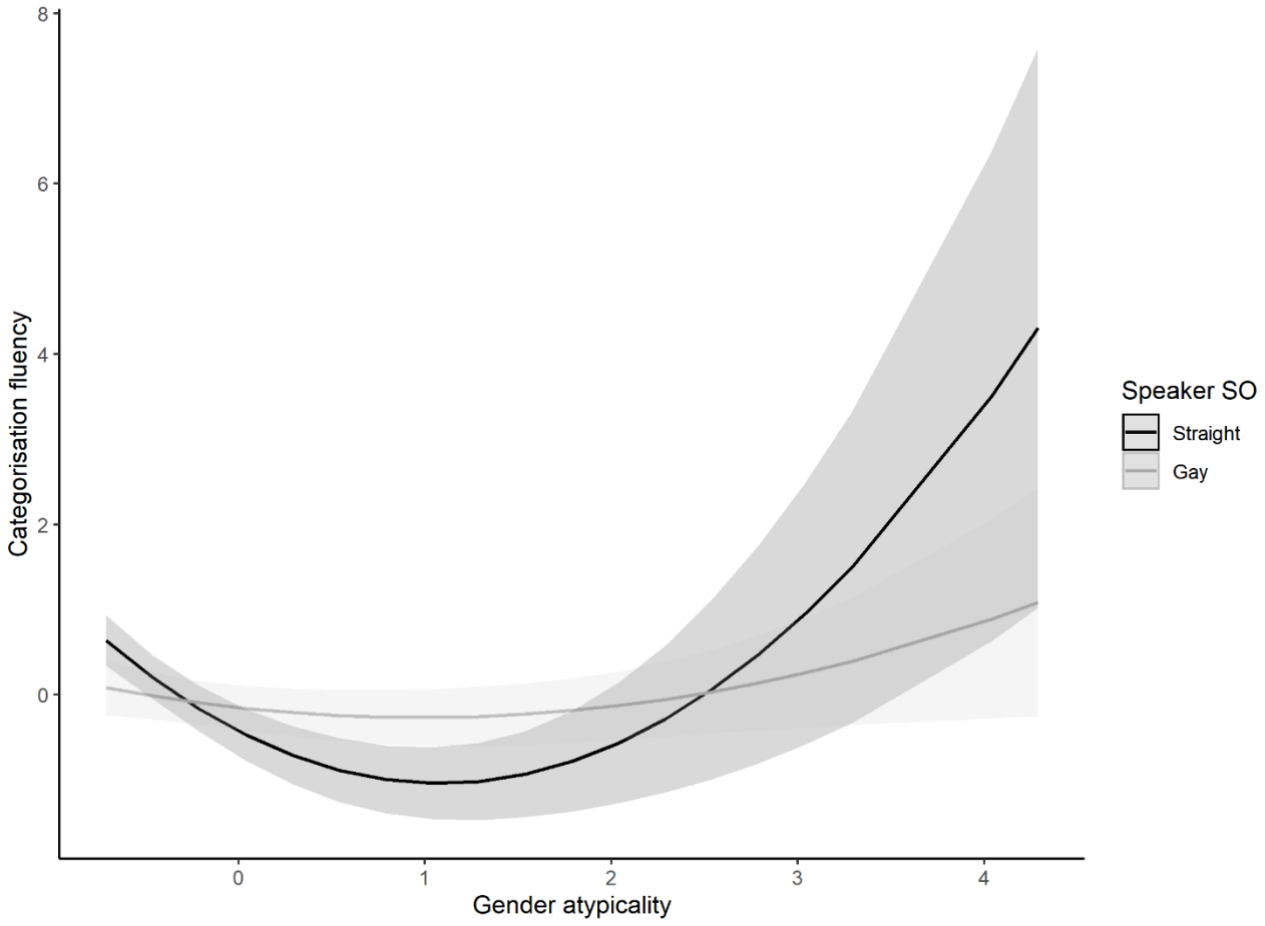

Figure 1. Plot depicting the quadratic regression linking gender atypicality (*x* axis) to categorization fluency (*y* axis) as a function of speaker SO. *Fluency*: positive scores correspond to a fluent categorization; *gender atypicality*: positive scores correspond to a speaker perceived as gender atypical.

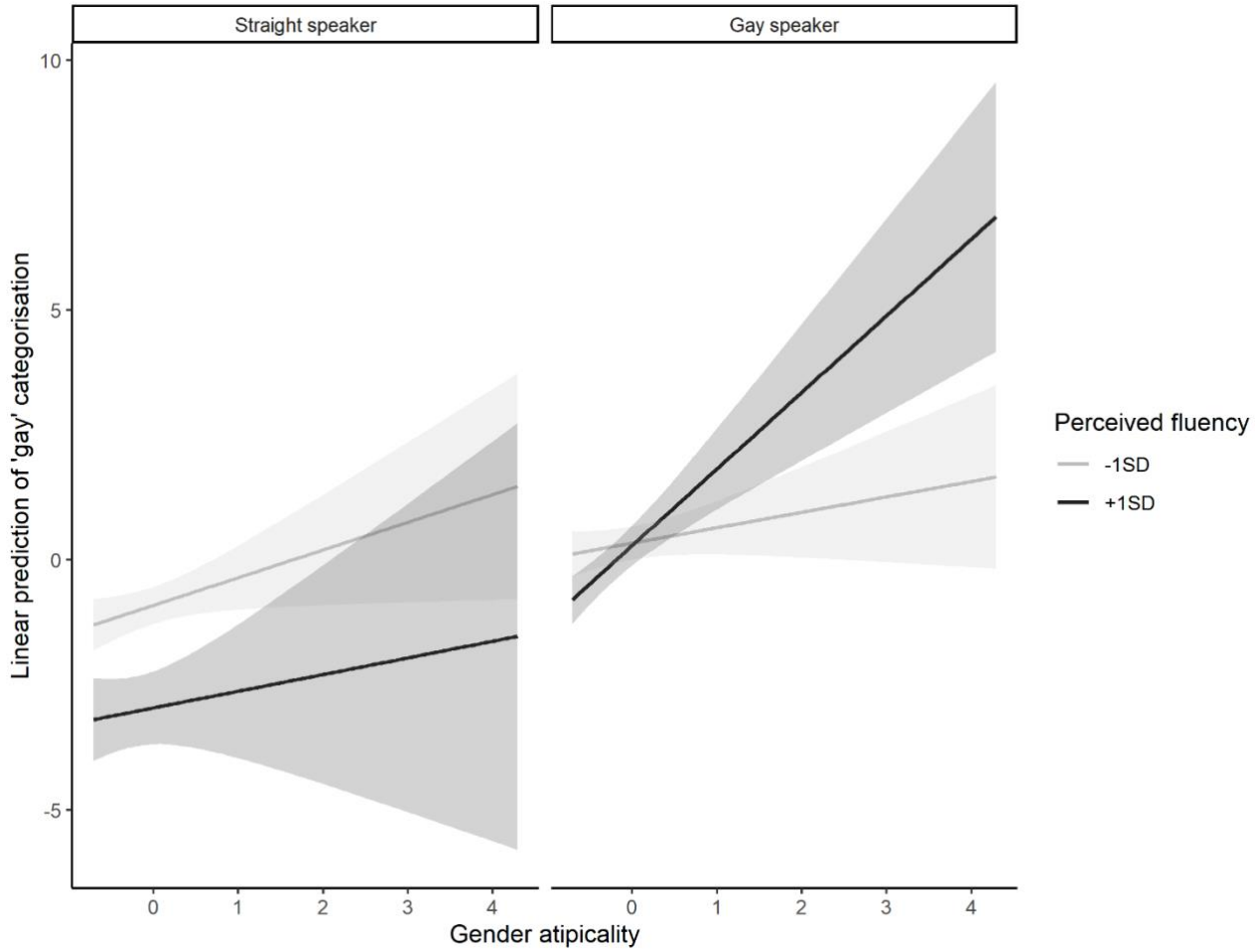

Figure 2. Plot representing the linear prediction of the 'gay' categorization (*y* axis) as a function of perceived fluency (lines) and its interaction with speaker SO (panels) and gender atypicality (*x* axis). *Fluency*: positive scores correspond to a fluent categorization; *gender atypicality*: positive scores correspond to a speaker perceived as gender atypical.