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Voice Matters: Social Categorization and Stereotyping of Speakers based on Sexual Orientation and Nationality Categories

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Abstract

This research examined how listeners categorize and stereotype speakers belonging to intersecting social categories (nationality; sexual orientation) based on voice alone. In Study 1, British heterosexuals categorized the nationality and sexual orientation of British and Italian speakers who self-identified as gay or heterosexual. Participants correctly categorized British speakers as co-nationals and Italian speakers as foreigners. Categorization accuracy of gay speakers' sexual orientation was poor. Italian gay speakers were perceived as most likely to be gay and non-native speakers. Study 2 examined stereotyping of speakers who sounded either native or foreign, and sounded either gay or heterosexual. Foreign-accented (vs. native-accented) speakers were rated as less competent, and gay-sounding (vs. heterosexual-sounding) speakers as less gender typical. Foreign-accented gay speakers were perceived as the least competent and gender typical.

Keywords: voice; social categorization; stereotyping; sexual orientation; accent

Can listeners tell who other people are after hearing them speak? Past research suggests that they can, to varying degrees of accuracy. Voice is a potent cue to social categorization (Giles & Rakić, 2014). Although extant literature has examined voice-based social categorization when looking at one specific social category at a time, each individual belongs to many intersecting social categories (Kang & Bodenhausen, 2015) which can be signaled by voice. Examining how individuals belonging to intersecting social categories are perceived is fundamental to understanding how they are treated in everyday life (see Dragojevic et al., 2021).

The present research examined how speakers are socially categorized and stereotyped based on their voices. Specifically, we focused on the intersection of vocal cues signaling nationality and sexual orientation. We first examined how British heterosexual listeners categorized the nationality and sexual orientation of British and Italian English speakers who self-identified as gay or heterosexual. Next – since voice-based social categorization prompts listeners to stereotypes speakers (Dragojevic, 2018) – we investigated stereotyping based on nationality and sexual orientation signaled by voice. Specifically, we examined how British listeners stereotyped speakers who were *perceived* as sounding native/foreign and gay/heterosexual and whose voice reliably signaled intersecting stigmatized social categories.

Social Categorization

Accent, or one's manner of pronunciation, is a potent cue to social categorization. Categorization of speakers as co-nationals or foreigners based on their native or foreign accent (henceforth NA and FA respectively) is usually accurate (Floccia et al., 2009; Girard et al., 2008; Lippi-Green, 2012). Such categorization is more accurate when general categories (e.g., co-nationals vs. foreigners, native vs. non-native speakers) rather than specific categories (e.g., the exact speakers' nationality) are involved (Lindemann, 2005). For instance, Americans are accurate at

distinguishing American speakers from foreigners by using NA or FA as an indicator. However, their inferences about FA speakers' actual nationality are frequently inaccurate (Dragojevic & Goatley-Soan, 2020).

While the NA or FA clearly define social group memberships, there are instances in which social categories are less 'marked' by voice. This is the case of sexual orientation, which is a more 'ambiguous' social category (see Tskhay & Rule, 2014). Research has focused on voice-based categorization of sexual orientation, also called 'auditory gaydar', across different languages (e.g., Czech: Valentova & Helfix, 2013; English: Munson et al., 2006; Italian: Sulpizio et al., 2015; German: Kachel et al., 2018). Results have been mixed with regard to accuracy. While some studies have found listeners to be accurate in judging speakers' sexual orientation (Gaudio, 1994, Linville, 1998; Tracy et al., 2015), others have found poor accuracy (Smyth et al., 2003; Kachel et al., 2018; Painter et al., 2021). Such poor accuracy appears to reflect an overall tendency to categorize speakers as heterosexual regardless of their actual sexual orientation, a phenomenon called 'straight categorization bias' (Lick & Johnson, 2016). Indeed, listeners are hesitant to label others as gay because they see this act as stigmatizing (see Alt et al., 2020) and only those speakers who clearly 'deviate' from the heterosexual category – for instance, those whose voice matches common gay speech stereotypes (e.g., lisping: Mack & Munson, 2015) – tend to be categorized as gay. In other words, although listeners do use speakers' voice to categorize them as gay or heterosexual, such judgments do not necessarily correspond to the speakers' actual sexual orientation (see Sulpizio et al., 2015).

Stereotyping

Social categorization promotes stereotyping. Once individuals are categorized as belonging to a particular group, they are attributed stereotypic characteristics associated with that groups (Fiske,

1998). Stereotyping is a fundamental cognitive process and serves various functions. For instance, it reduces uncertainty (see Hogg, 2018) and allows individuals to more easily navigate social interactions (Fiske, 2004). According to the stereotype content model (SCM), stereotypes are organized along the dimensions of status/competence (e.g., being intelligent, competent, and agentic) and solidarity/warmth (e.g., being warm, honest, and loyal; Fiske et al., 2002).

Research on *languages attitudes*, or people's evaluative reactions to different forms of speech, has shown that FA speakers are usually associated with lower status/competence than NA speakers meaning that they are perceived as less competent (Dragojevic et al., 2017; Fuertes et al., 2012; Lippi-Green, 2012). This happens in part because FA speakers are seen as deviating from the normative language spoken by the majority (Milroy & Milroy, 1999). Moreover, NA speakers tend to be attributed higher solidarity/warmth than FA speakers (Cramer, 2016; Dragojevic & Goatley-Soan, 2020), perhaps as a way to reinforce a positive image of the normative language variety and national ingroup. These findings reflect a more general trend wherein reference groups (e.g., ingroups and normative groups) are typically perceived as high in both competence and warmth (Cuddy et al., 2009; Fiske et al., 2002), whereas non-normative groups (e.g., outgroups) are often targets of negative (low competence and warmth) or ambivalent (e.g., warm but not competent) stereotyping (Fiske et al., 2002). Ambivalent stereotyping frequently varies across outgroups. For instance, in the United States, Italian immigrants tend to be attributed higher warmth than competence while the opposite is true for Chinese immigrants (see Lee & Fiske, 2006). Relatedly, when foreignness is signaled by voice, FA speakers are usually perceived as lacking status/competence (Fuertes et al., 2012; Roessell et al., 2018), but the extent of this downgrading depends on speakers' perceived nationality (e.g., Dragojevic & Goatley-Soan, 2020).

The stereotyping of male speakers who are perceived as gay or heterosexual based on their voice (henceforth gay-sounding and heterosexual-sounding speakers, respectively) is more complex. Research based on the SCM has typically found that gay men are neutrally stereotyped, as moderately warm and competent (Fiske et al., 2002). However, subgroups of gay men are targets of more ambivalent stereotyping. For instance, straight-acting and hyper-masculine gay men are seen as competent but lacking warmth (Clausell & Fiske, 2005), whereas feminine gay men are seen as warm but lacking competence. These latter results can be further explained by sexual orientation stereotyping as predicted by Gender Inversion Theory (Kite & Deaux, 1987), which suggests that gay men are perceived similarly to heterosexual women. In other words, some gay men are attributed more warmth than competence because they are seen as more feminine (Clausell & Fiske, 2005; Sink et al., 2018).

The warmth dimension can be further divided into two subdimensions, namely sociability and morality (see Brambilla & Leach, 2014). Morality, more so than sociability, appears to be central to impression formation (Brambilla et al., 2021; Goodwin, 2015). Studies on auditory gaydar have shown differences in attributions on both of these subdimensions. For instance, Fasoli and Hegarty (2000) found that English gay-sounding speakers were perceived as less moral than their heterosexual-sounding counterparts while no differences emerged on the sociability dimension. Fontenele et al. (2023), on the other hand, found that Brazilian gay-sounding speakers were perceived as less sociable than but equally moral as heterosexual-sounding speakers. These seemingly contrasting findings may reflect cultural differences – with morality being considered more important in the UK and sociability in Brazil (see Cuddy et al., 2009) – or differences in language perceptions (see Sulpizio et al., 2015). Nevertheless, these findings underscore the necessity to consider a wide range of evaluative dimensions when sexual

orientation is concerned. This could also be relevant for language attitudes research. For instance, attributions of solidarity/warmth to non-standard accented speakers are not always consistent (see Acheme & Cionea, 2022; Dragojevic et al., 2021). Accordingly, investigating whether FA speakers are perceived similarly on sociability and morality could contribute to a better understanding of solidarity-based stereotyping in the context of language attitudes.

Cross-categorization and Intersectionality

Social categories create dynamic processing in which one category may assume salience over others or multiple categories may become salient simultaneously (Crisp & Hewston, 2000). Examining how this dynamic processing transpires for individuals belonging to intersecting social categories is fundamental to understanding how those individuals are likely to be treated in everyday life. For instance, people who belong to a double minority (e.g., lesbian women, Black women) are at a higher risk of discrimination than those who belong to a single minority (e.g., heterosexual women, White women; Fasoli & Hegarty, 2020; Swang et al., 2013). However, there are other instances (e.g., gay Black men) in which one minority category (e.g., sexual orientation) can protect individuals from stigmatization (Pedulla, 2014; Remedios et al., 2011). We suspect that this asymmetry stems, at least in part, from differences in categorization and stereotyping.

Different models have been put forward to understand social categorization and stereotyping when multiple categories are involved. Models of cross-categorization (Brewer et al., 1987; van Oudenhoven et al., 2000) explain how different categorizations may occur. In the present research, we considered three models of cross-categorization. According to *additive models*, different categories are combined and added to one another. If the two categories refer to minority groups, this would enhance dissimilarity with the normative majority group and trigger

more negative evaluations of the double minority (e.g., Black women, lesbian women, foreign gay men; Crisp & Hewston, 2000; Singh et al., 1997). The additive effect supports the double jeopardy hypothesis, which predicts that individuals belonging to a double minority are likely to face stronger stigmatization than individuals belonging to a single minority, because the stigma associated with one minority status (e.g., being a woman) is added to the stigma associated with other minority groups those individuals may belong to (e.g., being Black; see Remedios & Akhtar, 2019). Conversely, *non-algebraic models* (category dominance, category conjunction, hierarchical ordering) suggest that either one category dominates over the other or different weights are applied to specific social categories (Macrae et al., 1995; Mullen et al., 2001; see Nicolas et al., 2017 for a review). These models usually explain stereotyping and stigma based on specific category prominence (Levin et al., 2002). For instance, Black gay men are liked more than Black straight men (Remedios et al., 2011) and Black gay men are perceived as warmer but also as more dominant than White gay men (Wilson et al., 2017). Finally, the model of *intersectional invisibility* (Purdie-Vaughns & Eibach, 2008) suggests that individuals who belong to multiple minority groups are not seen as prototypical of any of those social categories and, thus, remain invisible. For instance, Black gay men are seen as less similar to and less prototypical of the normative category 'men' than both Black and White heterosexual men and White gay men (Preddie & Biernat, 2021). Similarly, elderly gay men are seen as less prototypical of the gay men category; are less likely to be categorized as gay and attributed gay-stereotypical traits (Carnaghi et al., 2021); and may be overlooked and experience social isolation, compared to younger gay men (see Willis et al., 2022). These findings contrast with additive models, which predict that individuals belonging to multiple minority categories are likely to be more visible, and hence more stigmatized.

Although research has focused on cross-categorization of 'obvious' (e.g., race) and 'ambiguous' (e.g., sexual orientation) categories conveyed by facial cues (Johnson & Ghavami, 2011; Lick & Johnson, 2015; Preddie & Biernat, 2021), less is known about voice-based categorization. This is surprising, given that voice may sometimes play a more important role in social categorization than visual cues (see Kinzler et al., 2009). The few existing studies involving voice provide some preliminary knowledge. For instance, a study on nationality and religion – where the former was conveyed by an NA or FA accent and the latter by visual cues (headscarf) – showed that targets of the prototypical normative categories (NA speakers with no headscarf) were remembered better and the non-prototypical targets (FA speakers with headscarf) were ignored (Rakić et al., 2020). In a different study, NA/FA speakers were better categorized as ingroup/outgroup based on their accent than race-based visual information (e.g., skin color; Paladino & Mazzurega, 2020). Notwithstanding the importance of these studies, they examined the interplay of auditory and visual cues and did not focus on social categories signaled by auditory cues only. The limited research available on this issue has shown that speech features (e.g., -ing, TH-fronting, /s/) signaling regional accent, social class, and sexual orientation can interact. For instance, speakers whose voice involved sexual orientation cues were less likely to be perceived as working class (Campbell-Kibler, 2011) and those with an urban accent were more likely to be perceived as gay (Campbell-Kibler, 2007). Also, while vocal cues signaling a gay sexual orientation elicited lower attributions of competence, sounding gay and high social class (i.e., high socio-economic status) elevated attributions of competence (Campbell-Kibler, 2011). Expanding on this work, Levon (2014) examined the intersection of vocal cues signaling gender, sexual orientation, and social class on stereotyping. Results showed that participants who strongly endorsed gender stereotypes perceived male speakers as less

gender typical when feminine gender (high pitch) and gay sexual orientation (lisping) cues were presented in isolation or combined than when masculine gender (low pitch) or straight sexual orientation (no lisping) were assumed. Interestingly, sociability was generally lower when cues of low social class were present, but the effect disappeared if gay sexual orientation cues were also involved. Hence, speakers whose voice signaled a working class were perceived as less sociable, but when speakers also sounded gay they gained in sociability, presumably because vocal cues of specific social categories can block the salience of other categories and thus change stereotyping.

Overall, these voice-based studies suggest that vocal cues signaling multiple intersecting social categories can interact and, in turn, affect how speakers are stereotyped. For instance, one category may 'compensate' for another, helping speakers receive a more positive impression than they would if their voice signaled only one minority group membership. However, extant research has not systematically examined voice-based social categorization through the lens of cross-categorization and intersectionality models. Moreover, past linguistic research on this topic has primarily relied on digitally manipulated social category cues, making it difficult to generalize this work to natural/non-edited voices.

Overview

The present research examined auditory-based social categorization and stereotyping of speakers of different nationalities and sexual orientations while they engaged in natural/non-edited speech. In doing so, it considered the impact of vocal cues signaling an 'obvious' (nationality) and 'ambiguous' (sexual orientation) category (see Tskhay & Rule, 2015). This allowed us to test how accurate listeners are at categorizing speakers' nationality and sexual orientation based on voice alone (Study 1) and how listeners stereotype speakers whose voice signals both their

nationality and sexual orientation (e.g., gay-sounding, foreign-accented speakers; Study 2).

Examining both the categorization and stereotyping process is necessary, not only because they

both explain behaviors (e.g., discrimination), but also because stereotyping plays a role in

defining the salience of social category characteristics (see Petsko & Bodenhausen, 2019).

Previous work has shown that categorization is influenced by group membership. For instance,

past studies have found ingroup advantages in the categorization of race and gender (see Smith

& Zarate, 1990; Slone et al., 2000). Similarly, sexual minority individuals are more likely than

heterosexual individuals to categorize others as gay (see Fasoli et al., 2022). To avoid these

possible confounds, in both studies we focused exclusively on perceptions of participants

belonging to the majority, normative group – in this case, heterosexual British listeners.

In Study 1, participants listened to British and Italian English speakers who self-

identified as either gay or heterosexual. Participants categorized each speaker in terms of sexual

orientation, nationality, and native language. Previous work has shown that listeners are accurate

at judging whether speakers are co-nationals or foreigners based on voice alone. Hence, we

predicted that participants would correctly categorize British speakers as British and native

English speakers, and Italian speakers as non-British/foreign and non-native English speakers

(Hypothesis 1). Auditory gaydar literature has shown mixed categorization accuracy concerning

speakers' sexual orientation. Indeed, listeners typically display a straight categorization bias:

Although they overwhelmingly correctly categorize heterosexual speakers as such, they also tend

to categorize gay speakers as heterosexual. Accordingly, we expected participants to display a

straight categorization bias favoring the heterosexual over the gay category (Hypothesis 2).

We also examined whether the interplay of nationality and sexual orientation vocal cues

would affect listeners' auditory-based categorization of sexual orientation, nationality, and

language. Different predictions could be advanced depending on the cross-categorization models described earlier. The *additive model* would suggest that speakers' double minority status and 'deviance' from the normative categories would be emphasized. In this case, Italian gay speakers would be perceived as the most likely to be gay, non-British, and non-native English speakers (Hypothesis 3a). Alternatively, *non-algebraic models* would suggest that one category would block or dominate over the other. In the case of blocking, we could expect a correct categorization of nationality regardless of speakers' sexual orientation and vice versa (Hypothesis 3b). However, if categorization is guided by the dominance of normative categories over others, we would expect British heterosexual speakers to receive the most accurate categorization and be seen as the most prototypical in terms of nationality, language, and sexual orientation (Hypothesis 3c). Finally, the *intersectional invisibility hypothesis* would suggest that speakers belonging to multiple minority groups would be seen as the least prototypical of both social categories, making them 'invisible'. Thus, Italian gay speakers would be perceived as less gay than British gay speakers, but also as less likely to be non-British/non-native speakers compared to their Italian heterosexual counterparts (Hypothesis 3d).

In Study 2, we investigated how listeners stereotyped speakers who were perceived as *sounding* native/foreign (i.e., native-accented vs. foreign-accented) and gay/heterosexual (i.e., gay-sounding/heterosexual-sounding) in Study 1. We assessed listeners' perceptions of speakers' competence and sociability, as well as morality and gender typicality, because these dimensions are relevant for sexual orientation impressions. First, in line with the language attitudes literature (Fuertes et al., 2012), we predicted that NA speakers would be perceived as more competent than FA speakers (Hypothesis 4). Second, in line with the auditory gaydar research, we expected that gay-sounding speakers would be perceived as less gender typical, competent, and moral than

heterosexual-sounding speakers (Hypothesis 5). With regards to the intersection of social categories, the double jeopardy literature steaming from additive models suggests that being part of a double minority elicits more negative evaluations than being part of one minority (Remedios & Akhtar, 2019) and that speakers who belong to a double minority are likely to be perceived as lacking status/competence and morality associated with the normative groups (see Fasoli & Hegarty, 2020). Hence, we hypothesized that FA gay-sounding speakers would be attributed less competence, sociability, and morality than both NA gay-sounding speakers and heterosexual-sounding speakers (Hypothesis 6). However, more complex attributions may occur. Indeed, research on the SCM has shown that outgroups belonging to multiple minorities (e.g., Asian immigrants) are often targets of ambivalent stereotyping, meaning that they are seen as lacking either competence or warmth (Lee & Fiske, 2006). In line with gender inversion theory, men whose sexual orientation and 'affinity' with women highlight a double minority status (i.e., feminine gay men) are likely to be targets of ambivalent stereotypes (i.e., high warmth but low competence; Sink et al., 2017). Hence, we also explored alternative patterns of stereotyping.

Study 1

Study 1 examined how British heterosexual listeners categorize the nationality, native language, and sexual orientation of male British and Italian English speakers who self-identify as either gay or heterosexual. We assessed categorization using both dichotomous items (gay/heterosexual, British/non-British, native/non-native speaker) and Likert scales, as they provide different information. While judgments on dichotomous items provide a test of *absolute* accuracy, ratings on Likert scales inform us about the *relative* differentiation between groups (Painter et al., 2021). Such relative differences can also be interpreted as a proxy of prototypicality and/or similarity to

the category groups and may reflect differences in sexual orientation categorization (Fasoli et al., 2022). Hence, we tested our hypotheses using both types of measures.

Method

Participants

One hundred British participants completed the study. After excluding those who did not provide final consent to data use or who self-identified as gay/lesbian/bisexual ($n = 10$), the final sample consisted of 90 British, heterosexual, native English speakers (47 women, $M_{age} = 34.80$, $SD_{age} = 11.81$). The majority had a university or college degree ($n = 44$, 48.9%), were liberal ($n = 50$, 55.6%), and were not religious ($n = 47$, 52.2%). On average, participants knew 3 gay/lesbian people ($M = 3.39$, $SD = 2.69$).

A G*Power sensitivity analysis for a 2x2 within-participants design ($1 - \beta = .08$, $\alpha = .05$) indicated that our final sample allowed us to detect small to medium effects (f = .12).

Design

A 2 (Sexual Orientation: gay vs. heterosexual) x 2 (Nationality: British vs. Italian) within-participants design was implemented. Our independent variables reflected speakers' self-reported sexual orientation and nationality. Participants listened to 40 speakers. Audio recordings were presented one at a time, in a randomized order, to avoid order effects. Our dependent variables included participants' perceptions of speakers' sexual orientation, nationality, and native language. For each variable, categorization was assessed on a dichotomous choice and on a discrete choice (7-point Kinsey-like or Likert scale), allowing us to assess absolute and relative accuracy (see Fasoli et al., 2022). The presentation order of the measures concerning sexual orientation and nationality/native language was counterbalanced across participants, to avoid order effects. This implied that, for each speaker, half of the participants rated sexual orientation

first and then nationality/native language, while the other half rated the speakers in the opposite order. The study lasted on average 23 minutes.

Stimuli

Speakers. Forty-five male speakers were recruited through the researchers' contacts and LGBT associations. The inclusion criteria were being male; an adult (18+); a British or Italian national; an English or Italian native speaker; and self-identifying as gay or heterosexual. British speakers were recruited from the Surrey and London area, while Italian speakers were recruited from the northeast of Italy. They were invited to participate in a study involving being recorded while reading written materials and were informed that the audio recordings were going to be used in future impression formation studies. Italian speakers were informed that the materials they would be asked to read were in English; only those who indicated speaking English and feeling confident in reading English were recorded. Speakers were audio-recorded in a quiet room using PRAAT and a portable recorder placed in front of the speaker. After being recorded, participants completed a short questionnaire including demographic questions and questions on voice self-perception that were used to describe the voice sample (see SI.1).

After excluding 5 speakers whose audio recordings were of poor quality, 40 male speakers were selected. Classification of speakers as British or Italian and gay or heterosexual was based on speakers' self-reports. This final sample consisted of 10 gay British speakers, 10 heterosexual British speakers, 10 gay Italian-accented speakers, and 10 straight Italian-accented speakers. All speakers were adults (M_{age} = 31.80, SD_{age} = 10.10, with no age differences across national or sexual orientation groups, Fs < .67, ps > .42).

Sentences. Speakers were presented with a list of neutral English sentences and practiced reading them out loud as many times as they wanted, before recording them. This ensured that

each speaker felt comfortable reading the sentences during the recording phase. If mistakes happened, the incorrect sentences were re-recorded. From the list of sentences, we selected two that involved a range of different vowels and consonants and that have been used in previous work (Painter et al., 2022; Sulpizio et al., 2015). Hence, each speaker uttered the same two sentences (i.e., 'the dog runs in the park' and 'the English course starts on Monday').

Measures

Sexual Orientation Categorization. Participants rated the speakers' sexual orientation on a Kinsey-like scale from 1 (*exclusively heterosexual*) to 7 (*exclusively gay*) and on a dichotomous choice (heterosexual vs. gay).

Nationality Categorization. Speakers' nationality was rated on a Likert scale from 1 (*surely British*) to 7 (*surely not British*) and a dichotomous choice (British vs. other). Participants who marked 'other' were asked to specify the speaker's nationality using an open-ended question.

Native Language Categorization. We assessed native language categorization on a Likert scale from 1 (*surely English native speaker*) to 7 (*surely not an English native speaker*) and a dichotomous choice (Native English speaker vs. non-native English speaker).

Procedure

Participants were recruited on Prolific Academic (rewarded £2) and completed the study online via Qualtrics. After reading background information about the study and consenting to participate, they listened to audio recordings of 40 speakers, each uttering two neutral sentences in English. The recordings were presented in a different random order for each participant, to avoid order effects. After each recording, participants categorized the speaker based on his nationality, native language, and sexual orientation. The presentation order of dependent measures was counterbalanced across participants, to avoid order effect. Having rated all 40

speakers, participants completed prejudice measures (see SI.2) and provided demographic information. Finally, they were debriefed and asked to provide final consent to data use.

Results

Analyses strategy

Ratings of sexual orientation, nationality, and native language reported on a Kinsey/ Likert scale were averaged for each group of speakers (gay British, gay Italian, heterosexual British, heterosexual Italian), with higher scores indicating higher non-normativity—i.e., more likely to be gay, non-British, and a non-native English speakers. A 2 (Sexual Orientation: gay vs. heterosexual) x 2 (Nationality: British vs. Italian) repeated measures ANOVA was performed on each dependent variable. Pairwise comparisons (Bonferroni correction) were performed for significant interactions.

To examine categorization accuracy of sexual orientation, nationality, and native language assessed on a dichotomous choice, we first looked at percentages of correct responses and then performed a signal detection analysis (Stanislaw & Todorov, 1999). This analysis considers accuracy while taking into consideration response 'noise'. Correctly detecting a signal/category when it is present represents a *hit* while failing to detect it is a *miss*. When the category/signal is absent, but participants believe to have detected it, a *false alarm* has occurred. The analysis provides a *d'* score, which is indicative of participants' accuracy, with higher and positive scores indicating higher accuracy, as well as a *c* score, which provides information about response bias. Values of *c* equal to 0 represent no bias, while higher positive and negative values indicate a response bias toward one or the other category.

Sexual Orientation Categorization

Kinsey-like Scale

Results showed a significant effect of nationality, $F(1,89) = 20.15$, $p < .001$, $\eta_p^2 = .018$. Participants perceived the Italian speakers ($M = 3.23$, $SD = .80$) as less heterosexual than British speakers ($M = 2.99$, $SD = .72$). The main effect of sexual orientation was not significant, $F(1,89) = 2.75$, $p = .10$, $\eta_p^2 = .030$, while the interaction between the two factors, $F(1,89) = 3.76$, $p = .05$, $\eta_p^2 = .04$, was marginally significant. While no difference occurred between British heterosexual and gay speakers, $F(1,89) = .006$, $p = .94$, $\eta_p^2 = .00$, Italian gay speakers were perceived as more gay than Italian heterosexual speakers ($F(1,89) = 5.21$, $p = .02$, $\eta_p^2 = .06$; see first two columns in Table 1).

However, one sample t-tests indicated that scores for each group of participants were below the scale midpoint (4), indicating an overall bias in categorizing speakers on the heterosexual scale pole (ts <-7.71, ps $< .001$) meaning that both groups of speakers were perceived as more likely to be heterosexual but to a different extent.

Dichotomous choice

British and Italian heterosexual speakers were correctly categorized above chance level, ts > 16.98, ps $< .001$ (Table 2). Gay speakers were incorrectly categorized. Indeed, the accuracy rate for both British and Italian gay speakers was below chance (i.e., $< 50\%$), suggesting a tendency to categorize the speakers as heterosexual (ts < -6.57, ps $< .001$). The accuracy rate for British gay speakers was even lower than for Italian gay speakers, $t(89) = -4.52$, $p < .001$.

To perform a signal detection analysis, we considered correct categorization of gay speakers as a *hit*, and incorrect categorization of heterosexual speakers as gay as a *false alarm*. Hence, a positive d score indicates correct categorization while a positive c score indicates a tendency to categorize the speakers as heterosexual (straight categorization bias). An above chance but far from perfect (i.e., 100% accuracy) categorization rate was found ($M_{d'} = .60$, $SD =$

1.24; $t(89) = 4.58$, $p < .001$), with no difference across speaker nationality ($M_{British} = .36$, $SD = 1.81$ vs $M_{Italian} = .84$, $SD = 1.80$; $t(89) = -1.75$, $p = .08$). A response bias favoring the heterosexual response also emerged ($M_c = 1.46$, $SD = 1.53$; $t(89) = 9.02$, $p < .001$), with no differences between British ($M = 1.61$, $SD = 1.79$) and Italian ($M = 1.30$, $SD = 1.73$) speakers, $t(89) = 1.66$, $p = .10$.

Nationality Categorization

Likert scale

A significant effect of nationality, $F(1,89) = 2039.42$, $p < .001$, $\eta_p^2 = .958$, indicated that participants clearly differentiated between the two groups of speakers ($M_{British} = 1.35$, $SD = 0.30$ vs $M_{Italian} = 6.15$, $SD = 0.90$). Further *t*-tests against the scale midpoint (4) showed that the categorization was correct, with Italian speakers rated as non-British, $t(89) = 22.56$, $p < .001$, and British speakers rated as British, $t(89) = -84.76$, $p < .001$.

A significant main effect of sexual orientation, $F(1,89) = 34.06$, $p < .001$, $\eta_p^2 = .277$, showed that heterosexual speakers ($M = 3.67$, $SD = .46$) were perceived as more British than gay speakers ($M = 3.83$, $SD = .46$). The interaction between nationality and sexual orientation was not significant, $F(1,89) = 1.89$, $p = .172$, $\eta_p^2 = .02$.

Dichotomous choice

Categorization was accurate and exceeded the chance level ($ts > 26.10$, $ps < .001$) for both British and Italian speakers. For British speakers, accuracy was higher for heterosexual than gay speakers, $t(89) = -4.93$, $p < .001$, while the opposite pattern emerged for Italian speakers, $t(89) = 2.81$, $p = .006$ (see central columns in Table 2).

We considered *hits* the correct categorization of British speakers as British and *false alarms* the incorrect categorization of Italian speakers as British. Positive *d* scores indicate

correct categorization. Positive *c* scores represent a bias in categorizing speakers as non-British, while negative scores suggest the opposite pattern and 0 indicates no bias. Results on *d'* showed a high accuracy for nationality categorization (*M* = 9.63, *SD* = 2.52; one-sample *t*-test: *t*(89) = 36.38, *p* < .001), which was higher for heterosexual (*M*$_{d'}$ = 10.32, *SD* = 3.29) than gay speakers (*M*$_{d'}$ = 9.03, *SD* = 3.73; *t*(89) = 2.46, *p* = .02). A negative *c* score indicated a significant tendency to categorize speakers as British (*M* = -0.90, *SD* = 1.40; one-sample t-test: *t*(89) = -6.07, *p* < .001), which was more pronounced for heterosexual (*M*$_c$ = -1.62, *SD* = 1.59) than gay speakers (*M*$_c$ = -0.23, *SD* = 1.82; *t*(89) = -6.45, *p* < .001).

Although these results demonstrate that listeners were highly accurate categorizing British and Italian speakers as British and non-British, respectively, they say nothing about participants' ability to correctly detect Italian speakers' nationality. To examine that, we coded participants' open-ended responses (0 = inaccurate, 1 = accurate) and calculated the accuracy percentage. Overall, participants were very poor at accurately detecting Italian speakers' Italian nationality (*M* = 15.17, *SD* = 15.31; range 0-60%).

Native Language Categorization

Likert scale

A significant main effect of nationality, *F*(1,89) = 1513.96, *p* < .001, η_p^2 = .944, indicated that participants differentiated the British speakers (*M* = 1.47, *SD* = 0.33) from the Italian speakers (*M* = 5.66, *SD* = 0.92). One-sample *t*-tests against the scale midpoint showed that the British speakers were clearly perceived as native English speakers, *t*(89) = -72.81, *p* < .001, and the Italians as non-native English speakers, *t*(89) = 17.22, *p* < .001.

A significant main effect of sexual orientation, *F*(1,89) = 10.46, *p* = .002, η_p^2 = .10, showed that participants rated the heterosexual speakers (*M* = 3.51, *SD* = 0.48) as more likely to

be native English speakers than the gay speakers ($M = 3.62$, $SD = 0.48$). This effect was qualified by a significant interaction, $F(1,89) = 4.70$, $p = .033$, $\eta_p^2 = .05$. Italian gay speakers were more likely to be perceived as non-native English speakers than were Italian heterosexual speakers ($F(1,89) = 10.41$, $p = .002$, $\eta_p^2 = .10$). On the contrary, British gay and heterosexual speakers were rated similarly ($F(1,89) = .59$, $p = .44$, $\eta_p^2 = .007$; see last two columns of Table 1).

Dichotomous choice

British and Italian speakers were correctly categorized as native and non-native English speakers, respectively (all percentages above chance level: ts > 23.08, ps $< .001$). Among British speakers, heterosexual and gay speakers were correctly categorized as native English speakers to a similar extent, $t(89) = 1.42$, $p = .16$. Among Italian speakers, accuracy was higher for gay than heterosexual speakers; $t(89) = 4.48$, $p < .001$ (see Table 2).

We performed a signal detection analysis by considering *hits* the correct categorization of British speakers as native English speakers and *false alarms* the incorrect categorization of Italian speakers as native English speakers. Positive d scores indicate correct categorization. Positive c scores represent a bias in categorizing speakers as non-native English speakers, while negative scores suggest the opposite pattern and 0 indicates no bias. Overall, participants showed a high accuracy in categorizing speakers as native English speakers ($M = 10.55$, $SD = 2.41$; one-sample t-test: $t(89) = 41.53$, $p < .001$) with no difference between gay ($M = 10.90$, $SD = 2.98$) and heterosexual speakers ($M = 10.20$, $SD = 3.15$), $t(89) = 1.74$, $p = .08$. Moreover, a response bias that favored categorization of speakers as native English speakers emerged ($M = -1.54$, $SD = 1.11$; one-sample t-test: $t(89) = -13.11$, $p < .001$) and this was stronger for heterosexual ($M_c = -1.84$, $SD = 1.41$) than gay speakers ($M_c = -1.26$, $SD = 1.47$; $t(89) = 3.04$, $p = .003$).

Discussion

Our findings indicate that British listeners are accurate in categorizing British speakers as co-nationals and native English speakers, and Italian speakers as non-British and non-native English speakers, based on voice alone (confirming Hypothesis 1). Despite the correct categorization of Italian speakers as non-British, participants struggled to correctly detect the foreign speakers' nationality. Indeed, only a minority of participants correctly categorized the speakers as Italian. In line with Hypothesis 2, participants were accurate at categorizing heterosexual speakers as straight, but showed poor accuracy (e.g., ratings on Kinsey-like scale below midpoint) when categorizing gay speakers' sexual orientation. In other words, they showed a straight categorization bias. This result was supported by a response bias toward the heterosexual category when categorization was assessed on a dichotomous choice and by means being on the heterosexual pole of the Kinsey-like scale.

Importantly, we observed that the intersection between speakers' nationality and sexual orientation affected categorization. When rating speakers' sexual orientation on a Kinsey-like scale, participants perceived the Italian gay speakers as less heterosexual than the gay British speakers. Hence, despite a general tendency to rate all speakers as heterosexual, Italian gay speakers were perceived as the least 'prototypical' of the heterosexual category. Results for nationality showed that gay speakers were more likely to be categorized as foreigners than were heterosexual speakers, indicating that the former were perceived as the least prototypical of the reference national category (British). Finally, Italian gay speakers were perceived as being non-native English speakers to a higher extent than Italian heterosexual speakers. In line with this, participants were more likely to label gay speakers as non-British and non-native English speakers, generally. These results seem to support the additive model (Hypothesis 3b). Nationality and sexual orientation signaled by voice highlighted the fact that speakers belonged

to a double minority (those rated as the most 'gay' and more likely to be non-native speakers), making Italian gay men a clear outgroup deviating the most from the normative categories (i.e., being heterosexual and being British).

Study 2

Categorization of speakers as members of a given group leads to stereotyping (Dragojevic, 2018) and the intersection of two social categories defines the attribution of category-specific characteristics (Petsko & Bodehnausen, 2019). Study 2 examined the attribution of stereotypes to speakers whose voice reliably signaled both their nationality and sexual orientation. Specifically, participants listened to NA and FA speakers, who sounded gay or heterosexual, and rated their gender typicality, competence, sociability, and morality.

Participants

One hundred forty participants completed the survey. We excluded those who did not provide final consent to data use or who self-identified as gay/lesbian or bisexual ($n = 10$). The final sample consisted of 131 British heterosexual participants (64 women, $M_{age} = 37.21$, $SD = 12.26$). They were all native English speakers. The majority had a university or college degree ($n = 73$, 55.7%), were not religious ($n = 64$, 48.8%), and were liberal ($n = 76$, 59.2%).

A G*Power sensitivity analysis for a 2x2 within-participants design ($1 - \beta = .08$, $\alpha = .05$) indicated that our sample allowed us to detect a small effect $f = .10$.

Design

A 2 (sexual orientation: gay-sounding vs. heterosexual-sounding) x 2 (accent: native-accented/NA vs. foreign-accented/FA) within-participants design was adopted. The independent variables consisted of the sexual orientation and accent signaled by the speakers' voices. Participants listened to recordings of 12 male speakers, 3 speakers representing each group,

presented in a randomized order to avoid order effects. The speakers' sexual orientation and nationality were not disclosed to participants. Participants rated each speaker on gender typicality, competence, sociability, and morality measures using 7-point Likert scales. These constituted our dependent variables, which were presented in a randomized order to avoid order effects. The study lasted on average 14 minutes.

Procedure

Participants were recruited on Prolific Academic (rewarded £1.5) and completed the study online via Qualtrics. They were informed the study aimed to assess listeners' first impressions based on voice. After consenting to participate in the study, participants listened to audio recordings of 12 male speakers and rated each on several dimensions (i.e., gender typicality, competence, sociability, and morality). Having rated all speakers, participants reported their demographics, completed prejudice measures, and indicated how frequently they have contact with gay people (see SI.5). Finally, they were debriefed and asked to report their consent to data use.

Stimuli

Speakers. We selected 12 speakers from Study 1: 3 FA gay-sounding, 3 FA heterosexual-sounding, 3 NA gay-sounding, and 3 NA heterosexual-sounding speakers. These classifications were made based on how the speakers were categorized on dichotomous choices by participants in Study 1 and reflected the real social categories the speakers belong to. For NA speakers, we chose six British speakers who were correctly categorized as British (accuracy range: 92-99%) and native English speakers (accuracy range: 93-97%), while for FA speakers we selected six Italian speakers who were correctly categorized as non-British/foreign (accuracy range: 96-100%) and non-native English speakers (accuracy range: 95-98%). Among these speakers, half were perceived as heterosexual-sounding, since they were correctly categorized as heterosexual

(accuracy range 84-88%). The other half consisted of gay-sounding speakers, who were the most likely to be categorized as gay (accuracy range 42-67%). We also checked how the selected groups of speakers were perceived on scale ratings. Gay-sounding speakers were perceived as relatively more gay than heterosexual-sounding speakers, and FA speakers were perceived as more likely to be both non-British and non-native English speakers, compared to NA speakers (see SI.4).

Sentences. Speakers uttered the same two sentences used in Study 1 (i.e., 'the dog runs in the park' and 'the English course starts on Monday'). This ensured participants would categorize speakers similarly to participants in Study 1 and helped avoid potential message content effects.

Materials

 Gender typicality. Participants rated each speaker on masculinity and femininity on a scale from 1 (*not at all*) to 7 (*very much*). Since the two items were negatively correlated across targets (rs < -.70, ps < .001), we recorded the feminine item and averaged the ratings. The higher the score, the more gender typical the speakers were perceived.

 Competence. Participants rated each speaker on 3 traits referring to competence (i.e., competent, intelligent, skilled; Brambilla et al., 2012; α ranging from .86 to .92 across speaker groups). Answers were provided on a 7-point scale from 1 (*not at all*) to 7 (*very much*). Ratings were averaged, with higher scores indicating higher perceived competence.

 Sociability. Participants rated each speaker on 3 traits referring to sociability (i.e., likable, warm, and friendly; Brambilla et al., 2012; α ranging from.86 to .93 across speakers' groups). Answers were provided on a 7-point scale from 1 (*not at all*) to 7 (*very much*). Ratings were averaged, with higher scores indicating higher perceived sociability.

Morality. Participants rated each speaker on 3 morality traits (i.e., honest, sincere, friendly; Brambilla et al., 2012, α ranging from .80 to .90 across speakers' groups). Answers were provided on a 7-point scale from 1 (*not at all*) to 7 (*very much*). Ratings were averaged, with higher scores indicating higher perceived morality.

Results

Ratings on each dependent variable were submitted to a 2 (sexual orientation: gay-sounding vs. heterosexual-sounding) x 2 (accent: native-accented/NA vs. foreign-accented/FA) repeated measures ANOVA. Pairwise comparisons (Bonferroni correction) were performed for significant interactions.

Gender typicality

A significant main effect of sexual orientation, $F(1,130) = 404.50$, $p < .001$, $\eta_p^2 = .75$, indicated that gay-sounding speakers ($M = 4.54$, $SD = 0.92$) were perceived as less gender typical than heterosexual-sounding speakers ($M = 5.83$, $SD = 0.80$). A significant main effect of accent, $F(1,130) = 266.38$ $p < .001$, $\eta_p^2 = .67$, showed that FA speakers ($M = 4.79$, $SD = 0.80$) were perceived as less gender typical than NA speakers ($M = 5.58$, $SD = 0.86$). These effects were qualified by a significant interaction, $F(1,130) = 214.79$, $p < .001$, $\eta_p^2 = .62$. Both FA and NA gay-sounding speakers were rated as less gender typical than their heterosexual-sounding counterparts (FA*:* $F(1,130) = 72.55$, $p < .001$, $\eta_p^2 = .36$; NA: $F(1,130) = 461.39$, $p < .001$, $\eta_p^2 = .78$). However, the FA gay-sounding speakers were rated as less gender typical than the NA gay-sounding speakers ($F(1,130) = 327.54$, $p < .001$, $\eta_p^2 = .72$), while no difference emerged between the NA and FA heterosexual-sounding speakers ($F(1,130) = 1.33$, $p = .25$, $\eta_p^2 = .01$; see Table 3).

Competence

A significant main effect of accent, $F(1,130) = 17.03$, $p < .001$, $\eta_p^2 = .12$, was found. Participants rated FA speakers ($M = 4.32$, $SD = 0.77$) as less competent than NA speakers ($M = 4.56$, $SD = .79$). The main effect of sexual orientation was not significant, $F(1,130) = 2.61$, $p = .11$, $\eta_p^2 = .02$, but the interaction between speaker sexual orientation and accent was, $F(1,130) = 30.25$, $p < .001$, $\eta_p^2 = .19$. As shown in Table 3, FA gay-sounding speakers were rated as less competent than NA gay-sounding speakers ($F(1,130) = 41.31$, $p < .001$, $\eta_p^2 = .24$), while heterosexual-sounding NA and FA speakers were rated similarly ($F(1,130) = .23$, $p = .063$, $\eta_p^2 = .002$). Moreover, while FA gay-sounding speakers were perceived as less competent than FA heterosexual-sounding speakers, the opposite pattern emerged for NA speakers, with gay-sounding speakers perceived as more competent than heterosexual-sounding speakers (all ps < .004).

Sociability

The main effect of speaker accent was not significant, $F(1,130) = 1.05$, $p = .31$, $\eta_p^2 = .008$. However, a significant main effect of speaker sexual orientation, $F(1,130) = 14.55$, $p < .001$, $\eta_p^2 = .10$, indicated that gay-sounding speakers ($M = 4.27$, $SD = 0.75$) were perceived as more sociable than heterosexual-sounding speakers ($M = 4.08$, $SD = 0.70$). The significant interaction, $F(1,130) = 9.19$, $p = .003$, $\eta_p^2 = .07$, indicated that participants rated FA gay-sounding speakers as more sociable than NA gay-sounding speakers ($F(1,130) = 7.67$, $p = .006$, $\eta_p^2 = .06$), while perceiving heterosexual-sounding NA and FA speakers similarly ($F(1,130) = 1.03$, $p = .31$, $\eta_p^2 = .008$). Also, while FA gay-sounding speakers were seen as more sociable than FA heterosexual-sounding speakers ($F(1,130) = 24.17$, $p < .001$, $\eta_p^2 = .16$), no difference emerged for NA gay- and heterosexual-sounding speakers ($F(1,130) = .31$, $p = .58$, $\eta_p^2 = .002$; see Table 3).

Morality

No significant main effect of speaker accent, $F(1,130) = .35$, $p = .56$, $\eta_p^2 = .003$, and speaker sexual orientation, $F(1,130) = 1.77$, $p = .19$, $\eta_p^2 = .01$, nor a significant interaction, $F(1,130) = .01$, $p = .91$, $\eta_p^2 = .000$, emerged. Hence, participants perceived speakers as similarly moral regardless of how they sounded (see Table 3).

Discussion

Study 2 provided information about how perceived social categories elicit stereotypes. Results showed that impression formation is influenced by vocal cues signaling both nationality and sexual orientation. In line with Hypothesis 4, FA speakers were perceived as less competent than NA speakers. Moreover, partially confirming Hypothesis 5, gay-sounding speakers were perceived as less gender typical than heterosexual-sounding speakers overall. The interplay between nationality- and sexual orientation-signaling vocal cues also had an effect on stereotyping. FA gay-sounding speakers were perceived as the least gender typical and competent, but the most sociable. Hence, Hypothesis 6 was only partially supported.

General Discussion

This research investigated voice-based social categorization and stereotyping of speakers belonging to multiple social categories. Study 1 showed that listeners belonging to the majority group (British heterosexuals) were accurate at judging whether male speakers were native or non-native English speakers, as well as their co-nationals or foreigners, based on voice alone. Hence, speakers' voices clearly allowed listeners to differentiate between co-nationals and foreigners, a result that held on both dichotomous choice and Likert scale measures. However, this did not translate into an accurate recognition of the foreign-accented speakers' exact nationality (see Dragojevic & Goatley-Soan, 2020), since only a minority of participants correctly categorized the speakers as Italian. When guessing Italian speakers' nationality,

participants frequently listed Spanish, French, Portuguese, or Polish; in other words, they referenced other Indo-European languages or main minority groups in the UK (see Statista, 2021). Moreover, participants showed a straight categorization bias (Lick & Johnson, 2016). The majority of speakers were categorized as heterosexuals, leading to an accurate categorization of heterosexual speakers, but an overall poor categorization accuracy of gay speakers. This mimics previous findings (Munson et al., 2006; Painter et al., 2021; Sulpizio et al., 2015) showing that only a few gay speakers are correctly recognized as gay. Hence, our findings replicated previous work that focused on one category at a time.

Interestingly, British speakers were perceived as more heterosexual than Italian speakers on a Kinsey scale, and heterosexual speakers were more likely than gay speakers to be categorized as British and native English speakers. This suggests that participants belonging to the majority group tended to assume that their co-nationals also belonged to other majority groups (heterosexual) and vice versa. Instead of one category 'blocking' the other, we saw here an additive effect, leading participants to assume that, if a man is British, he is more likely to be heterosexual (than gay) and, if he is heterosexual, he is more likely to be British (than foreign). When looking at the double minority group, participants' ratings revealed that the Italian gay speakers tended to be perceived as the least heterosexual among all groups, and as the most likely to be non-native English speakers. Even in this case, an additive effect identified these speakers as a clear minority group. These findings contribute to the literature on cross-categorization in multiple respects. First, they extend research focusing on multiple social categories and targets whose sexual orientation is explicitly disclosed (Carnaghi et al., 2021; Preddie & Biernat, 2021) or signaled by facial cues (Wilson et al., 2017). Second, our findings extend linguistic work using digitally-manipulated vocal features (Campbell-Kibler, 2007;

Levon, 2015) by showing that, when natural voice is involved, vocal cues signaling nationality and sexual orientation can interact with one another. Our data seem to support additive rather than intersectionality categorization models (see Nicolas et al., 2017). Indeed, the Italian gay speakers were not perceived as the least prototypical of the two minority categories (i.e., gay sexual orientation and foreignness), and thus were not invisible. Instead, their double minority was highlighted, and their minority group status enhanced. This suggested that Italian gay speakers were potentially exposed to double jeopardy (see Remedios & Akthar, 2019).

Study 2 assessed if this was the case by examining listeners' evaluations of male speakers whose voice reliably signaled their nationality (i.e., NA vs. FA) and sexual orientation (i.e., gay-sounding vs. straight-sounding). Results showed that FA gay-sounding speakers were perceived as the least gender typical and the least competent among all the speakers. Such stereotyping may reflect a negative evaluation. Deviating from gender typicality is viewed negatively, as masculinity is associated with a high status (Vandello & Bosson, 2013). Competence is also associated with high status and being seen as lacking competence is linked with prejudice (Fiske et al., 1999). Unexpectedly, FA gay-sounding speakers were rated as the most sociable. Gay men are usually seen as more sociable than heterosexual men (Clausell & Fiske, 2005) but as equally competent and warm (Fiske et al., 1999). Italians are also perceived as highly warm, and hence there may be an overlap between the stereotype for gay men and Italians (Cuddy et al., 2009). This polarized stereotyping may make FA gay-sounding speakers at risk of ambivalent benevolent prejudice, as it happens for targets perceived as high in warmth but low in competence.

Examining both categorization and stereotyping based on *perceived* nationality and sexual orientation allowed us to provide empirical evidence necessary to understand social

interactions and discrimination. Previous work has shown that FA and gay-sounding speakers are at risk of discrimination in a number of contexts, including the workplace (Fasoli & Hegarty, 2020; Hansen et al., 2018; Rakić et al., 2011; Roessel et al., 2020) and teaching (Gill, 1994; Taylor & Raadt, 2021). Also, speakers who belong to a double minority (lesbian-sounding women) have been found to bear the brunt of discrimination due to their perceived lack of competence (Fasoli & Hegarty, 2020). Future studies should examine whether FA gay-sounding speakers face similar treatment and which form of prejudice they may be targets of (see Roessel et al., 2020); such research would contribute to the current literature involving explicit social categories (see Swang et al., 2013; Pedulla, 2014; Rosette & Livingston, 2012).

Our findings also extend language attitudes research. Specifically, our results show that certain language varieties—i.e., sets of linguist items (e.g., sounds) that define ways of speaking (see Dragojevic, 2018)—and their speakers are at higher risk of being negatively evaluated than others. This creates a distinction between low and high prestige language varieties that affect both intergroup relations and communication (see Dragojevic et al., 2021). Our work represents a first step in considering how intersecting language varieties which deviate from the norm (e.g., foreign accent and gay-sounding voice) and are associated with stigmatized groups (e.g., immigrants and gay men) can influence impression formation during intergroup encounters.

Limitations

This research comes with limitations. First, we only focused on a single native (British) and a single foreign accent (Italian) of English. Future research should extend our findings to other accents and languages. It is possible that vocal cues signaling sexual orientation may interact differently with different national accents (e.g., gay-sounding, German-accented English speaker). This may be particularly important since some stereotypes about nationalities and

sexual orientation could overlap. For instance, gay men and Italians are both perceived as warm (Cuddy et al., 2009). Second, we focused on the majority's perspective (i.e., English native speakers and heterosexual individuals), since stigmatization of non-standard accented and gay-sounding speakers is usually enacted by the dominant group. It would be important to understand whether minority participants (e.g., Italian-accented speakers and gay men) would engage in the same categorization process and would form similar impressions of the speakers. Moreover, it would be interesting to assess how high-status NA (e.g., British-accented speakers speaking Italian) gay/heterosexual speakers would be perceived (see Birney et al., 2020). The British accent is usually perceived as 'prestigious' (Stewart et al., 1985), and hearing a British-accented speaker talking in a foreign language is considered enjoyable and pleasant (see Babbel, 2019). In this case, NA and FA speakers may be attributed similar levels of competence, making sexual orientation the only factor determining differences in competence ratings. Finally, we focused only on male speakers. Hence, it remains unclear whether the same pattern of results would emerge for female speakers or whether gender, as a third category, would interact with nationality and sexual orientation to influence categorization and stereotyping.

Altogether, this research shows that voice can simultaneously convey information about multiple, intersecting social categories. This influences not only whether speakers are seen as ingroup or outgroup members by the majority group, but also how they are evaluated on multiple dimensions. Thus, our results offer a better understanding of how people make first impressions of others (social categorization and stereotyping) during intergroup encounters.

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VOICE, SEXUAL ORIENTATION AND NATIONALITY

Tables

Table 1

Means (Standard Deviations) for ratings on sexual orientation (Kinsey-like scale), nationality (Likert scale), and native language (Likert scale) across speakers' groups (Study 1)

	Dependent Variable					
Ratings for	*Sexual Orientation*		*Nationality*		*Native Language*	
	British speakers	Italian speakers	British speakers	Italian speakers	British speakers	Italian speakers
Heterosexual speakers	2.85 (.87)	3.15 (.90)	1.25 (.31)	6.09 (.95)	1.45 (.32)	5.57 (.95)
Gay speakers	2.84 (.83)	3.32 (.84)	1.46 (.37)	6.21 (.93)	1.48 (.42)	5.75 (.95)

Note: Higher numbers indicate more likely to be perceived as non-normative, meaning more gay, foreign, and non-native English speakers.

Table 2

Means (Standard Deviations) for percentages of correct sexual orientation, nationality, and native language categorization across speakers' groups (Study 1)

	Dependent Variable					
Percentage of correct categorizations for	*Sexual Orientation*		*Nationality*		*Native Language*	
	British speakers	Italian speakers	British speakers	Italian speakers	British speakers	Italian speakers
Heterosexual speakers	91.22 (17.21)	34.77 (22.00)	98.67 (4.02)	92.22 (15.34)	98.78 (3.62)	89.78 (16.35)
Gay speakers	87.67 (21.04)	23.33 (17.67)	94.56 (6.56)	95.00 (10.40)	97.89 (10.93)	95.89 (10.93)

Note: Higher numbers indicate a higher percentage of correct categorization of sexual orientation (heterosexual/gay), nationality (British/non-British), and native language (native/non-native English speakers).

Table 3

Means (Standard Deviations) for perceived gender typicality, competence, sociability, and morality across speakers (Study 2)

	Dependent Variable							
	Gender typicality		*Competence*		*Sociability*		*Morality*	
	British speakers	Italian speakers	British speakers	Italian speakers	British speakers	Italian speakers	British speakers	Italian speakers
Heterosexual speakers	5.85 (.82)	5.80 (.88)	4.43 (.85)	4.40 (.81)	4.12 (.86)	4.04 (.81)	4.36 (.89)	4.32 (.79)
Gay speakers	5.30 (1.04)	3.78 (1.04)	4.69 (.85)	4.24 (.84)	4.16 (.85)	4.38 (.89)	4.40 (.87)	4.37 (.79)

Supplementary Information

SI.1. *Study 1 – Speakers*

Previous work has shown that internalized homophobia is associated with a lower likelihood of self-disclosure (outness) that, in turn, makes individuals less likely to be perceived as gay (Tskhay & Rule, 2017). Hence, we checked participants' level of coming out assessed on 9 items which asked whether different people (e.g., mother, father, friends, superiors) knew about their sexual orientation (1 = the person does not know about my sexual orientation – 5 = the person knows about my sexual orientation because we have openly talked about it). A one-sample *t*-test against the scale midpoint showed that gay speakers were out with a lot of people they usually interact with ($M = 3.16$, $SD = .60$, $t(18) = 4.80$, $p < .001$). Moreover, Italian gay speakers ($M = 2.91$, $SD = .66$) tended to report lower coming out than British speakers ($M = 3.44$, $SD = .40$), $t(17) = -2.16$, $p = .050$, but both groups of speakers reported being out of the closet. Also, since perceived gender typicality is associated with self-perceived and other-attributed sexual orientation (Kachel et al., 2020), we assessed self-perceived gender typicality. Gay speakers ($M = 4.45$, $SD = .94$) perceived their voices as less gender typical than straight speakers ($M = 5.65$, $SD = .87$), $t(38) = 37.78$, $p < .001$. Moreover, British speakers ($M = 6.62$, $SD = .51$) tended to believe that their voices were more revealing of their nationality than Italian speakers ($M = 5.95$, $SD = 1.10$), $t(31) = 2.04$, $p = .050$.

SI.2. *Prejudice*

We assessed sexual prejudice using the Modern Homonegativity scale (MHS, Morrison & Morrison, 2002; $\alpha = .93$), which consists of 12 items (e.g., "Many gay men and lesbians use their sexual orientation so that they can obtain special privileges"), and prejudice toward immigrants using the Modern racial prejudice scale (MRP, Akrami et al, 2000; $\alpha = .81$), which consists of 9 items (e.g., "Racist groups are no longer a threat toward immigrants"). Answers on these two scales were reported on a scale from 1 (*strongly disagree*) to 7

(*strongly agree*). Items were averaged so that higher scores indicated higher prejudice toward gay men and immigrants, respectively.

Participants showed low prejudice toward gay men (M_{MHS} = 3.26, SD = 1.27; $t(89)$ = -5.43, $p < .001$) and immigrants (M_{MRP} = 3.16, SD = .93; $t(89)$ = -8.48, $p < .001$) since one-sample t-tests indicated that both scores were below the scale midpoint (4). For correlations between variables see SI.3.

SI.3. *Study 1 - Correlations*

	1	2	3	4	5	6	7	8	9	10	11
1. Sexual prejudice	-										
2. Racial prejudice	.77**	-									
3. Sexual orientation – Kinsey-like scale	-.05	-.11	-								
4. Sexual orientation – *d* prime	.06	.14	-.13	-							
5. Sexual orientation – response bias	.03	.12	-.44**	.12	-						
6. Nationality – Likert scale	.06	-.04	.13	.22*	.00	-					
7. Nationality – *d* prime	-.16	-.17	-.04	.22*	.14	.27**	-				
8. Nationality – Response bias	-.07	-.11	.08	.006	-.03	.39**	-.16	-			
9. Native language – Likert scale	.06	.02	.22*	.005	-.04	.75**	.26*	.20	-		
10. Native language – *d* prime	-.22*	-.21*	-.09	.17	.25*	.34**	.58**	.13	.35**	-	
11. Native language – Response bias	.04	.06	-.004	-.02	.01	.41**	.07	.50**	.53**	.06	-

SI.4. *Study 2 - Speakers*

A 2 (speaker sexual orientation) x 2 (speaker accent) ANOVA was performed on ratings for speakers who were selected for Study 1.

For sexual orientation ratings, a significant main effect of sexual orientation, $F(1, 89) = 141.07$, $p < .001$, $\eta_p^2 = .61$, showed that gay speakers ($M = 3.950$, $SE = .11$) were rated as more gay than heterosexual speakers ($M = 2.58$, $SE = .08$). A significant main effect of accent, $F(1, 89) = 17.73$, $p < .001$, $\eta_p^2 = .17$, showed that FA speakers ($M = 3.49$, $SE = .10$) were more likely to be perceived as gay than NA speakers ($M = 3.04$, $SE = .10$). No significant interaction emerged, $F(1, 89) = 2.01$, $p = .16$, $\eta_p^2 = .02$.

For nationality ratings, a significant main effect of accent, $F(1, 89) = 1704.21$, $p < .001$, $\eta_p^2 = .95$, showed that FA speakers ($M = 6.20$, $SE = .10$) were perceived as more non-British than NA speakers ($M = 1.28$, $SE = .04$). A significant main effect of sexual orientation, $F(1, 89) = 19.63$, $p < .001$, $\eta_p^2 = .18$, showed that gay speakers ($M = 3.85$, $SE = .05$) were rated as less likely to be British than heterosexual speakers ($M = 3.64$, $SE = .06$). No significant interaction emerged, $F(1, 89) = 1.29$ $p = .26$, $\eta_p^2 = .01$.

For language ratings, a significant main effect of accent, $F(1, 89) = 1215.06$, $p < .001$, $\eta_p^2 = .93$, showed that FA speakers ($M = 6.20$, $SE = .10$) were perceived as more non-British than NA speakers ($M = 1.28$, $SE = .04$). A significant main effect of sexual orientation, $F(1, 89) = 111.41$, $p < .001$, $\eta_p^2 = .56$, showed that heterosexual speakers ($M = 4.33$, $SE = .08$) were rated as more likely to be English non-native speakers than gay speakers ($M = 3.69$, $SE = .06$). A significant interaction emerged, $F(1, 89) = 224.89$ $p < .001$, $\eta_p^2 = .72$. While FA gay ($M = 6.10$, $SE = .11$) and heterosexual ($M = 5.81$, $SE = .14$) speakers were similarly perceived as non-English native speakers, NA heterosexual speakers ($M = 2.86$, $SE = .05$) were perceived as less

likely to be English native speakers than gay NA speakers ($M = 1.29$, $SE = .05$). Despite this

difference, both gay and heterosexual NA speakers were clearly rated as English-native speakers.

We also checked how the selected speakers self-perceived in terms of gender typicality, since

this was assessed in Study 2. Gay speakers ($M = 4.33$, $SD = 1.03$) self-perceived as sounding less

gender typical than heterosexual speakers ($M = 6.00$, $SD = .89$), $t(10) = 2.99$, $p = .014$.

SI.4. *Prejudice*

Participants completed the Modern Homonegativity scale (MHS, Morrison & Morrison, 2002; α

$= .93$) and the Modern racial prejudice scale (MRP, Akrami et al., 2000; $\alpha = .90$), as in Study 1.

They also reported how frequently they have contact with gay colleagues, friends, acquaintances,

and neighbors (1 = *very small amount*; 7 = *very large amount*). One-sample *t*-tests against the

scale midpoint (4) showed that participants reported relatively low levels of prejudice toward

both gay men ($M_{MHS} = 3.17$, $SD = 1.38$) and immigrants ($M_{MRP} = 3.30$, $SD = 1.12$), ts < -6.86, ps

$< .001$. Analyses also showed that participants knew approximately 3 gay/lesbian individuals (M

$= 3.46$, $SD = 3.20$) and did not have frequent contact with gay people ($M = 2.70$, $SD = 1.50$;

$t(128) = -9.11$, $p < .001$).

SI.5. *Study 2 – Correlations*

	1	2	3	4	5	6
1. Sexual prejudice	-					
2. Racial prejudice	.76**	-				
3. Gender typicality	.19*	.08	-			
4. Competence	-.25**	-.31**	.28**	-		
5. Sociability	-.30**	-.29**	.12	.75**	-	
6. Morality	-.25**	-.31**	.20*	.89**	..86**	-