**“Like Static Noise in a Beautiful Landscape”:
A Mixed-Methods Approach to Rationales and Features of Disliked Voices in
Popular Music**

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Abstract

The use of the voice in everyday communication is vital for our understanding of human interaction. The singing of popular music often amplifies vocal features from speech, which can provide insights into vocal activity in the context of the intense emotional impact of music. Three studies with a mixed-methods approach aimed at evaluating rationales and features of disliked voices in the context of popular music. In an interview study (N = 20), rationales and features for disliked voices were identified using self-selected voices. In a group testing session (N = 48) and an online survey (N = 216), these disliked voices were presented to new participants, and the vocal features and evoked emotions by the singers were investigated, assuming that the participants did not have strong opinions about the voices. The results showed that participants justified their dislikes based on object-related/sound and emotional reasons, similar to findings from studies on musical taste. Specific features of disliked voices were confirmed in the following studies, including a specific feature of popular singing styles, the twang, perceived as a squeaky and nasal sound. Further disliked features include a pressed sound, imprecise and ordinary articulation and a uniform expression. Notably, a rough voice was no predictor of aesthetic judgments. Evoked feelings relate to vocal features with similar tension levels. The measures created in the current study will also be informative for studying voice perception and evaluation more generally, which is a tool to evaluate vocal expression and items to evaluate reasons for disliked voices.

Keywords: voices, vocal features, singing, expression, aesthetics

“Like Static Noise in a Beautiful Landscape”:

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Singing voices are an everyday, widespread phenomenon, nowadays accessible via every portable audio device and played in many situations, when driving a car and listening to the radio, going to a store, or watching television or YouTube channels. As a result, listeners are highly familiar with different kinds of musical styles and voices of different colors and expressions. However, while music has been shown to play an essential role in everyday life and serves important functions such as social engagement and mood management (DeNora, 2010; Schäfer & Sedlmeier, 2009), the role of the singing voice and its sonic qualities have gained little attention so far, even though the voice can strongly influence music preferences and dislikes (Greasley et al., 2013). The reason for this might lie in the limited vocabulary available, as noted by Kenny and Mitchell (2006, p. 56), i.e., that listeners apply personal constructs to make voice judgments simply because they might not have the vocabulary needed to describe vocal features. The ‘limited vocabulary’ explanation might account for why research so far has not proceeded beyond asking participants to report their judgments without exploring what they perceive in the voice. Taking these verbal descriptions of vocal qualities into account might be valuable in understanding these judgments – and, more importantly, might explain why listeners often differ in their aesthetic judgments.

To date, the evaluation of voices has been restricted to expert evaluations with trained listeners and to specific contexts, such as the clinical context to describe voice disorders (Hirano, 1981; Mathieson, 2001; Nawka et al., 1994; Wendler & Anders, 1986), the field of phonetics (Laver, 1980) or speech science (Bose, 2001, 2010), pedagogy with a focus on singing classical repertoire (Ekholm et al., 1998; Henrich et al., 2008; Oates et al., 2006), or, only rarely, with a focus on the voice in popular music (Sadolin, 2009).

Hence, the investigation of aesthetic judgments of singing voices with untrained listeners needs a broader approach that gives room for the participants to express their impressions of a voice. Free descriptions by the participants could be supported by providing specific terms of vocal-articulatory expression that give participants the chance to express their impressions. By this, the participant's implicit knowledge would be used to investigate their judgment basis of voices. The descriptions and terms elicited can then be matched to expert ratings and related to the aesthetic experience.

This approach is supported by research that has shown that non-experts are not necessarily 'bad' judges. Listeners are familiar with popular music styles, which makes them experts in their own rights as was shown, for example, in the implicit learning of musical capacities (Bigand & Poulin-Charronnat, 2006) and the correctness in singing (Larrouy-Maestri, 2018). Even in the evaluation of emotional speech, non-experts were able to rate voices on several vocal features leading to characteristic descriptions of emotional expression (Bänziger et al., 2014). Therefore, a 'non-expert' in the current study has to be understood as someone without formal musical or singing training but with the capacity to judge voices based on implicit knowledge through exposure.

With the current series of studies, a mixed-methods approach combining interviews with questionnaires was selected to investigate the rationales and features of disliked singing voices. Notably, essential features of vocal-articulatory expression were investigated in the context of different musical styles and, through this, acknowledged a culturally relevant phenomenon—popular music. Because singing popular music is close to everyday life, the everyday singing experience, and in many aspects close to speech production, this study draws on the participant's experience with these voices, particularly their attitudes toward voices and the specific vocal features that contribute to disliking. The current studies offer a new approach toward investigating aesthetic judgments: All features that make a voice special

in some way can either contribute to liking or disliking—which can, therefore, be regarded as an equally valuable approach to researching aesthetic judgments.

Features of Popular Music Singing Styles

Phenomena from everyday communication can be found in popular music, such as crooning (whispering) and moaning (whining, lamenting, and sighing), howling, or wailing (Hähnel, 2015). Depending on the style, consonants and vowels are treated very speech-like, not as in Western lyrical and opera singing with prolonged vowels. A pressed (Thalén & Sundberg, 2001), rough or breathy phonation is quite common in speech and singing and does not only exist in Heavy Metal. Country singing shows acoustical overlap with speaking (Cleveland et al., 2001). Singing techniques such as belting, characterized by high intensity, are comparable to loud speech (Stone et al., 2003). The change of register in popular singing styles exists in its own right with pitch breaks that might be called an insufficient technique in lyrical/opera singing (Hähnel, 2015). Another distinguishing feature of singing and speaking concerns the form of pitch changes, which is represented by the characteristics ‘sudden and gliding’ (in music/singing called ‘glissando’) (Merrill & Larrouy-Maestri, 2017). Vibrato, on the other hand, does not occur in speech and refers to a regular change in pitch at regular intervals.

A significant feature in popular styles is the so-called twang, which is produced with a narrowing/constriction in the larynx (a kind of funnel; cf. Sadolin, 2009), which changes the sound spectrum (Sundberg & Thalén, 2010). A nasal sound can accompany it, but both can occur independently from each other (Hähnel, 2015).

Interestingly, for a long time, musicology and psychology focused on Western classical music, and lyrical/opera singing and features such as roughness in popular singing styles became a stigma in clinical voice research questioning the value of aesthetic judgments (Büttner, 2008; Seidner & Büttner, 1998). However, particularly these features, such as pitch breaks and roughness, provide the opportunity to investigate a much broader range of vocal

expression—and possibly also aesthetic judgments—than the highly legitimized and standardized Western lyrical/operatic singing style.

Features of Liked and Disliked Voices

Discussions about voice quality and judgments about the beautiful and the ‘good’ voice date back to ancient history (Brutus by Marcus Tullius Cicero, Cicero, 2012; the *Onomasticon* by Iulius Pollux, Bethe, 1900-1937). Only a few studies have empirically investigated the aesthetic judgments of voices. Reports show that listeners from Western cultures prefer voices with a medium intensity level, together with almost any, often lower, pitch level (Hollien et al., 1991), they find voices pleasant that are not harsh, but associated with naturalness and a certain loudness and are suitable for the specific context, here of audiobook readers (Goy et al., 2016). Women find low but not too low male voices more attractive, and men prefer high female voices to low female voices (Re et al., 2012). Of course, these kinds of judgments are dependent on socio-cultural aspects, as has been shown cross-culturally for speaking pitch in different cultures (Montepare & Zebrowitz-McArthur, 1987; Ohara, 1999; van Bezooijen, 1995). Even ‘ideal’ voice quality has been tried to be defined, leading to the conclusion that there are no features that will, in any situation, separate the ideal voice from the average/normal voice (Hollien, 2000, p. 16). Only in clinical research, a normal voice is more likely to be defined based on its ‘counterpart,’ the disordered voice (Mathieson, 2001, p. 68). In the context of the ‘beautiful’ voice, Himonides (2009) formulates (theoretically) seven factors that the perception/judgement is dependent on, such as emotion perception or musical and acoustical aspects (see also, Scherer & Zentner, 2001). Aiming at identifying the beautiful voice via its supposed counterpart, the acoustical analysis of an ‘ugly’ voice of one male classical singer shows a lack of a singer’s formant, an irregular vibrato and a hyperfunctional phonation (Sundberg, 2006, p. 139).

It is striking that the ‘normal’ voice has only been described in a scientific context to show what is different from it. In everyday life, it could be assumed that ‘normal’ is also used

as a synonym for inconspicuous and, therefore, almost boring. An ‘ideal’ voice, however, already indicates a preference—for example, a voice is preferred if it is ideal in a specific situation. However, an opera singer can be ideal for a role, but he or she does not have to be liked—even if this is often implied. Hence, it is obvious that the aesthetic experience partly lies in the context. Therefore, it is vital to extend our knowledge to ecologically valid fields—popular music listening via headphones is luckily one of them.

Rationales for Liking and Disliking Music

It could be seen that the vocal behavior of singers plays a role in the construction of musical taste (Ackermann, 2019, p. 93; Greasley et al., 2013, p. 414; von Appen, 2007, pp. 105–109). This does not only apply to vocal features; it was also noted that the emotional impact of a singer on the listener plays a critical role, indicating that further rationales exist for the liking or disliking of voices. The legitimization strategies for musical taste have been subsumed under the themes of a) self-referential reasons, i.e., aspects that refer to the perceiving person, such as their attitudes, b) object-related reasons, i.e., features in the music, and c) social reasons, i.e., referring to oneself in the context of others or d) unspecific judgments, i.e., aspects that cannot be assigned to one of the other categories, such as ‘kitsch,’ authenticity and commerciality (Ackermann, 2019; Behne, 1986, 14ff., 1987, 229f.; Kunz, 1998; Schäfer & Sedlmeier, 2009).

It can be assumed that such rationales also play a role in the aesthetic judgments about singing voices. For example, why people listen or do not listen to music involving a particular singer, which rationales do they present to justify their likes and dislikes and how do certain vocal features relate to the presented justifications, needs further investigation.

Taken together, aesthetic judgments of voices in music is an underrepresented phenomenon in empirical research. Additionally, researching the ‘negative’ side of musical taste has shown promising results into how people form aesthetic judgments. The roots for this discourse can be found in sociology. In his theory of social distinction, Bourdieu (1984)

formulated that dislikes of cultural goods or art works cannot be interpreted without incorporating the social status, social environment, and the practice of discrimination. Particularly in the context of music, Bourdieu sees the use of negative attitudes and feelings, such as disgust and aversion, as being toward the taste of ‘the others’ (p. 105). Empirically, it has been shown that dislikes were more socially diagnostic than positive desires (Wilk, 1997, p. 175). Furthermore, negative events have stronger as well as longer lasting effects on mood than positive events; negative emotions lead to stronger cognitive processes and have stronger effects on behavior, and there are more words to express negative than positive feelings (Baumeister et al., 2001, 331ff.; Rozin & Royzman, 2001, p. 305). Therefore, researching dislikes is a valuable addition to our understanding of how people form aesthetic judgments.

The Present Study

In a series of three studies, qualitative and quantitative methods were combined to evaluate the rationales, features, and evoked emotions by singing voices in popular music. Firstly, interview sessions focused on rationales of disliked voices, including free descriptions of vocal expression. The uttered terms were compared to a questionnaire that every participant additionally used to evaluate the disliked features of the particular voice. Building on the findings, a revised list of vocal features was presented to a new group of participants, where the liking/disliking was investigated for every single feature. Liking ratings of the singer, song, lyrics, and musical style were also collected to control for possible interference between these dimensions in the judgment of voices. Finally, an online survey was implemented with a much larger group to confirm the disliked features of voices found. Additional to the overall liking of the singer and the song, a small selection of evoked feelings in response to voices and music was investigated to compare the perceived features with the emotion items.

Interview Study 1: Rationales for Disliked Voices

Based on the presented literature, one could assume that people are more often than expected able to express their attitudes toward individual singing voices and the respective vocal features in a sophisticated way. Nonetheless, it was also to be suspected that the vocabulary of non-experts about voices might be limited. Therefore, a mixed-methods approach was chosen, which included interviews to give a person the chance to use their vocabulary, and a questionnaire with terms to provide the person with additional tools to describe features of vocal expression to widen their expressivity. Because these terms could not be assumed to be easily understood—or might even be misunderstood—the interviewer could give further explanations in a controlled manner.

Additionally, three voice-experts (with a Ph.D. in speech science and phonetics and experiences in evaluating singing voices) rated all voices using the same questionnaire so that a comparison between their judgments and the participants' judgments could be made. Another goal of this study series was to create a tool for the evaluation of vocal expression (EVE₉) for non-experts to describe the vocal-articulation expression in singing voices in popular music. These results, including the comparison with expert ratings (who did not give aesthetic judgements), are not part of the current report, but supporting information can be found in the supplementary material (Figure S1).

Methods

Choice of research method. Firstly, the main research questions were formulated so that a concept for carrying out the study could be developed: How do non-experts describe vocal features? Which features of singing voices are disliked? How is the disliking of voices justified? Additional to these overall questions, questions of further, secondary interest were formulated: To what extent is the dislike of a voice associated with the dislike of the musical style, lyrics, and other music-external reasons, such as the impression of the singer's personality or associations with the song?

The study aimed at capturing an open and uninfluenced investigation of a) the feature descriptions of disliked voices, and b) the rationales for disliking and reactions to the voice. The ‘focused interview’ was chosen to be a suitable research method (Merton et al., 1990). This approach requires participants to be involved in a particular situation or with a specific stimulus so that the interview can examine the individual’s reactions to that stimulus. This goal was to be achieved by inviting participants who brought a self-selected recording of a voice they strongly disliked to the interview. The recording was listened to together with the interviewer at the beginning of the session.

The interview was based on an interview guide, which needed to satisfy four criteria for conduction. In a nutshell, it had to give room for the participant to express a range of responses, but at the same time, elicit specific reports about the stimulus as well as go in-depth to describe affective, cognitive and evaluative meanings of the situation. Also, it had to ascertain attributes and prior experiences of the participants that are related to the subjective experiences (i.e., Range, Specificity, Depth, and Personal Context; Merton et al., 1990).

It is of note that the studies were conducted in German, and all terms and phrases were translated into English.

Participants. Recruitment was done via a pool of participants who agreed to receive invitations for studies at the research facility and were asked to send in a link or a recording of a singing voice they disliked. The selection followed these criteria: The focus had to be on vocal features of a professional voice (i.e., how the voice sounds) and not performance features (wrong notes); growling and screaming was not welcome (e.g., singing techniques from Heavy Metal) as well as clear examples of electronically modified voices; also, the voice should be audible (i.e., not covered too much by background singers). Participants could also send in more than one recording.

Twenty participants (15 female) were recruited, of which three brought two different singers to the interview session so that 23 voices were incorporated into the study (Table 1).

Participants were on average 38.55 (SD = 16.39) years old, and 13 were University students.

The chosen music titles were all from popular music styles. Nine singers were female, 13 male and one a child (Angelo Kelly).

The interviews took place in a room that was set up for conducting interviews with a living room atmosphere. At the beginning of the interview, the recording of the singer was listened to together via a stereo with loudspeakers. Ten interviews were conducted by a female and ten by a male researcher to counteract an interviewer bias. One session lasted about an hour; the interview itself was between 20 and 40 minutes. Monetary compensation was 10 euros.

Table 1

Singers and Titles in the Interviews

DV	Singer/Artist name (real name)	Song	Gender	Study 2 ID	Musical Style
01	Kelly Family (Angelo Kelly)*	An Angel	m (child)		Pop
02	Lena Meyer-Landrut	Satellite	f	08	Pop
03	Xavier Naidoo	Abschied nehmen	m	15	Pop
04	Gitte Haenning	Ich habe die Liebe verspielt	f	05	Schlager, Folk
05	Helge Schneider	Katzeklo	m	06	Jazz, Schlager
06	Canned Heat (Adam Wilson)	Going Up The Country	m		Psychedelic Rock
07_1	Samuel Harfst	Privileg	m		Pop
07_2	Casper (Benjamin Griffey)	Hinterland	m	04	Hip Hop, Rap
08	Anneliese Rothenberger	In mir klingt ein Lied	f	13	Classical (Operetta)
09	Annett Louisan	Das Spiel	f	02	Pop
10_1	Tim Bendzko	Nur noch kurz die Welt retten	m		Pop
10_2	Udo Lindenberg	Durch die schweren Zeiten	m	14	Rock
11	Maroon 5 (Adam Levine)	Misery	m		Pop
12	Bob Dylan	Don't Think Twice It's All Right	m	03	Folk
13	Michelle	Paris	f	11	Schlager
14	Sarah Brightman	Think Of Me	f		Classical (Musical)
15	Anastacia	I'm Outta Love	f	01	Pop
16	Mariah Carey	My All	f	09	Pop, R&B
17	Herbert Grönemeyer	Männer	m	07	Pop
18_1	Max Herre	Blick nach vorn	m	10	Singer Songwriter, Pop
18_2	Nena	Nur geträumt	f		Pop
19	Passenger (Mike Rosenberg)	Let Her Go	m	12	Alternative, Indie
20	The Tallest Man on Earth (Kristian Matsson)	Love Is All	m	16	Alternative, Indie

Note. ‘DV’ indicates the abbreviation used in the text. The column ‘Study 2 ID’ shows the selection of music titles for the group study.

Interview procedure and guideline. After filling out the forms for data protection and giving consent about the recording of the interview, the session consisted of two parts. After listening together to the full song, firstly, the interview was conducted following an interview guide (Table 2), and secondly, a questionnaire with preselected terms to describe vocal expression was filled out.

Questions in the first block (questions no. 1–5) were aimed at feature descriptions of the voice. Named features were inquired repeatedly to not only find out about ‘what’ is disliked but also about ‘why’ it is disliked. Another question asked for more general descriptions of the voice, to maybe tease out more terms to describe the voice but also to see whether participants were able to distance themselves from the disliked voice. Questions in the second block (no. 6–9) aimed at inquiring about the influence a voice could have on the listener, e.g., about evoked feelings and physical reactions. Questions on associations with the voice should, for example, lead to connections with environmental noises or sounds, which possibly support the described vocal expression. Furthermore, memories that might be connected with the piece should be inquired. This was, together with the questions in the third block (no. 10–13), also aimed at finding out whether extra-vocal or -musical reasons might have led to the dislike. The influence of musical style and lyrics on the dislike was examined to separate them from the dislike of vocal features.

Table 2

Interview Guide

1.	What is this recording? Who is the singer?
2.	What do you dislike about the voice?
3.	Why do you dislike [mentioned characteristic]? (Go through all the characteristics one after the other.)

4.	Which of these characteristics is the most important for you? What do you like least?
5.	How does this voice sound to you? Can you describe it?
6.	What does this voice trigger in you?
7.	How do you feel when you hear this recording? (if not mentioned: How does your body react to it? What feelings do you have when listening?)
8.	Does the sound of the voice remind you of anything? (associations)
9.	Do you associate memories with the voice or piece?
10.	Do you like the voice of this singer in other pieces?
11.	Do you like this kind of music?
a.	Would you perhaps like the song more if it was sung by another singer?
b.	Do you (not) like the style of music in general?
12.	What do you think about the singer? What is he/she like?
13.	What do you think about the text of this piece? Can you say what the piece is about?
14.	Do you have anything to add?

Questionnaire. The questionnaire (Table 4) consisted of an adapted and shortened version of the extensive catalog for the description of ‘vocal-articulatory expression’ (Bose, 2010, p. 29). The questionnaire was already used for the expert evaluation of ‘speech song’ in Western Art Music of the 20th century (Merrill, 2017; Merrill & Larrouy-Maestri, 2017) and Jazz singing (Merrill, 2019). Participants completed the questionnaire by themselves first and then asked questions about the items they did not understand, which were subsequently discussed. Lastly, the chosen items were rated according to their importance in constituting the dislike: (1) very important, (2) important, (3) not important. Evaluations reflected a so-called ‘Just-about-right scale,’ i.e., a characteristic being present in a singer either ‘too much’ or ‘too little,’ which can be found in other judgments of sensory events in consumer research (Popper & Kroll, 2005), music and vocal performances (Kroger & Margulis, 2016; Merrill & Larrouy-Maestri, 2017), and reports on disliked music (Ackermann, 2019).

Analysis. The interviews were recorded and transcribed in a ‘wide’ transcription, in which laughter, hesitations, possible demonstrations, and incomprehensible utterances were noted and annotated. Interviews were analyzed following the Qualitative Content Analysis (Mayring, 2000, 2010) using the computer software Atlas.ti (Version 7, Scientific Software Development, Berlin). The interview study had a clear objective and followed a hypothesis-

based approach. The first coding already followed a basic structure due to the research questions described above and the specifically formulated question for the interview guide with the following themes: Disliked properties , general description of voice, reasons for the dislike, physical reactions, queries about the singer, musical style, associations with the singer/voice sound, and memories.

Categories and subcategories were gradually developed inductively out of the material (Mayring, 2010, p. 84, 2012, p. 472). By going through the material repeatedly, the code system was regularly adapted by combining and revising codes, and eventually reduced to main categories (e.g., codes were combined, such as displeasure and discomfort, and broader categories were created, such as different reasons for disliking a voice or categories of vocal features).

Three people were involved in the transcription and coding process. They coded two interviews together at the beginning, whereby the coding was discussed and standardized. Subsequently, all coders worked individually and met at regular intervals to discuss difficulties, ambiguities of the coding process, and to clarify and standardize the codes.

Results

Influence of background knowledge, memories, and associations on judgments.

The influence of background knowledge was particularly interesting in separating possible other sources for the dislike than those related to the voice. These related to the singer, the musical style, the lyrics, and the song. The results are summarized; detailed reports can be found in the supplementary material.

Singer. In 20 cases (of N = 23 evaluated singers), the participant would probably like the song more if it were sung by another singer. Only six participants reported background knowledge about the singer (partly not verifiable), i.e., the participants cite evidence by relying on information from the media. This background information was kept rather neutral, i.e., it refers to presented facts such as popularity (DV05, 08, 12, 06; IDs refer to Table 1).

More often than fact-based opinions, assumptions were made about the singer (which the participants were encouraged to do), and conclusions were drawn about the personality (his/her intelligence, self-confidence, being likable or correspond to certain gender stereotypes; DV05, 11, 14, 17, 08).

Other impressions about the singer were expressed in connection with negative evaluations. For example, the listener insinuates that the artist acts only depending on the taste of the audience (DV08) or “It doesn't sound to me as if he actually likes to sing, but as if he's just there to get something done quickly, just because that's his job, and not because he wants to bring in emotions somehow, what I at least find has to do with music when you sing” (DV10), or it was regretted that the singer “didn't use the potential of the human voice” (DV12). In these cases, the associations are extended remarks and count as rationales for the dislike.

In connection with the impressions of a voice, the following statements are representative: “Well, she's actually old, so she's middle-aged, but she sounds like a little girl, so I think that's kind of negative.” (DV13), or “That's a wimp (laughs) [...] I just think this voice is weak for me [...] that's weepy” (DV18_1), “I think he sounds suppressed. Somehow passionate, but somehow suppressed” (DV01), which does not describe any physical suppression, but a voice that is not free, “So now without researching him or knowing him, I'd say that this is an old man trying to be cool by making his voice deeper and singing about things that affect his life, but the way he changes his voice, it sounds to me like he never experienced it, but just sings something that he thinks goes down well” (DV10). The latter statement already includes factors of the credibility of a singer's personality and additionally justifies the dislike via the criticized lack of authenticity, as also in the following examples: “I always imagine him as a small guy who somehow tries to present himself as something special through his voice. Because the voice itself sounds special and is quickly recognized,

but I just don't like it" (DV20); "Somehow superficial, very concerned about what other people think of it and boring. [...] Well, I don't like her that much either, that's why" (DV02).

Nonetheless, positive attributions can be found, such as "she is apparently a good singer" (DV16) or "I don't think he's stupid. I think he is intelligent and I think he simply has a completely different kind of humor than I do" (DV05), i.e., despite recognition of positive characteristics (humor and vocal technique), it is found that it simply does not suit one's taste. Similarly, even a certain fascination for the voice is expressed, although listening to it is described as 'not beautiful': "But on the other hand [...] it is also interesting. [...] So it's interesting, but you don't find it nice to listen to for a longer time." (DV07), "I can imagine listening to something more beautiful" (DV11) or "it's just simple, yes, not so beautiful (laughs)" (DV15). Here, a peculiar vocal sound is opposed to a 'non-beautiful' sound.

Influence of musical style, song, and lyrics on the dislike. Neither the musical style, the lyrics nor the song contributed in a significant way to the dislike of the singer. Fourteen participants liked this kind of music, and 17 liked the musical style. In the case of negative judgments, it is sometimes added that this song simply does not belong to the kind of music that the participant likes to listen to. Eight participants reported specific memories in connection with the song, which were neutral memories.

The content of the lyrics was known to most participants and could be reproduced by sixteen participants. The other participants mostly justified their lack of knowledge with the fact that they had not paid any attention to the lyrics so far. Thirteen participants made positive remarks. Criticism was uttered such as "The lyrics just sell quite well" (DV02), "not very witty" (DV03) or "trivial" (DV03, 05), "kitsch, typical Schlager [German Pop music]" (DV13) or "not so fascinating or great that I would like it" (DV10).

These findings support the conclusion that the participants' dislike focused on the voice, which would, for example, be disliked in other contexts as well. The dislike of the voice was, in some cases, accompanied by aspects of the song or the musical style, or the

lyrics that did not meet one's expectations. A missing authenticity of the singer was communicated to contribute to the dislike, which was mostly a reflection of the vocal expression, e.g., sounding cool with a lower voice, weak or wimpy. Most importantly, no negative personal memories influenced the judgment (in one case, the singer was personally known, but none reported a life event to have caused the dislike).

Rationales for disliked voices. All comments that explained a dislike of a specific voice were coded as reasons for the dislike. External attributions were incorporated as well as specific musical, lyrical, and sound aspects that were criticized or perceived as being disturbing and thus led to the negative judgment about the voice.

The reasons for the dislike could be separated from specific reactions to the voice. While reasons can be understood as part of an individual's judgment formation, which consists of a mixture of opinions, generalizations, prejudices, past experiences, and more, reactions are close to bodily reactions and behavior and immediately follow the confrontation with the disliked music. Nonetheless, reactions can become reasons for a dislike when it comes to avoiding these (unpleasant) reactions: 'This music triggers something unpleasant in me, so I don't like it and don't want to hear it.' While emotional reasons can refer both to the perceived emotions and the felt emotions (Gabrielsson, 2002), reactions refer only to the feeling component.

The codes, therefore, distinguish between reasons for a dislike (why the participant does not like the voice) and reactions to the confrontation with the disliked voice (what happens when they hear it). The participants themselves, though, did not or rarely distinguish these two aspects. The reasons given by the participants could be divided into the categories 'emotional reasons' and 'object-related reasons.' The described reactions were emotional or physical, which corresponds to the argumentation based on affective responses to music in Greasley et al. (2013). Similar to Berli (2014), the participants used both music-internal and music-external reasons, which will be discussed in more detail below.

Table 3*Rationales for Disliked Voices*

Category	Frequency	Category	Frequency
Reasons for disliking the voice	82	Reactions to the voice	53
Emotional reasons*	62	R: Actions	19
unpleasant/not pleasant/discomfort/miserable	6	need to distance myself	15
feeling disturbed	2	blank it out	1
unnatural / not authentic	11	escape reflex	1
no evoked emotions	5	conscious effort to remain seated and listen	1
not fun to listen to	1	pursuing other activities	1
puts one in a bad mood/pulls one down	3	R: Physical	24
no evoked positive emotions	1	unpleasant / malaise	2
not mellifluous	1	strenuous	3
annoying	6	tensed up	3
stressful	2	cramped	3
straining	1	tense	6
makes one furious	1	impatient	3
nothing expressed (emotions)	3	restless / nervous	3
disgust / being repelled	2	cannot concentrate	1
retreat / avoidance	1	R: Behavior	10
anger / aggression	7	twitch	1
unwillingness	3	folded arms	1
defense	3	hand clenched into fists	1
dislike	2	closing eyes, squinted eyes	2
changes one's mood	1	breathing deteriorates	1
Object-related reasons	20	hurts one's ears	3
the voice does not fit the song	4	makes one's hackle rise	1
dis-harmonic	4		
technical deficiencies	2		
missing sound image	2		
lack of variability	1		
lack of power	1		
strained voice	2		
like scratching on a blackboard	1		
boring / not interesting	3		

Note. List of identified categories and subcategories with their frequencies. Note, the table does not include repeated quotations by one participant/song. * Refer to the text for overlap with emotional reactions.

Emotional reasons and reactions. Often an unnatural or less authentic impression with additional descriptions was named as the reason for the dislike (Table 3). Even if no specific emotional experience was mentioned, this kind of impression was coded as emotional reasons, because it was more a felt impression than a rationally considered reason.

The performance either evoked unpleasant emotions, such as discomfort, or putting one in a bad mood, or it did not trigger emotions and did not evoke positive emotions, such as being no fun to listen to it.

Emotional reactions included that listening was annoying, stressful, straining, and made one furious. One participant was repelled by the voice, and another was disgusted. Further reactions included retreat or avoidance, anger, or aggression (“my impatience is actually a form of aggression,” DV03) or an adverse emotional reaction to the singer (“dislike the person I don't know at all,” DV19). One noticed that music listening could “bring about a certain mood,” after which it was said that the voice “pulls me down [...] it changes my mood [...] when he [the singer...] wails, then I'm just as miserable” (DV18_1).

Object-related reasons. The most frequently mentioned object-related or music-internal reasons are that certain aspects of the music did not fit together in terms of sound, the lyrics, or the mood of the piece, e.g., a perceived disharmony in comparison to a melodic piece. “So it is somehow a disturbing noise, like having a beautiful picture, with a flower and a landscape, and then static noise comes into this picture” (DV01). Some participants named technical deficiencies concerning the intonation, lack of variability, and power; it sounds strained or like scratching on a blackboard with one's fingernails.

Reactions to the voice. Three subcategories were identified. The first comprised specific actions that were taken when listening to the voice, such as, most frequently, the need to distance oneself, and related actions, such as closing eyes and blocking out the music.

The second subcategory comprised physical reactions. The feeling of unpleasantness was already described under emotional reasons because it could relate to emotional or physical unpleasantness. Further physical reactions included descriptions such as tensed up and cramped when listening. That the voice makes one impatient, restless and nervous was also mentioned.

Thirdly, actual changes of behavior were observed in the form of a twitch, that arms were folded, hands were clenched into fists, and the eyes were squinted, and that breathing deteriorated (“this pressure, which primarily develops in the chest,” DV18_1). It was reported that it hurts one's ears, or once that it makes one's hackles rise.

The physical reactions were rarely assigned to a specific organ or body part. Interestingly, participants did not mention reactions related to their own vocal behavior, i.e., reactions affecting organs directly involved in voice production, such as the throat. Only the respiration/thorax was mentioned once, i.e., the peculiar respiration and the breathing pressure of one singer was physically reproduced. In the current study, it can be assumed that a conspicuous use of the voice was felt in the sense of imitation, which then could have contributed to the negative judgment. Either the functional reproduction was not explicitly perceived, or it did not have such a strong influence on the reaction of the listener as was suspected.

Disliked characteristics and voice descriptions. Most descriptions referred to the sound of the voice (N = 29; Table 4), of which eight referred to noise components, that is to a perceived roughness in the vocal sound (rough, scratchy, but also ‘not clear’ and ‘unclean’). Also, sound descriptions such as ‘pressed’ could contain noise. Other terms commonly refer to a squeaky or nasal sound.

Ten descriptions refer to pitch, such as the pitch level, the form of pitch changes, and intonation. The quotations in the categories articulation and sound duration were unclear. While only one participant mentioned an accent and incomprehensibility, other statements referred somewhat diffusely to tone holding durations. The term ‘accentuation’ also occurred twice and could not be assigned to an accentuation. Twice aspects of mode of phonation were named and once a rhythmic aspect. A total of 16 statements referred to the overall impression of the vocal expression, including seven descriptions of ‘not masculine’ and ‘childlike.’

First of all, it can be concluded that the participants mentioned characteristics from the categories pitch/voice pitch and voice sound, including noise components and descriptions of the overall impression rather often. Characteristics of articulation, such as sound duration and emphasis, seemed to be important, while comprehensibility itself seemed to play a subordinate role. These terms were compared to the terms checked in the questionnaire.

Further associations with the voices and general descriptions can be found in the supplementary material.

Table 4

Categories of verbal descriptions of disliked characteristics of the voice in the interviews (all translated from German)

Pitch	Loudness	Sound of voice	Noise	Articulation / Sound Duration
changing pitch level (DV10, 16, possibly 20) wrong pitch level (DV04, 05) ‘unclean’ (in the sense of intonation DV06, in the sense of form, pitch connection DV08) high (DV06, 17) missing depth/low (DV19) monotone (DV02, 05) sings/reaches tones from below (DV08)	(shouting)	nasal, miffed (DV02, 07, 09, 14) ,knoedel‘ (twangy DV08) pressed (DV10, 17, 18_1, 20) less soft (DV19) thin (DV17) pointy (DV06) squeaky (DV11, 15, 18_1, 20) squeal (DV13) ‘cheepy’ (DV13) tinny (DV19; DV04) no substance (?) (DV18_2)	noise in tone onset (DV16) scratchy (DV01) rough (DV07, 20) scrabble/paw (DV14) not clear (DV08, 11) ‘unclean’ (in the sense of noise) (DV01)	accent (DV02) intelligibility (DV02) stretched (?) (DV01) does not hold sung vowels (?) (DV14) short tone duration/length (?) (DV03)

Mode of phonation	Rhythm	Accentuation	Tension	Associations / Expression
spoken (DV12) shouting (DV16)	choppy (DV10)	emphasis/stress (?) (DV07, 08)	powerless, weak (DV18_1) (also pressed, see sound of voice)	Not masculine (DV11, 18_1, 19) childlike (DV01, 02, 18_1, 19) arrogant (DV14) unappealing (DV14) disinterested („uncouth“ DV10; „dashed off“ DV12) boring (DV02, 05) whiny/sniveling, moaning (DV03, 18_1) eerie (DV05) exaggerated female (DV13)

Note. Question marks indicate ambiguous usage.

Disliked features in the questionnaire. The ratings of characteristics being crucial for the dislike are indicated by low mean ranks (i.e., highest ‘important’ ratings; Table 5), that is, average pitch, timbre, sonority, resonance, nasal, sound and pitch modulations. Tension was slightly less important. It should be noted that not all characteristics were rated. In particular, the characteristics with a perceived lack of clarity were often not evaluated, such as ‘creaky’ and ‘breathy.’

Table 5*Questionnaire with Features and Feature Characteristics in Study 1*

Question	Characteristic	N	Characteristic	N	Importance rating 1/2/3	Mean rank	Feature
The voice is too ...	low	5	high	7	8/2/2	7	average pitch
	dark	3	bright	8	9/0/2	7	timbre
	loud	5	soft (quiet)	3	0/0/0	-	loudness
	tense	10	unsupported (,un-tensioned*)	6	4/6/6	8.5	tension
	full	1	thin	13	8/5/1	7	sonority
	wide	0	constricted (tight)	10	2/6/2	12.2	faucal distance
	soft	7	hard	7	2/9/3	12.2	sound of voice
	dull	1	shrill	10	8/2/0*	7	resonance
	breathy	5			3/1/1	11.5	breathiness
	rough	7			3/1/3	11.5	roughness
	creaky	5			3/1/1	11.5	creaky
	nasal	13			11/2/0	7	nasal
The sounds are too ...	lengthened	7	shortened	3	3/4/3	10.3	sound duration
The pitch changes are too ...	sudden	3	gliding	4	1/6/0	14.1	pitch changes
Singing rather resembles ...	speaking	9	shouting	3	1/2/9	16.4	mode of phonation
The voice has inappropriate ...	vibrato	2	tremolo	4	3/3/0	10.3	vibrato
The vocal onsets are too ...	soft	3	hard	5	2/5/1	12.2	onsets
The articulation is too ...	precise	2	imprecise	11	3/6/3*	10.3	articulation precision
The voice modulates sound too ...	little	12	much	5	9/7/1	7	sound modulations
The voice modulates pitch too ...	little	9	much	6	8/4/3	7	pitch modulations

Note. Numbers of checked disliked characteristics and rating of importance for the dislike:

Rating 1 = very important, 2 = important, 3 = not important. Mean ranks are based on a

Friedman test. * One not evaluated.

Considering the frequency of the feature ratings together with the mean ranks of importance ratings, most essential for the disliked voice were: nasal, timbre (bright more often than dark), few modulations in sound and pitch, a high and a low average pitch, a thin voice, and shrill resonance.

Interim Discussion 1

Features. Features that contribute to the disliking of voices belong primarily to the categories pitch, vocal sound, and descriptions of the overall expression. Particularly, modulations in sound and pitch, as well as sonority/resonance, are often mentioned and rated as important features. The pitch of the voice itself also seems to be important, however, is

mentioned less often. Characteristics of articulation (duration of sound and emphasis) seemed to be important in the interviews, but it is still unclear to what extent. Comprehensibility, in itself, seems to play a subordinate role compared to peculiarities in articulation.

The feature nasal led in this evaluation to an exciting result because it was not explicitly mentioned in the interviews but rated important for the dislike in the questionnaire. Mentioned frequently together with a ‘squeaky’ sound, these terms are used to describe an essential feature in popular music called the twang.

In the interviews and the questionnaire, roughness and associated noise descriptions were used by about a third of the participants and were rated as less important for the dislike of voices. This result questions the importance of roughness being a reason for the dislike of voices and will need to be investigated further in the subsequent studies.

Object-related and emotional rationales. Conceptually, it was essential to show that the participants disliked the voice because of the voice itself and not because of other reasons, such as the song or the musical style. Much evidence was presented that the voice is clearly perceived separately from the song, also supported by the object-related reason, that the voice did not fit the song. Within the object-related reasons, the participants primarily described the lack of certain musical or sound qualities, in line with studies on music judgments (Ackermann, 2019; von Appen, 2007, p. 98).

Emotional reasons ranged from not triggering emotions, being somewhat annoyed to strong aversive feelings, and aggression. Hence, the voice can change someone’s emotion and put someone in a bad mood. These kinds of mood- or emotion-related justifications have previously been captured in positive music judgments (Berli, 2014, 195ff.). Therefore, the emotional quality of music and the ability to generate a particular mood do not only serve as a strategy to justify the liking of music but, as shown, the disliking of voices.

With their judgments, the participants follow an aesthetic of authenticity, in which (perceived) honesty both in the music and in the performance is an essential external musical quality feature of ‘good’ music. This result is in line with (Berli, 2014, 191ff.) who showed that music-external criteria of quality serve the judgment, that is, authenticity and the sincerity and honesty of a performance. von Appen (2007) also stressed in his investigation of online reviews that the authenticity argument plays a vital role in the evaluation of music. Particularly in the case of negative reviews, this argumentation strategy is used for social distinction and degradation of the opposite side (von Appen, 2007, 117ff.). In the current study, a perceived lack of authenticity in the singer was used to (additionally) justify the dislike of the voice, and to distance oneself from it.

In conclusion, the current study took an open and broad approach to investigating the reasons for disliked singing voices, using voices from the participants’ everyday lives—popular music. Showing emotional and object-related reasons for the dislike, the features presented require further investigation in a less-biased setting; that is with new participants that do not have the same pre-set negative attitudes toward the voices.

Group Study 2: Features of Disliked Voices

Turning this study to a quantitative approach, an adjusted questionnaire from the interview study with terms to describe vocal-articulatory expression was presented to a larger group (N = 48) in group testing sessions. The goal was to identify disliked vocal features in the context of pre-selected voices about which the participants were not expected to have strong opinions. The participants were required first to assess the characteristics of each feature (e.g., average pitch), and then to indicate the liking of this characteristic (e.g., if ‘high’ was indicated, the dis-/liking of the characteristic ‘high’ was evaluated). Overall, liking ratings of the singer, the song, the lyrics, and the musical style were collected after the feature ratings. Therefore, dis-/liking was evaluated on two levels, per feature and overall, which

enabled a comparison of the liking of single features and their reflection in an overall liking rating. Conclusions could be drawn as to whether an overall assessment of the liking might be sufficient or whether individual queries would permit more detailed conclusions.

Note that for efficiency, the term ‘liking-ratings’ will be used in the following, keeping in mind that the ratings include liking and disliking ratings.

Methods

Participants. A total of 48 participants (29 females) took part in the study, mean age = 40.06 (SD = 18.24) years. Twenty-one participants had as the highest educational degree a high school degree, 25 a University degree, one a Ph.D., one a middle school degree (after ten years of school). Twenty-seven were University students. Five participants were professionally involved in music, 26 played an instrument, including singing.

Selection of music titles. Sixteen of the 20 titles of the interview study were selected (Table 1) because (a) the role of the attitude toward a voice/singer (which was a dislike in the first study) was to be investigated and (b) the voices represented a wide range of vocal characteristics for the evaluation of voices. A representative excerpt was chosen from each song (Table S1), and a balanced ratio of male and female singers was ensured.

Questionnaire. The features were evaluated on a 4–point scale, which did not leave a midpoint, forcing participants to decide between the characteristics (Table 6). The liking was assessed for each feature separately on a 5–point scale so that a center for indicating a neutral/indecisive rating was possible. Additional questions comprised the general liking of voice, song, text, and musical style (each on a 5–point scale) and the familiarity of song and singer (see supplementary material).

Table 6

The newly comprised tool for the group study

Feature	The voice is rather...	I like the chosen characteristic...				
		very much				not at all

pitch	low	☐	☐	☐	☐	high	☐	☐	☐	☐	☐
loudness	loud	☐	☐	☐	☐	soft (quiet)	☐	☐	☐	☐	☐
sonority	full	☐	☐	☐	☐	thin	☐	☐	☐	☐	☐
timbre	dark	☐	☐	☐	☐	bright	☐	☐	☐	☐	☐
sound	soft	☐	☐	☐	☐	hard	☐	☐	☐	☐	☐
tension	tense	☐	☐	☐	☐	unsupported (un-tensioned)					
	The voice sounds rather...										
noise	rough/scratchy	☐	☐	☐	☐	smooth	☐	☐	☐	☐	☐
resonance	dull/wide	☐	☐	☐	☐	squeaky/nasal	☐	☐	☐	☐	☐
pressed	lax	☐	☐	☐	☐	pressed	☐	☐	☐	☐	☐
	The changes from tone to tone are rather...										
pitch changes	sudden	☐	☐	☐	☐	gliding	☐	☐	☐	☐	☐
	The articulation is rather...										
articulation	distinctive	☐	☐	☐	☐	plain	☐	☐	☐	☐	☐
	Singing resembles...										
mode of phonation	speaking	☐	☐	☐	☐	shouting	☐	☐	☐	☐	☐
	The vocal expression is rather...										
expression	varied	☐	☐	☐	☐	uniform	☐	☐	☐	☐	☐
						I like it				I don't like it	
	How do you like the song?					☐	☐	☐	☐	☐	☐
	How do you like the singer in general?					☐	☐	☐	☐	☐	☐
	How do you like the lyrics?					☐	☐	☐	☐	☐	☐
	How do you like the musical style overall?					☐	☐	☐	☐	☐	☐

Note. Terms are translated into English, terms in brackets mark translations that are closer to the German original. The column ‘feature’ was not included in the questionnaire and the four general questions at the bottom were presented on a separate page.

Procedure. The testing took place in a group testing room, where each participant sat in a booth at a computer. After signing the written informed consent about the study, participants completed a questionnaire on their demographic data. Then, each participant rated six out of a total of 16 singers, with one singer rated by all participants: The Tallest Man on Earth (no. 16). This singer was to be used to make necessary comparisons between all participants concerning response behavior. The music samples were listened to via headphones (Beyerdynamic DT 770 Pro), whereby the volume could be individually adjusted. The music titles were played back according to lists created beforehand so that a) the pieces were distributed as evenly as possible throughout the study and b) the order in which they were presented varied. While the music stimuli were administered on the PC, the

questionnaires were filled out on paper. Each participant was able to determine his own pace. The test lasted approximately 1–1.5 hours, and each participant received monetary compensation of 15 euros.

Analysis. Firstly, it was examined whether the liking ratings differed from the negative judgments in the interviews. Secondly, which features were liked/disliked was investigated using two approaches: (1) based on the overall liking of a singer with a regression model, (2) based on the single liking ratings per feature with Spearman correlations. It is of note that all feature descriptions were again compared descriptively to the collected expert ratings to ensure a matched usage of the terms.

Data were analyzed using R Statistics 3.5.1. The *lme4* package (Bates et al., 2014, 2014) was used to perform linear mixed-effects models and to obtain confidence intervals. *F*- and *p*-values were obtained by the *lmerTest* package (Fox & Weisberg, 2011b). Two (Pseudo-) R^2 values were calculated with the *MuMin* package (Nakagawa et al., 2013), one represents the variance explained by the fixed effects ('marginal' $R^2(m)_{GLMM}$), the other the variance explained by the entire model ('conditional' $R^2(c)_{GLMM}$), including fixed and random effects. The variance inflation factor (VIF) was calculated for the variables of the model, using the *vif()* function from the *car* package (Fox & Weisberg, 2011a). The VIF is designed to detect multicollinearity in regression models and a variable is uncorrelated if $VIF = 1$.

Results

Liking of singers. Firstly, it was investigated whether the disliked singers in the interview study could also lead to positive or 'neutral' evaluations in a different group. As to be expected, participants' ratings were broadly distributed across the rating scale with mean ratings for Michelle of $M = 4.059$ ($SD = 1.144$), turning out to be the most disliked, and Passenger of $M = 2.375$ ($SD = 1.310$), being the most liked. All other singers revealed mean ratings between 2.7–3.7 and *SD*'s of about 1 (Table S2).

Vocal features and general liking. A linear mixed-effects model was fitted with all features as fixed effects, predicting the general liking of the singer, and the random intercepts participant and singer to account for repeated measures. Four features predicted the overall liking of a singer ($R^2(m) = .224$, $R^2(c) = .319$): Sonority (a thin voice is disliked), pressed (a pressed voice is disliked), articulation (plain is disliked), noise (a smooth voice is disliked), and marginally mode of phonation ($p = .064$; **Fehler! Verweisquelle konnte nicht gefunden werden.**, Table S3). The VIF of the variables was at a maximum of 1.71, showing that no multicollinearity was detected in the model (Table S4).

Vocal features and single liking ratings. Next, the relationships between the ratings of the features and the single liking ratings of individual characteristics were investigated using Spearman correlations between each feature rating and the respective liking rating.

The results were similar to the regression model, i.e., the following characteristics were disliked: pressed ($r = .65$, $p < .001$), thin (sonority; $r = .64$, $p < .001$), squeaky/nasal (resonance; $r = .49$, $p < .001$), plain articulation ($r = .47$, $p < .001$), uniform expression ($r = .41$, $p < .001$), hard sound ($r = .35$, $p < .001$), sudden pitch changes ($r = -.28$, $p < .001$), tense sound ($r = -.27$, $p < .001$), shouting ($r = .25$, $p < .001$), bright timbre ($r = .23$, $p < .001$), and high pitch ($r = .23$, $p < .001$). Noise ($r = .10$, $p = .088$; tendency toward a disliking of a smooth sound) and loudness ($r = -.082$, $p = .16$) did not show significant correlations (Figure S2).

Relations between liking of singer, song, lyrics, and style. The overall liking ratings were distributed over the range of the rating scale with mean ratings around the middle of the scale, i.e., of singer ($M = 3.12$, $SD = 1.32$), song ($M = 3.16$, $SD = 1.43$), text ($M = 3.08$, $SD = 1.35$), and style ($M = 3.33$, $SD = 1.31$). Spearman correlations revealed that liking of the singer correlated significantly with liking of the song ($r = .785$), the lyrics ($r = .631$), and the style ($r = .627$).

Interim Discussion 2

First of all, the liking ratings of voices were broadly distributed, i.e., neither highly liked nor disliked by the group of participants. This confirms the notion that the previously disliked singers are judged differently by other listeners with no strong attitudes toward these voices—a circumstance that has been shown for liked/pleasurable music (Salimpoor et al., 2009).

Secondly, investigating relations between overall liking of a voice and liking of specific features showed some overlap concerning the most important features. However, more detailed insights could be gained with single-item ratings. While a pressed phonation and a thin vocal sound were revealed as disliked items in both analyses, the dislike of a squeaky/nasal sound only became apparent in the single liking ratings. The feature noise has a small effect on liking, and none of the analyses revealed evidence for rough voices being disliked.

While the feature ratings refer to the vocal expression, the overall liking rating of a voice is confounded with the expression of the song. This is shown by the high correlations of the overall liking ratings of the singer, song, text, and musical style. In the group study, it could not be excluded that this was the result of a methodological problem, that is, asking for the judgment of these four aspects in short succession on the same page. In general, the influence of the song/music on the evaluation of the liking of the voice must be taken into account and will be further tackled in the following study by asking these questions separately.

Online Study 3: Dislikes and Evoked Emotions

In the final step of this study series, the goal was to verify and further determine the hitherto presented relations between disliked voices and perceived vocal features with a larger group of participants. Additionally, a set of evoked feelings was presented to get a first insight into the participants' reported feelings associated with singing voices in popular music.

Methods

Selection of voices. Since this investigation was aimed at the everyday listening experience, singers were investigated with background music. Participants were instructed to pay attention to the voice and to disregard the music as much as possible.

The choice of singers was made according to the following criteria: It should not unduly prolong the survey processing time for the participants. Singers were selected so that the features discussed so far could be compared between the studies. Six popular voices and songs were chosen, which were expected to be known by the participants due to their age and positions in the charts (Table 7). In an effort to control for familiarity, popular voices and songs were chosen. Three female and three male singers were selected, who can be heard well in the recording (a little additional reverb can be heard in Houston). Each excerpt was about 30 seconds long and was a representative part of the song, in which the voice did not change too much in sound and technique.

Table 7

Selection of Singers for the Online Survey

Singer	Title	Album	Released	Excerpt
Bob Dylan	Don't Think Twice It's All Right	The Freewheelin' Bob Dylan	1963	00:07-00:43
Elvis Presley	Love Me Tender	Love Letters from Elvis	1971	00:02-00:41
James Brown	I Got You (I Feel Good)	Out of Sight	1964	01:26-02:03
Tina Turner	What's Love Got to Do With It	Private Dancer	1984	00:45-01:12
Wanda Jackson	Let's Have a Party	Wanda Jackson	1960	00:04-00:33
Whitney Houston	One Moment in Time	One Moment in Time: 1988 Summer Olympics Album	1988	00:59-01:30

Selection of items. A selection of evoked emotions from art and music evaluations was used for the current investigation on voices (Schindler et al., 2017; Zentner et al., 2008). The selection partly corresponded to what the participants had noted in the previous studies, such as the items 'touched me' and 'fascinated me.' Otherwise, the items tried to illustrate the affective dimensions, that is, valence in the form of 'made me happy' and 'made me sad,' and

arousal in the form of ‘energized me,’ ‘irritated me,’ and ‘relaxed me.’ Items were rated on a 5-point Likert scale, asking how much each emotion was evoked in the listener (1 = not at all, 5 = severe; Table S6).

Procedure. After the collection of demographic data, including native language, an open question was asked on involvement with the singing or speaking voice in a private or professional context. The evaluation of the six selected singers was in a randomized order. After listening to one recording in full, evaluations of the voice included a question on liking (5-point scale; 1 = like it, 5 = do not like it), a list of evoked emotions, and the ratings of the vocal features on a 6-point scale (Table 8). The questionnaire was adjusted according to the findings in the group study. During all steps, the recording could be listened to repeatedly. After this, the liking of the song was evaluated in the same way as the liking of the voice. The familiarity of both was evaluated with a simple ‘yes/no’ question (Table S11). This process was repeated until all six voices were evaluated. After room for comments, it was possible to take part in a raffle in which every tenth participant won an Amazon.de voucher worth 10 euros. The survey lasted about 20 minutes. Unlike in Studies 1 and 2, the media use by the participants was not controlled in this online survey. Future studies should ensure the uniformity of media across participants.

Table 8

Questionnaire of Study 3

	The voice sounds rather...							Feature
	low	☐	☐	☐	☐	☐	high	pitch
	rough/scratchy	☐	☐	☐	☐	☐	soft	noise
	pressed	☐	☐	☐	☐	☐	pressureless	tension
	squeaky/nasal	☐	☐	☐	☐	☐	dark/dull	timbre
	The changes from tone to tone are rather...							
	sudden	☐	☐	☐	☐	☐	gliding	titch changes
	The articulation is rather...							
	precise	☐	☐	☐	☐	☐	imprecise	articulation precision
	peculiar	☐	☐	☐	☐	☐	ordinary	articulation peculiarities
	The form of presentation is rather...							

sung	☐	☐	☐	☐	☐	☐	spoken	mode of phonation
	The vocal expression is rather...							
varied	☐	☐	☐	☐	☐	☐	uniform	expression

Note. Vocal features to describe the overall impression of the singers. The column ‘Feature’ was not included in the questionnaire.

Participants. 216 participants (female = 138, male = 77, not stated = 1) took part in the study. The participants were on average 31.31 years old (SD = 12.19; range 18–68). 195 had at least a high school degree, and just over half of the participants were University students (N = 113). The open question on the professional or non-professional involvement with voices revealed that 53.24% (N = 115) had no experiences with voices, 19.98% (N = 41) with speaking voices (e.g., speech scientist, speech therapist, actor), and 27.78% (N = 60) with singing voices (e.g., professional singers, singing lessons during their studies).

Results

Liking of vocal features. A linear mixed-effects model was fitted with the (nine) features and expertise as fixed effects predicting liking of the voice and the random intercepts of participant and singer. Seven features with timbre being the strongest predicted the liking/disliking of a singer ($R^2(m) = .176$, $R^2(c) = .269$; **Fehler! Verweisquelle konnte nicht gefunden werden.**, Table S7). The VIF of the variables was at a maximum of 1.33, showing that no multicollinearity was detected in the model (Table S8).

It can be concluded that a voice is disliked when it has the following characteristics (and liked when it has the opposite characteristics): squeaky/nasal sound, imprecise and ordinary articulation, a uniform expression, a speaking mode of phonation, sudden pitch changes and a pressed phonation. Again, the feature noise (roughness) had no effect on disliking.

A significant effect of expertise ('singer': Estimate = -0.27, SE = .08, $t(214.8) = -3.251$, $p = .001$) revealed that singing experts like the singers more (estimated marginal mean (emmean) = 2.21, SE = .10) than the speaking (emmean = 2.57, SE = .11), and non-expert groups (emmean = 2.48, SE = .09; Table S10). This small difference might be explained by their overall interest in singing voices.

Vocal features and evoked feelings. The emotion 'agitated' revealed a low mean ($M = 1.99$, $SD = 1.122$) and was not further investigated. Spearman correlations (corrected for multiple comparisons) were used to evaluate the relationships between the characteristics and the emotions. Correlations (Table 9) between the vocal features and 'relaxed' as well as 'energizing' and 'sad' show moderate ($r > .30$) to high coefficients ($r > .50$), the other emotions only correlate low with the vocal features ($r > .10$) (Cohen, 1988). Emotion items with higher arousal, that is energized, happy, and fascinated correlated with 'opposing' vocal features than emotion items with lower arousal, that is touched, sad, and relaxed.

Feeling energized correlates with a rough/scratchy, pressed voice and a varied expression (medium effects) and with a high, squeaky/nasal voice, sudden pitch changes, and articulation peculiarities (small effects). The emotion 'happy' correlates with the same set of features but timbre. 'Fascinated' correlates with precise articulation, singing, and varied expression.

Regarding low arousal emotions, 'relaxed' correlates with: pressureless (large effect), a low, soft, dark/dull voice, gliding pitch changes (medium effects), precise and ordinary articulation, singing, and a uniform expression (small effects). Sad and being touched show considerable overlap with relaxed.

Table 9

Correlation Matrix of Features and Emotions

	Pitch	Noise	Tension	Timbre	Pitch changes	Art. precision	Art. peculiarities	Mode of phonation	Expression
Touched	-.162	.286	.260	.295	.297	-.162	.039°	-.224	.094
Fascinated	.024°	-.075°	-.039°	.094	.011°	-.114	-.096	-.134	-.188

Relaxed	-.319	.450	.510	.408	.404	-.137	.156	-.128	.280
Energized	.244	-.400	-.332	-.152	-.272	-.037°	-.166	-.029°	-.383
Happy	.185	-.292	-.202	-.073	-.174	-.019°	-.175	-.016°	-.299
Sad	-.261	.437	.378	.279	.326	-.069°	.130	-.082	.298

Note. ° Indicates non-significant correlations.

Relations between liking of singer and song. In line with the group study, a Spearman correlation showed that liking voice and liking song correlate highly ($r = .711$), even though the two questions were separated from each other (before and after the feature and emotion ratings). Similarly to the group study, the liking of the voice and the song correlated highly, even with the separation of the questions during the procedure. This shows that it is not a methodological but a phenomenological problem, that participants do not separate the voice from the song concerning liking ratings.

General Discussion

How people talk about voices, how they build their attitudes toward voices, which rationales they use to justify their judgments and which features of vocal-articulatory expression are important to them was evaluated throughout three studies using quantitative and qualitative methods. Dislikes do not account for people's aesthetic judgments less than their preferences and likes: The features that make a voice unique can lead to both preference and dislike. Hence, studying the disliked voice is a necessity in the study of aesthetics.

Judgments about music and singing voices are not only based on object-related reasons and specific vocal features but also on emotional reasons, i.e., what the stimulus does to someone—or not. Hence, the current study investigated features of vocal-articulatory expression in combination with evoked feelings.

In Study 1, rationales and features for disliked voices were identified. However, the participants were prejudiced about their selection of voices, and it had to be shown in Study 2 that other respondents would like (rather than dislike) those same voices because of the same features, or whether they just perceived those voices differently (i.e., as not having the

disliked features). In Study 3, the features had to be confirmed by a much larger group and a different set of voices. In sum, this allowed for a set of features to be determined which typically are disliked, and that can be distinguished from those features that might be disliked only by some people in some songs. The measures used in the current study will also be informative for studying voice perception and evaluation more generally.

Figure 1. Simplified depiction of the results of the three studies. Reasons for disliked voices (dark boxes), including disliked features (dark circles), features that did not predict dis-/liking (light circles), and emotions (light boxes) associated with vocal features (lines). * Sudden pitch changes were disliked in the online survey, not in the group study. Note, in the correlations identified between emotions and features, the other pole of the feature is related to the other set of emotions.

Vocal Features as Object-Related Reasons for Vocal Judgments

Two features of vocal-articulatory expression lead to the most exciting results: Firstly, the feature squeaky/nasal was an important indicator for the disliking of voices (almost in all three studies), and secondly, the roughness of a voice was neither an indicator for liking nor for disliking a voice (the results of all studies are summarized in **Fehler! Verweisquelle konnte nicht gefunden werden.**).

This feature ‘squeaky’ was already prominent in the interview study, here described with different synonyms such as thin, shrill, and bright, with a constricted pharynx (sounds ‘tight’), and (sometimes incorrectly) nasality. Some theories suggested that a constricted pharynx is associated with unpleasant feelings (being associated with a facial expression of a bad taste or smell, showing withdrawal behavior; Bühler, 1933; Scherer, 1986), and expansion or ‘wideness’ with the opposite, that is approach behavior and pleasantness (discussed in Scherer, 1986). However, in popular music, the associated ‘twang’ is a characteristic feature of singing styles (Hähnel, 2015; Sundberg & Thalén, 2010). Hence, a generalizing statement that the twang is always disliked will not hold but makes it again obvious that judgments are dependent on many factors.

Roughness is not just a constituting feature of Heavy Metal singing but is used by many singers of different musical styles—and is, in fact, a common sound in everyday speaking voices. The discussion about the aesthetic value of rough voices comes primarily from the clinical practice where it counts as an indicator for a vocal disorder, which needs treatment and should, therefore, be eliminated. Voice clinic practitioners have a sensitive ear because they are aware of the long-term damage and psychological problems that can follow hoarseness. Hence, this feature gets the most attention due to its relation to voice disorders, albeit, in an artistic context, roughness does not occur to be conspicuous. This was already indicated in other studies on voice and music preferences (Büttner, 2008; Seidner & Büttner,

1998), where terms such as ‘smoky’ were used to describe a rough voice with a positive connotation (Ackermann, 2019, p. 93; von Appen, 2007, p. 106).

Pressed, on the other hand, was an essential feature for the disliking of voices. A pressed phonation is characterized by high muscle tension and often leads to a harsh voice (Edmondson & Esling, 2006), or a constricted pharynx, resulting in a squeaky sound. Pressed was mentioned in the interviews and was a significant predictor of disliking in the other studies. Too much tension is disliked, probably also because it increases physical tension in the listener, as could be seen in the emotion ratings.

Two more features became conspicuous for liking/disliking a voice, that is the articulation and the overall expression. The articulation in preferred voices is precise, intelligible, but also peculiar, which points to a distinct vocal performance. The overall expression represents modulations in vocal expression, which can comprise several different aspects, such as modulations in pitch, sound, articulation, and voice pitch. In the current study, a uniform expression is disliked, which probably also reflects the impression of a boring, not interesting performance, which could be seen in the interview study.

It can already be assumed that certain features play a different role in the liking of different musical styles and different contexts (as discussed in von Appen, 2007). For example, average pitch was not a predictor of liking, but was mentioned in studies on musical taste (Ackermann, 2019), voice preference (Hollien et al., 1991), or in other contexts, such as attractiveness in speaking voices (Re et al., 2012). Overall, average pitch is a significant feature in voice descriptions, as it differentiates between male and female voices and how ‘masculine’ or ‘female’ a voice sounds, which was a common association in the interview study. This feature might be necessary when investigating different musical styles (e.g., a female singer of Heavy Metal).

Mode of phonation was named in other studies to be important in the case of Rap (Ackermann, 2019; von Appen, 2007), and the phenomenon of ‘speech song’ (Merrill

& Larrouy-Maestri, 2017). Likewise, pitch changes are used to describe specific cases such as howling or whining or discriminating singing from speaking.

Rationales for Disliked Voices

People use justifications for their attitudes toward voices very similarly to judgments of liked and disliked music (Ackermann, 2019; Behne, 1986, 1987). Participants use firstly, object-related reasons, referring to performance characteristics, such as vocal features and technical aspects of singing and, interestingly, a missing fit between the voice and the song. Secondly, they use subject-related (emotional) reasons, referring to missing as well as negative evoked feelings and effects on one's mood (likewise in liked music, Berli, 2014). Social reasons have become evident in studies on musical taste, but in the current study, they were only evident in relation to the singer, not the voice itself. Social reasons were conveyed by a degradation of the singer to distance oneself from him or her, or the assumption that he/she only acts depending on the taste of the audience to improve his/her popularity.

In future research and in addition to the presented questionnaire (Table 8), a feature ranking could be included (comparable to the interview study) to investigate the more or less important features for the liking/disliking. Further, the categories derived from the interview study were formulated into items (Table 10) and are suggested to be used to investigate the reasons for disliked singing voices (according to the items for rationales of disliked music, Ackermann, 2019). Note that these items were not further investigated.

Table 10

Items Derived from the Interview Study for the Evaluation of the Rationales for Disliked Voices

Rationales for disliked voices in popular music
Emotional reasons
The voice evokes unpleasant feelings in me.
The voice does not evoke any feelings in me.
The voice does not have enough emotional expression.
The voice is annoying.
The voice makes me angry.
Object-related reasons

The voice does not fit with the song.
The singer is out of tune.
The singer has technical deficiencies.
The voice fascinates me.
I find the voice boring.
Reactions
When listening to the voice, I feel the need to distance myself.
When listening to the voice, I feel physical tension.
When listening to the voice, I become restless and impatient.
When listening to the voice, I withdraw internally.
Social reasons
The singer is not authentic enough.
I understand the reasons why other people like the voice.
External reasons
I am familiar with the singer.
I like the voice in different songs.
I would like the song if it was sung by a different singer.
I associate negative experiences with the song or the voice.
I like the kind of music.
I have a bad impression of the singer's personality.
My impression of the singer is based on my background knowledge.
I cannot identify with the singer.
The lyrics of the song negatively influence my judgment.

Relations Between Features and Emotions

Evoked emotions are a vital instance to explain one's attitude toward music – and voices play an essential role in forming these attitudes for many people (Greasley et al., 2013; von Appen, 2007). Besides open descriptions in the interview study that were explicitly linked to disliked voices, it was the goal of the online survey to use the participants' feature descriptions to explain emotional reactions to the voices. The small set of chosen emotions in the current study only allows for a brief look into the relations with vocal features (for much more detailed analyses on vocal emotions in similar contexts, see Banse & Scherer, 1996; Bänziger et al., 2014; Coutinho & Scherer, 2017). As expected, evoked 'high arousal' emotions, such as energized and happy, correlate with vocal features that are produced with higher muscle tension, which is a rough, pressed, high, squeaky voice. Evoked low arousal emotions, such as relaxed, being touched and sad, are associated with vocal features with low tension, such as pressureless and soft, and in the current context also low and dark/dull.

Additionally, a uniform expression fits into the idea of a calming, relaxed emotion, as well as gliding pitch changes that can have a more calming effect than the sudden ups and downs in the sung melody.

The largest effect was revealed by the emotion relaxation in relation to the vocal feature of tension (pressed–pressureless), showing that the tension items are directly related—a relaxed voice can induce relaxation, which demonstrates the close relationship between expression and impression. Therefore, the assessed emotions are in close correspondence to the features of the tool, which is promising for future applications investigating evoked emotions by vocal expression.

Voice and Song

As already discussed, emotions evoked by a singing voice can usually not independently be assessed from the musical performance—particularly when considering the voice itself a musical instrument. In the current context, for example, the combinations of sudden pitch changes and articulation peculiarities with energy seem to be highly influenced by the performances of Brown and Jackson, both with a positive, high arousal expression. It also needs to be considered that a separation of vocal expression and musical expression based on different evoked emotions, is typically not in the interest of the performer. Nonetheless, in the specific context of disliked voices and as demonstrated in the interview study, the negative aesthetic judgment relates solely to the voice. The song is, in most cases, not part of the dislike. Participants differentiated between the song and the voice, also reporting that the voice, in their opinion, did not fit the song—which is part of the reason for disliking the voice.

Conclusion

The current series of studies is the first that used a broad, mixed-methods approach to investigate aesthetic judgments on singing voices in popular music. The presented tool for the evaluation of vocal expression, as well as the categories and items derived to describe

rationales for disliked voices, are eligible for future research on voice perception and evaluation in various contexts.

Some features turned out to reliably predict disliking of voices but might change in a different context and with a different set of singers and the background of the participants. Overall, the findings show that the vocal expression in popular music shows a great variety and overlap with vocal features in speech and supports further research on voice usage in artistic contexts, if not everyday communications, particularly in emotionally involved moments.

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