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Mimetic Dimensions of Bird-Human Interactions: The Use of Bird Sound Imitations among Estonian Birders

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Abstract

This paper explores bird sound imitation as a particular type of interspecies interaction. Using questionnaires, interviews, and participatory observations, a survey was conducted among Estonian birders to find out about the prevalence of the practice, the diversity of imitated species, the means of imitation, and the attitudes of birders towards the use of recordings in the field. The study found that 55 species of birds from 11 orders were imitated and using one's own voice was the most common way of imitating birds. The choice of the method of imitation depended on the purpose and context of imitation. Most birders supported the use of playbacks for scientific purposes, but not for daily birding. With the easy availability of playback technologies, there are increased concerns about the ubiquitous presence of disturbing factors. At the same time, however, the technological boundlessness is balanced by the heightened ethical self-reflection of birders.

Keywords

human-bird interactions – birding – imitation of nature sounds – bird vocalization – playbacks

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Humans have mimicked the sounds and behavior of other species since the beginning of humankind. It has even been suggested that the mimicking of natural sounds has contributed to the evolution of language, speech, and music. In various indigenous communities, human speech, singing, whistling, and the sounds of other species are intertwined and mutually responsive, contributing to the formation of interspecific communities (Abram, 1996; Feld, 1994; Smith, 2015). The listening, interpretation, and crafting of the imitation of the expressions of other species may encompass complex instances of sonic exchange.

In the contemporary world, mimetic communication with other species is segmented into smaller sets of activities. An activity which has entailed mimetic interactions with other species, since time immemorial and continues to the present day, is hunting (Alves et al., 2009; Hui, 2018; Kalaberda, 2016; Willerslev, 2007). Scaring birds is another human practice, which is part of the long history of acoustic bird-human interactions, but it acquired a new mimetic dimension in the 1950s with the introduction of the use of distress and alarm call recordings (Smith, 2021). Recently, sounds have been used as an attractant in conservational contexts, such as conspecific playbacks aiding in the translocation of birds to restored or similarly suitable habitats (Friesen et al. 2017; Ward & Schlossberg, 2004). In addition, both amateur birdwatchers and people engaged in the professional monitoring of birds use the vocal imitation of birdcalls, whistling, and bird-song playbacks to interact with birds (Hausleitner, 2006; Zimmerling, 2005). These final groups will be the focus of this study.

There are a number of studies on the impact of playbacks on the behavior and well-being of birds (e.g., Harris & Haskell, 2013; Johnson & Maness, 2018), their efficiency as survey tools (Budka et al., 2019; Burnett & Sieving, 2016; de la Hera et al., 2017; Wojczulanis-Jakubas et al., 2016), and their role in attracting birds to high-quality conservation habitats (DeJong et al., 2015; Fletcher, 2008; Ward & Schlossberg, 2004). The increased access to smartphones and the easy availability of bird sound recordings has resulted in debates on the ethics of the use of sound reproductions among birders (e.g., Sen, 2009; Sibley, 2011). Most of the worries arise from the concern that these activities stress and disturb birds, which might divert birds from their habitual activities and reduce their wellbeing and survival. However, the impact of playbacks on bird behavior is still poorly understood (Harris & Haskell, 2013). The conclusions about the impact are multifarious and depend on the species, region, and specific research questions guiding the study. For example, an experiment conducted in northern Louisiana showed that playbacks have a negative impact on wintering birds by reducing the foraging and movement of the birds (Johnson & Maness, 2018). However, a study conducted with serins (*Serinus serinus*) in

Coimbra, Portugal demonstrated a positive effect of male song playback on the breeding behavior of female birds (Mota & Depraz, 2004). Different contexts of playback use may interfere with one another, with playback used in birding potentially obstructing their use in population censuses, because the birds who have experienced playbacks behave differently than the *naïve* ones, who have not been exposed to imitations before (Budka et al., 2019). To our knowledge, there is only one recent study (conducted in Columbia) which specifically explored the practices and motivations of birders in their use of playbacks (Watson et al., 2018).

In our study, we were interested in learning about the motivations of birders and the means they used to imitate birds in various contexts. At the same time, we wanted to contextualize the imitation of bird sounds as a specific kind of human-nonhuman interaction. Thus, the study had multiple aims. Firstly, we wanted to learn about the prevalence of the use of imitations among Estonian birders, the list of imitated bird species, and the types of sounds and devices used for imitation. Secondly, our aim was to explore the diversity of contexts which influence the mimetic communication. The third aim of the study was to examine the attitudes of the birders towards the use of playbacks while birding, and analyze how this attitude reflects the perceived position of humans amongst other species.

Methods

Procedure

In order to get an overview of the usage of sounds in birding and the ethical considerations of birders, we conducted a study with Estonian birders in 2018. Although the number of birders in Estonia is not large (the main birding organization, the Estonian Ornithological Society, has approximately 600 members), Estonia has a well-established birding tradition. Estonian birders have a strongly networked birding culture and hold collective birding events. Our study was based on a questionnaire, semi-structured interviews, and participatory observations of field trips with birders. The aim of the questionnaire was to collect data about the different contexts in which imitation (if carried out at all) was performed by birders, the diversity of bird species and sounds imitated, the means of imitation, and the attitudes towards the use of sound while birding. Some of the questions asked were: (a) Have you used vocal imitation of birds or playbacks while birding?; (b) Which bird species have you imitated?; and (c) In which situations do you consider the use of playbacks appropriate? While the respondents were not asked to limit their answers to a specific geographical region, based on the species mentioned

by the respondents, one can conclude that the region was first and foremost Estonia. The focus of the questions on ethics was on playbacks, because this is the most debated and regulated means of producing imitations. The questionnaire was distributed online through the email list of Estonian birders and the Facebook group of the Estonian Ornithological Society. Additionally, paper versions of the questionnaire were distributed at face-to-face events attended by birders. All potential respondents were first informed about the aim of the study; they were assured that full anonymity would be guaranteed, that the responses of the questionnaires would not be shared with third parties, and that the information obtained would be used for this specific study only. People filled out the questionnaire after being informed about these principles of data management and ethics. In order to understand the rationale of using sounds in birding, and to get better insight into the experiences of people imitating birds, the questionnaire was supplemented by in-depth, semi-structured interviews. The interviews contained questions about personal motivations for the imitation of birds, behavior during imitation, memorable occasions of imitation, and attitudes towards different ways of mimicking birds. The interviews lasted 30–60 minutes and were transcribed later. Like the questionnaire respondents, the interviewees were informed about the data management and ethical principles of the study. We proceeded with the interviews after receiving oral consent from the participants. Supplementary material was gathered by taking notes, photographs, and sound recordings of imitations during birding trips with Estonian birders. Altogether, four birding trips were undertaken, lasting from two hours to two days. Two trips focused on the imitation of owls, one trip centered on the imitation of woodpeckers, and one trip was a visit to a bird-ringing station (spread over two days), where playbacks were used to lure birds for ringing.

Participants

A total of 69 participants (38 males and 31 females), aged 18–83 years, filled out the questionnaires. They were involved in the following birding-related activities (one person could be involved in multiple activities): leisure birdwatching (95.7% of respondents), bird photography (62.3%), feeding birds (52.2%), conducting bird surveys (44.9%), educating people about birds (34.8%), birdwatching as a job (23.2%), conducting bird excursions (21.7%), and hunting birds (1.4%). Subsequently, the interviewees were recruited from two sources: Firstly, from the questionnaire respondents who answered "yes" to the survey question about their willingness to give an interview, and secondly through a snowball subject recruitment. Altogether, nine people (six males and three females), aged 18–47, were interviewed. Their birding related activities ranged from professional monitoring of birds to bird tourism and hobby birding.

Data Analysis

The questionnaire data were coded, the proportions for each category were calculated, and the results were analyzed to draw generalizations about the trends and tendencies in the bird-sound use among Estonian birders. In addition, we performed χ^2 tests to examine potential differences in the use of sound by men vs. women and professionals vs. amateurs. The transcripts of the interviews, which supplemented the questionnaire results, were subjected to categorical analysis (see Gillham, 2005) to understand the spectrum of factors which influenced behavior. In addition, the interviews provided a list of individual experiences of interactions with birds via imitation, and these experiences were documented in order to map and analyze the diversity of motivations and personal interpretations of the interspecies interactions. The fieldwork observations and notes, containing further insights from the field, were used to complement the data from the questionnaires and the interviews.

Results

The Diversity of Species, Sounds, and Imitation Devices

Our study established that the use of bird sound imitations is still a prevalent practice among birders. Out of the 69 questionnaire respondents, 49 people (71%; 95% CI [0.61, 0.81]) used sound in some form to interact with birds. There was no difference between men and women in their use of sound in birdwatching ($\chi^2 = 2.59$, $df = 1$, $p > .05$), nor was there a difference between professional and amateur birders in whether they use sound reproduction ($\chi^2 = 2.98$, $df = 1$, $p > .05$).[1] The questionnaire results show that 55 species of birds (from 11 bird orders), out of approximately 390 Estonian bird species, were imitated acoustically. The most imitated bird species was the Common Cuckoo (*Cuculus canorus*), which is a common Estonian bird and is relatively easy to imitate with the human voice (see Table 1). The top imitated bird order consisted of nocturnal owls (*Strigiformes*), which were contacted by humans in the dark using sound (see Figure 1).

1 A differentiation between amateurs and professionals is not easy to determine, but we categorized those who had mentioned conducting bird surveys, educating people about birds, birdwatching, and/or conducting bird excursions as professionals and the others as amateurs. We did not include photography and hunting categories to this test, as these do not allow to easily draw such a distinction.

TABLE 1 Ten most imitated bird species and the devices of imitation

	Name of the bird species	Total instances of imitation	Whistle	Recording	Voice-imitation
1	Common Cuckoo (*Cuculus canorus*)	12	0	0	12
2	Eurasian Pygmy Owl (*Glaucidium passerinum*)	10	1	2	8
3	Tawny Owl (*Strix aluco*)	10	0	3	8
4	Ural Owl (*Strix uralensis*)	8	0	4	5
5	Grey-headed Woodpecker (*Picus canus*)	9	1	0	8
6	Hazel Grouse (*Tetrastes bonasia*)	8	5	6	4
7	Golden Oriole (*Oriolus oriolus*)	6	0	0	6
8	Northern Goshawk (*Accipiter gentilis*)	5	1	5	2
9	Tengmalm's Owl (*Aegolius funereus*)	3	0	0	3
10	Thrush Nightingale (*Luscinia luscinia*)	3	0	3	0

The interview data and fieldwork showed that the birds most commonly imitated by ornithologists for survey purposes were owls, woodpeckers, Corn Crakes (*Crex crex*), and Ortolan Buntings (*Emberiza hortulana*). The bird-ringing stations used playbacks for birds, like Reed Warblers (*Acrocephalus* sp.), Siskins (*Carduelis spinus*), Garden Warblers (*Sylvia borin*), Eurasian Blackcaps (*Sylvia atricapilla*), Barn Swallows (*Hirundo rustica*), Redpolls (*Carduelis flammea*), and Long-tailed Tits (*Aegithalos caudatus*). The bird-ringing stations also used the recordings specifically for some rare birds, or for a species being studied for a research project. The hobby birders often focused on songbirds for their imitative activities, but the variety of imitated species was large and depended on the particular situation. Typically, hobby birders tried to receive responses from birds of the same species as the sound source, but they sometimes used the calls of one species to attract birds from other species by invoking various interspecies relations.

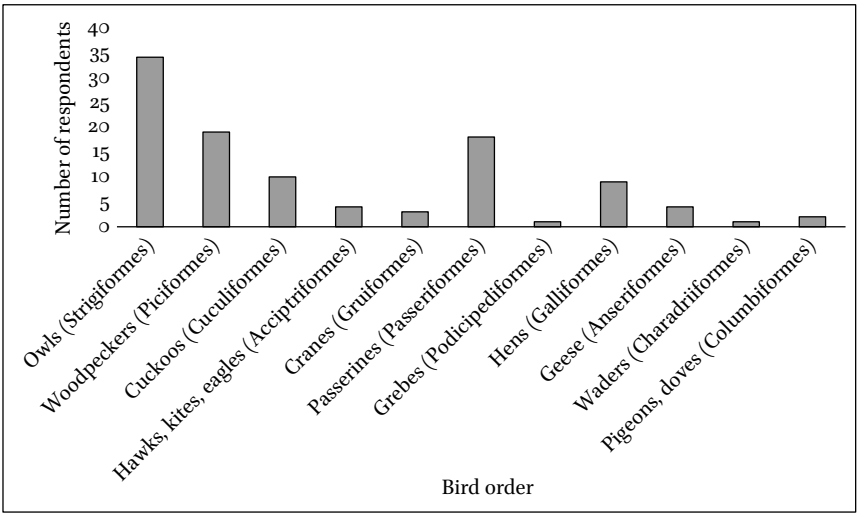

FIGURE 1 The most imitated bird orders

The questionnaire survey found 174 cases of bird-sound imitations for 55 bird species (each species listed by a person is counted as one case). Most often, people used songs (54% of the cases; 95% CI [0.47, 0.57]) and territorial-calls (29.3% of the cases; 95% CI [0.22, 0.35]) out of the selection of anxiety-calls, invitation-calls, songs, territorial-calls, and other sounds listed in the questionnaire. As per the survey, the least commonly used sounds are anxiety-calls (8.1% of the cases; 95% CI [0.04, 0.12]) and invitation-calls (8.6 % of the cases; 95% CI [0.04, 0.13]). The differentiation of these types of sounds is not present in all bird species, because some birds might have a significantly higher variety of sounds. Yet this simplified grouping of sounds sufficiently categorized the most common sound types present in different bird taxa.

Relying on the questionnaire, our study found that imitation with voice (49.4% of the cases; 95% CI [0.39,0.59]) and the use of playbacks (41.4% of the cases; 95% CI [0.34, 0.48]) were the most common means of reproducing the sounds of birds. Among the top ten imitated bird species in our study, there were nine bird species which were imitated with voice and six with playbacks (see Table 1). The use of whistles was mentioned for only a few species, with Hazel Grouse (*Tetrastes bonasia*) being the most prominent one. Besides the devices mentioned above, branches of wood (which were knocked on tree trunks to make sounds) were used to imitate woodpeckers. One unusual instrument used to imitate the sound of birds was the block flute, which was used by one birder to contact owls.

The Contexts and Purposes of Imitation

While categorizing the interview data, we found that there are two kinds of contexts which influenced the choice of imitated species, the devices of imitation, and the rationale for mimicking other species. We have tentatively named them as the "macro-context" and the "micro-context" for imitation. By the term "macro-context," we mean the specific frames of activity which provide the rules, codes of conduct, and organization of behavior. In contrast, the "micro-context" is constituted by the "here and now" situation, where the bird and human share the same environment, and where the decision to imitate is undertaken. The fieldwork observations demonstrate that while the micro-context is usually embedded in specific macro-contexts, the behavior of the birder is not fully determined by the macro-context, but depends on what the birder perceives in the particular environment. For example, one birder recalled a birding trip during an ornithology camp, where only the teacher had done the imitations (the protocol of the macro-context), and at each location the group had discussed which species might potentially be present, and the teacher had produced the imitations accordingly (situation-specific micro-context).

The interview data and fieldwork revealed that different contexts will determine first of all the devices and senses that are used for interaction. For example, bird stations use only recordings, while birding competitions often forbid the use of playback[2]; birding tourists want to see the birds even if they hear them[3], whereas it is enough in bird monitoring or competition to rely on sound to ascertain the bird's presence. In addition, the contexts also influence the form and length of the interaction itself. The context determines whether the interaction will take place as a one-sided contact, or a communication based on mutual feedback. In professional bird-surveys, where the aim is to detect the presence of bird species at a certain location, there might be no real feedback cycles involved, because once a response from a bird is obtained, or a bird is spotted, the interaction is terminated. Yet hobby birding may involve longer cycles of interaction, and here the micro-context is crucial. Additionally, people may engage in imitation spontaneously, without any predefined context, to have some interaction or fun with birds. An interviewee who does hobby birding and conducts bird surveys described such situations, where the interest and the contact-making is mutual and longer duets are held:

2 The prohibition of the use of playback stems from the notion that its use will result in excessive disturbance to the birds, given the high concentration of birders at a competition.

3 We may only presume that the visual presence of the bird gives the tourist more trustworthy evidence, and a fuller perception of the bird. They might want to photograph the bird too.

> Most easy ones are these smaller owls: The Pygmy Owl (*Glaucidium passerinum*). And this Grey-headed Woodpecker (*Picus canus*). I think, these are the two with whom I can have a long duet.... They are a bit curious. Who is this strange-looking bird which makes my kind of sound?

Avian Responses and Human Self-Reflection

As the interviews and fieldwork revealed, the behavior of birds in response to the imitation can be rather varied, depending on what kind of sound is imitated and how, the ecological status of the species (a predator or a bird of prey), the frequency of imitations, individual differences among birds, etc. Although there are experimental studies available for the impact of playbacks on bird behavior, in the interviews, the responses to the question about a bird's reaction became entangled with the person's self-reflection about the impact of his/her activity on the bird's wellbeing and habitual behavior. For example, a hobby birder noted that golden orioles tend to get lethargic if one "fools" them too much, while an ornithologist was concerned about stressing the birds during the imitation of bird sounds. Contrastingly, a nature guide recalled that he had been able to show the same pygmy owl over a period of five years to tourists without noticing any changes in the behavior of the bird, and this observation led him to conclude that the practice of imitation was not harmful to the bird.

Attitudes Toward Playback Use

There were only three respondents who mentioned in the questionnaire that the playbacks should not be used under any circumstances when birding, while 27 (59%) respondents out of 46, who had explicitly expressed their opinion in this matter, held the opinion that the use of playbacks is acceptable for scientific purposes. The use of playbacks for nature photography was a contentious issue, with some people finding it acceptable, and others deeming it objectionable.

Most of the interviewees said that the ethics of using playbacks has been discussed among Estonian birders. Several of them considered using playbacks to be less problematic in Estonia, where the community of birders is relatively small, as compared to neighboring Finland, where the use of playbacks in birding was considered to be more problematic. As a general trend, birders did not think that the use of sounds should be more regulated in Estonia, and most of them stressed that they preferred to rely on their own internal ethics rather than on written regulations. Several precautionary measures for avoiding the disturbance of birds were mentioned: In a group looking for rare birds, only

one person should use playbacks; people should avoid going to the same place in one season; and people should not continue to imitate a bird after spotting it. All the interviewees said that they try to use playbacks as little as possible, and especially avoid it during the breeding season of the birds. However, one professional birder discussed the problem that the breeding season of birds often overlaps with the fieldwork times of birders. A nature photographer and an ornithologist also pointed out potential threats concerning the intermingling of different purposes of playback use: When playbacks are extensively used for touristic activities, the birds may not be responsive during the bird survey; additionally, the use of recordings during breeding times can make the birds unresponsive to other birds.

Discussion

The questionnaire and interviews showed that birders use imitation to attract both rare (e.g., Ortolan Bunting) and common species (e.g., different species of tits), and diurnal (most passerine birds) as well as nocturnal birds (owls), while the common denominator for all the imitated species was that their presence is hard to confirm visually. However, the range of the birds imitated varies greatly from context to context, with professional birding and hobby birding constituting the two major frames of imitation, although there are activities (such as hunting and nature photography) that provide different contexts for imitation.

The sounds used by the birders for imitation, with songs being the most frequent sounds used, depend not only on the preferences, skills, and abilities of the person, but are limited by the sound repertoire of the bird. The number of calls for a bird varies from species to species, with the general rule of thumb being that the more social a species is, the more varied its calls are. The ornithologist Peter Marler stated that the forms of sociality of a species can influence the differences in the song and the call systems of birds by noting that birds like galliforms (like domestic chickens), corvids (like ravens), and parrots, who have complex social lives with hierarchies, have a large number of calls; meanwhile, songbirds in temperate zones (like chaffinches) have a looser social structure and in general have a smaller call repertoire (Marler, 2004). However, the calls used by a human to contact a bird are a small subset of all the calls produced by the bird. This is due not only to the particularities of the human vocal apparatus but also to the limits of human hearing. For example, recent experiments which recorded the individual vocalizations using "on-bird microphone transmitters" in an indoor setting with zebra finches (*Taeniopygia*

guttata) have shown that zebra finches use a number of short distance calls to communicate with each other which may not be heard by a human from a distance (Gill et al., 2015).

Besides the fact that not all bird species use these calls, the low usage of certain types of calls, such as anxiety-calls, might be partly related to the view that the imitation of those calls can be stressful for the birds, and hence the use of other sounds – like songs – are generally preferred by birders. One interviewee noted in the context of bird ringing:

> I have heard that if you want to catch or get the bird, then songs are mostly used. And we have mostly used songs and not calls.... Almost only songs; and I think, the songs are not as disturbing for the birds compared to if you attract them with some calls, alarm calls, then it can be quite stressful for the birds.

Although birders are reluctant to use anxiety-calls because they can stress birds, they are easy to produce because of their simplicity and short duration. The imitation of mostly monosyllabic or disyllabic call-notes (Thorpe, 1961) needs less practice and learning compared to the imitation of songs, and could be the reason, why "birds more often imitate other birds' *calls* than their songs" (Rothenberg, 2005, p. 99). As one of our hobby birder informants noted: "But sometimes the song is very complicated, and the invitation-call is the easiest to learn."

As we saw from the survey results, birders also used the calls of one species to attract birds from other species because many birds belonging to the same order have similar calls. Interestingly, it is mainly the calls – and not songs – that transgress the species boundaries and get a reaction from birds of other species. For example, the use of the calls of the Grey-headed Woodpecker (*Picus canus*) can attract the Black Woodpecker (*Dryocopus martius*) and the White-backed Woodpecker (*Dendrocopos leucotos*). The birders in the survey mentioned that the recordings of the Eurasian Blackcap (*Sylvia atricapilla*) have an impact on other warblers, and the sounds of a particular owl species elicit responses from a variety of owl species. On the other hand, the sounds of some taxa, like the alarm calls of passerines, carry the same meaning of "danger" for taxonomically distant bird species, resulting in cross-species eavesdropping (i.e., one species can obtain information from listening to the calls of other species). The term "keystone information producers" has been introduced to signify species that "are particularly valuable sources of information for eavesdroppers" (Magrath et al., 2015, p. 578). Thus, imitating the calls of such species allows for a higher diversity of responding species, but

it also inserts a moment of exploratory uncertainty, because one cannot be sure about the species which will respond to the imitation. Another technique to attract birds is to use the sounds of predator species like the Pygmy Owl (*Glaucidium passerinum*) to get the attention of prey species, like some passerines. As in the case of eavesdropping, the sound carries a meaning of danger, but it is done through a direct association with the source of the sound – the predator bird itself. However, this human motivation may be reversed by the responding bird, so that instead of the birds of prey, a predator is attracted instead. This is exemplified by the following interview excerpt: "I have experienced that I have whistled the pygmy owls, the small ones, but then the Ural owl (*Strix uralensis*) comes to look if it is a possible meal – what is going on?"

Even with the advent of smartphones and electronic devices like portable loudspeakers, many birders continue to use their own voices to imitate birds. Although a wide variety of birds can be attracted with the human voice, humans are not capable of imitating the sound of every bird, and are capable of imitating only certain sounds of a particular bird species. The limits of imitation are largely determined by the similarities and the differences between human and bird vocal apparatus: pitch, loudness, speed, and complexity being the primary factors which determine which device can be used for imitation. The typical fundamental frequency of the human voice range profile extends from 100 Hz to 800 Hz (Titze et al., 2016) and this sets the limitation on the sounds which humans can imitate. The range of the human voice allows us to classify bird sounds into three basic frequency classes, which correlate with the devices humans use for imitation (see Table 2).

TABLE 2 Classification of sounds by complexity and frequency

Frequency-range	**Simple in frequency (pure tone) and short timespan**	**Complex in frequency and short timespan**	**Complex in frequency and/or long timespan**
100–800 Hz	Voice (pure tone)	Pishing	Recording
100 Hz-5 kHz	Voice (with whistling)	Pishing	Recording
> 5 kHz	Mechanical Whistle		Recording

Note: The categorization was made relying on the data provided for human voice and whistling range by Titze et al. (2016) and Nilsson et al. (2008), however, this classification should be taken as an approximation only.

First, there are a group of sounds which are easy for the human voice to imitate due to their acoustic characteristics (short-duration and 100–800 Hz) (Table 2, first row). According to the questionnaire, the most imitated species was the Common Cuckoo (*Cuculus canorus*). The Common Cuckoo's call falls within the pure tone range of the human voice, making it easy to mimic, and thus birders only used their voice to imitate this bird. In addition, the cuckoo produces its sounds in a tempo which is easily followed and repeatable by humans. There are other birds like the Golden Oriole (*Oriolus oriolus*) and the Tengmalm's Owl (*Aegolius funereus*) which were also imitated using only the human voice. In some cases, like during the imitation of the Ural Owl (*Strix uralensis*), hands are placed in front of the mouth to form a cup, which helps to modify the timbre. The human vocal range can be extended by switching from the normal voice to whistling – allowing for an additional range of up to 5 KHz. The sounds of some birds, like the Pygmy Owl (*Glaucidium passerinum*), exceed the pure tone range of the human voice, but can be imitated by a combination of voice and whistling (short-duration and 100–5000 Hz) (Table 2, second row). The call of birds like the Hazel Grouse (*Tetrastes bonasia*) exceeds the range of unaided human whistling, but is a pure and simple tone, and can be imitated using mechanical whistles (like copper whistles). Birders use "pishing" (production of a "pshh-pshh" sound) to approximate the alarm calls of passerines, and pishing produces sounds which last for a short time span, but includes a variety of frequencies. Finally, there are sounds that cannot be imitated by the human voice, like the complex "two-voiced" song of some songbirds (Table 2, third row). Imitation of "two-voiced" sounds can only be done using playback recordings. Recordings surmount the limits of the human voice, and the efficacy of the imitation depends on the type of sound used (calls or songs) as well as the responsiveness of the specific species to particular sounds. For example, an ornithologist noted in an interview that for the survey of Estonian Corn Crakes (*Crex crex*), they used a Finnish recording (with a higher frequency and higher speed of vocalization compared to the Estonian bird) because they thought that a more aggressive voice would be more effective for the purpose. Two other respondents mentioned using the song recording of the Asian Desert Warbler (*Sylvia nana*), which is not found in Estonia, but which catches the attention of local tits and warblers.

Indeed, there is a midzone between vocal imitation and playbacks, which offers the possibility for innovation in the use of different techniques for imitation. Some techniques involve a combination of human voice and whistling. Smith (2015) described whistling as a vocal technique which creates

an acoustic contact zone between humans and birds and allows for mutual learning and transformations of each other's melodies. Though Smith documented that the diachronic diversity of bird song imitations can result from technological and cultural change, the diversity of imitation devices may be observed even within specific eras and occupations. For example, Kalaberda (2016) noted that traditional Karelian hunters have used a whole arsenal of acoustic decoys for the imitation of different birds of prey made of feathers, bird-bones, wood bark, and other natural materials. However, this variety of self-made acoustic decoys is absent (or at least not prevalent) in modern birding. For example, for the Hazel Grouse, a bird most commonly imitated with a whistle (by both hunters and birders), one can easily use commercial copper-whistles provided by hunting shops.

During one of our birding trips, when the birder received no responses to the use of vocal imitations, we observed that the birder switched to the use of playbacks. In addition to surpassing the limits of the human voice, recordings allow for more accurate sound reproduction, and offer more credibility in terms of "authenticity." In his monograph on the history of the techniques of transcribing and recording bird sounds, Bruyninckx (2018) observed that the introduction of audio recordings to the field in the 1930s and 1940s brought along a standardization of bird sounds. Bruyninckx (2018) noted how the sounds were transformed into reproducible and transportable objects in the form of recordings, which "afforded users an unprecedented control over the spatial and temporal dimensions of acoustic phenomena. Complex soundscapes could be sampled and sterilized, acoustic events repeated endlessly, slowed down infinitely, settled in spectrographic and numerical forms" (p. 167). When these decontextualized and purified acoustic events are "fed back" through a playback into the field in a concrete birding event, they not only result in a novel form of technological and sensory mediation, but they also induce novel self-reflections about the position of the human in the interspecific acoustic field, including human responsibilities and duties in connection with the possibility of acoustic omnipresence.

Although most of the interviewees of our study were aware of the debates concerning the ethics of using playbacks and about the existence of formal ethical guidelines, they tended to rely on personal ethical principles while imitating birds. This was demonstrated by several interview responses, where the changes in a bird's behavior subsequent to imitation provided direct feedback into the opinions of people about the soundness of their imitative activities.

In Estonia, there is no official regulation which specifically governs the use of playbacks for birding, although playbacks are not allowed in birding competitions. However, like several other birding organizations (BirdLife

Australia, American Birding Association), the Estonian Ornithological Society has a code of conduct concerning the use of playbacks and it has published a booklet, where birders are given guidelines for proper behavior such as the following:

> 2.10. Disturbing birds with sound recordings is prohibited during breeding, as it affects bird behavior and may interfere with breeding success.
> 2.17. Direct disturbance of birds is justified only by official monitoring and research work with the permission of the Environmental Board (e.g., decoy with sound recordings, visiting nesting colonies to evaluate breeding success, etc.). (Tali, 2017, p. 1; translated by the authors)

The guidelines provided in the booklet convey the dominant sentiment, which was also prevalent in the individual questionnaire responses, that one should disturb the birds as little as possible and try to avoid the use of playbacks. For example, one questionnaire respondent, who was involved in conducting bird surveys as well as nature education, when asked, "When is it fine to use playbacks while birding and when not?" provided the following answer:

> To attract birds, definitely not. In the sense of education, the use of recordings to repeat the bird song is acceptable. The ethical limit is transgressed if threat and danger calls of birds are used – these distract and are an intrusion to nature.

Such a divergence about the acceptance of playbacks for research or educational purposes, and the disapproval of the use for other purposes, is different from the birth and early historical development of bird sound recordings when popular and scientific aims converged (cf. Bruyninckx, 2018). Moreover, the predominant role of humans, as reflected in the responses and guidelines regulating bird sound reproductions, appears to be that of a potential distractor. This is a rather different perception compared to the imitation of nature sounds in many indigenous societies, where a human is only one interlocutor in the interspecies web. As Feld (1984), who has worked with the Kaluli people in Papua New Guinea, wrote: "Kaluli find the forest good to listen to, and good to sing with as well. Improvised human duets with birds, cicadas, or other forest sounds are not uncommon everyday events" (p. 395). The use of the technological extensions of the human voice seems to have raised awareness of the potential destructive status of humans. Hence, it is not just about extending the human phenotype, as some researchers have

designated the role of technology (see e.g., Kelly, 2010; McLuhan & Fiore, 1967), but the technological extensions have also initiated novel forms of ethical consideration. People not only think of themselves as interlocutors with and among other sign-using creatures, but simultaneously, the technological extension, which removes all previous limits to contact making, has induced the rise of self-reflexivity about one's behavior. The situation is not simply that of two organisms which are communicating with one another, but a case in which one of them has a clearly superior position because they are capable of imitating any sound under any circumstance. This makes one question as to whether the contact that one can make is also something that the other wants to receive and leads to the formulation of one's internal ethics. This sentiment about interspecies ethics – which is borne out by the survey responses – is echoed in Kohn's (2013) words,

> And value extends beyond the human. It is a constitutive feature of living selves. Our moral worlds can affect nonhuman beings precisely because there are things that are good or bad for them. And some of those things that are good or bad for them are also, we might learn if we could learn to listen to these beings with whom our lives are entangled, good or bad for us as well. (p. 134)

However, as shown beforehand, there are occasions when birders contact birds spontaneously, and even hold long duets with them without feeling any guilt, because they feel that both sides enjoy the interaction and exhibit mutual curiosity. These are the moments where the original interspecific semiotic unity is restored, and where the semiotic capacities of both sides are realized. Thus, instead of humans being boxed into the category of a disturber (who should stay as imperceptible to other species as possible), humans can have a different role as an interactor, with their presence becoming perceptible to other species. But such dialogic interspecific interactions require attentive listening and attending to the meanings in the local soundscape, including assessing whether one's acoustic presence is welcomed by other species. The imitation might thereby take the shape of a response, rather than a one-sided expression, with the open-ended possibility of cross-species polyphony that has the potential for dual roles as addresser and addressee. These moments of mutual curiosity between humans and nonhumans can transform into innovative cross-species compositions similar to the creative pieces of musicians like David Rothenberg or Hollis Taylor.

Conclusions

The diversity of interspecies interactions established through bird-sound imitations is a function of the diversity of existing bird sounds, abilities, and reasons of humans for imitation, and the self-reflective and ethical considerations that place bird-sound imitations in a wider framework of interspecies ethics. Despite the ubiquitous availability of portable audio-devices, mobile-phones, and other devices, which allow for the unselective mechanical reproduction of bird sounds, vocal imitation of birds is still an ongoing practice among birders. However, today the choice of devices used for imitation (with the dominance of voice imitation and playback recordings) is smaller than in traditional societies. The choice of species and sounds imitated is guided by the particular purpose of imitation, which is further embedded in a larger context of birding related activity (e.g., bird censuses vs. hobby birding) and situations where the possibilities of potential contact may be spontaneously realized.

In general, birders held a critical stance towards the extensive use of electronic devices while birding (though making exceptions for scientific surveys). The ubiquitous presence of humans and their technological extensions in natural environments has made birders question their own status as interactors, with the potential that they can be perceived as disturbers. However, our study also found that interesting moments of interaction are feasible, where the mutual curiosity of birds and humans overshadowed the concern of disturbance, and allowed for interspecies interactions based on mutual feedback to occur. Additionally, the fieldwork and interviews of our study revealed that the birders, fashioned by the responses of the birds to their own activities (and what meaning they attributed to the reaction), have formed a set of internal ethics which guides their behavior.

The use of imitation results in an entry into the ecological and communicative networks of other species, while simultaneously distancing oneself from one's role as a human in this set of relations. Skillful mimetic communication allows one to receive reactions which one would not receive when acting solely as a human; hence, disguising oneself with a foreign voice helps to diversify the meanings a human can have for other species. Imitation further allows for shifts in sonic identities (Hui, 2018), while simultaneously embodying the learning and listening practices and devices of human culture and the blurring of one's human identity. Yet, further comparative studies in other countries would be needed to confirm or confute our results on the dominant purposes of bird sound imitation and the prevalence of different devices used for imitation by the birders, as well as the ethical considerations of the birders, including the differences in local and international birding activities.

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References

Abram, D. (1996). *The spell of the sensuous*. Vintage Books.

Alves, R.R., Mendonça, L.E., Confessor, M.V., Vieira, W.L., & Lopez, L.C. (2009). Hunting strategies used in the semi-arid region of northeastern Brazil. *Journal of Ethnobiology and Ethnomedicine 5*(12). doi:10.1186/1746-4269-5-12.

Bruyninckx, J. (2018). *Listening in the field: Recording and the science of birdsong*. MIT Press.

Budka, M., Matyjasiak, P., Typiak, J., Okołowsk, M., & Zagalska-Neubauer, M. (2019). Experienced males modify their behaviour during playback: the case of the Chaffinch. *Journal of Ornithology*, *160*, 673–684.

Burnett, J.L., & Sieving, K.E. (2016). Songbird distress calls as an improved method for detecting Red-shouldered Hawks (*Buteo lineatus*). *Florida Field Naturalist, 44*(4), 157–168.

Busse, P., & Meissner, W. (2015). *Bird ringing station manual*. Walter de Gruyter GmbH.

DeJong, L.N., Cowell, S.D., Nguyen, T.N., & Proppea, D.S. (2015). Attracting songbirds with conspecific playback: a community approach. *Behavioral Ecology 26*(5), 1379–1388.

De La Hera, I., Fontanilles, P., Delalande, L., Glad, A., & Sarraude, T. (2017). Attraction of other species by bluethroat *Luscinia svecica* song playback during autumn migration: An experimental test using bird-ringing data. *Ardeola*, *64*(1), 91–99.

Gill, L.F., Goymann, W., Ter Maat, A., & Gahr, M. (2015). Patterns of call communication between group-housed zebra finches change during the breeding cycle. *eLife, 4*, 1–23.

Gillham, B. (2005). *Research interviewing: The range of techniques.* McGraw-Hill Education.

Feld, S. (1994). *Sound and sentiment: Birds, weeping, poetics, and song in Kaluli expression*. University of Pennsylvania Press.

Fletcher, R.J. Jr. (2008). Social information and community dynamics: Nontarget effects from simulating social cues for management. *Ecological Applications*, *18*(7), 1764–1773.

Friesen, M.R., Beggs, J.R., Gaskett, & A.C. (2017). Sensory-based conservation of seabirds: a review of management strategies and animal behaviours that facilitate success. *Biological Reviews, 92*, 1769–1784.

Harris, J.B., & Haskell D.G. (2013). Simulated birdwatchers' playback affects the behavior of two tropical birds. *PLoS ONE, 8*(10), e77902.

Hausleitner, D. (2006). *Inventory methods for owl surveys. Standards for components of British Columbia's biodiversity No. 42.* British Columbia Ministry of Environment and Climate Change Strategy. http://www.env.gov.bc.ca/wildlife/wsi/reports/4383_WSI_4383_RPT.PDF.

Hui, A. (2018). Imagining ecologies through sound: An historic-ecological approach to the soundscape of the Mississippi flyway. *MUSICultures*, *45*(1/2), 35–52.

Johnson, J.M., & Maness, T. (2018). Response of wintering birds to simulated birder playback and pishing. *Journal of the Southeastern Association of Fish and Wildlife Agencies, 5*, 136 -143.

Kalaberda, A.V. (2016). Звуковые подражания (голосовые имитации и манковые наигрыши) в традиционной культуре карел [Sound imitations (voice imitations and decoy tunes) in the traditional Karelian culture]. *Музыковедение*, *10*, 10–16.

Kelly, K. (2010). *What technology wants?* Viking.

Kohn, E. (2013). *How forests think: Toward an anthropology beyond the human*. University of California Press.

Magrath, R.D., Haff, T.M., Fallow, P.M., & Radford, A.N. (2015). Eavesdropping on heterospecific alarm calls: from mechanisms to consequences. *Biological Reviews of the Cambridge Philosophical Society, 90*(2), 560–586.

Marler, P. (2004). Bird calls: a cornucopia for communication. In P. Marler & H. Slabbekoorn (Eds.), *Nature's music: The science of birdsong* (pp. 132–177). Academic Press.

McLuhan, M., & Fiore, Q. (1967). *The medium is the massage: An inventory of effects.* Penguin Books.

Nilsson, M., Bartunêk, J.S., Nordberg, J., & Claesson, I. (2008). Human whistle detection and frequency estimation. *Proceedings of the 2008 Congress on Image and Signal Processing*, *5*, 737–741.

Rothenberg, D. (2005). *Why birds Sing: A journey through the mystery of bird song. Basic Books*.

Sen, S.K. (2009). *The ethics and science of bird call playback*. Retrieved September 12, 2020, from https://www.kolkatabirds.com/callplayback.html.

Sibley, D.A. (2011). *The proper use of playback in birding.* Retrieved September 25, 2020, from https://www.sibleyguides.com/2011/04/the-proper-use-of-playback-in-birding/.

Smith, J. (2015). *Eco-sonic media.* University of California Press.

Smith, J. (2022). A biosemiotic and ecoacoustic history of bird-scaring. *Biosemiotics, 15,* 67–83.

Tali, T. (2017). *Linnuhuvilise Meelespea*. [Reminder for birders] Retrieved October 5, 2020, from https://www.eoy.ee/pics/237_Linnuhuvilise_meelespea.pdf.

Thorpe, W.H. (1961). *Bird-song: The biology of vocal communication and expression in birds*. Cambridge University Press.

Titze, I., Riede, T., & Mau, T. (2016). Predicting achievable fundamental frequency ranges in vocalization across species. *PLoS Computational Biology 12*(6), e1004907. doi:10.1371/journal.pcbi.1004907.

Willerslev, R. (2007). *Soul hunters: Hunting, animism, and personhood among the Siberian Yukaghirs*. University of California Press.

Wojczulanis-Jakubas, K., Wietrzykowski, J., & Jakubas, D. (2016). Response of reed warbler and sedge warbler to acoustic playback in relation to age, sex, and body condition. *Journal of Ornithology, 157*, 137–143.

Ward, M.P., & Schlossberg, S. (2004). Conspecific attraction and the conservation of territorial songbirds. *Conservation Biology, 18*(2), 519–525.

Watson, D., Znidersic, E., & Craig, M.D. (2018). Ethical birding call playback and conservation. *Conservation Biology, 33*(2), 469–471.

Zimmerling, R. (2005). Bringing in the birds. *Birdwatch Canada, 3*, 10–12.