RESEARCH

Youth Inclusion in Forest Policy Dialogue: Contemplating Human–Forest Relationships through Arts-Based Methods

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Awareness of human–forest relationships offers a basis for meaningful forest policy participation. However, weakening connections to forests, particularly among young people, hamper youth inclusion in policy arenas. We consider the use of arts-based methods as knowledge practices that nurture human–forest relationships and may promote inclusive policies. Arts-based methods, such as photography, music, or drama, offer insights and elicit opinions. Within the forest domain, exploiting such methods requires better understanding of how participants perceive them. Here we present two cases where young people (17–30 years) unfold their forest relationships. Following prompted retrospective reflections, we qualitatively analyse participant perceptions of the interventions. Case one is an innovation workshop blending art and science, where young research participants joined artists and environmental and forest scientists. Case two is a writing exercise for young research participants, where a hip-hop/rap video about laser scanning and the role of forests in climate change was used to catalyse participants' reflections. Analysis applied the tripartite model of attitude comprising cognitive, affective, and behavioural dimensions. The workshop results emphasise benefits of networking and fruitful reflections, coupled with unequal participation concerns. The video experience yielded a range of thoughts and emotions, including excitement and invitingness, but also irritation, doubts over its influence, and no explicit behavioural intentions. The findings suggest that realising the opportunities of arts-based knowledge practices requires time and space for ensuring that young people's voices are heard. More inclusive participation of youth in formal and informal forest policy dialogue calls for careful facilitation and means to secure continuation.

Keywords: arts-based methods; human–forest relationships; knowledge practices; parallel pathways; youth

Introduction

Youth Inclusion as a Forest Policy Challenge

Recent forest policy literature has argued for the need to enhance participation of citizens in policy processes and discussions (Kleinschmit et al., 2018; Mustalahti, 2018). A particular driver for further considering forest policy participation is the nexus of urbanisation and generational change. Alongside more urban living and lifestyles, people tend to have less direct experiences and interactions with nature (Schuttler et al., 2018). Concurrently, with this detachment, people becoming less familiar with forestry concepts translates into weaker capabilities for participating in forest policy dialogue. Saarikoski, Tikkanen and Leskinen (2010) found that Finnish regional forest policy actors have recognised increasing alienation from nature and nature-based livelihoods among youth and young adults as a major future threat to the forest sector. In this article we discuss whether arts-based methods could not only prevent alienation of young people from forests but also support their inclusion in forest policy dialogue.

The inclusion challenge is especially relevant with citizen groups such as immigrants and youth, who enter the forest policy discussions from outside the traditional stakeholder coalitions (Korhonen et al., 2018) but are influenced by its internal debate and power structures (Zurba and Trimble, 2014). These citizen groups may be willing to express their views in the forest policy discourse, or they may even be invited to participate in formal policy processes, but one may ask whether they have sufficient capabilities to contribute. A recent study of international forest policy processes found that although youth participation was appreciated, the genuine opportunities for youth to express their views remained limited (Yunita, Soraya and Maryudi, 2018).

Arts-Based Methods in Knowledge Practices

A wealth of arts-based methods (for example, visual arts, videos or drama) has been employed with youth across various domains, such as mental health, student wellbeing and refugee research (Coholic et al., 2020; Lenette et al., 2019; Rättilä et al., 2021; Watson and Barton, 2020). Perhaps the closest recent research example to our present policy participation challenge is where arts are used to foster hope, self-expression, and community engagement

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of young people (Lee et al., 2020). Within the scope of the present study, we see arts-based methods as important supporters of knowledge creation, reformulation, and diffusion, which justifies their use in knowledge practices (Casas-Cortés, Osterweil and Powell, 2008).

As a special type of arts-based methods, art and science blends are of relevance to policy participation because they can open a door to evidence-informed policy making in a creative and engaging manner. Art and science blends can be employed when engaging people of various backgrounds to cross-pollinate ideas and to find solutions to global challenges (Andersson and Shahrokh, 2013). One may consider a collaborative co-construction mode as a novel knowledge practice when combined with consideration of such knowings and actions that science and art arenas provide (Ahn, 2016). Challenges with these activities include tension between trained professionals and laypersons on the one hand (Bromme, Nückles and Rambow, 1999) and between generations on the other (Bang et al., 2016). When looking at the opportunities for young people and other citizen groups for meaningful participation, one must pay attention to their own perception of the impacts of participating.

Arts-based methods have been acknowledged by various researchers as a means to increase insight and understanding (Leavy, 2015; Lenette, 2019). In arts-based research methods, some forms of arts or art-producing activities are used as part of participatory or action research methodology, and the research interventions may take various forms (Barone and Eisner, 2011). Arts-based methods may also contribute to the dissemination of scientific knowledge (Lapum et al., 2014). For example, music videos can be a powerful tool for transferring knowledge and grabbing the viewer's attention compared to purely verbal or written means because they can heighten our senses by stimulating multiple pathways in our brains (Piercy and Benson, 2005). Over the last decade, the use of music videos in science dissemination has increased in step with increased availability of online video streaming services, such as YouTube, which allows users to upload their own videos for free, and the decreased costs of high-quality video production (Allgaier, 2013; Edmond, 2014).

Arts-based participatory learning methods have also proved useful in the context of programming (Fields, Vasudevan and Kafai, 2015) with high-school students collaboratively programming music videos. The use of music in teaching science has been acknowledged in university-level teaching to enhance learning (Crowther, 2012), while music videos have been found to prolong content gains compared to traditional video among intermediate school age children (McFadden, 2013; Walker et al., 2016). While the benefits of using music and music videos for education are well-known, there is less knowledge of the potential of science music videos in behavioural change and awareness raising.

Objectives
From the above perspective, our normative-ethical starting point is that citizen groups outside established policy coalitions deserve to be considered as equal participants in forest policies and collaborative forest-use debates. In this study we focus on how art–science interventions are received among young participants and how those practices prepare them for policy dialogue and action. We examine two real-life cases with a small number of young informants and attain a deeper understanding of the potential for success or failure of such arts-based knowledge practices.

To fulfil our overall research task, we ask:

1. What kinds of cognitive and emotional reception did the art–science interventions induce among the young participants?
2. How did the participants consider the role of the arts-based knowledge practices in deepening their understanding of their own forest relationship?
3. Did the arts-based knowledge practices offer participants motivating inputs which complement other ongoing activities in their lives?

Based on the results, we discuss the young people's verbal expressions connected to forest relationships or to the experienced methods indicating either positive or negative emotions. We consider the issues which are critical for employing arts-based knowledge practices to improve youth capabilities in forest policy participation.

Conceptual Underpinnings
Human–Forest Relationships and Environmental Citizenship
Self-awareness of one's own forest relationship is important. When we are aware of our own relationship to forests, we may be more able to participate with others to achieve environmentally responsible behaviour (Häyrinen and Pynnönen, 2020). Uncovering and nurturing human–forest relationships among young people could help them recognise their own competencies and enhance their capabilities as environmental citizens acting and participating in society as agents of change (Paraskeva-Hadjichambi et al., 2020). For example, in the Finnish Forest Strategy (MoAF, 2019), the human–forest relationship is considered as an individual's direct or indirect living relationship with the forest and as part of the individual's more extensive relationship with its environment and identity.

Young people worry more than previously about the environment, and especially about climate change (Pekkarinen and Myllyniemi, 2018). Their willingness to have an impact on society has also grown. A characteristic way for young people to express their agency, especially as minors (under 18 years old), is through politicising everyday life (Kallio, 2018). This is because their citizenship takes shape through the experience of non-sovereignty. Instead of engaging in formal, institutional politics, young people may act their citizenship at school, home, and in their free time, both virtually and face-to-face. To support their growth as environmental citizens, various arenas and channels for expressing and exploring one's values, knowledge and talents are necessary. Being a youth is a relatively short period in life, and experiences

from that period define also one's adult life. Acting as an environmental citizen may entail collective powers which later appear as a generational experience (Albrecht et al., 2020).

Nurturing young people's human–forest relationships requires a diverse use of different knowledge and communication forms. An example is a biocultural approach that aims to overcome the traditional human–nature dichotomy by using local knowledge, practices and ontologies as a basis for management decisions, and hence to address the complex connections and feedbacks between human and ecological well-being (Caillon et al., 2017). Human–forest relationships may entail cultural, social, economic and ecological aspects, and cultural, spiritual and symbolic values that are characterised by their long history and the bonds which they have created between humans and forest (Ritter and Dauksta, 2006, 2013; Himberg, 2011). Humans are seen as part of nature, but at the same time it is acknowledged that we may position ourselves as apart from nature or even superior to nature (Keski-Luopa, 2009). According to Barthel et al. (2018), those who experience close bonds with nature tend to live in balance with it, care for it and act for nature's well-being. The novel use of knowledge and communications may entail designing such knowledge practices to help actors engage and contribute to taking steps towards wider inclusion in the forest domain and deepening understanding of one's own forest relationship (see Bisbee O'Connell et al., 2020).

Belonging and Attitude
In this study we consider how arts-based knowledge practices may influence inclusiveness via young people's sense of belonging (Isin, 2008; Kaukko and Wernersjö, 2017). We understand belonging as 'a sense of ease with yourself and among the people around you, and the ability to act and to participate in a social context in a respected and acknowledged manner' (Kaukko and Wernersjö, 2017: 11; May, 2011). Belonging is a crucial aspect of being a person, and belonging plays a role in connecting individuals to their social environment. An inclusive environment is one that allows a sense of belonging, encourages and supports its members and offers encouragement through positive and specific feedback (Peterson et al., 2001).

Alongside sense of belonging, the present study considers attitude as a concept that connects to policy participation. Attitude requires an awareness of the specific person, place, thing, or event. This includes beliefs regarding the issue, which in turn guide the subject to a given intention, and finally to a behaviour toward the issue. These three components—cognitive, affective and behavioural—together form a subject's attitude. This three-stage model of attitudes, originally developed by Rosenberg and Hovland (1960), is often referred to as the tripartite model of attitudes (Breckler, 1984; Klop and Severiens, 2007). In forest sciences, the model has been recently used when analysing forest owners' orientation towards climate change and was considered useful for analysing actors' perception of forest-related matters (Laakkonen et al., 2018). In this study, the three-stage model is used as a conceptual basis for anticipating potential impacts of arts-based interventions and hence as an interpretation lens in empirical analysis. The main reason for choosing the model was its fit to the science–art research design that was intended to bring new knowledge, evoke emotions, and subsequently contribute to potential behavioural change, that is, participation in informal and formal forest policy.

Binding the Concepts Together
When considering the sense of belonging and action-oriented attitudes through arts-based knowledge practices, we pay attention to two separate but interconnected aspects: immediate perceptions, and longer-term impacts. The immediate perceptions are derived from participants' cognition and reactive emotions relating to how they experienced fitting in as participants or audience. Obviously, the immediate perceptions cannot be analysed based only on direct questions. Instead, there should be an overall analysis of the pieces of evidence on how the knowledge-practice experience resonated with the participants' thinking.

Prior to or even without an opportunity for longitudinal monitoring of actual behaviour, longer-term impacts may be analysed from the participants' proactive emotions (i.e., affects that contain indications of ignition towards action) and more concrete behavioural intentions, as elicited in reflection enquiries—acknowledging, however, the remaining gap between intentions and action (e.g., Sheeran, 2002; van Hooft et al., 2005). As with immediate perceptions, the search for evidence of longer-term impacts should include analysing the connection of the knowledge-practice experience with the participants' parallel pathways as environmental citizens (Dobson, 2003; Doyle, MacEachern and MacGregor, 2015), including taking responsibilities and being capable of critical reflection (Mezirow, 1998). Participation in arts-based knowledge practices may represent scaffolding interventions (Belland, 2014) that facilitate the actors towards stronger environmental citizenship and a better-informed relationship with forest. This is in turn presumed to yield more active policy participation.

Methods
Methodological Approach to Research Participation
In this study, we refer to participants aged 17 to 30 years as young people. In that we acknowledge that the definition of young people within this age range assumes various real-life manifestations as concerns, for example, maturity and life situation. Our aim was to invite youth from various backgrounds (native and non-native Finns, different levels of education, rural and urban) to bring multiple voices into the study and to avoid bias towards particular cohorts.

We applied arts-based methods, co-research and a parallel pathways approach in this study. These comprise a nested knowledge-practice entity and generate social exchange. Discussions in the field of youth research have raised questions about power relations and structures related to studying young people (Allaste and Tiidenberg, 2015; Lohmeyer, 2020; Mubeen and Tokola, 2021; Pyyry, 2012). There has been critique of adult-initiated definitions and top-down research strategies, while the

need to take stock of the experiences, viewpoints and thoughts of youth has been emphasised. Some of the power asymmetries of participation might be unsolvable, thus power repositioning efforts are welcome. Co-research is considered a way to fix the asymmetry of power relations between youth and researchers. Pyyry (2012: 37) following Higgins, Nairn and Sligo (2007: 105) defines co-research as 'participation of people under study in the implementation of the research and considering them as capable actors who have knowledge about their own world'. Co-research is about knowledge co-creation between researchers and young people on epistemologically different but equal grounds. In this study, all potential features of co-research process, including planning, implementation and reporting, were not present because the participants did not take part in the analysis and writing of this report. However, it is important to stress that the co-researching process, via co-researcher training, diary and blog writing and continuous reflections, contributed significantly to data acquisition with the co-researcher participants.

Following Lohmeyer's (2020) thoughts on power repositioning, we adopted an approach whereby participatory research with young people can be understood as forming *parallel pathways*: our approach thus invited young people in this study to participate as experts of their own lives with their personal values, interests, and motivations. Lohmeyer (ibid.) originally understands youth participation in qualitative research as parallel *projects* and argues that by doing so, researchers can value young people's reasons for participation. Lohmeyer describes how both a researcher and a young person arrive at a research encounter with their own (one or more) project(s): 'The project could include the reason for participation, the method of engagement or the goals being pursued through the research encounter' (Lohmeyer, 2020, 2). This approach avoids positioning research participants as disempowered or disinterested participants by recognising that they have projects that motivate and direct their participation. In this study we replace the term 'project' with 'pathways' to emphasise the continuation and sustainability aspects of participation (see also Mubeen and Tokola, 2021). We recognise that young people's pathways may have started long before the parallel intervention and they may continue that path after it. In other words, parallel pathways are understood as longer-lasting activity processes of the participants (e.g., working in an environmental non-profit organisation or being active in a local moose hunting club), which shape and are shaped by the participation experiences in the research project.

Examined Cases on Arts-Based Knowledge Practices
We set up two cases of arts-based knowledge practices in this study: a workshop and a music video experience, which differed in the amount of time invested by the participants in the knowledge practice. The music video was a short intervention compared to the two-day workshop.

"Encounter on the Top" Multi-Actor Workshop
The initiator of multi-actor workshops incorporating art and science collaboration was Savonia University of Applied Sciences in Eastern Finland. Savonia together with several science and art organisations and culture festivals organised a multi-actor innovation workshop in summer 2019 on the theme of 'Science – art – forest'. The aim was to bring together a diverse group of people (both youth and adults) from science, arts and civil society communities to elaborate on the manifold relationships people have with forests and create collaborations and initiatives to further communicate these in public discourses on sustainable use of forests. The ambition was to establish new partnerships for co-creating ideas for pieces of art, exhibitions, demonstrations, research projects, and more, all somehow combining arts and sciences.

Through collaboration of the ALL-YOUTH research project at the University of Eastern Finland and the other organisers, four co-researchers accepted an invitation to the workshop. We call these young participants co-researchers because they had been collaborating and co-creating knowledge with ALL-YOUTH researchers since late 2018 when a co-research training camp was organised for young people interested in research approaches to environmentally sustainable well-being. The camp participants were volunteers gathered via communication to educational organisations on high school and university levels as well as to civic organisations in health and social sectors in Joensuu region in eastern Finland. Co-researchers' engagement in the large youth research project, within which this study fell, has included posing research questions, writing autoethnographic diaries, blogging about co-researcher experiences and findings, scientific report writing, statement writing, and participating in research project activities and events, all according to their individual interests. The multi-actor workshop was one of the events chosen by these young individuals. The costs of participating in the event were covered for them. The two-day event, consisting of workshops and excursions, took place at a national park in a hotel conference venue surrounded by forest trails, scenic views and rich cultural heritage. Following keynote talks, organisers divided the participants into groups, each of which had a different theme connected to human–forest relationships. Rather than forming a separate group of youth, the young participants went to different groups and joined the adult participants. The groups had a pre-designated facilitator whose task was to lead and mediate the group's work during a couple of hours in the late afternoon and in the morning of the second day, after which the groups presented their work in a plenary session. The co-researchers' inspired experiences and the critical questions raised after the workshop triggered the planning of this scientific article.

"The Forest Scan Plan" Music Video
The hip-hop/rap music video that was used in this study was created by one of the present authors. The music video is based on the author's PhD thesis which focused on the utilisation of a novel remote sensing method to detect trees in decline. The author wanted to i) couch their science in an understandable and interesting manner for the public, and ii) gain the attention of the media, particularly mainstream TV, regarding these research results. A doctoral study about remote sensing of forests

may not be the first to catch the eye of journalists, thus it was easier to 'sell' the results alongside a music video, which is not a common format for remote sensing. Furthermore, the music video aimed at communicating forest-related solutions to climate change, but instead of being dramatic and pessimistic, the communication highlighted solutions and technical development that can help in solving these challenges.

The author also wanted to create a conversation about the role of science and scientists in society. Pop artists are well-known and highly respected in modern society. Could a scientist have a similar position in society? What makes a scientist 'cool' or 'uncool'? And could we influence general opinion about scientists by taking part in cultural activities? The author aimed at putting themselves in the role of an artist in the music video, but at the same time bring elements of science into the audio-visual content. Music also has a major role in transferring knowledge and ideas and in changing attitudes within society. Could music be used to aid the spread of scientific knowledge within different levels of society? Both a group of young co-researchers and immigrant adult high-school students and one tenth-grade student, provided answers to the aforementioned questions.

Data Gathering

Our data consist of two entities: young participants' retrospective reflections from 1) the multi-actor workshop participation, and 2) the music video watching experience. The total number of young participants across the two data gathering entities was 10 (**Table 1**).

First, four young co-researchers, who were one man and three women aged 18–29 years, participated in the above-described workshop and shared their thoughts about the experience through answering open questions (see Appendix 1a). The questionnaire consisted of 12 open questions that aimed at acquiring knowledge about the participants' learning, emotions, and intentions for action during and after the workshop. Three persons answered the questions in writing and one person wanted to be interviewed face-to-face. The interview was audio recorded and transcribed. This data gathering was facilitated by the present authors. Since the co-researchers were already familiar with knowledge co-creation processes with researchers, their levels of engagement and abilities to articulate their thoughts were already high upon entering this exercise.

Second, four co-researchers and three adult high school students and one tenth-grade student provided answers

to 13 open questions (see Appendix 1b) that reflect the viewer's learning, emotions, and intentions for action arisen by the music video. Of the co-researchers (two men and two women, aged 18–29 years), two were the same and two were different from the above workshop participants. Unlike these co-researchers, the adult high-school students and the tenth-grade student (one man and three women, aged 17–30 years) had received no such training in engagement and thinking. Three of them were immigrants and therefore in a different position in terms of their cultural and practical relationship to forest compared to Finnish native participants. The intention behind complementing the co-researchers with these immigrant youth was to obtain responses from a diverse group of people.

The two questionnaires following the two cases covered essentially the same themes and were guided by the tripartite model of attitude but tailored to the different cases and audiences. However, in Appendix 1a the questions focus more on participants' relationship to forest and feeling of belonging, whereas in Appendix 1b the emphasis is on participants' art experience and relationship to forest.

The high school students and the tenth-grade student had not engaged in our research activities previously and therefore they are considered as short-term research participants who are in challenging transformative periods in their lives. They participated in this study through collaboration between the research project and a high school, and their engagement in this study can be considered short. The collaborating teacher of the adult high school students and the tenth-grade student welcomed novel inputs in their thematic course on sustainable development. The teacher engaged in organising lectures with the high school students where the music video was used for teaching and for unravelling the students' forest relationships. The high school students and the tenth-grade student did writing exercises based on given instructions and facilitated by their teacher. Due to the then current COVID-19-restrictions, the authors of this study were not able to facilitate the lecture and the writing-exercises together with the teacher. Written data from those who had given their informed consent were delivered to the authors and used for this study.

Data Analysis

The three present authors jointly conducted qualitative analysis of all data, that is, the transcribed interview and written responses. The procedure followed broadly the

Table 1: Number of participants in the cases.

Case	Multi-actor workshop	Music video	Number of individual informants
Co-researchers	4	4 (two were same and two were different than in the multi-actor workshop)	6
High school students	–	4 (3 immigrant high-school students and 1 non-immigrant tenth-grade student)	4
Altogether	**4**	**8**	**N = 10**

phases of thematic analysis (Lester, Cho and Lochmiller, 2020), in which data organising and transcribing are followed by getting familiar with the data, memoing, coding the data, and moving from coding to generate combined meaning categories and more abstract themes, which are aligned according to the research questions in the results narrative.

The first reading served to acquire general understanding of the data. Next the researchers discussed their initial perception of the data in an online meeting and arrived at the main classification to follow the above-introduced tripartite theory of attitude: knowledge, feelings, and action (corresponding to cognitive, affective and behavioural dimensions, respectively). In addition, the researchers agreed upon adding one classification category for the sense of belonging and another one for general benefits from participation.

Then each researcher, following a directed—deductive yet flexible—coding strategy (Hsieh and Shannon, 2005), individually coded the transcribed data using the above five classification categories as a working theory. The coding took place following careful and contextualised reading of the transcripts where each passage of the text, identified to contain a noteworthy meaning (Lindgren, Lundman and Graneheim, 2020) from the viewpoint of some main category, was selected and placed under one or several subcategories within a two-level hierarchical thematic structure of phenomena. In this interplay of root-level coding and interpretative categorisation, researchers sought answers to questions: i) does this expression, taking its context into account, provide evidence of gaining knowledge, experiencing emotions, preparing for action, sensing of belonging, or benefitting from the arts-based method at hand, and ii) how can one categorise and label this evidence under one or more sub-categories? This thematic structure accumulated and became progressively richer as coding and categorisation of the data proceeded.

Following another online meeting between the authors, the first author implemented the aggregate coding and categorisation into NVivo (Release 1.2) qualitative data analysis software (Jackson and Bazeley, 2019). In that phase, the first author made sure that the different and complementary interpretations of all authors were included, and that the terminology was consistently applied. The consolidated, hierarchical NVivo coding and categorisation structure comprised 36 parent-level and 225 child-level categories for the workshop case, and 25 parent-level and 78 child-level categories for the music video case. The difference in numbers is partly due to the rather long transcribed interview concerning the workshop, and partly to the individual and short nature of experiencing the music video.

Through this collaborative investigator triangulation exercise (Archibald, 2016), similar understandings between the authors on thematic categorisation was achieved. In the third and final online meeting concerning the data analysis, the authors discussed the final categorisation structure and the main themes for organising the results narrative, supported by selected illustrative quotes. When discussing the lower-level category contents to reach a higher-level abstraction and to identify the main themes, the researchers asked themselves: i) what are the most relevant merged cultural-contextual messages (Vaismoradi and Snelgrove, 2019) from the analysis categories representative to the data, and ii) how can one interpret those to answer the research questions? The authors also discussed and implemented an idea for illustrating the summary of the findings, which is shown in a figure at the beginning of the results section.

Results
Connections Between Observed Phenomena
To sum up the participants' reactions to the interventions in the two cases we placed the identified evidence categories into a space showing a continuum from negatively to positively expressed reactions (**Figure 1**). From the figure we notice that the workshop and the music video shared some immediate impacts (in the middle), while some identified expression categories were more characteristic of one or the other of the cases (left and right edges of the figure). It was obvious that both interventions catalysed the informants to talk and reflect rather vividly on their forest relationships and artistic activities. These are indications of parallel pathways in the participants' other life spheres, indicative of an impact potential beyond the intervention itself. Both cases evidenced contradictory emotions and general enjoyment connected to encouragement and inspiration.

As a social event, the workshop had the characteristic features of social networking and group dialogue, but also the worry of unequal participation. The music video showed evidence of igniting emotions and inviting features but also critical argumentation and irritation.

While the evidence in **Figure 1** may be roughly organised within a vertical dimension from positively to negatively expressed reactions, a sense of belonging or growth as an environmental citizen cannot be read from the figure directly but only indirectly. On the one hand, a negatively expressed reaction with critical argumentation may be viewed as an indication of maturity in thinking and readiness to participate with one's own voice, even with challenging messages. On the other hand, general enjoyment as a positively expressed reaction is not very strong evidence of the participant's own thinking because such reactions may partly be products of social desirability bias, but positively expressed detailed behavioural intentions do constitute such evidence.

Observed Phenomena Classified in Main Themes
Guided by the above research questions and theoretical viewpoints, the qualitative analysis yielded a set of main themes which constitute the below section structure. The quotes are the words of young participants (co-researchers' or high school students'), translated from Finnish to English by the authors.

The first main theme, 'catalyst for widening and deepening one's own thinking', gathered observations on the cognitive impacts of the studied arts-based methods. The second theme, 'diverse fountain of emotions', addressed the various affective reactions, and the third
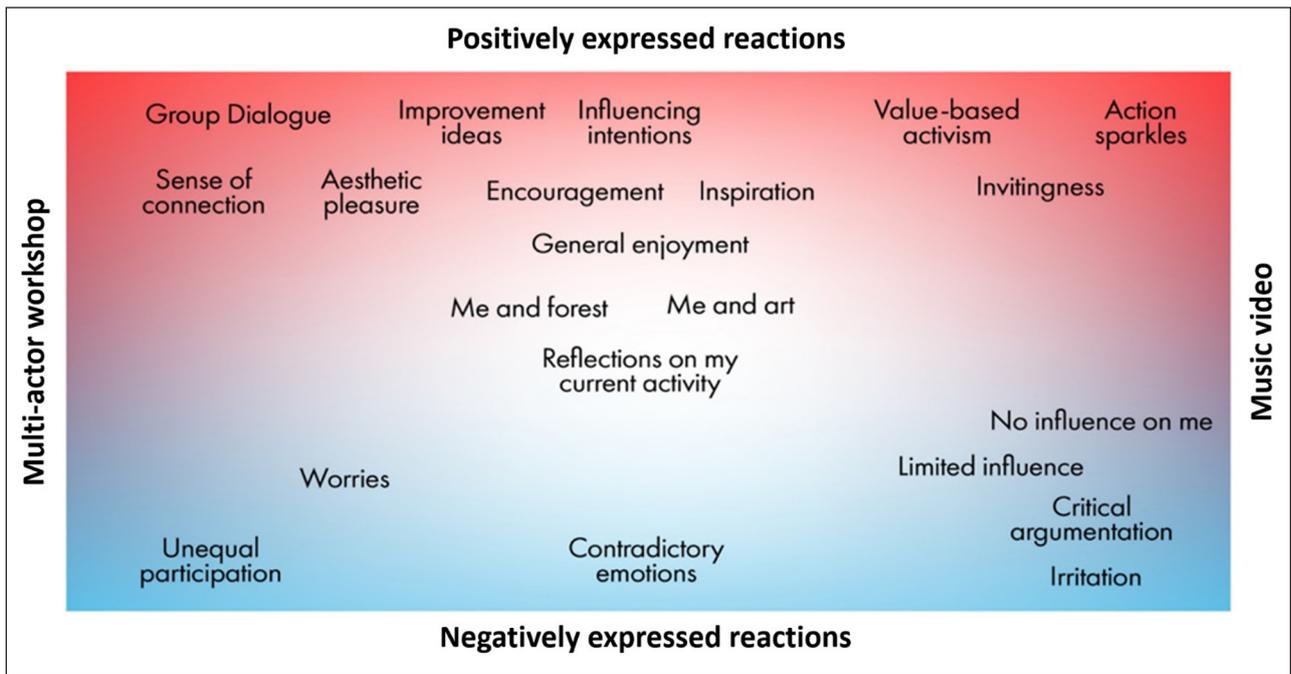
Figure 1: Summary of main observations from the two cases. Items at the top emerged as more positively expressed and items at the bottom as more negatively expressed reactions. Items to the left were characteristic of the workshop participation, while items to the right were characteristic of the music video experience. Items at the centre emerged within both cases.

theme, 'strengthening what I am already doing—and going further', described action intentions. The fourth theme, 'delight at meeting people and participating, but worry of unequal participation', comprised informants' participation experiences. Finally, the fifth theme, 'contradictions and doubts of bounded effectiveness', addressed critique and reservations towards the arts-based methods under study.

Catalyst for Widening and Deepening One's Own Thinking

According to the data, the workshop was fruitful for evoking thinking among its young participants. Due to the topic of the event, those thoughts related to forest use and conflicting forest policy views as well as lifestyles and global challenges. Some participants expressed critical views towards excessive harvesting and short-sighted forest policy, while some others acknowledged the economic relevance of the forest sector or supported a constructive approach to influence sustainability of the forest industry. The diversity of human–forest relationships appeared to be an inspiring observation and seemingly encouraged the participants to reflect on their own connection to forests. When reflecting on the outcomes of the event, one participant emphasised:

> 'How different people look at forests and react to it. A very exaggerated example: for one person, harvesting causes physical anxiety, and another person has formulas of income in mind' (Co-researcher 2, over 20 years old).

The participants even pondered over the possible futures of human–forest relationships following urbanisation, technology development and the ecological crisis as well as the nature of the connection between humans and forests:

> 'It could be that we will be forced into a relationship with nature and into a different way of life due to ecological catastrophes. Perhaps there would also be a "stage of humans" where humans rule and nature is merely a resource to be extracted using force' (Co-researcher 4, under 20 years old).

When prompted, the participants described various roles for arts in forest discourses. For example, arts from the participants' view may promote further knowledge towards understanding, facilitate communication, and make change happen.

> 'Art has a fundamental ability to cause emotions in us and to make us look at things from a different perspective. That's why art is a power that can transform the World' (Co-researcher 3, over 20 years old).

Overall, these utterances provide evidence that the workshop helped the young participants to organize thoughts and emotions, gave new ideas, and widened thinking perspectives. The participants suggested that these types of events and arts-based activities may afterwards help to disseminate knowledge by raising awareness and spreading scientific information.

> 'I think art can have an important role in disseminating scientific information among citizens' (Co-researcher 4, under 20 years old).

As a shorter type of art intervention, the music video catalysed a somewhat different reception from our young informants. The video evoked thinking about trees and forests connected to climate change as well as practices of science and technology, in particular using laser scanning for measuring trees. The music video also made them consider forest health and damages. Thus, the new knowledge was quite efficiently taken up from the lyrics. However, one sole video did not seem to influence immediate changes in the informants' action intentions. But the high school students did acknowledge the potential value of the video to popularise and disseminate information to students. The potential effectiveness of arts-based science communication was appreciated by the informants:

> 'We can perhaps make people figure out the World's problems better via art' (High-school student 4, over 20 years old).

Diverse Fountain of Emotions

Both cases appeared to initiate various emotions among the participants. Alongside the generally positive feedback of enjoyment, the national park as a workshop venue was praised for its magnificent scenery and other aesthetic pleasures. The young participants liked the event, and in their feedback, they discussed a range of feelings that they experience in their forest encounters. Those include, for example, relaxation, spirituality, thankfulness, meaningfulness, and excitement. They also associated the efficient economic use of forests and emerging forest conflicts with worry, sorrow, and despair:

> '[I felt] despair, how people are interested in the same thing, but still discuss it in totally different terms without understanding each other' (Co-researcher 2, over 20 years old).

The workshop made the participants feel connected to the forest. But they also felt that although the event was an enlightening experience, it was partly too busy and stressful. There were contradictory emotions. On one hand the participants felt happy and empowered:

> '[I experienced] joy about the fact that Finland has very long traditions when it comes to both arts and human–forest relationships, and we have woken up and recognise synergies between these two' (Co-researcher 4, under 20 years old).

On the other hand, the participants expressed frustration with the huge challenges that forest policies and practices are facing. Some were confused and reported having lost concentration at the event.

The music video also evoked manifold emotions among the informants. Some felt worry and fear:

> '[The video evoked] fear for forests because of climate change, and fear for the forest animals' (Co-researcher 3, over 20 years old).

In general, the video was described as stylistic and trustworthy. Some informants expressed igniting emotions such as inspiration, insight, curiousness or awakening. They felt it was engaging, was danceable for some and even kept playing in the head for one. Emotions in general were considered important in knowledge delivery:

> 'I think that it [video] is in sufficiently plain language and still noteworthy, so that the message is delivered along with positive emotions. I experienced it like that. The messages are 'delivered' more easily when emotions are also involved' (Co-researcher 3, over 20 years old).

However, some others expressed embarrassment and irritation. There was some reservation about the potential for influence, although it was acknowledged that the video had not fallen into the most obvious traps of trying and failing to be cool in the eyes of the young.

Strengthening What I Am Already Doing—And Going Further

The general observation from across all participants and from both cases was that the interventions encouraged them to continue the activities, hobbies, and activism that they had already been doing. As one co-researcher explained:

> 'I want to continue my activities in speaking for non-wood forest products and in encouraging multiple use of forests' (Co-researcher 4, under 20 years old).

The reactions expressed demonstrate that the participants received an extra push for their behaviours. Some participants mentioned that they had become inspired and planned to follow the example. The workshop participants wanted to influence the society to become fair and sustainable. The video, in turn, evoked some willingness to help and take care of forests:

> 'I felt the need to act, because forests are important to Finland and to Finns—so without doubt I want to take care of forests' (Tenth-grade student 1, under 20 years old).

Both cases catalysed the participants to revisit their childhood forest experiences and reiterate their current forest relationship. In the same way, reflections on the arts-based methods of science communication made them consider their own artistic hobbies and activities. Some participants gave suggestions on how to strengthen urban citizens' forest relationships with recreational forests and services, and some went on to suggest improvements in the workshop arrangements to make the art–science mixes function better.

Delight at Meeting People and Participating, but Worry of Unequal Participation

The workshop participants praised the opportunity to meet up with a diverse group of people. They enjoyed the networking and exchanging of ideas. They felt a sense of

encounter, togetherness, and meaningfulness. Dialogue in a small group was considered beneficial, and they liked the social nature of the event:

> 'It was great to meet people with different backgrounds and different professions' (Co-researcher 3, over 20 years old).

At the same time, however, some participants expressed their worry over whether everyone's voice was heard:

> 'How come, even in such a small group, the views of the less talkative are left unheard' (Co-researcher 2, over 20 years old).

This issue concerned the less talkative people who may not have been given sufficient time and space to participate equally. Further, the busy schedule caused the discussions to remain partly superficial.

Contradictions and Doubts of Bounded Effectiveness

The data revealed some tensions between participants' perceptions. While the workshop was considered enjoyable, the feedback indicated that not all groups had functioned equally well. Specific suggestions to improve the communication and facilitation practices (e.g., mixing groups) also speak for a partial success of the event in the eyes of the young participants. However, there was little criticism towards the concept as such. The music video received some doubts of bounded effectiveness, most notably that although stylistic and professionally produced, it might not eventually reach audiences very far beyond academic bubbles. There were also some opinions that the video was not fully convincing:

> 'The video caused a kind of confusion, because I didn't get what the piece was actually trying to say' (High school student 4, over 20 years old).

Several informants also declared that watching the video once, although a nice experience as such, did not affect them in any noticeable manner.

Discussion

The Examined Knowledge Practices Were Well Received, with Constructive Criticism

Our first research question was about the young participants' cognitive and emotional reception of the arts-based knowledge-practice cases: a multi-actor workshop and a music video experience. In this respect the richness of the acquired results, although partly reflecting the specific questions asked, may be interpreted as revealing that the case elicited both knowledge gains and feelings, which provoked participants to reflect vividly on their experience. The investigated art–science integration seemed to facilitate young participants' learning and sustainability action intentions in a comparable manner to the cases reported by Trott, Even and Frame (2020). What appears successful for the described workshop event

in the eyes of the young participants was the opportunity to meet with different people, which contributed to their social networks and sense of belonging. More critical, however, was how well the equal participation within the smaller groups was enabled—equal treatment is a relevant issue that has also been found to be critical in wider youth participation contexts (Cammaerts et al., 2016).

The above two findings, first, speak to the importance of inviting young participants to these types of multi-actor events and making extra efforts to ensure equal participation regardless of social status, cognitive skills, communication styles or temperament. Those participants who do not come as established experts of the topic at hand are especially vulnerable to being left unheard. We recommend that event organisers conduct inclusiveness assessments and that facilitation training is organised prior to art–science workshops. Second, these types of multi-actor workshops are easily narrowed down to special 'high-level' occasions that may fail in engaging other than already active and privileged young participants. A solution to this issue may be to replicate the multi-actor activities in different localities and thus bring them to surroundings where other young people are included, such as at schools and youth centres. In addition, the co-researchers could be encouraged and trained to take responsibility for acting as advocates or change agents to organise such events for a diverse group of young people who did not participate in the first encounter. In other words, inclusiveness should be fostered via including young people as organisers and facilitators of such multi-actor events, and not only as participants.

The music video raised several different reactions in the respondents. Generally, the music video was regarded positively and as inspirational and achieved its purpose as a means of communicating science. However, some of the respondents found the video difficult to understand and were not sure if they understood the message 'correctly'. The respondents had different backgrounds regarding the role of music in their lives. Participants who considered music an important part of their lives had more positive reactions to the music video. This raises the question as to whether the lesser musical background of other people could limit the ability of music or music videos to transfer information, and in particular limit the emotional reaction that enhances knowledge transfer processes (Bassols, Cros and Torrent, 2013). It is also questionable whether music videos on their own can contribute much to young people's thinking about science. The impacts of the music video on the emotional and cognitive perceptions of the participant seemed more immediate than long-term. It might be advisable to connect these kinds of interventions to teachers' toolboxes of classroom activities to enable facilitation and reflection, and to make sure that the music videos and their messages reach a higher proportion of the targeted generation.

One challenge in sharing scientific knowledge through music videos is that they are still regarded mainly as music videos, which puts them on a par with other similar media.

The competition for attention in the media scene is harsh and tends to favour artists who have a well-established position in the culture. Breaking into the music scene is difficult for anyone, let alone for scientists who are creating music videos on an occasional basis while trying to advance their scientific careers. Balancing between professionalism, trustworthiness, expense, and impact creates an important question of who and what kind of working groups should create these music videos or other art–science packages for open and free consumption.

Examined Cases Enabled Participants to Reflect Their Forest Relationship

Our second research question concerned the role of arts-based knowledge practices in deepening the participants' understanding of their human–forest relationship. The results indicate that the workshop event, with the specific theme of human–forest relationships, was fruitful in evoking reflections among participants. This is partly a product of their role as trained co-researchers, but evidently the event itself was inspiring and encouraged participants to consider their own childhood, opinions on forest policy, and intentions to act. Part of the reason behind the childhood, policy and action considerations may relate to the special study context of Finland, where forests have culturally had a strong role (Berglund, 2006). The reflections were rich in all dimensions of the applied tripartite model of attitude: the young participants discussed vividly their knowledge, emotions, and behaviours. The event seems also to have influenced participants self-efficacy to continue as citizens who take action and try to influence the status and the future of the natural environment, which resonates with the recent findings by Trott, Even and Frame (2020). One reason for this outcome may be the interactive nature of the event: reflecting with others' views may provide such encouragement.

On the contrary, the music video experience, conducted alone and facilitated remotely, lacked this live interactive nature. The results also show that the music video did not have a reported influence on the informants' forest relationship. What it did yield, however, was new knowledge on forests, forest health, climate change and laser scanning, alongside some instantly reported positive and negative feelings. If used together with some other activities and interventions, or in the facilitated classroom setting (see Taylor, 2007), the music video may also serve the purpose of expressing the forest relationship more clearly. However, this presumption should be confirmed in further studies not constrained by the COVID-19 pandemic's restrictions. In general, however, the present findings of arts-based interventions as a rich source of emotions for the young participants are consistent with the arguments of Muhr (2020), who stresses that the opportunities for emotional expression of arts-based methods may be pivotal for unveiling nuances of nature-connectedness that go beyond words.

Parallel Pathways Increased Action Orientation

Our third research question concerned whether the examined arts-based knowledge practices offered partici-pants pathways which were in parallel with theirs. For the four co-researchers, the workshop event appeared to support their existing motivations and values, and thus their participation did go in parallel with their other existing pathways. They all stated that they would participate again if a similar event was organised. They also mentioned ongoing activities of their own for which the workshop event had been enriching and supportive, which speaks for a longer-term impact of the intervention. This promising result is supported by a recent review which found connections between arts-based methods and the resilience and short- and long-term well-being of young people, especially with regard to engagement and interpersonal connections (MacDonald et al., 2020). Such indications of engagement were also present in the co-researchers' feedback after watching the music video. However, there was mixed evidence from the co-researchers as to whether they liked the video or were irritated by it.

Finding parallel pathways may be fundamental for achieving longer-term influences from participating in an event. A more complex social environment, like the one at the workshop event, may provide sufficient affordances for finding parallels for connecting to and feelings of belonging. By contrast, the parallel pathways from a music video depend more on whether the participant happens to like music videos. More generally, if it is a 'simple' or a short intervention, its potential to find parallels is more arbitrary and lacks long-term impacts on the participants' perceptions. Nevertheless, the co-research approach appears beneficial for the young people themselves and for the impacts of youth engagement activities, because the interventions yielded indications of belonging, empowerment and deep insights comparable to earlier youth engagement experiences in health and social research (Mubeen and Tokola, 2021; Powers and Tiffany, 2006). The conceptual and future-oriented reflections of two co-researchers relating to the essence of human–nature connections may be regarded as indications of the less dichotomous biocultural approach (Caillon et al., 2017), which is a rather ground-breaking idea when placed in contemporary forest policy context.

Methodological Reflection

The number of young research participants in this study was 10, which is lower than typical in most qualitative analyses in forest and natural resource sciences. It must be stressed that the detailed results should not be viewed as statistically representative of youth who experience knowledge practices that challenge them to explore their forest relationship, and obtaining such representative results was not an intended aim of this study. Instead of statistical representativeness, we aimed at analytical transferability via acquiring a deeper understanding of the phenomena reflecting the authentic perceptions of young people. Incorporation of different types of young people (both trained co-researchers and high school students and the tenth-grade student, native Finns and immigrants, people experiencing challenging times in their lives) functioned well in obtaining a rich picture of the potential and limitations of the arts-based knowledge-practice types examined.

We consider that both the interventions were of good qua-lity, a well-organised workshop event and a professionally

produced music video. We also stress that co-research training enabled six of the ten participants to articulate their thoughts in an open and candid manner, contributing to the validity of the study. The wealth of the acquired data also demonstrates that the study succeeded in engaging the young participants on a deeper level rendering the findings trustworthy. However, the study could perhaps have yielded conceptually more advanced and better backed-up results if it had been possible to conduct the data acquisition as in-person encounters without COVID-19 restrictions.

Arts-Based Knowledge Practices Carry Promising but Bounded Potential

The participatory methods applied in the workshop facilitated a sense of belonging that was not apparent in the music video case study where participants merely watched a ready-made product. Based on our results, participating in the making of the science-art products seems a key to obtaining more profound results in affecting a person's forest relationship. However, ready-made products like the music video in our second case may be fruitful as a part of longer projects to attract attention, challenge thinking, and catalyse orientation.

Overall, we see that art may bridge different knowledge systems through various mechanisms and contribute to human–forest relationships and to environmental citizenship. In the music video case, the mechanism was sharing scientific knowledge with young people using the language of art. In the workshop case, the mechanism was mainly the diverse social interaction with people from both science and art backgrounds. A sense of belonging was explicitly manifested by the vivid and positive feedback from the event and the action intentions. We find it important to acknowledge the critical comments and expressed negative emotions also as indications of belonging. When people have the courage to give feedback on dislikes and constructive suggestions for improvement, they are actively participating citizens (Isin, 2008).

However, we do not see arts-based knowledge practices as a silver bullet or as a solution that works automatically or easily, and there are caveats concerning how the true value of such practices might be jeopardised. For example, if the activities are considered special occasions, they tend most easily to engage the more privileged participants (see Navarro and Front, 2013) and thus participation ideals are naturally hampered. Another critical point in organized events is facilitation, which must carefully take into account equal participation opportunities so that everybody's voice is heard and people with varying learning and communication backgrounds and styles can feel part of the event and safe about expressing themselves. For online videos the critical points include whether the style and content are trustworthy enough to attract attention and whether the video provides a sufficiently reasonable combination of factual and artistic features to maintain interest and evoke some kinds of inspiration.

Earlier research (e.g., Lee et al., 2020; Lougheed and Coholic, 2018; Northington, 2018) has suggested that arts-based methods are useful for various special social groups among youth. Although the present research only partly addressed the engagement of special social groups, the evidence from our cases supports the notion that arts-based methods may foster higher inclusiveness and better participation opportunities in forest policy. However, we observe that while youth may gain capacities to participate as environmental citizens through designated spaces for arts-based experimentation and reflexive learning (Bentz and O'Brien, 2019), other operating channels would be required to ensure their views are heard in forest policy arenas. This goes against the current general trend towards the prevalent role of participation professionals (Kleinschmit et al., 2018) and narrow groups of forest policy representatives (Egunyu et al., 2020). Comparable evidence from the western United States shows that participation of youth in collaborative forest governance is weak (Davis et al., 2017).

Achieving higher inclusion of youth is challenging in circumstances where the powerful actors hold a narrow view on what is good participation (Adeyeye, Hagerman and Pelai, 2019). On the other hand, recent findings from Mexican forest communities suggest that reaching out to young people to understand their ideas and aspirations may be a way to start to empower them and make them take active roles in their villages (Robson et al., 2020). These research examples together with our present findings tell us that arts-based methods alone are insufficient and ineffective. Yet by integrating these methods with various research, education, policy, arts, and discourse practices may make them knowledge practices that are more likely to receive higher attention and impact in the forest-related policy arenas of the future.

Conclusions

This study has sought to understand how young people may perceive arts-based knowledge practices, how those practices can strengthen the young participants' awareness of their human–forest relationships, and whether knowledge practices mixing art and science may yield sustained impacts on young people's environmental citizenship and policy participation capabilities. The motivation for this effort came from recent forest policy research that calls for citizen participation in forest policy and points to the need for better inclusion of young people's voices in policy dialogue.

We learned that young people may enrich their thinking and obtain inspiration from arts-based knowledge practices. Our cases, an art–science workshop and a music video experience, elicited both positive and negative emotions as well as indications of various knowledge and awareness gains among the young informants. The positive and negative feelings may contribute to an understanding of the individual's own human–forest relationship in relation to those of others. The induced feelings may also foster a sense of belonging and behavioural intentions, at least when the participant already has a living connection to forest and experience in expressing their opinions as a civic actor. All these findings are promising from the viewpoint of young participants' capabilities as environmental citizens and foster their participation in informal forest policy dialogue. However, youth inclusion in formal policy processes will require

employing arts-based methods in the explicit policy context or otherwise more systematically including youth and raising their participation capabilities within the activities.

Our study participants were highly appreciative of the social interaction with both science and art representatives in the art–science workshop. In their feedback, however, participants stressed the importance of ensuring everyone's voice is heard in these interactions. Inclusion of youth not only requires inviting different young people as participants but also careful facilitation during the events to safeguard balanced participation. Furthermore, the level of inclusion both generally in arts-based knowledge practices and specifically in forest-policy-related events may be raised by incorporating young people as co-designers and co-organisers of the activities.

As suggested in this study, a music video can be an attractive way to disseminate scientific information in a fresh manner to young audiences, but the effectiveness partly depends on the relationship of the actors to music. An art–science video watching experience may be used as an introduction to a topic but on its own has limited impact potential. Therefore, following such an event with collaborative video making can be a promising way to foster better participation capabilities.

Concerning the wider implications of our study on arts-based knowledge practices for youth inclusion in forest policy, designers of such practices should be aware of these critical success factors: wide and equal participation, action orientation, and continuity. Making arts-based knowledge practices recognised among the youth and influential for (forest) policy participation will require scaling up the approach. If wide capacity-building of young people is the intention, we recommend incorporating art–science interventions in formal education where all regardless of background are included. Moreover, traditional policy networks should diversify their existing action modes and be open to making use of youth-mediated arts-based knowledge practices as policy deliberation arenas.

Appendix 1. Data Gathering Questions for Interview and Writing Tasks
A. Questions to the workshop participants

1. How did you experience the workshop event in summer 2019?
2. What did you learn in the event? What kind of thoughts arouse?
3. What kind of emotions did you experience?
4. How would you describe your forest relationship?
5. Do you see your forest relationship changing in the future?
6. What changes in the society might cause changes in your forest relationship?
7. What are your thoughts about the discussions concerning logging?
8. How do you relate to arts?
9. Based on the experience from the event, what kind of activity would you like to engage in? Do you think that your participation in the event either

activated or passivated you as an environmental citizen? If yes, how, and why?
10. What may be gained by mixing arts and science? Do you think that arts possess instrumental value, for example in impacting climate or sustainability issues, what kind, why or why not?
11. What was lacking at the workshop event? What would you change?
12. What did you like most in the event?

B. Questions to the music video test audience

1. What was the song about? You can mention many things.
2. Were the lyrics understandable? How about the message?
3. Did you find the artwork credible?
4. Did you learn new information from the artwork?
5. What kind of feelings arose when you watched the video?
6. Did the artwork evoke insights or inspiration to learn more?
7. Did you feel like you need or want to act on a cause after hearing the song? If so, how would you act on it in practice?
8. Did you find the song danceable? Did it generate a physical experience or an action?
9. What kind of role does music have in your life?
10. What was the best thing about the artwork?
11. How would you describe the dialogue between science and art in this artwork?
12. What do you think is the intrinsic value of the artwork?
13. How do you see the artwork as a means for transferring scientific knowledge?

Competing Interests
The authors have no competing interests to declare.

Author Contributions
Hujala: initial idea of the article, co-formulating data gathering templates, co-formulating research questions, leading the analysis, drafting the manuscript, writing all sections, finalizing the report. Junttila: commenting the initial idea, writing about music and videos as knowledge practices, writing the second case description, participating in analysis, commenting on the full draft manuscript. Tokola: co-creating the initial idea, leading the data gathering planning, co-formulating research questions, conducting data gathering including transcribing, participating in analysis, writing about theory, methodology, results and discussion.

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