

Situational relevance of music information modes

An empirical investigation among Doctor of Music students

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Abstract

Purpose – The purpose of this paper is to elaborate the picture of situational relevance of music information from a performing musician's point of view by delving into its diverse layers within the context of Doctor of Music students' information seeking.

Design/methodology/approach – Music-related information is approached through six modes that categorize music information sources based on their levels of abstraction. Situational relevance of the modes of music information is examined in relation to the situational requirements of accomplishing a dissertation on music task consisting of both a series of concerts and a written thesis. The empirical material was collected by interviewing Finnish doctoral students in the field of music performance.

Findings – A set of situational relevance types related to each mode of music information were identified. As a whole, the differences between the perceived importance of the modes varied a little.

Research limitations/implications – The goal of the present paper is not to create a generalizable list of situational relevance types suggested by modes of music information, but to show that the modes may suggest diverse situational relevance types of their own when evaluated by performing musicians.

Originality/value – The present paper provides a rare account on performing musicians' vocational and school-related information seeking. For studies of music information retrieval, the present paper offers new contextual facets explaining why diverse music information could be relevant to musicians. For studies of music-related information seeking, the present study offers new insights on why performing musicians have information needs regarding certain types of music information sources.

Keywords Music information, Information seeking, Relevance, Music, Musical semiotics, Performing musicians

Paper type Research paper

Introduction

Music is a domain where information resides not in mere written language. In their works on musicology and musical semiotics, Bengtsson (1977) and Tarasti (1994) examine the different systems of description relevant to musical communication. According to Bengtsson (1977), the concept of tone may refer to a notated tone, a measurable frequency or an aural experience. Tarasti (1994, p. 4) supports Bengtsson's (1977, p. 18) claim that different systems of description relevant to musical communication should be held as separate. It cannot be assumed that unequivocal translation between the diverse systems of musical communication

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exists (Bengtsson, 1977, p. 18; Tarasti, 1994, p. 4). The previous problem of translation is also reflected in Kuhlthau's (2004, p. 112) information search process (ISP) model. It suggests that information types at varying levels of abstraction have differentiated interpretations, and that these interpretations can undergo change as the information-seeking process progresses. The above accounts suggest that situational relevance of music information of various kinds may vary in information seeking. When juxtaposing the above notion of music information with previous research on relevance of music information, an anomaly becomes apparent. These studies have left open a significant question; what are the situational relevance types suggested by diverse modes of music information for performing musicians' information seeking?

Previous studies of music information retrieval (MIR) have approached relevance of music information objects most often through matching string search queries with textual metadata representations or through matching music similarity of audio data examining rhythm and melodies humming (e.g. Casey *et al.*, 2008; Kim, 2015). These approaches to relevance are, by necessity, more system than user oriented and the contextual factors affecting users' relevance inferences regarding diverse modes of music information often receive little attention within such studies. Studies describing and modeling information seeking and needs of musicians and music scholars confirm that both groups have information needs spanning to diverse information sources representing music information at varying levels of abstraction (Brown, 2002; Hunter, 2006; Liew and Siong, 2006; Kostagiolas *et al.*, 2015; Lavranos *et al.*, 2015; Lavranos *et al.*, 2016). However, these studies have not devoted due attention to the particular nature of these types of music information and the ways in which performing musicians evaluate their situational relevance.

To elaborate the issues above, the present paper utilizes a novel music information typology that encompasses broadly different music information facets by categorizing music information sources according to their level of abstraction. The term "music information mode" refers to a set of information sources that are seen to represent music information at a certain level of abstraction. In other words, the concept of music information mode is used to group information sources based on their method of representation, be it gestural language, non-conceptual aural experiences of music or symbolic written representations, for example. The modes of music information were first presented in our previous work (Rousi *et al.*, 2016). Six modes were identified: music making as the first mode of enactive representations; music listening as the second mode of enactive representations; iconic representations of music; technological models of music as the first mode of symbolic representations; and ideological models of music as the second mode of symbolic representations.

In general, studies on situational relevance examine the relationships between information and the user's information problem situation (Schamber, 1994, p. 8; Saracevic, 2007a, p. 1930). The present paper approaches the situational relevance of the modes of music information in relation to situational requirements of accomplishing a dissertation on music task consisting of both a series of concerts and a written thesis. Situational relevance types related to the modes of music information are identified through the question of why Doctor of Music students consider the individual modes important to their dissertations. Situational relevance types are thus the situational factors that make above modes of music information relevant for the Doctor of Music students working on their dissertations on music. The empirical material was collected in 2013 and 2014 by interviewing Finnish doctoral students in the field of music performance.

Since the present study deals with sign systems other than written or spoken language, the following clarification of terminology is needed. The grounding concept of the paper is music-related information seeking, and it encompasses as object of seeking all music-related information, be it in audible, written or notated form. When referring to the audible non-conceptual information types of performing and listening to music, for example, the concept of music *per se* is used.

The rest of the paper is structured as follows. First, a literature review is presented starting with the introduction of the modes of music information. Then, the research questions and the empirical research design are specified. The main part of the paper focuses on the report of the empirical findings. The concluding section discusses the findings and reflect their significance.

Literature review

Modes of music information

The way music information is defined affects greatly on how this phenomenon appears in studies of information seeking. The validity of our music information notions should be from time to time tested with theories of knowing and information emerging from music-related domains such as musicology and music semiotics. According to Bengtsson (1977) the *concept of tone* (our italics) may refer to a notated tone, a measurable frequency or an aural experience. Tarasti (1994, p. 4) adds to the latter also the gestural language, which is needed to transform a notated tone into both a measurable frequency and an aural experience. Musical knowing therefore transpires also within sign systems, which are inherently non-conceptual (Tarasti, 1994, p. 4). Bengtsson (1977, p. 18) stresses the importance of keeping the different systems of description as separate categories. We cannot assume that the possibility of direct transformation between these sign systems exists (ibid.). A piece's staff notation can be interpreted, or modalized in Tarasti's (1994, p. 39) terms, in various ways, allowing for the performer great power over the musical message, for example. According to Tarasti (1994, p. 4), the most radical translation occurs when a person is trying to explicate his or her aural experiences into conceptual form. Yet, according to Tarasti (1994, p. 4) and Bengtsson (1977, p. 23), it is insufficient to state that musical knowledge is merely transmitted through the musical non-conceptual sign systems. As no sign system works in a vacuum, but in interaction with other systems, also verbal sign systems have had an important role in transmitting musical tradition (Tarasti, 1994, p. 4).

Acknowledging the problem of translation occurring between modes of music information is of importance in order to gain further understanding about their relevance within information seeking. As stated in the introduction, the above problem of translation is also reflected in Kuhlthau's (2004, p. 112) information-seeking process model. It suggests that information types at varying levels of abstraction can have various interpretations and that these interpretations can undergo change as the information-seeking process progresses. In order to elaborate the issues above, the present paper approaches music information through a typology comprising of six modes that categorize music information sources based on their levels of abstraction. This typology was first presented in our previous work (Rousi *et al.*, 2016).

The typology of music information was built upon juxtaposing Bruner's (1966) modes of information representation – introduced in his book *Toward a theory of instruction* – with the sign systems relevant to musical communication presented by Tarasti (1994) in *Theory of musical semiotics*. According to Bruner, any domain of knowledge, and every single problem within that domain, can be presented to the learner through using three modes of representation. Enactive mode of representation refers to sequences of activities for creating desired results. Iconic mode of representation refers to presenting a concept through a graphic without exhaustively defining it. Most abstract of modes is the symbolic mode where through a system that defines rules of expression, a set of arguments is created for describing a concept (Bruner, 1966, pp. 44-45). The above juxtaposition resulted in a continuum ranging from the most enactive to most abstract music information categories as follows (Rousi *et al.*, 2016):

- (1) Music making as the first mode of enactive representations refers to information resided in different sequences of actions that produce sounds for musical purposes.

This action may appear in varied forms, such as playing the violin, singing or creating electronic music with a computer. Whereas the term “music making” may in its common use refer to either playing or composing music, here it is used in a broader meaning to illustrate the information resided in different sequences of actions that aim to produce sounds for musical purposes.

- (2) Receiving music as the second mode of enactive representations refers to receiving musical performances, while being present at a performance or through a recording, without the control over the performance’s sonic results. Audio recordings played using either home audio devices or mobile online music streaming services function as examples of sources incorporating this second mode of music information.
- (3) Iconic representations of music refer to the graphic illustrations presenting music-related information. Different notations, such as modern staff notations, function as an example of sources incorporating this mode of music information.
- (4) Technological models of music as the first mode of symbolic representations refer to examining structures of music, i.e., tonal organization of harmony and counterpoint and sonic formulae of orchestration and interpretation, for example, through symbolic means such as written language. Information sources that incorporate the first mode of symbolic representations are, for example, textbooks of harmony and counterpoint.
- (5) Ideological models of music as the second mode of symbolic representations addresses music at a symbolic level but not directly the qualities that transpire in music *per se*. In this mode conceptual symbolism regarding music are negotiated with other fields and their conceptual symbolic representations. For example, it is possible to produce narratives on concepts such as “Western classical music” and “history” or “music” and “aesthetics” without reference to actual phenomena present in sonic reality of music. Examples of information sources that can be more geared towards the second symbolic mode include monographs on philosophy of music and some texts concerning the history of music, such as some biographies of composers.
- (6) As Doctor of Music students might also have other than music-related information needs, such as information needs about academic writing, a sixth information category titled other symbolic information was added into examination. This sixth category of other information was defined to include all symbolic, i.e., conceptual, information sources from other than music-related disciplines, such as conventions of scientific writing.

The typology’s purpose is not to exhaustively classify phenomena as belonging to one mode alone. The position and needs of the information seeker play a crucial role in providing the angle through which the different modes of music information transpire. For example, the technological models of harmony and counterpoint are closely weaved with the history of Western music, which is evident in concepts such as “Palestrina style counterpoint” (see also Tarasti, 1994, p. 17). Thus, the same information sources can very well include many of the modes of music information. Also, being present at musical performance could be considered both as a source of first and second enactive representations. While attending a music performance, it is possible to study of the mere gestural language of the performer creating the music or mere audible qualities of the performed musical piece, for example.

Situational relevance

Whereas systems or algorithms create relevance by retrieving documents based on the query, people derive relevance from obtained information objects (Saracevic, 2007a, p. 1919).

Situational relevance refers to examining relationships between information and the user's information problem situation (Schamber, 1994, p. 8; Saracevic, 2007a, p. 1930). Relevance inferences depend not only on the features of the information in document, but also on user's context, user's previous knowledge and specific qualities sought (Barry, 1998, p. 1302). Situational relevance approach differs from topical relevance approach where the focus is on relation of the topic expressed in a search query and topic covered by resulting information objects (Saracevic, 2007a, p. 1929; 1931). Concepts such as success dimensions, criteria categories and factors influencing selection have been used to describe the outcomes of previous research examining situational relevance (Schamber, 1994, pp. 24-25). The concept of situational relevance type was seen as most descriptive of the outcomes of the present paper.

Even though the present paper is the first attempt to study situational relevance through theoretical constructs of modes of music information, parallels with previous research may be found. The present study has the same exploratory and descriptive nature as the set of studies named user criteria studies by Schamber (1994, pp. 23-25) and also weaves with the concept of utility. In addition, parallels to the group of studies coined by Saracevic (2007b) as relevance clues approach may be seen. According to Saracevic (2007b, p. 2127), the focus of the previous studies was on "relevance criteria users employ while contemplating what is or is not relevant, and to what degree it may be relevant."

Music information objects and relevance

The issue of music information objects and relevance has predominantly been discussed within the field of MIR. MIR studies have examined relevance of music information objects through context-based approaches matching string search queries with textual metadata representations and through content-based approaches matching music similarity of audio data examining rhythm and melodies, for example (e.g. Downie, 2003, 2004; Casey *et al.*, 2008; Kim, 2015). In MIR, the approaches to relevance are, by necessity, more system than learner oriented. This is reflected in Downie's (2003, pp. 293-301) specification of music information for MIR, which consists of pitch, temporal, harmonic, timbral, editorial, textual and bibliographic facets. Coherent to MIR research, these facets approach music-related information mostly from the viewpoint of interacting with MIR systems, and provide a useful summary of the challenges for MIR system design. However, this conceptualization of music information may not be sufficient from the viewpoint of a person engaged in music information seeking to whom gestural language of music making (see e.g. Godøy and Jensenius, 2009) and diverse literature (see Brown, 2002, p. 82) may also be relevant.

Currently, there are users' situational or contextual factors incorporated into MIR techniques, too. For example, context-aware music recommender systems utilize the following contextual data when suggesting content. User's mood or emotion (e.g. Kim *et al.*, 2010); daily activities, such as working, sleeping and running (e.g. Wang *et al.*, 2012); user's location (e.g. Cheng and Shen, 2014); and time of day (e.g. Su *et al.*, 2010). However, these factors are general in their nature, and do not tell why, for example, musicians and music scholars see the different modes of music information relevant for their information-seeking tasks. The general nature of the above situational factors is partly explained by how the above studies approach the notion of user. Most often the term "users" refers to the vast audience utilizing current online music streaming services (see e.g. Wang *et al.*, 2012; Cheng and Shen, 2014). While utilization of users' contextual factors is still limited in MIR, they are becoming increasingly important (see Inskip *et al.*, 2007; Weissenberger, 2015). Situational relevance of the diverse modes of music information should be further examined with the focus group of performing musicians to gain a more detailed understanding of this phenomenon.

Studies describing and modeling information seeking and needs of musicians and music scholars confirm that both groups have information needs spanning to diverse information

sources representing music information at varying levels of abstraction (Brown, 2002; Hunter, 2006; Liew and Siong, 2006; Kostagiolas *et al.*, 2015; Lavranos *et al.*, 2015; Lavranos *et al.*, 2016). For example, music performances, recordings, notations and music-related literature are identified as information need types, albeit amongst many, by previous studies (e.g. Kostagiolas *et al.*, 2015, p. 7). Brown's (2002, p. 82, 86) findings suggest that music scholars utilize, for example, audio recordings and music notations while conducting research. However, these studies have not devoted due attention to the particular nature of the modes of music information and the ways in which performing musicians evaluate their situational relevance. Without approaching music information through its many layers, its diverse situational relevance types cannot be systematically examined. The branch of research primarily focusing on the source preferences and user satisfaction among music scholars and students (e.g. Lai and Chan, 2010; Dougan, 2012, 2015; Matson and Shelley, 2013) often examines the frequency of use of pre-categorized sources of information. While these studies are very usable in collection development, neither from this branch of research one finds systematic attempts to examine how performing musicians evaluate the situational relevance of information sources representing diverse modes of music information.

The context of everyday life music information seeking differs from the settings of vocational and school-related information seeking. Everyday life music information seeking and needs constitute not so much a goal-oriented activity, but are often initiated by hedonistic, social and cognitive needs, such as identity constructing, mood managing, maintaining interpersonal relations and alleviating monotony (Cunningham *et al.*, 2003; Laplante, 2008; Laplante and Downie, 2011; see also Bourdieu, 1984 and DeNora, 2000). DeNora (2000) provides a detailed account on how music is used for the above purposes in different everyday situations. Performing musicians may certainly utilize music also in the aforementioned ways. However, with reference to the previous sections of this literature review, there currently is a greater lack of studies examining how musicians view the situational relevance of music information in their vocational or school-related contexts.

Methods

Research questions

The present paper seeks to offer new empirical findings regarding situational relevance of music information of various kind in the context of performing musicians' information seeking. To this end, this paper approaches situational relevance types of the modes of music information through the question of why Doctor of Music students consider the individual information modes important to their dissertation on music tasks. There might not be unequivocal translations occurring between the modes of music information (Bengtsson, 1977, p. 18; Tarasti, 1994, p. 4), making it problematic to rely solely on concepts that imply a direct relation or utility between the modes. The concept of importance was thought as broader one that includes the aspect of utility, too. To examine the above issues in greater depth, the present study addresses the following research questions:

- RQ1.* What kind of types of situational relevance can be identified from diverse modes of music information sought for dissertation projects by Doctor of Music students?
- RQ2.* How does the perceived importance of music information of diverse modes vary from the viewpoint of situational relevance?

It should be noted that the goal of the present paper is not to create a generalizable list of situational relevance types suggested by modes of music information, but to show that the modes may suggest diverse situational relevance types of their own when evaluated by performing musicians.

Methodology

Participants. The participants of this study were six Doctor of Music students from Sibelius Academy, Helsinki University of Arts in Finland. The dissertation projects of all participants focused on music performance and included both a series of five concerts and a written part. All of the participants were instrumentalists with a background in the Western art music tradition. In order to protect the anonymity of the participants, their instruments are not revealed. The participants were recruited from an information retrieval course arranged for the Doctor of Music students by Sibelius Academy Library. Prior to the interviews, the participants had submitted their final dissertation proposal for examination, which they had worked on during the previous year. In their proposals, both the concert programs and the topic of the written part of the dissertation were defined. Sibelius Academy is the only organization in Finland providing Doctor of Music programs. The Finnish Doctor of Music program consists of 4 years of full-time study and its length is 240 European Credit Transfer System study points. Within the period of 2011-2015, on average five Doctors of Music focusing on music performance have graduated per year.

Data collection. The empirical data were gathered using audio-taped recordings and an additional questionnaire filled during the interviews. First, background information concerning the participants and their dissertation projects were gathered. Second, in the interview, the definitions of the music information modes specified above were presented to the participants. In addition, examples of information sources per information mode were provided. The participants were asked to indicate on a four-point scale how important they consider each music information mode for their dissertation on music. Thereafter, they were asked to further explain and elaborate these answers. The interview data consist of 305 minutes of audio-taped records. The data of this study were collected during the years 2013 and 2014.

Coding and data analysis. The questionnaire data were summarized by calculating mode-specific averages of perceived importance. The transcribed interview data were scrutinized through qualitative content analysis. The open-ended answers explaining the perceived importance assessment of an information mode were interpreted to indicate its types of situational relevance. In other words, an information mode was considered important by Doctor of Music students because of diverse reasons A, B, C, etc. and these reasons were considered as the information mode's situational relevance types in this study. The types were identified from the transcribed data by means of constant comparative method (Silverman, 2005, pp. 213-214). A preliminary inductive coding was done during the transcription process. This coding was further enhanced through comprehensive data treatment until no new situational relevance types could be formed. Even though there were cases where the same situational relevance type could be identified from the answers of several participants, a single occurrence was sufficient for the type to be included in the analysis.

To improve the validity of this study, all situational relevance types presented next are accompanied by quotes taken from the interview data. The quotes were translated from Finnish into English by the first author. Care was put into preserving the quotes as close as possible to verbatim form during the translation process. Additional notes in italics were in some cases added if the context of the quote would otherwise be vague for the reader. The italicized notes were also used to replace a specific section of the quote with a more general expression in cases in which the specific part contained an indirect identifier that would compromise the anonymity of the participant.

Findings

The present study elaborates the picture of situational relevance by focusing on the perceived importance of different modes of music information. To this end, an empirical

study was carried out by interviewing six Doctor of Music students about their ways to seek information for the needs of ongoing dissertation projects. A summary of findings is presented in Table I.

As Table I indicates, a total of 21 types of situational relevance could be identified from the interview data. A set of situational relevance types was identified from each mode of music information. The answers on the importance of individual information modes were examined on a four-point scale where 0 = not at all important, 1 = not that important, 2 = important and 3 = very important. Most types of situational relevance are linked to modes I-III and these modes on average were perceived as the most important for the dissertation. As a whole, the differences between the perceived importances of the modes varied little with the exception of the mode IV, which received the lowest average score on a scale from 0 to 3. All modes received at least an indication from one of the participants of being very important for their dissertation. Respectively, none of the participants considered any of the modes as being “not at all important.” All of the information modes were seen to include situational relevance types that were related to performing the concert pieces of the dissertations. Respectively, all of the modes also included situational relevance types that were seen to relate to the written part of the dissertation. What follows is a more detailed presentation of the identified situational relevance types per music information mode presented in Table I.

Iconic representations of music

Notations as the foundation of gestural language. Music notations and scores were considered important by the Doctor of Music students and were sought by them to be used in familiarizing with the gestural language of the concert pieces. Notations were not only seen important by the participants because they included information used for gaining

Music information mode	Perceived importance (avg.)	Situational relevance types
III Iconic representations of music	Very important (2.7)	III.1 Notations as the foundation of gestural language III.2 Utilizing notations in creating arrangements III.3 Utilizing notations in music analyses III.4 Notated traditions of performance
I Music making as the first mode of enactive representations	Very important (2.5)	I.1 Gestural language of the concert pieces I.2 Models of gestural language as the focus of written examination I.3 Own interpretation as the focus of written examination
II Receiving music as the second mode of enactive representations	Very important (2.5)	II.1 Selecting the concert pieces II.2 Thematic material of the concert pieces II.3 Complementing the aural experience of the piece II.4 Interpretations of other musicians II.5 Recorded traditions of performance
V Ideological models of music as the second mode of symbolic representations	Important (2.4)	V.1 Ideological models of the concert pieces V.2 Music history as a framework V.3 Familiarizing with terminology
VI Other symbolic information	Important (2.2)	VI.1 Cultural history of the concert pieces VI.2 Multidisciplinary approaches to dissertations topics VI.3 Conventions of scientific writing
IV Technological models of music as the first mode of symbolic representations	Important (1.7)	IV.1 Technological models of the concert pieces IV.2 Previous analyses of the concert pieces IV.3 Analyzing music of difference eras

Table I.
Summary of findings

control of the gestural language of the pieces but also because they include clues regarding their interpretation:

They [*music notations*] are of course where the playing and studying starts. All or most information comes from them, forming your foundation.

Utilizing notations in creating arrangements. The Doctor of Music students that created their own arrangements of the concert pieces saw notations of the previous arrangements important for the process. These participants modified notations and scores of the original arrangements through experimentation into new notations and gestural language:

It is material for my arrangements. It is very important that I have what exists [...] I need the material from which to start arranging, from which to start playing. [...] Like how would I arrange the dots and how would I play these on my instrument.

Utilizing notations in music analyses. The Doctor of Music students also investigated the music theoretical aspects and structures of the concert pieces through acquiring and examining their notations. The participants thus interpreted and translated information resided in musical notations into written language that examined the technological models thought to reside in the pieces. These extractions of technological models could influence their gestural language of the played pieces, i.e., they could bring forth thematic material in their interpretation as a result of these analyses. Participants could also use these extracts of music theoretical analyses in the written part of their dissertation:

I will do analyses on how twelve-tone technique have been used in the piece, or serialist methods or I use other means of analysing this style of music [...] I have already acquired the notations and presented analysed passages in seminars. It was very important to find the notations at that point.

Notated traditions of performance. The participants also saw musical notations as important documents of traditions of performance. Besides transmitting information regarding the gestural language of the pieces, the Doctor of Music students elaborated that music notations also transmitted information regarding their interpretation of through articulation marks. These presentations of suggested interpretations were seen to differ between editions of different eras. Even though formulas of interpretation may be regarded as technological models of music (see Tarasti, 1994, p. 17), the present paper differentiates this situational relevance type from the previous one due to its possible gearing towards ideological intertextual models of music which is exemplified through use of concepts such as “narratives” by the participants:

When studying narratives, or the element of narratives in the chamber music literature, it is based substantially on music notations and articulation marks. They also guide the interpretation, or how to approach the piece emotionally.

Music making as the first mode of enactive representations

Gestural language of the concert pieces. The Doctor of Music students rehearsed in order to gain control over sequences of actions required by the concert pieces, which was considered important for the dissertation tasks. Within the interviews, the discussion with the participants regarding this situational relevance type ranged from examining different solutions of playing a single passage to rehearsing entire pieces to be played from memory. Most often the Doctor of Music students mentioned private rehearsing as a key mean of studying and gaining this control within the enactive realm. A participant who created his own arrangements stated that the boundaries of his ability with the gestural language of his instrument had a defining power over the musical material he could include in his re-arrangements and that there were no substitutes for experimentation with gestural language to be found from any other mode of music information. Even though the notion of considering gestural language as information

appears as somewhat new to studies of information seeking, gestural language is considered as an integral part of music behavior in other music-related disciplines (see e.g. Godøy, 2003; Godøy and Jensenius, 2009; Luck *et al.*, 2010):

Doctor of
Music students

This is very important because I am a performing musician. [...] Complex [*music*] theoretical structures or similar are very difficult as such to express for the audience. [...] Actually, this motoric aspect is very important because most composers of modern music write their music in a very uncompromising manner.

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Models of gestural language as the focus of written examination. Doctor of Music students saw studying models of gestural language present in other musicians' playing as important for their dissertation tasks. Whereas within the previous situational relevance type their focus was on seeking control within the enactive realm of gestural language, it was here on translating how to gain this control into written language. Within the interviews, the discussion with the participants regarding this situational relevance type ranged from sets of specific techniques, such as the angle of the arm in the act of playing, to studying the more general factors that were seen to create appealing performances. A participant stated that currently there is not much information available regarding gestural language of professional musicians and acknowledged the problem of translating this information into written language:

Right now I am examining that how much can I see, based on both the visual and aural experience [*of a person performing music*], through my professional experience or through intuition. I would say that there are great many things that a professional can see that are both really interesting and useful. Right now I am interested on how [*players of a certain instrument*] use their arm.

There doesn't really exist that much information regarding professional musicians that would have been somehow verbalized. [...] It is a different story then how much you can translate into textual form, but some of it can be translated.

Own interpretation as the focus of written examination. Also the following issue of gestural language of music making was seen of importance by a Doctor of Music student: how to study own interpretative power through means of written language? There was an intertextual element present in this participant's description of her musical interpretations, which was displayed via use of terminology such as "narratives." The initial information of her interest resided in her own gestural language. She then explained that she attempts to study these phenomena at the level of written language in the written part of her thesis:

Each of my concerts has a different theme. I have a different position as a narrator in all of them. This allows me to study my role as a narrator [*as in the act of performing music*] from different perspectives [*in the written part of the dissertation*].

Receiving music as the second mode of enactive representations

Selecting the concert pieces. The Doctor of Music students stated that listening to potential concert pieces was important for selecting the concert programs included in the dissertations. They also stated that emotional connection with the potential pieces affected these decisions. The piece selection naturally influenced the gestural language requirements of the concerts and the written part in which some of the students included analyses and background information of the concert pieces, for example:

It's important to get to listen to the pieces. How do they sound like? Are they something you want to play?

Thematic material of the concert pieces. The Doctor of Music students considered the examination of the musical themes of their concert pieces by listening to audio recordings as

important for their dissertation projects. To this end, the participants focused on what is heard through polyphonic musical textures. They saw this “prioritizing of material” to complement the translation from studying music notations to form the gestural language of playing the pieces:

I read the score and see that okay these kinds of things are happening. [...] Then I listen to the music and notice the things that are heard through. What are the main things and what are subordinate. [...] It is like prioritizing material. Giving them different roles. It is so much easier, when you hear the music.

Complementing the aural experience of the piece. Doctor of Music students saw listening to audio recordings as important because of the interest to hear all the different voices of the concert pieces, their balance and details to the full extent. This was especially mentioned by orchestra and chamber music players, who stated that the aural experience which they receive while playing differs greatly from that of a person sitting in the audience. A participant also stated that he was doubtful whether anyone performing music at any given setting was essentially able to listen to the details of their own playing to the extent of a person listening that performance. The same participant also recorded his own solo playing to compare the aural experience he had heard while performing to the audio recording:

In this case of chamber music, it would be of much relevance because you frequently run into these problems of balance. And these are something that you as a player might not even be aware of because you hear what you hear. It is impossible to know what the person sitting in the fifth, second or third row is hearing.

I believe that a person is unable to hear everything from what they are doing [*in the act of performing music*]. Actually even so that if you play with a piano, some of the layers of sound [*from the instrument played*] end up unheard, some of the layers of sound get trampled by the piano.

Interpretations of other musicians. Interpretations of the concert pieces made by other musicians were also regarded as important by the Doctor of Music students. The participants reflected their own interpretations of the concert pieces by examining previous interpretations made by other musicians found from audio recordings. One of the participant further classified her analyses of previous interpretations into dimensions of dynamics, phrasing and agogics (i.e. the theory that accent within a musical phrase can be produced by modifying the duration of certain notes rather than by increasing dynamic stress). Two participants intentionally avoided hearing audio recordings of the pieces they were working on, which seems to underline the suggestive nature of interpretations made by other musicians:

My methods regarding this, or the background work I will do for creating this interpretation, is first an analysis of recordings. I will analyse six [...] previous recordings of the piece and I will examine their agogics, dynamics and phrasing.

Every time I hear an interpretation of a piece, it affects me somehow. And I wish to avoid it. [...] I have a principle that I should work on [*a piece of certain genre by a certain composer*], I will listen other pieces of the genre made by the composer. So I am in this world of music and listen to different pieces of different styles, and I am able transfer various things into my interpretation. But what comes to the piece I am working on, that's the interpretation I wish to create and solve myself.

Recorded traditions of performance. Doctor of Music students also saw audio recordings as important documents of era-specific traditions of performance. Whereas the participants' saw the previous situational relevance type of interpretations of other

musicians to affect their own gestural language of music making, here their focus was more on translating this aural information of era-specific performance traditions into written language:

Now a new era has become of interest. And those records that were once laughed at, that were made fun of twenty years ago, all of a sudden they are of interest. What was then horrid is now interesting because it is an example of a tradition of performance.

Ideological models of music as the second mode of symbolic representations

Ideological models of the concert pieces. Doctor of Music students indicated that there is a link between studying literature regarding music historical context and aesthetic schools of the concert pieces and the interpretations of the concert pieces they would eventually form. Traditions of performance and aesthetics were seen as music historical entities by the participants that were related to the cultural history of a specific era. The Doctor of Music students saw this type of literature to include both information regarding the key elements of the concert pieces and information regarding period-correct traditions of performance, for example. As stated in the presentation of the typology of modes of music information, ideological models are here defined broadly as all music-related literature that does not examine sonic qualities and structures present in music *per se*. The theme of studying music within the context of its society is of major importance within the field of ethnomusicology (e.g. Hood, 1963). The findings of the present paper suggest that this understanding about the contextual frame of musical works is also one of the aims of a performing musicians working within the Western art music tradition:

History and aesthetics are relevant because [...] This Russian school and the background of the composer, he's influences. Why has he composed as he has? What key in his music? How did he play his music, being a pianist himself? [...] In that sense history, culture and aesthetics are relevant.

Traditions of performance are history. During a certain period in time, there has been a certain tradition of performance. It is wise for us to know about history and about the certain tradition of performance, and hopefully one can hear these from our playing, that we play in a certain way.

Music history as a framework. Some Doctor of Music students used writings on music history as a structuring framework for their dissertations, both the concert programs and written parts. The structuring units could be based on notions of eras of styles or literal decades. Also knowledge of the historical usage of one's instrument in different genres of music was mentioned by a participant as important in making decisions about concert programs:

Yes, music history [...] it's clearly visible. I have a principle that in the first concert a played pieces and premieres from the sixties and in the previous pieces and premieres from the seventies.

Familiarizing with terminology. Doctor of Music students found music-related literature concerning their dissertation topic important for the purposes of familiarizing with the terminology of their topic. Many of the participants felt a need to improve their ability to produce texts that are scientifically sound. Also, the problem of translation referred to by Tarasti (1994, p. 4) was touched; one participant mentioned the difficulty of translating the experience of first-hand playing of music into written language:

I am hoping that by getting acquainted with works on philosophy of music and psychology of music performance I would be able to use a terminology that is scientifically sound. [...] Even though I know, or I mean experience, the phenomena that are discussed in these works, I might not know how to describe them just yet.

Other symbolic information

Cultural history of the concert pieces. The discussion within the interviews on the importance of non-music-related literature revealed that written texts examining the specific era during which the participants' concert pieces were composed on increased the Doctor of Music students' understanding about the cultural context of the pieces. Both fictional and academic texts were mentioned as important in this sense by the participants. The participants believed that the knowledge of cultural history can affect the interpretation of the pieces and such knowledge may provide useful background information for the written parts of the dissertation:

If you think of the fiction that you read, for example a significant classic fiction work, it may date to the same era as the music that I am playing. So it kind of provides a description of that era. It gives perspective on how the music you are playing should be approached.

Multidisciplinary approaches to dissertation topics. Some Doctor of Music students stated that the written part of their dissertation included multidisciplinary approaches combining elements from non-music related domains. Domain of acoustics was mentioned by a participant, for example:

I have now observed that I am going deeper into acoustics [...] I really would like to study it more to gain a deeper understanding of what we are measuring.

Conventions of scientific writing. Many of the participants stated that as being initially trained in music performance, they felt that they needed to strengthen their scientific writing. The Doctor of Music students mentioned both instructional works and previous dissertations as examples of important information sources on these conventions:

I have noticed that it is really useful just to read previous dissertations, as I am not acquainted with the matter, I mean the format, as such. It helps to understand how your thoughts should be formulated for it to be academically credible.

Technological models of music as the first mode of symbolic representations

Technological models of the concert pieces. The Doctor of Music students indicated that the examination of the concert pieces through music theoretical analysis helped them to understand the structure and details of the pieces, which in turn could influence their interpretation. Whereas the participants found that music notations provided the foundational material for analyses, this activity of analysis as such appeared to rely mostly on their previously acquired music theoretical expertise. As discussed above, related to situational relevance type of utilizing notations in music analyses, the participants stated that technological models derived from the pieces could influence their interpretation. Moreover, the participants could use extracts of analyses in the written part of the thesis:

Yes, it [*theoretical analyses*] has quite a great influence. One also understands details and the structure of the piece spontaneously, but it is of help here. Then again, in my opinion, the relation of analyses and performance may be problematic because bringing forth the details may be impossible in practice. But it [*analysing of pieces*] has been useful and will continue to be so.

Previous analyses of the concert pieces. Whereas most Doctor of Music students seemed to rely on their own previously acquired ability of creating music theoretical analyses of the concert pieces, some of them indicated that gaining access to prior analyses is important for obtaining complementary insights and viewpoints to the pieces to be examined and played in their dissertation:

I would really like to search for works of theorists or experts concerning this music. [...] Because each composer has a tonal language of their own, that is, they utilize these things discussed in music theory in different ways. And you can analyse music using different methods.

There certainly are [...] Like harmony, how this specific composer approaches harmony? And these are interpretations, as analyses often are. They are not definitive truths. [...] But they provide new points of view.

Analyzing music of different eras. Some participants stated it would be of importance to increase their knowledge of era-specific analysis methods. Their explicated interests included the analysis of baroque and 12-tone music (also dodecaphonic or 12-tone serialist music). Different from the situational relevance types reviewed above, the emphasis of the participants were here on the methodologies of music analysis in general:

You can't do historical performance without knowledge. [...] For example, being a period-correct baroque musician has a lot to do with a harmony-based approach. [...] Harmony is theory. The significance of this [*mode of music information*] is thus great.

Discussion

A closer qualitative investigation of the findings reveals some particularities regarding the music information modes and their identified situational relevance types for the Doctor of Music students. Within the situational relevance types linked to the first enactive mode, the sense of touch and muscular memory of gestural language appears primary. Respectively, sense of hearing appears primary within the situational relevance types linked to the second enactive mode. At level of individual pieces, gestural language and the aural experience generated appear simultaneously (see e.g. Godøy, 2003) and this “multi-enaction” may augment the difficulty of translating information within these modes into written language. There appears to be no current common terminology capable of exactly describing and classifying gestural language of music making (see situational relevance type of models of gestural language as the focus of written examinations). Despite the inherent simultaneousness of the enactive modes, both modes also suggested more general situational relevance types, which are not necessarily directly linked to the concert pieces included in the participants' dissertations on music, such as models of gestural language as the focus of written examination and recorded traditions of performance.

The situational relevance types identified from information representing the iconic mode of music information suggest that music notations occupy an important role related to the gestural language of the concert pieces and their interpretation. This mode of music information was seen as on average the most important one by the participants. This suggests that music notations, along gestural language and aural experiences of music, have an integral role in performing musicians' information seeking. The importance of music notations is also evident from some of the quotes presented in the findings section. However, the importance of the individual modes might vary as the dissertation on music task proceeds. It is possible that the importance of music notations decreases (or further increases) in the later stages of the dissertation tasks. Given that theoretical analyses derived from music notations are first and foremost also interpretations (see situational relevance type of “previous analyses of concert pieces”; also Tarasti, 1994, p. 31), the findings of the present study also support the claim that music notations are quite alien to terms of written language (Adorno, 2006, p. 168).

The first and second symbolic modes appear important because they provide frameworks at the level of written language, both theoretical and cultural historical music, for the dissertation on music tasks. Especially the interpretative work concerning the concert pieces seemed to be open to influences from diverse types of literature, both academic and fictional. Written language used in dissertations also needed to be researched and learned. In the quotes illustrating the situational relevance type of familiarizing with terminology, a student explained that she was familiar with the experience of the phenomena, but had yet no means of translating these experiences into written language. The situational relevance types linked to other symbolic information were broadest in their

topics suggesting that the Doctor of Music students joined ideas to their dissertations from various non-music sources.

The first three modes of music information appear difficult to be unequivocally translated into written language. However, diverse situational relevance types were identified from these three modes and they were considered most important ones by the Doctor of Music students. Even though the situational relevance types identified from the interviews are not generalizable, the above traits of these modes of music information should be taken more into account in studies of both information seeking of performing musicians and music-related information seeking in general where music information should be examined in greater detail by delving into its diverse layers. The findings of the present paper reflect the previous accounts of musicology (Bengtsson, 1977), music semiotics (Tarasti, 1994) and ethnomusicology (e.g. Hood, 1963) in a sense that they suggest a separation between symbolic language and enactive music.

It is reasonable to ask, whether situational relevance types identified in the present study reflect real-life information needs or whether they are more of a product of the theoretical framework used. However, the review of studies on music-related information needs reveal parallels between previously identified need types and the used music information modes. Music performances, recordings, notations and music-related literature are identified as information need types, albeit amongst many, by previous studies (e.g. Kostagiolas *et al.*, 2015, p. 7). The present study answers the question why these needs occur for the focus group of Doctor of Music students.

Further research

It is important to acknowledge that also the phase of the dissertation on music projects influenced both the perceived importance of information categories and the identified situational relevance types. As the interviews were conducted in an early phase of their dissertation projects, it is likely that the perceived importance of, for example, information representing music making as the first mode of enactive representations increases as the dissertation work proceeds. Further studies are needed to examine the dynamic nature of the situational relevance types of diverse modes of music information. The previous need for further research is also supported by Kuhlthau's (2004, p. 112) ISP model, which suggests that the interpretations of information types represented at varying levels of abstraction might undergo change as the information-seeking process progresses. The research design used in the present investigation could also be replicated with a different focus group to verify whether it is the users' previous knowledge and background which primarily affects the perceptions of the situational relevance of diverse music information modes (see Barry 1998, p. 1302).

The problem of translation occurring between the modes of music information also suggests different areas of further research that could be useful to MIR design. Future focus of interest could be on tasks where gestural language of music making is examined at a level of written language or in scrutinizing how music notations are used in tasks that aim to both music performances and written reports, for example.

Conclusion

The present paper elaborates the picture of situational relevance of music information from a performing musician's point of view. The findings highlight that the modes of music information may suggest diverse situational relevance types of their own when evaluated by performing musicians. For MIR, the present paper offers new contextual facets explaining why diverse music information could be relevant to musicians. The findings also underline the importance of gestural language within music information behavior, which appears to be a theme of increasing importance in MIR (Godøy and Jensenius, 2009; see also Luck *et al.*, 2010). For studies of music-related information seeking, the present study offers new insights on

why performing musicians have information needs regarding certain types of music information sources, such as audio recordings and music notations (e.g. Kostagiolas *et al.*, 2015). Furthermore, the present paper provides a rare account on performing musicians' vocational and school-related information seeking.

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