Room for interpretation

Methodological aspects of a music research project

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Introduction

The research project 'Room for interpretation' at Luleå University of Technology, which is financially supported by the Swedish Research Council, addresses questions concerning the influence of room acoustics on the performance of Western art music from the performers' perspective. The empirical core of the project is a number of experimental performance sessions carried out in Studio Acusticum, Piteå, a concert hall where the acoustic conditions can be varied, primarily by changing the height of the ceiling. The present article discusses the project, its aims, design and methodology in relation to previous research on the same or closely related issues. The main focus is thus on the research process rather than on the results, which are summarised in the concluding part of the article and will be presented in more detail in forthcoming articles devoted to particular aspects of the project.[1]

Following the introduction, the article consists of five parts. Part one is a presentation of the project, its preconditions, goals, design and methods. Part two is an overview of previous research on the same topic. In Part three, characteristics of the present project are compared to those of the previous studies. In Part four, 'Room for interpretation' is related to the ongoing discussion on the purposes and means of artistic research. As Part five, a summary of the most important results is presented.

Performance and acoustics

A performance of a piece of music can be viewed as the result of a number of artistic decisions made by the musician or musicians involved. Many such decisions are taken in advance, sometimes even years before the performance, whereas others are taken on the spur of the moment, during the actual performance.

This latter kind of decision may result from ideas that the performer gets while playing, but they are often influenced by factors outside the performer's control, in certain

1 The project and its (preliminary) results have already been presented at seven national and international conferences in the years 2015–17. See also the project's website <https://www.ltu.se/research/subjects/Musikalisk-gestaltning/Forskningsprojekt/Tolkningsrum>

cases unknown to the performer even until the beginning of the performance.[2] The acoustic conditions may be said to be such a factor; even if the performer has the opportunity to test the acoustics before the concert, the presence of an audience, especially a large one, may considerably influence the acoustic conditions. Since composers rarely specify the kind of acoustic in which the music is intended to sound,[3] the responsibility for adjusting the music to the acoustic properties of the room normally falls on the performer. An important part of the musician's professional competence is therefore the ability to adjust the performance to different acoustical conditions (Sachs, 2008, pp. 7–8). A further complication is that the acoustic conditions may be experienced differently on stage than in the audience. The picture becomes even more complex in situations with many musicians, especially when placed in different parts of the room, as in polychoral vocal music.

Research on the interplay between musician and acoustic may therefore contribute important knowledge for the musician but also for the development and adjustment of concert halls and other rooms intended for (acoustic) musical performance.

The room

The concert hall, Studio Acusticum, inaugurated in 2007, was the result of a collaboration between the municipality of Piteå and Luleå University of Technology. From the outset it was intended not only for concerts and other public events but also as a laboratory for music-related research of different kinds, including artistic research, audio engineering and applied acoustics. The ceiling of the concert room can be lowered or raised, thus enabling highly variable acoustical conditions (see Figure 1). In the years following the inauguration, plans evolved for research that would make use of these special features for investigating how the performance of music, and the experience of it, is influenced by varying acoustical properties, while other conditions, such as venue, musicians, repertoire, etcetera remain identical.

These ideas were first tested in 2013 in a pilot project with a solo pianist.[4] The experiences from the pilot project were used in designing a larger research project, 'Room for interpretation' (Tolkningsrum), conducted in the years 2015–17.[5]

2 Such factors include, among other things, audience behaviour and changes in the condition (for instance, the tuning) of the instrument(s).

3 An exception is Gunnar Bucht's *Musik för Lau* (Bucht, 2009, p. 7).

4 For a detailed account of the pilot project, see Berg, et al., 2016.

5 The pilot project was funded by Innovative Art & Technology at Luleå University of Technology, Sweden; the main project was funded by the Swedish Research Council.

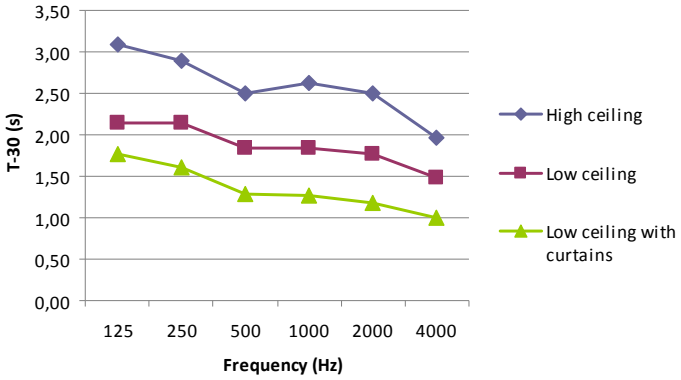

Figure 1. Reverberation time with different acoustical configurations (Ökvist, Ägren and Tunemalm, 2008). The T-30 is a measure of the 'persistence' of sound in the space defined by the ISO (International Organization for Standardization), ISO 3382 <http://www.iso.org/iso/home/store/catalogue_tc/catalogue_detail.htm?csnumber=36201> [accessed 14 February 2017]. The difference between high ceiling and low ceiling is close to one second at low frequencies and half a second at high frequencies, with an average of 0.7 seconds.

Part one. The project 'Room for interpretation'

For the project 'Room for interpretation', two main objectives were formulated:

- To develop musicians' interaction with the room through individual and collective reflection.[6]
- To incorporate the listener's perspective into the musician's thinking on performance.[7]

From these objectives were derived six research questions:

- What does 'good' and 'bad' acoustics signify for a musician?
- Are there differences in sensitivity to acoustical conditions between instruments / ensembles, and if so, which?
- Do musicians adjust to acoustics in a reflexive way or subconsciously?
- What kind of artistic possibilities can be created by different acoustics?
- How should acoustic-related interpretive strategies be formulated and developed?
- Should a variable acoustic be recommended for all future concert halls?

6 The 'room' here refers to the acoustical properties of the concert room.

7 In this context, 'listener' does not refer to an ordinary member of an audience, but rather to persons professionally engaged with music (musicians and audio engineers). Three of the five members of the research team were active as performers in the project, each in one (in one case, two) of the parts of the project. One member was active as a sound engineer throughout the project.

Project design and method

The core of the project is recorded live performances by professional musicians in various constellations. Eight different instruments or ensemble types were used: piano solo (in the pilot study), organ solo, flute solo, flute and piano duo, three kinds of chamber ensemble (string quartet, wind quintet, mixed ensemble with conductor), and mixed choir.

Each performer or ensemble made three performances, with the height of the ceiling in three positions: the lowest and the highest position possible, respectively, and an intermediate position.[8] Except for the position of the ceiling, the three performance sessions were designed to be as similar as possible: they were made in the same day by the same performers, in the same physical environment and using the same repertoire.

The order of the different positions of the ceiling was random, and the performers were not informed of this order in advance (although the position of the ceiling was visible to them when entering the room). The interval between the performance sessions was normally 2 hours, in some cases 1 hour 30 minutes (for practical reasons). Before each recording, the performer or performers were allowed 30 minutes of preparation in order to get accustomed to the new acoustics produced by the change of the ceiling height.

The repertoire performed consisted of 3–4 pieces for each of the solo instruments or ensembles participating in the project.[9] According to the criteria formulated by the research team, the repertoire should include music representing different styles and epochs, as well as different characters (as regards, for instance, tempo, dynamics, and articulation). The total duration should be 15–20 minutes.[10] The programme was proposed by the performer(s) or the ensemble leader and then discussed in the research group; a discussion that in some cases led to changes. The order in which the pieces were played was decided by the performer(s)/ensemble leaders; it remained the same for all sessions.

8 The pilot project included a fourth performance session, with the ceiling in the lowest position and, in addition, the curtains of the side walls drawn, to achieve the 'driest' acoustics possible. In the evaluation of the pilot project, this alternative was considered unsatisfactory for both artistic and practical reasons and was therefore excluded from the main project.

9 For details of the repertoire, see Appendix.

10 These criteria were formulated for the main project. In the pilot study with piano solo, the repertoire consisted of only two pieces, by the same composer but contrasting in character, with a total duration of circa 10 minutes.

Time	Activity
09:30	Performer's preparation
10:00	**First session** (circa 15 minutes) *immediately followed by:* individual annotations by all participants
(before 11:30)	Ceiling raised or lowered
11:30	Performer's preparation
12.00	**Second session** *immediately followed by:* individual annotations by all participants
(before 13:30)	Ceiling raised or lowered
13:30	Performer's preparation
14:00	**Third session** *immediately followed by:* individual annotations by all participants

Table 1. A typical schedule for a 'performance day'.

Evaluation of the performances

All performance sessions were recorded for renewed listening and analysis. Individual reports were written by the performers (in the case of ensembles, by selected performers) and by the members of the research team (the research team and the other performers participating in the project are referred to below collectively as 'the participants').

Three kinds of report were produced:

1. Spontaneous impressions, written down immediately after each performance.

The recordings of the three performance sessions were re-numbered randomly and, after 2–4 weeks, sent to the participants, who listened to them individually according to two modes, writing a separate report from each listening mode:[11]

2. Quasi-live listening mode, similar to the evaluation of the live performance: the participants listened through the recording of a performance once and wrote down their immediate impressions. Participants were instructed to avoid comparing the

11 An exception is the organ solo performer's report, which does not make any distinction between the two listening modes.

performances with each other, and to let at least 24 hours pass from listening to one recorded performance before listening to the next.

3. Analytical-comparative listening mode: Each participant compared recordings from all sessions, generally and/or in detail. In this listening mode, the participants were allowed to use the recordings freely: for example, to listen to extracts repeatedly or to listen to the same passage in two recordings immediately after one another. The three versions were compared by pairs, i.e., each participant produced three comparisons.[12]

No specified instructions for the reports were given other than that the focus should be on aspects of performance, such as tempo, agogics, articulation/phrasing, and dynamics. The reports therefore differed considerably both in length and in character, ranging from general impressions and evaluative statements to systematic descriptions of individual performance parameters. The freedom given to the participants in formulating their reports was considered helpful in ascertaining that no potentially interesting but unforeseen observation should be excluded because of the inevitable limitations of questionnaires and written instructions, however detailed.

The microphones used for the sound files distributed for evaluation were placed so as to minimise the audible reverberation, in order for the participants to focus their evaluation on their experience of the performance as such. Other microphones were used as well, however, making it possible to create sound files that would represent the experience of the audience in the hall, including the acoustics.

The material produced in the project is thus of two kinds: written documentation of musicians'/listeners' experience of the performances, and the recordings themselves, from which measured data can be derived, including details of tempo and dynamics.

The method in relation to the research questions

Answers to the first two of the six originally formulated research questions (see above) could be expected to be yielded by analysing the evaluative reports written in connection with the experimental sessions. As for the third, approaching an answer would require a combined analysis of 'subjective' (reports) and 'objective' (recordings) material. The last three questions are of a different kind, belonging to a later stage of meta-reflection or application and presupposing, more or less, the results from the analyses of the written and sounding material.

12 The venue and listening equipment used for modes 2 and 3 were freely chosen by each participant; this is commented on in Part four below.

Part two. Previous research

The problem of achieving flexible acoustics in concert halls was discussed already in the 1970s. Parkin (1972) describes two systems for electronic modification of concert and multi-purpose hall acoustics. Geerdes (1975) also presents different systems for variable acoustics, some of them involving modification of the ceiling height. In contrast to Parkin, who sees the future in electronically manipulated acoustics, Geerdes warns against such systems because of the risk of distortion of the sound and advocates a system of wall draperies that make it possible to fine-tune the acoustics in order to accommodate different kinds of ensemble and even different repertoires with the same type of ensemble. (This kind of differentiation is not discussed by Parkin, who only distinguishes between acoustics for speech and music, respectively.) The different standpoints of the two authors as to preferred methods of realising variable acoustics were highly relevant in the planning of Studio Acusticum: both electronic and physical systems were presented and discussed, before the decision was taken in favour of the latter.

In addition to continued research on the creation of flexible acoustics in concert rooms (which will not be further discussed here), there have been numerous experimental studies on musicians' responses to changing acoustics. In recent years, the number of such studies has increased so much that it can be doubted whether it can still be maintained that 'most studies on concert hall acoustics assume that the music performances are constant regardless of the hall's acoustics' (Kawai, et al., 2013, p. 1). The situation is summed up in a fairly recent article: '[...] the study of musicians' performance adjustments to room acoustics is a topic under investigation and similar experiments have been completed focusing on piano performance, cello and other soloist instruments' (Amengual, Lachenmayr and Kob, 2015, p. 252). Given the fact that the results of these experiments have been published mainly in journals specialised in acoustic science, it is not surprising that the bulk of the articles fall within applied acoustics or psycho-acoustics, rather than musicology or other kinds of music research. Within artistic and performance-oriented research in music, on the other hand, very little attention has been given to the relationship of room acoustics to musical performance. Leech-Wilkinson (2009, 1.2, §17) mentions acoustics as one of the areas that have to be considered, even in 'a limited programme of work, focussing on what performers do', but does not develop this theme further. In Sachs (2008, pp. 7-8), one of ten questions posed to three famous pianists concerns the performer's adjustment to the acoustics of the concert hall. However, the stereotyped Q & A format of this text does not allow for a deeper discussion.

Under the following headings, selected aspects of the design and methodology of 16 experimental studies, all of them including comparisons of musical performances in

different acoustical conditions, will be summarily compared. Most of the studies were published between 2003 and 2017; in addition, one study is from 1978, two from 1989 and one from 1994.

The rooms

The conditions under which the experiments were conducted were in most studies wholly or partly artificial. Anechoic rooms or recording studios with electronically simulated acoustics are used by Gade (1989a), Ueno and Tachibana (2003), Ueno, Tachibana and Kanamori (2004; 2005) and Ueno, Kato and Kawai (2010)/Kato, Ueno and Kawai (2015),[13] as well as by Woszczyk and Martens (2008), Schärer Kalkandijev and Weinzierl (2013a; 2015), and Fischinger, Frieler and Louhivuori (2015). In Gade (1989a) and Ueno, Tachibana and Kanamori (2004; 2005), the location of one of two duo players in a separate room adds to the artificiality of the setting. Two studies (Kawai, et al., 2013, and Armstrong, 2017) use both natural and electronically enhanced acoustics.

Concert halls were used in some of the studies. Amengual, Lachenmayr and Kob (2015) conducted their experiment in a concert hall where the acoustical changes were implemented using the hall's existing system (*Vivace*) for electronically varying the acoustics. Armstrong (2017) compares performances in real concert halls and churches with performances in simulated acoustics based on these rooms. Schärer Kalkandijev and Weinzierl (2013b), as well as Gade (1989b) and Chiang, Chen and Huang (2003), use several real concert halls without electronically manipulated acoustics. The only study found that uses a concert hall with non-electronic variable acoustics is Bolzinger, Warusfel and Kahle (1994).

The instruments

Eight of the sixteen studies exclusively used unaccompanied melody instruments, one of them (Ueno, Kato and Kawai, 2010/Kato, Ueno and Kawai, 2015) a singer as well. Three of these eight studies used only a single type of instrument: in Schärer Kalkandijev and Weinzierl (2013a, 2013b) two celli and one cello, respectively; in Armstrong (2017) an electric guitar.

Four of the studies exclusively used keyboard instruments, in one case (Amengual, Lachenmayr and Kob, 2015) an organ, in another (Woszcyk and Martens, 2008) various historical keyboard instruments, and in the remaining two (Bolzinger, Warusfel and

13 Ueno, Kanako and Kawai (2010) and Kato, Ueno and Kawai (2015) are both based on the same experimental study.

Kahle, 1994, and Kawai, et al., 2013) a modern grand piano equipped with Disklavier technology.

Ensemble constellations are infrequent: Marshall, Gottlob and Alrutz (1978) uses a string trio, Gade (1989b) several symphony orchestras, whereas Gade (1989a) and Chiang, Chen and Huang (2003) use various ensemble types (duos and trios) as well as several different solo instruments. The latter study is the only one to include both melody instruments and a keyboard instrument (piano).

With the exception of the baritone singer in Ueno, Kato and Kawai (2010)/Kato, Ueno and Kawai (2015) and the mixed choir in Fischinger, Frieler and Louhivuori (2015), no vocal performers are used in the studies.

The musicians

The large majority of the performers taking part in the experimental studies were professional musicians. For ten of the studies, it is explicitly stated that only professional performers were used. Marshall, Gottlob and Alrutz (1978) and Chiang, Chen and Huang (2003) do not explicitly state that the musicians were professional, but it seems very likely that they were. Amengual, Lachenmayr and Kob (2015) employed music students on different study levels, though all 'at a comparably high professional level' (p. 254). Ueno, Tachibana and Kanamori (2004; 2005) used pairs of one professional performer (as the actual subject) and an experienced amateur player (as 'co-musician'). Armstrong (2017) does not give any information about the qualifications of the musician (an electric guitar player).

The music

Excerpts or complete pieces?

The amount of music used in the experiments varies dramatically between the studies. Most commonly, however, only single phrases or short excerpts were played (Gade, 1989a; Bolzinger, Warusfel and Kahle, 1994; Chiang, Chen and Huang, 2003; Ueno, Tachibana and Kanamori, 2004 and 2005; Ueno, Kato and Kawai, 2010/Kato, Ueno and Kawai, 2015; Kawai, et al., 2013; Schärer Kalkandijev and Weinzierl, 2013a and 2015; Armstrong, 2017).

A complete single-movement work (Bruckner's *Locus iste* for choir) was performed in Fischinger, Frieler and Louhivuori (2015), a complete multi-movement work (Beethoven's String trio, op. 3) in Marshall, Gottlob and Alrutz (1978), a complete cycle of multi-movement works (J. S. Bach's cello suites) in Schärer Kalkandijev and Weinzierl (2013b) and the complete works for keyboard by a single composer (Joseph Haydn) in Woszczyk and Martens (2008). Gade (1989b) gives no information on the music played by the or-

chestras involved, though it seems very probable that it comprised complete movements or works.

Single voices or full score?
When the performances studied were on melody instruments (as opposed to, for instance, keyboard instruments) several studies use solo lines (with accompaniment or other parts excluded) (Ueno, Kato and Kawai, 2010/Kato, Ueno and Kawai, 2015); original solo music was used by Schärer Kalkandijev and Weinzierl (2013, both studies). Ueno, Tachibana and Kanamori (2004 and 2005) use two parts (one played by the subject, the other by a 'co-player'), probably taken from a composition with several parts (though this is not explicitly stated). Gade (1989a) uses, alongside single voices, both duos (with no information on the origin) and excerpts from original trio works. The repertoire used in Schärer Kalkandijev and Weinzierl (2015), chosen by the musicians (24 excerpts in all), shows a mixture of original solo music and solo lines from other music (for instance the solo part in concertos).

Who chose the music?
In some cases, the researchers chose the music to be played (Ueno, Kato and Kawai, 2010/Kato, Ueno and Kawai, 2015; Kawai, et al. 2013; Amengual, Lachenmayr and Kob, 2015; Fischinger, Frieler and Louhivuori, 2015), but it also occurred that the musicians were free to choose the repertoire (Ueno and Tachibana, 2003; Ueno, Tachibana and Kanamori, 2004 and 2005; Armstrong, 2017). In Bolzinger, Warusfel and Kahle (1994), the researchers imposed exercises to be played prior to the actual repertoire, which was chosen by the participating musicians (all pianists). In Schärer Kalkandijev and Weinzierl (2013b), the repertoire was determined by the concert situation, and thus reasonably chosen by the musician; similarly, in Gade (1989b), the orchestras played from their current concert programmes. In Schärer Kalkandijev and Weinzierl (2015), the excerpts from the repertoire were chosen by the musicians but following specific instructions from the researchers regarding duration and character (tempo). Marshall, Gottlob and Alrutz (1978) and Woszczyk and Martens (2008) do not state explicitly who decided the music, but it seems very likely, especially in the latter case, that the performer had a strong influence on the choice of music.

How prominently does the music played figure in the articles?
In some of the studies, the music played was not mentioned at all (Gade, 1989b; Ueno and Tachibana, 2003; Ueno, Tachibana and Kanamori, 2004 and 2005; Armstrong, 2017) or only for parts of the experiments (Gade, 1989a) or very summarily (Bolzinger, Warus-

fel and Kahle, 1994, only state 'from Mozart to Berio'). Others specified the repertoire, though without discussing the significance of, or the reasons for, the choice of repertoire (Marshall, Gottlob and Alrutz, 1978; Chiang, Chen and Huang, 2003; Ueno, Kato and Kawai, 2010/Kato, Ueno and Kawai, 2015; Kawai, et al., 2013).

On the other hand, Schärer Kalkandijev and Weinzierl (2013a, 2013b, 2015) not only give the chosen repertoire but also discuss the relationship between the character (=tempo) of the different pieces (movements) and the results. Kawai, et al. (2013) give details of the chosen excerpts (using the term 'test phrases') but also specify certain characteristics of the individual pieces with respect to musical parameters such as tempo, texture, tonal range, dynamics and agogics. Fischinger, Frieler and Louhivuori (2015) explain the reasons why a specific piece was chosen for the performance experiment. Amengual, Lachenmayr and Kob (2015) emphasise the importance of the character of the music (two contrasting excerpts from the first movement of Mendelssohn's Organ sonata, op. 65:2) for the results regarding the influence of acoustics on performance. In Woszczyk and Martens (2008), the performer/interviewee discusses the special qualities of Haydn's piano music in relation to the instrument and the acoustic conditions.

In two of the articles (Amengual, Lachenmayr and Kob, 2015; Kato, Ueno and Kawai, 2015), the scores for the excerpts used are reproduced.

Musicians' evaluation

Most of the studies report some kind of subjective evaluation of the different acoustics from the participating performers. The evaluations took different forms. Interviews as a complement to measured data on the performances were used by Gade (1989a), Schärer Kalkandijev and Weinzierl (2013a and 2015), Ueno, Kato and Kawai (2010)/Kato, Ueno and Kawai (2015), Amengual, Lachenmayr and Kob (2015), and probably also by Marshall, Gottlob and Alrutz (1978). In Woszczyk and Martens (2008), who give no measured data, most of the article consists of the detailed responses given by the performer (only one performer was used in this study) to a set of eleven questions concerning his experience of the electronically enhanced reverberation. This article differs from all the others not only in the space given to the answers, which seem to be rendered in full (some of them taking the form of an extensive discussion), but also in that the performer/interviewee (who is named and presented as a 'pianist/musicologist', p. 1043) appears to come very close to being a co-author.

Gade (1989b), Bolzinger, Warusfel and Kahle (1994) and Fischinger, Frieler and Louhivuori (2015) used a questionnaire; Chiang, Chen and Huang (2003), a rating scale for four different parameters; while Ueno and Tachibana (2003) and Ueno, Tachibana and

Kanamori (2004; 2005) gave the musicians the opportunity to formulate their impressions and comments in their own words, without providing interview questions.

In Schärer Kalkandijev and Weinzierl (2013b), Kawai, et al. (2013), and Armstrong (2017), no comments from the musician(s) are reported.

Part three. 'Room for interpretation' in relation to previous studies

Even though there are many differences of design and method among the individual studies discussed above, for most of the aspects related above there is a clear majority for one choice, making it possible to summarily describe a (fictional) typical study of this kind:

> The experimental performing sessions are conducted in an **anechoic room** with **artificially enhanced acoustics**. The study uses **exclusively melody instruments**, on which **professional musicians** play **short excerpts** (solo passages) from the classical repertoire, **chosen by the musicians**. The chosen **repertoire is mentioned but without any discussion** of the reasons for the choice or the significance of the repertoire for the study. The performances **are recorded and analysed using measurement tools** but the performances and/or the acoustics are also **evaluated subjectively by the performers** by means of **interviews**.[14]

If we compare the methodological set-up of the 'typical' study as summarised above (or rather the part of the set-up relevant to the present comparison) to that of 'Room for interpretation' described in Part one, we can see certain similarities: the exclusive use of professional performers, the recording of the performances and the subjective evaluations by the performers themselves. Everything else in the methods used for 'Room for interpretation', however, differs from the 'typical' study.

Some of the methodological components in 'Room for interpretation', while differing from those employed in most of the studies, can be found in one or a few of them: the use of a concert hall (in one case even a concert hall with mechanically variable acoustics), the absence of artificially enhanced acoustics, the combination of vocal and instrumental music, the intentional use of pieces contrasting in character, the use of complete pieces or movements, and the freely formulated reports by the participating performers.

14 There is actually no single study in the material to which all of these features apply. Schärer Kalkandijev and Weinzierl (2015) comes closest, the only deviation being that they mention the basic tempo as a determining factor in the choice of repertoire (the repertoire was chosen by the musicians but they were instructed to choose one slow and one fast piece).

On the other hand, there are certain parts, some of them significant, of the design and methodological set-up of 'Room for interpretation' that have no counterpart in any of the 16 studies, such as:

- The wide variety of instruments and ensembles (keyboard instruments, melody instruments, several chamber ensembles and a vocal ensemble).
- The dual role of most of the participating researchers as both performers and observers.
- The careful procedure for determining the repertoire, where pieces were suggested by the performers and subsequently discussed and decided by the research group according to explicit criteria.
- The inclusion of written evaluations not only by the performing musicians but also by the members of the research group (all of them professional musicians).

Part four. Discussion: the methodology of 'Room for interpretation' in relation to the discussion on artistic research

Artistic research is commonly described in terms of differences in relation to other research.[15] Such differences are assumed to include a rather wide variety of aspects, including the researcher's competence, the methods and forms of presentation, as well as the purpose of the research and the intended practical application (if any) of the results.

At the same time, the nature of the relationship between artistic and other research is continuously and intensely debated, as a corollary to the problem of defining and explaining the *raison d'être* of this relatively new branch of research in the academic landscape – what exactly does artistic research contribute in terms of new knowledge that is not accessible through established disciplines and methodologies?

Although the debate has not, as it appears, led to a general consensus on the demarcation lines between artistic and other research (nor on many other issues), an attempt will be made here to formulate, in general terms, some criteria for artistic research that seem to be shared by most of those involved in the discussions:

15 What is here referred to as 'other research' has often been termed 'scientific research' or 'science' (in Swedish: 'vetenskaplig forskning', 'vetenskap'). There is, however, a well-known fundamental difficulty in the use of this term, since the scope of the term 'vetenskap', as of the German 'Wissenschaft', is much broader than the English 'science'; in addition, there is some ambiguity as to exactly which disciplines should be regarded as 'science'. In discussing this terminological problem, Hansson (2007, pp. 6f) advocates a broader use of 'science' that covers all 'knowledge disciplines' recognised by the academic community, in equivalence to the scope of 'Wissenschaft'.

1. Impetus: the research problem (question[s]) emerges from artistic practice.[16]
2. Method: the methods used include the researcher's artistic practice.
3. Presentation: the presentation of results includes artistic formats.
4. Application: the results, whether presented in artistic or other formats, can be used/applied in artistic practice (to improve or enrich existing artistic practices).

The first of these criteria can be said to be the basic one, from which most of the others are derived. It should be noted that the last criterion is not exclusive to artistic research: it is certainly possible to imagine results from different kinds of 'non-artistic' research that can be applied in artistic work. In the field of music, such results may be, for instance, technical improvements to musical instruments, or historical information on a composer or a particular musical practice. On the other hand, the presence of this criterion is expressive of the close relationship between artistic research and artistic practice (and not only the researcher's own).

With the researcher's artistic competence and experience comes also a perspective that influences the entire research process: research problems or tasks formulated within the artistic practice itself can be expected to be different from those coming from the outside, and the use of, for instance, musical performance and/or composition as research tools would arguably be likely to produce other kinds of result than can be achieved with conventional research methods. Behind the criteria listed above thus lies the assumption that the researcher's artistic competence, when applied in the research, has the potential of producing knowledge that is not accessible by other means.

There is, however, hardly any agreement on what constitutes specifically 'artistic' methods of research, perhaps not even on whether methods of artistic *research* can be distinguished from methods of artistic *work*. On the other hand, it seems to be generally accepted that artistic research may borrow methodological approaches from other disciplines without losing its 'essence' (cf. Frisk and Östersjö, 2013).[17] Indeed, artistic research has been described as the most interdisciplinary of research areas, characterised by 'methodological pluralism' (Hannula, Suoranta and Vadén, 2005, p. 67). From this

16 It is presupposed that this practice reflects an ability to produce artistic works or performances of professional quality ('professional' here referring solely to artistic level, regardless of factors such as education and remuneration).

17 Bolt (2016) seems to take a different stand on the methodological issue: she maintains that 'artistic research or creative arts enquiry reveals new modes and methodologies that could be considered to constitute a new paradigm of research distinct from the dominant modes of qualitative and quantitative research' (p. 131). Instead she proposes what she calls a 'performative paradigm'. At the same time, in pointing out that art could serve as 'data that could be analysed using qualitative and aesthetic modes' (p. 131), she hints at a partial acceptance of the inclusion of methods from the 'dominant modes' of other research in performative artistic research.

follows that there is no template or fixed set of rules against which the methodology of a project can be tested in order to arrive at a final verdict of whether or not it constitutes artistic research. And would not such a ready-made pattern be counter to the very idea of what the special contribution of artistic research is or could be?

This brings us to the question of the relationship of artistic research to specific areas of 'traditional' academia. It has often been pointed out that artistic research, though naturally associated with the humanities on account of its subject matter, usually involves an experimental approach, which would lend it an affinity with natural and technological science. On the other hand, the 'experiments' involved in artistic research are normally conducted in a free manner, not being subjected to the rigorous rules determining the set-up of scientific experimentation, which includes repeatability[18] and isolation of individual phenomena.[19] Such sets of rules are required to ensure the objective character of the research by making the results independent, as far as possible, of the researcher's person. But research experiments that involve, or aim at, the production of art and thus are dependent on the individual artist-researcher, cannot reasonably be repeated; with another person, the research process, and consequently the result, would inevitably turn out different. Therefore, objectivity as a principal aim in the design of experimental situations is hardly applicable to artistic research[20] – though other aspects of scholarly rigour, such as acknowledging sources (including sources of inspiration) and providing accurate descriptions, are certainly relevant.

What, then, characterises the methodology of the project 'Room for interpretation'? In relation to the above discussion, the following features can be identified:

- The research problem and the questions addressed derive from the experience of the researchers in their professional activities within musical performance or audio engineering (the latter being a profession with clear artistic implications when it comes to recording music).

18 Repetition in a certain sense can, however, be used as part of the methodology of artistic research. Bolt (2016, p. 140) sees 'repetition with difference' as characteristic of 'art-as-research', in contrast to 'repetition of the same' typical of 'science-as research'. In 'Room for interpretation', the repeated performances of the same repertoire in the same room and by the same performer(s), producing different results, are clear examples of 'repetition with difference'.

19 Östersjö (2016, p. 95) even describes the 'experimental nature' of a specific artistic research project in terms of 'feeling our way in the dark', emphasising the contrast to its appearance, in retrospect, of being 'systematic'. Scientific experimental designs, by contrast, are necessarily systematic. On the principles for experimental design in scientific contexts, including separation and repeatability, see Hansson, 2007, pp. 49-55.

20 Today, it is generally recognised that the possibility of objectivity in scientific enquiries cannot be taken for granted. For example, Hansson (2007, p. 11), while naming objectivity a 'requirement' in science (in which he includes, besides natural and technological science, not only the social sciences but also the humanities), admits that '[o]bjectivity can be difficult to achieve, and sometimes it cannot be possible to achieve it more than partially'. The main difference between artistic and other research in this respect would then be that *striving for* objectivity is required in the latter but not necessarily in the former.

- The core of the project is live performances of music (which are also recorded) and the participants' (performers' and professional listeners') subjective responses.
- A complete presentation of the results of the project would require the inclusion of sound recordings from the performances.
- The intention and goal of the project is to enhance performers' awareness of aspects of room acoustics and their significance for the artistic result of live performances as well as of recordings of music.

In most studies, especially within natural or technological science, including the acoustic studies discussed in Part three above, the choice of methods is wholly or partly determined by the desire to isolate the influence of an individual variable on the phenomenon studied. This applies, at least partly, to 'Room for interpretation' as well, in that the project was designed to isolate the phenomenon of the acoustic properties of the room by making other factors as similar as possible, as described in Part one, above.[21]

As we have seen, the experimental design of 'Room for interpretation' includes certain elements that are similar to scientific research – more so than is usual in artistic research projects. Rather than eschewing such methodological choices on the sole ground that they are associated with 'hard' science, we have strived to find a combination of methods that will achieve the specific goals of the project. Since these are primarily concerned with artistic development (see the last bullet point above), it is not surprising that 'Room for interpretation' differs considerably from the acoustic studies described in Part three. In these studies, subjective responses tend to be gathered by means of questionnaires, rating scales or guided interviews, since responses in those forms lend themselves to summary result presentations, especially in the form of tables or graphs, where tendencies can be easily observed and general comparisons made. In 'Room for interpretation', by contrast, the individual participants have been asked to express themselves freely in their own words, with a minimum of guidelines. This methodological choice has precluded the presentation of results in graphic or numeric form; on the other hand, it has made it possible to capture individual nuances and aspects that would otherwise have been lost.[22]

Another important aspect of the design of scientific experiments is the desire for controlled and simplified conditions (Hansson, 2007, pp. 52-53). As we have seen, this tends

21 At the same time, even at the design stage there has been an awareness that there are variables relating to the participating individuals that cannot be eliminated, such as the memory of previous performances in the same day, and tiredness (for instance at the end of the workday). Such factors need to be considered when evaluating both the sounding results and the musicians' comments immediately after each performance session.

22 The 'freedom of expression' allowed to the participants has not prevented the research team from identifying some rather clear tendencies in the written evaluations; see Part five below.

to favour the exclusive use of melody instruments as well as a preference for using only short excerpts, instead of complete pieces, and/or only a single part in ensemble or orchestral music. In some of the studies, musicians, placed in an anechoic room, have received acoustic feedback (from artificial room acoustics or even from other players) exclusively through headphones.[23] Such considerations inevitably widen the gulf between the experimental situation and realistic conditions for performance, thereby substantially reducing the artistic dimension of the performance. By contrast, the experimental performance sessions in 'Room for interpretation' were designed in order to include as wide a variety as possible of repertoires and instruments (including both instrumental and vocal ensembles), performing complete pieces or movements under conditions as similar as possible to ordinary performing situations. The same goes for the performers' and researchers' individual listening to the recordings. Whereas the listening modes were specified ('quasi-live' and 'analytical-comparative' listening, respectively; see 'Evaluation of the performances' in Part one above), the choice of venue and technical equipment (for instance stereo loudspeakers or headphones) was left to the discretion of the individual listener. The intention was that the listening environment and equipment should not differ from that normally used by the participants. This aspect of the project design was consistent with the general aim to create, as far as possible, realistic conditions, even at the cost of uniformity, as well as with the focus of the project not being audio quality but musical interpretation.

Furthermore, unlike many of the studies referred to above, it is not a goal of 'Room for interpretation' to make comparisons between subjective (individual responses) and objective (measured) data in order to determine, for instance, whether or not the participants' experiences of, say, tempo were 'correct'. Rather, the sole focus of the project is the experiences of the participating researchers and performers.[24]

In 'Room for interpretation' listening is a central methodological tool. Most of the material produced in the course of the project, besides the recordings themselves, consists of written-down responses to the music played (whether live or in recorded format) in the project sessions, by the performers and the members of the research team. This emphasis on listening is yet another difference in relation to the acoustic studies, where, although the participating musicians' (test persons') listening to recordings of their own performances is usually an important element, very little is reported on the authors' own

23 Listening through headphones is the rule among pop and rock musicians in recording contexts, but it is foreign to performers of Western art music, which is the genre studied in almost all of the articles discussed in Part two. On attitudes to headphones among musicians of different kinds, see Greig (2009, pp. 21-22).

24 However, as has been mentioned above, the project has also yielded 'hard' (measured) data, which may be used in future research.

listening to the music performed in the project. Rather, the characteristics of the performances are typically communicated as the result of measurements.

In this context, it is interesting to consider the changing attitudes to listening and performance research within musicology in recent decades. In the post-war era, methods borrowed from the natural sciences became common also in musicology (as a counterpart to the 'scientific' approach to composition typical of the Darmstadt school). Consequently, tracing developments in performance practice by listening to recordings was not considered 'appropriate for research' (Philip, 2004, p. 1). Part of the explanation for this would have been that listening, especially to (commercially released) recordings was considered 'something to be done in one's spare time for relaxation, and was not regarded as a serious occupation' (Philip, 2004, p. 2).[25] Since Robert Philip's pioneering work (1992), the situation has changed radically; the study of sound recordings is now fully accepted, and research on performers' work, interacting with or independent of musical scores, has emerged not only as a growing subdiscipline of musicology, but rather as a multidisciplinary field of research.[26] Some of this research comes close to artistic research in that the researcher combines analytical approaches to scores with his/her own experiences as a performer (Schmalfeldt, 1985; Rink, 2002). A radically rethought, performance-based view of the entire discipline of musicology has been proposed by Nicholas Cook (2013).[27]

A central characteristic of 'Room for interpretation' is that the customary rigid distinction between 'researchers' and 'informants' has been blurred, not to say eliminated.[28] Each member of the research team, with one exception, also participated in experimental sessions as performer, or, in one case, as sound engineer. Furthermore, two of the participating musicians who were external to the research team (a flautist and a choral conductor) participated in the follow-up meetings of the research team after the respective sessions where they had performed.

The oscillation between the roles of 'reflective performer'[29] and observer of other performers' practice actually distinguishes the present project not only from most 'tradi-

25 In ethnomusicology, by contrast, the listening to recordings was established early on as a means of gathering information on musical practices.

26 See, for instance, Rink, ed. (1995), and the contributions by John Rink, Nicholas Cook and José A. Bowen in Cook and Everist, eds. (1999).

27 Cook does not refer to his own experience as performer (he describes his experience of performing as being 'at a strictly amateur level' [p. 2]), and, although he mentions in passing 'the burgeoning field of practice as research' (p. 2), there is no real discussion of artistic research in the book.

28 A parallel case is the research on musical performance conducted at the Royal Institute of Technology (KTH), Stockholm, from the late 1980s to circa 2000, where the violinist Lars Frydén participated as researcher and co-author of well over 20 scientific articles and book chapters, for instance Thompson, et al. (1989), Sundberg, Friberg and Frydén (1991) and Friberg, Sundberg and Frydén (2000).

29 A special case of the well-known concept of 'reflective practitioner', coined by Donald Schön in 1983.

tional' research, regardless of discipline, but also from artistic research as it is normally understood, in which the focus is usually limited to the researcher's own artistic practice, or the practice of a group of artists of which the researcher is a member.[30]

Finally, if we look at other disciplinary areas, there are, on a more general level, certain similarities to be found with some qualitative methods used in sociology and other social sciences, including action research and autoethnography. Such methodological similarities, including the participation of the researchers in the activities studied[31] as well as the emphasis on the researchers'/musicians' subjective responses, are not, however, unique to the present project but shared with much artistic research.[32] Apart from methodology, a further similarity with action research is the ultimate aim of improving external conditions, in this case musical practices in connection with room acoustic properties, and, in a longer perspective, perhaps, the construction of concert rooms.

Part five. Summary of results

In this section, the most important results from the project are presented in a summary way, with an emphasis on observations that are common to all or most subprojects.[33]

- We found that the performers' evaluation of the artistic result as written down immediately after playing or live listening, tended to differ from the judgements formulated when listening to recordings. In the performance situation, the performers tended on the whole to prefer large acoustics, whereas they were more uncomfortable performing in dry acoustics, where they felt that they had to put in more effort in order to produce a reasonably good performance. However, when listening to recordings of their performances of the same piece in different acoustics, the musicians experienced that such 'uncomfortable' acoustics 'paid off' in that certain aspects of the performance (such as articulation, accuracy, balance in tempo and agogics) were judged as better in the 'dry' acoustics. Similar observations were made by the professional listeners in the research group. (Since, due to the placement of the microphones close to the instrument[s], very little of the difference in acoustics was heard on the

30 An exception is Scott (2014), in which early recordings are analysed and discussed in relation to the author's own recorded performances.

31 The term 'practitioner research', which can be said to express one aspect of artistic research, is sometimes used synonymously with 'action research'; see, for instance, Whitehead and McNiff (2006).

32 Despite the element of introspection present in the evaluative statements of the participating musicians in 'Room for interpretation', there are also many differences in relation to autoethnography. For instance, the accounts of the musicians/researchers in 'Room for interpretation' concern exclusively very recent experiences and are thus much more limited in scope than is common in autoethnographical texts.

33 As mentioned above (Introduction), results specific to individual subprojects or particular aspects of the project will be presented and discussed in forthcoming publications.

recordings, the preferences expressed concerned the perceived artistic quality of the performances, not the acoustics.)[34]

- Differences between instruments or instrument constellations were observed regarding the influence of the acoustics on the tempo. In some cases (piano solo, mixed chamber ensemble with conductor), tempi tended to be perceptibly slower in large acoustics, whereas others (most notably the wind quintet) kept tempi virtually identical in all three performances. It thus seems that playing without conductor in ensembles of four or five musicians leaves less room for tempo variation than solo or duo playing, and consequently also for adaption to different acoustics.
- In the instructions given for the comments, performers and members of the research team were recommended to give particular attention to tempo (including agogics), articulation, dynamics and (if relevant) dynamic balance. It turned out, however, that, both in the live situation and when listening to the recordings of the performances, the performers tended to focus on the qualities of the sound more than on other aspects of the performance.

Some ideas for future research

The material collected in the course of the present project could serve as a basis for continued research along several lines. As mentioned above (Part one), the recordings of the performances have produced (or make it possible to produce) data on details of the performances, such as tempo, dynamics and balance, which could be analysed and used as an aid to reach a deeper understanding of the participants' evaluative comments. Another idea that has been discussed in the research group is to involve, in addition to musician-researchers, experienced recording engineers (*Tonmeister*) in evaluating different microphone configurations from the same recording.

A possible future research project could focus on the production of music, where composers use different acoustic conditions for artistic purposes.[35]

Final remark

In the general curriculum for third-cycle education in Musical Performance (*musikalisk gestaltning*) at Luleå University of Technology, the subject is described as being located 'in the field of tension between art and science' (Jullander, 2007, p. 83; Jullander, 2010, p. 197). This description would seem to be appropriate also for the research project 'Room

34 Some of the reports show that musicians' responses to different acoustics are conditioned not only by what they hear but also by the other senses, especially the eyesight.

35 A project of this kind could not, however, include the actual change of acoustics, since the concert room, for reasons of security, must be evacuated during the lowering or raising of the ceiling.

for interpretation', which, while firmly committed to the quest for a deepened understanding of issues and questions born in the artistic practice of music performers, does not hesitate to employ designs and methods from quite different research disciplines, adapting them for the purpose at hand. This approach can be described as pragmatic in the everyday sense of the word: 'practical rather than idealistic or theoretical' or 'concerned with practical results or consequences'.[36] Using Henk Borgdorff's (2012, p. 38) definitions and terminology concerning art-related research, the project can be described as, at the same time, 'research *for* the arts', providing 'insights and instruments that may find their way into concrete practices', and 'research *in* the arts', which 'does not assume the separation of subject and object, and does not observe a distance between the researcher and the practice of art'.[37]

Appendix

Repertoire used in 'Room for interpretation'.

0. Piano solo (pilot project)

Edvard Grieg (1843–1907), from *Lyriske stykker (Lyrical Pieces)*:

- Bryllupsdag paa Troldhaugen (Wedding day at Troldhaugen), op. 65, no. 6 (1896).
- Hjemve (Homesickness), op. 57, no. 6 (c. 1890–93).

1. Organ

Dieterich Buxtehude (1637–1707):

- Praeludium in D, BuxWV 139.

Max Reger (1873–1916), from *52 Choralvorspiele für Orgel*, op. 67 (1900–02):

- 33. O Welt, ich muß dich lassen.
- 49. Wie schön leuchtet der Morgenstern.

Bengt Hambræus (1928–2000), from *Missa pro organo; in memoriam Olivier Messiaen* (1992):

- Introitus.

2. Flute solo

Georg Philipp Telemann (1681–1767), from *12 fantaisies à traversière sans basse* (publ. 1732–33):

- Fantaisie no. 10, F sharp minor, TWV 40:11, 1st mvt., 'A tempo giusto'.

36 Both definitions cited from 'pragmatic 1', *Merriam-Webster unabridged.* Available at: <http://unabridged.merriam-webster.com/unabridged/pragmatic> [Accessed 10 January 2018].

37 Authors' emphases. Borgdorff also has a third category: research on the arts, including traditional scholarly disciplines such as musicology and art history.

Luciano Berio (1925–2003):

- Sequenza I (1958).

Claude Debussy (1862–1918)

- Syrinx, L. 129 (1913).

3. Flute and piano

Johann Sebastian Bach (1685–1750), from Sonata in E minor for flute and basso continuo, BWV 1035 (c. 1717–1723):

- 1. Adagio ma non tanto.

Carl Reinecke (1824–1910), from Sonata in e-minor for flute and piano, op. 167, 'Undine' (publ. 1882):

- 2. Intermezzo.

Francis Poulenc (1899–1963), from Sonata for flute and piano, FP 164 (1957):

- 2. Cantilena.

4. Chamber ensemble

Jörgen Häll (b. 1986):

- Braid [for flute, clarinet, violin, viola, violoncello and percussion] (2015).

5. Wind quintet

Carl Nielsen (1865–1931), from Quintet for flute, oboe, clarinet, horn and bassoon, op. 43 (1922):

- 1. Allegro ben moderato.

6. String quartet

Antonín Dvořák (1841–1904), from String quartet no. 12 in F major, op. 96, 'American' (1893):

- 4. Finale.

7. Mixed choir

Otto Olsson (1879–1964), from *Sex latinska hymner (Six Latin hymns)*, op. 40 (c. 1912–13):

- 1. Psalmus CXX.

John Farmer (c. 1565/70– c. 1601)

- Fair Phyllis (publ. 1599).

Sven-Erik Bäck (1919–1994), from *Motetter för kyrkoåret (Motets for the ecclesiastical year)*:

- Se, vi gå upp till Jerusalem (Behold, we go up to Jerusalem) (1959).

Max Reger (1873–1916), from *Drei Chöre*, op. 6 (1892):

- 1. Trost.

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Abstract

Room for interpretation: methodological aspects of a music research project

The artistic research project 'Room for interpretation' addresses questions concerning the influence of room acoustics on the performance of Western art music from the performers' perspective. The empirical core of the project is a number of experimental performance sessions carried out in Studio Acusticum, Piteå, a concert hall with mechanically variable acoustics. The authors discuss issues relating to the project's design and methodology; the focus of the article is thus the research process rather than the results. A presentation of the project, its preconditions, goals, design and methodology is followed by an overview of previous research, mostly in acoustic science, on the same or closely related topics. In the third part of the article, characteristics of the present project are compared to those of the previous studies. In the following part, 'Room for interpretation' is related to the ongoing discussion on the purposes and means of artistic research. The authors argue that the project, while showing certain similarities to previous studies, differs considerably with respect to aims and important aspects of design, and that its characteristic features agree well with those usually regarded as typical of artistic research. The article concludes with a summary of the most important results concerning: differences between performers' reactions in the live situation and when listening to their own recordings; differences between chamber ensembles, conducted ensembles and soloists as to the influence of the acoustics on the performance; and the prevalence of sound over other musical parameters in performers' comments on their recorded performances.

Keywords
Musical performance; musical interpretation; artistic research; methodology; room acoustics; variable acoustics; Studio Acusticum.

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