This is an Accepted Manuscript of a book chapter published by Jenny Stanford Publishing/Routledge in Musical spaces: place, performance, and power on 29 November 2021, available online:
https://www.taylorfrancis.com/chapters/edit/10.1201/9781003180418-18/person-environment-relationships-influences-beyond-acoustics-musical-performance-james-edward-armstrong

Chapter X

Person-environment Relationships: Influences beyond Acoustics in Musical Performance

James Edward Armstrong
School of Film, Media and Performing Arts, University for the Creative Arts, UCA Farnham, Falkner Road,
Farnham, Surrey, GU9 7DS UK
james.armstrong@uca.ac.uk

1.1 INTRODUCTION

The environment in which a musical performance takes place is highly influential over a musician's playing and performance, and over their experience while doing so. Existing research within music performance studies tends to focus on the effects of the acoustic characteristics within an environment on a musician's playing. From such studies, it has been established that tempo, dynamic range, articulation, and musical expressiveness are shaped, and sometimes dictated, by the acoustical characteristics within a space (Kawai *et al.*, 2013: 1; Schärer Kalkandjiev, 2015). But when focusing entirely on acoustical characteristics, the experiential influence of an environment often goes unnoticed.

A small number of studies have indicated that a musician's perception of their surroundings on a psychological and emotional level is important

Geography, Music, Space (working title)
Edited by James Williams & Samuel Horlor

www.jennystanford.com

when investigating the environment within a music performance context. The purpose and everyday uses of an environment, or its place in culture, do in fact impact upon a musician's playing and performance experience. These affective environmental qualities are carried into musical performance experiences from the everyday existence of the environment, rather than emerging as the result of musical activity, and are thus referred to as 'non-musical'. The surrounding environment's attributes contribute greatly towards the manifestation of a 'person-environment relationship'; this term describes the interactions between a person and their surroundings, in relation to both their immediate physical setting, and the wider socio-cultural setting. The aim of this chapter is to reveal how person-environment relationships can be influential in the context of a musical performance, focusing on themes of behaviour-settings, socio-cultural significance, and personal meaning.

1.2 EXISTING STUDIES

A majority of existing studies on the subject of environment and space in musical performance tend to focus only on the influence of acoustical characteristics over a musician's playing. In the interest of providing a controlled environment to ensure scientific accuracy and to minimize potential variables (Woszczyk and Martens, 2008: 1043), the experiments conducted by scholars such as Sato, Kamekawa, and Marui (2011), Ueno, Kato, and Kawai (2010), and Ueno, Tachibana, and Kanamori (2004) take place within an anechoic chamber. With the absence of an acoustical response within anechoic chambers, acoustical characteristics are instead simulated via convolution processing. This provides the participating musician with artificial reverberation that responds in real-time to their playing, in a similar way to in a real-world space. Researchers can observe changes in a musician's playing in response to a range of simulated acoustic environments, encompassing attributes such as reverberation, early reflections, resonance, and echoes. One advantage this approach offers is the ability to test a large number of acoustic environments without having to physically relocate the experiment (Galiana, Llinares, and Page, 2016: 110). It also provides the researchers, and all of those involved, with the convenience of conducting their experiments in a fixed setting that does not introduce additional environmental variables.

Although studies of this nature are conducted to a high level of accuracy, they examine a very limited set of variables; rarely, if at all, are real-world environments outside of the laboratory setting considered for investigation (Schärer Kalkandjiev, 2015: 117). A church, a cathedral, a concert hall, a rock venue, a rehearsal room; all are defined by much more than their acoustical properties and are likely to impart more than their acoustical identities into a musician's playing and performance. The personal meaning and individual associations a musician may have in connection to each environment transcends the limitations of what an artificial reverberation effect can be expected to create. Indeed, this is acknowledged in fields concerned with simulated audio environments and auditory virtual reality. Anechoic chambers are unrealistic performance environments, and this fact is a likely cause of discomfort for musicians participating in the experiments (Noson *et al.*, 2002: 474). A small number of existing studies have also implied that there are emotional and psychological influences attached to real-world environments that cannot be replicated in a simulation (Lenox and Myatt, 2007: 209), and these studies acknowledge the need for research that factors in these influences (Sato, Kamekawa, and Marui, 2011: 4).

A final point to note is that existing studies typically analyze the performances of classically trained musicians, unless investigating performers from a specific genre. None of the authors of the studies mentioned above offer reasoning for favouring this musical background. There is, however, criticism of recent music performance research retaining a focus on classical music (Gabrielsson, 2003: 222). Perhaps the preference is based on a generally accepted idea of there being a higher level of instrumental proficiency and professionalism amongst classically trained musicians, and it is suggested that future studies include musicians of alternative genres as well. Similarly, many of the studies regarding the influence of environment over a musician's playing and performance suffer from a lack of repetition and replication. These publications regularly conclude by calling for further investigation.

1.3 INTRODUCING ENVIRONMENTAL PSYCHOLOGY INTO MUSIC PERFORMANCE RESEARCH

This research is conducted using an interdisciplinary approach combining music performance studies and environmental psychology. Environmental

psychology is a discipline concerned with the study of the interactions between humans and their surroundings; how behaviour-settings, social instruction, and place attachment affect the ways we perceive and experience our built environment. The aim of an environmental psychologist is to understand how and why we interact with our surroundings in the ways that we do, with the overall goal to improve the environment and our attitudes towards it. In the context of a musical performance, the knowledge and methodologies afforded by the field of environmental psychology offer an understanding of a musician's relationship with their environment that is under-researched, and that remains unavailable in current music performance research. A relatable study from within psychology by Aarts and Dijksterhuis investigated the situational norms and behaviours attached to a library setting, suggesting that the built environment has the potential to prime the behaviour of those within it, even if there are no direct social stimuli providing encouragement (2003: 20). Similarly, Cassidy indicates that the behavioural demands of a church environment are also likely to remain in effect even when users are engaged in activities beyond the space's main function of hosting a service or other religious activity (1997: 40). Unlike with the behavioural influences exerted by social stimuli, a built environment remains fixed, creating boundaries of influence to a specific location that extend to include wider social factors. Furthermore, environmental psychology is yet to be applied in a music performance context in any detail.

'Behaviour-settings' is a term frequently mentioned in this chapter, particularly with reference to the behaviour-settings theory first outlined by ecological psychologist Roger Barker (1968). This approach is often found in environmental and ecological research fields, and therefore it requires an explanation before application in a music performance study. Behaviour-settings theory approaches the relationship between a person and their surrounding environment as a series of behavioural interactions: 'in many cases the behavior outcomes of individuals can be predicted more accurately on the basis of the situation in which they are located' (Popov and Chompalov, 2012: 19). To contextualize, using the example of a church: from a young age, people are taught not to run and shout in this kind of building; that disruptive actions are disrespectful; and that there is a clearly defined etiquette to follow here. This is an example of socio-

normative expectation, and it instructs the learned behaviour associated with a specific environment; a behaviour-setting is established.

1.4 METHODOLOGY

The methodological approach developed for a wider research project from which this chapter's findings are extracted builds upon those used in existing music performance studies. Participating musicians in the wider project are tasked with playing a selection of musical excerpts of their own choosing in a real-world performance environment, a simulated acoustic environment, and an acoustically dry setting. For example, a participating musician performs in a church, followed by in an acoustic simulation of the same church, and finally in an acoustically deadened studio. This process is repeated with eight musicians performing on variations of the acoustic guitar; they each come from different musical backgrounds and have different skill and experience levels (see Table 1). Specifically focusing on the performance experiences for players of the same instrument, the guitar, is a decision made for the purpose of consistency within the study, and also to benefit from access to the network of musicians around the International Guitar Research Centre (IGRC) at the University of Surrey.

Table 1. Participants within the study.

Participant	Age	Gender	Instrument Type (acoustic guitar)	Playing Style
Guitarist A	30	Male	Classical (nylon-string)	Classical
Guitarist B	37	Male	Classical (nylon-string)	Classical
Guitarist C	44	Male	Steel-string	Folk

Guitarist D	38	Male	Classical (nylon-string)	Latin/Flamenco
Guitarist E	32	Female	Steel-string Resonator	Folk and Blues
Guitarist F	27	Male	Steel-string	Pop
Guitarist G	29	Male	Steel-string	Pop
Guitarist H	30	Male	Steel-string	Pop

The study uses the 'three-stage method', the name referring to the three different environmental settings (real-world, simulated, unmediated) encountered by participating musicians (see Figure 1). This method provides similar results to existing studies as to how a musician's playing is altered in response to the acoustic feedback of their surroundings. The addition of the real-world setting provides another level of comparison to explore changes in a musician's performance, with the potential to highlight that differences in performances do not necessarily result from changes in acoustical conditions. Indeed, the present chapter focuses specifically on the musicians' experience in this category of environmental setting, real-world performance environments. As in previous studies, no audience attends any of the performances in these experiments, and all performance environments are closed to the public to reduce the risk of interruption and the creation of additional variables. It must be acknowledged that the absence of an audience while performing in environments where one would usually be found may lead to some unusual experiences for the musicians involved (Kartomi, 2014: 190).

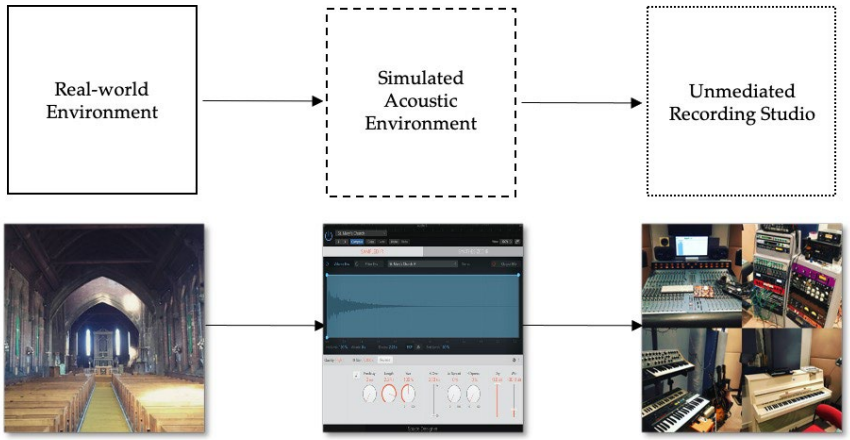

Figure 1. Real-world, simulated, and unmediated performance environments within the three-stage method.

Following on from the practical experiments, participants are interviewed about their experiences while performing during the study. They are initially questioned on their level of awareness of acoustical characteristics within different environments, and how these can influence their instrumental playing. The main focus of the post-experiment interviews, however, is on how participants experience their performances as a result of environmental qualities, including behaviour-settings, socio-cultural significance, and personal meaning. It is at this point that qualitative data can be obtained about the emotional, psychological, and experiential qualities of responding to a music performance's surrounding environment; these data are unavailable through analyzing differences in playing exclusively (Holmes and Holmes, 2013: 72–73).

The responses of each participant were analyzed separately, and common themes were extracted manually for presentation in the research findings. The experiment was conducted eight times with the addition of a pilot study for testing the methodology. The findings of the pilot study do not contribute to the overall findings. Locations in the South East of England included Guildford Cathedral, St. Martha's Church, and the Studio One hall at the University of Surrey, all located in Guildford, Surrey. Locations in the North East of England included St. Mary's Church in Horden, County Durham, and the Sage Gateshead and Cluny 2 live venues in Tyne and Wear. This method contributes to understanding of how

musicians experience and interact with their environment beyond its acoustical characteristics by offering insights into behaviour-settings, socio-cultural significance, and personal meaning.

All of the practical performance experiments and post-experiment interviews took place between February 2016 and July 2017. The following research findings form a case study into the influence of behaviour-settings, socio-cultural meaning, and personal meaning experienced by a selection of the participating musicians within a real-world church environment.

1.5 RESEARCH FINDINGS

This research indicates that a number of environmental qualities have the potential to significantly influence a musician's performance and their experience in performing. Excerpts of the post-experiment interviews conducted with the participating musicians are included in this section in support of the identified outcomes. All of the research findings in the rest of this chapter focus on the real-world church setting.[1] The church was chosen as a music performance environment to investigate due to the widely accepted understanding of how to act and behave within this place of worship, established through social expectations and learned during previous experiences (Cassidy, 1997: 35). The behavioural expectations attached to a church setting are also applicable outside of music research fields. The following section of the chapter discusses themes of behaviour-settings, social and cultural significance, and personal meaning.

1.5.1 *Behaviour-settings*

Participating musicians adhere to the behavioural demands of their surroundings, and this becomes a factor in their performances within a church setting. All instances of the experiment showed that the associated

[1] Three different church environments were used during the practical performance and recording experiments in this study. Guitarists A and B performed in Guildford Cathedral's Lady Chapel and the Church of St. Martha-on-the-Hill, both in Guildford, Surrey. Guitarists C to H performed in St. Mary's Church in Horden, County Durham.

expectation for a person's behaviour in a church remains intact in a performance situation. For example, the musicians remained quiet and noticeably reserved once they had entered the building. Upon reflection, some of the participants recalled a sudden awareness of a change in environment that was, in part, signalled by the abrupt contrast in acoustics; suddenly, the smallest movements and sounds were exaggerated by the highly reverberant space, and this caused a hyperawareness of one's own actions and the subconscious imposition upon oneself of the requisite restraint. Some of the participants were able to elaborate further, having acknowledged their awareness of the behavioural demands attached to their surroundings, during their reflection on their involvement in the study. However, the acoustical conditions are unlikely to be the sole factor in directing a behavioural change; dense reverberation is an environmental characteristic widely associated with churches that may further enhance the perceived need for a change in behaviour.

All but one of the participating musicians behaved as might be expected in a place of worship; they were calm and peaceful, acting with respect to the beliefs presented in the surroundings, speaking quietly, and minimizing any playing between recording takes. The one anomaly, Guitarist B, appeared to be highly excitable, was energetic in performing, and acted in ways that might be deemed disruptive. An explanation for Guitarist B's actions is found in personal meaning associated with the specific church environment he was performing in at the time, and is discussed in the 'Personal meaning' section, below.

1.5.2 *Social and cultural significance*

During the post-experiment interviews, a number of interesting details about the participants' individual experiences are revealed. All of the guitarists involved in this research indicated that they felt performing in a church produced conflicts with the belief systems associated with the environment. Guitarist A remarked: 'You wouldn't play Flamenco in a church', and Guitarist D agreed: 'It feels slightly wrong to be playing Flamenco in a church'. These two guitarists are from different countries, play different styles of music, are at different skill levels, and have different religious beliefs, yet they shared the same concerns over what is appropriate musical behaviour for this environment. Guitarist D

commented further on his concerns about the cultural expectations and restrictions perceived to be in play in the church setting:

> I think having been in a church a lot, I know what churches are. I have an idea of how you're meant to behave in a church. I spent many hours of my life in a church. I just thought it was appropriate that I make music in church environment that was right for the environment, and that's more of a spiritual type of thing. One of the songs is quite percussive and it didn't even feel quite right playing it there. It's about an attractive Latin lady, I was very conscious of what the environment wants of you.
>
> (Guitarist D)

Despite the churches used in this experiment having impressive acoustical qualities with expansive reverberation and musical resonances, the musicians involved approached their performances with a sense of caution due to their concerns around behaving disruptively, despite there being no audience in attendance to view any perceived disruption. In the case of Guitarist D, this came from a feeling that his chosen musical excerpts contrasted with the belief systems attached to the building. The same sense of unease was not experienced in the recording studio when the simulated acoustic environment of the church was introduced; the recording studio setting clearly did not carry the same social expectations. This further indicates that an environment is much more than its acoustical characteristics within the context of a musical performance.

1.5.3 *Personal meaning*

A sense of personal meaning in relation to the surrounding environment is often unique to the individual. For example, the one participant whose behaviour proved an anomaly was not purposefully trying to act disruptively or show disrespect to his environment. During the interview, he revealed a particular interest in horror films. The 1976 movie *The Omen* was filmed in Guildford Cathedral, and this explained the musician's excitement; his behaviour was an attribute of personal meaning and its significance could not have been identified through performance analysis alone. A sense of personal meaning is more likely to affect a person's emotional state, as opposed to their behavioural actions. For example, Guitarist G spoke of the church setting with a great sense of sadness since

his previous experiences in churches often revolved around funeral services:

> In the church I probably… to be honest, think of times of mourning. That was probably the first that sprung to mind, and that kind of, like, affects you, because it's a place where you're meant to be quite sad, and therefore that's definitely the way I felt in that environment.
>
> (Guitarist G)

This association altered Guitarist G's emotional state during his time in the church, including throughout his performances, and this contributes to his overall performance experience.

1.6 THE 'CLASSICAL DIVIDE' AND LOCALNESS AMONGST PARTICIPATING MUSICIANS

In addition to insights into the relationships between individual musicians and their surroundings during a performance, two further areas of interest emerged from the post-experiment interviews. The first is a distinct difference in how a musical performance is approached and experienced when comparing musicians with classical training to those with other backgrounds. In this study, two self-identified classical guitarists (Guitarists A and B) provided responses regarding their experiences that were significantly different from those given by Guitarists C to H, who are not classically trained and do not play in a classical style. The second additional area of interest is the difference in the individual participants' experiences during a performance depending on whether they were local to a specific performance environment or were visiting. This comparison reveals interesting generalizations in actions and behaviour stemming from association and expectation. The following section provides an overview of these two areas of additional findings and discusses how these outcomes contribute to a more holistic understanding of the person-environment relationship in music performance contexts.

1.6.1 *Classical vs. pop*

This research indicates a significant divide between participants with formal training and a classical music background when compared to participants from pop, folk, and experimental genres. For those with classical training, there was an emphasis on delivering a precise

performance and 'playing to the score' throughout their participation in the study. Guitarists A and B both revealed a sharp awareness of their acoustic environment, noting a focus on playing to accommodate the space whilst also trying to remain faithful to the notated music. In highly reverberant spaces, one of these classical guitarists expressed frustration at not being able to tune his instrument or play at the tempo that the score stipulated. Although they indicated recognizing an obligation to adhere to the expectations of a church setting, their main anxiety was with feeling unable to perform as desired. For the non-classical musicians, the acoustical characteristics of a space seemed to offer grounds for experimentation, and the necessity to alter their playing was not considered a negative. One possible explanation for the divide is that the musicians without classical training are more likely to experiment, compose, and improvise in their music-making more generally, and are therefore more likely to take advantage of the opportunity to be creative with varying environmental conditions (Sovansky *et al.*, 2016: 34). Although this study did not aim specifically to demonstrate differences between participating musicians based on their musical backgrounds, the divide here suggests that previous studies of this nature using solely classically trained musicians may have resulted in an unforeseen bias.

1.6.2 *Local vs. visiting musicians*

The results of these experiments also reveal a divide between visiting and local musicians in how they respond to the performance environment. A local musician is likely to be familiar with the cultural significance of an environment, whereas a visiting musician may approach it with an outsider's perspective. Where a church environment provides a behaviour-setting that is typically universal across all places of worship (Cassidy, 1997: 35), the personal significance of performing in a church in the North East of England, such as St. Mary's in Horden, is much less likely to affect musicians that are not local to the region. In this experiment, Guitarists C and D, both from the North East of England, expressed a sense of sadness when performing in St. Mary's Church. Guitarist C stated:

> I felt quite upset there, in that town, Horden, and the beach, because this is how my father has lived, and forefathers lived, and I felt, you know? How much hardship and suffering… It still goes on today. The conditions were appalling when there was work, and now it's appalling because there is no work. It wasn't just a church in a village, but it was in a town that was… A town in distress, you know? It's ailing, suffering.
>
> (Guitarist C)

The building is situated in an ex-mining village, apparently neglected since the closure of the mining activity on which the vast majority of its residents once relied for their livelihoods. When a participant who lives in a similar ex-mining village, Guitarist E, was asked about the influence of local history and heritage, she replied, 'Well, that's just the North East' (Guitarist E). This points to an indifference that may have emerged as a result of a gradual normalization of this apparently depressed situation.

1.7 CONCLUSION

This research project reveals a number of environmental attributes that influence a musician's playing and performance experience, beyond acoustical characteristics. The adaptation of methods typically found in the field of environmental psychology has allowed for a wider range of aspects of environment and space to be introduced to existing research in music performance studies. Rather than disregarding research currently available, this project provides an extension by including real-world environments and investigating participants' individual experiences throughout the various stages of performance. Behaviour-settings and social expectations change a musician's approach to a performance in ways not replicated within a simulated environment.

Although the acoustical characteristics of church settings are often impressive and conducive to (certain) music, the musician is likely to be influenced in ways beyond simply adjusting their playing to acoustical responses. The differences between musicians with classical and other kinds of musical training or background suggest that some musicians may be more susceptible to the effects of the person-environment relationship on an experiential and emotional level than others. Due to the qualitative nature of this research project, there is not enough data to confidently make conclusions on how a musician's training impacts upon their interaction with a performance environment beyond acoustics. This does,

however, highlight a possible area for further research, and one that would require dedicated case work. While previous studies suggest that musicians play in certain ways in response to their acoustic environment, this research reveals that there are more environmental attributes to take into consideration.

References

Aarts, H., and A. Dijksterhuis. 2003. 'The Silence of the Library: Environment, Situational Norm, and Social Behavior', *Journal of Personality and Social Psychology* 84(1): 18–28.

Barker, R. 1968. *Ecological Psychology: Concepts and Methods for Studying the Environment of Human Behavior*. Palo Alto, CA: Stanford University Press.

Cassidy, T. 1997. *Environmental Psychology: Behaviour and Experience in Context*. Hove, East Sussex: Psychology Press.

Gabrielsson, A. 2003. 'Music Performance Research at the Millennium', *Psychology of Music* 31(3): 221–272.

Galiana, M., C. Llinares, and Á. Page. 2016. 'Impact of Architectural Variables on Acoustic Perception in Concert Halls', *Journal of Environmental Psychology* 48: 108–119.

Holmes, P., and C. Holmes. 2013. 'The Performer's Experience: A Case for Using Qualitative (Phenomenological) Methodologies in Music Performance Research', *Musicae Scientiae* 17(1): 72–85.

Kartomi, M. 2014. 'Concepts, Terminology and Methodology in Music Performativity Research', *Musicology Australia* 36(2): 189–208.

Kawai, K., K. Kato, K. Ueno, and T. Sakuma. 2013. 'Experiment on Adjustment of Piano Performance to Room Acoustics: Analysis of Performance Coded into MIDI Data'. In *Proceedings of International Symposium on Room Acoustics, Toronto*. Available online at http://www.caa-aca.ca/conferences/isra2013/proceedings/Papers/P125.pdf

Lenox, P., and T. Myatt. 2007. 'Concepts of Perceptual Significance for Composition and Reproduction of Explorable Surround Sound Fields'. In *Proceeding of the 13th International Conference on Auditory Display, Montreal*.

Noson, D., S. Sato, H. Sakai, and Y. Ando. 2002. 'Melisma Singing and Preferred Stage Acoustics for Singers', *Journal of Sound and Vibration* 258(3): 473–485.

Popov, L., and I. Chompalov. 2012. 'Crossing Over: The Interdisciplinary Meaning of Behavior Setting Theory', *International Journal of Humanities and Social Science* 2(19): 18–27.

Sato, E., T. Kamekawa, and A. Marui. 2011. 'The Effect of Reverberation on Music Performance'. Presented at the 131st Audio Engineering Society Convention, New York. Available online at http://www.aes.org/e-lib/browse.cfm?elib=16582

Schärer Kalkandjiev, Z. 2015. *The Influence of Room Acoustics on Solo Music Performances: An Empirical Investigation*. PhD thesis, Technical University of Berlin.

Sovansky, E., M. Wieth, A. Francis, and S. McIlhagga. 2016. 'Not All Musicians Are Creative: Creativity Requires More than Simply Playing Music', *Psychology of Music* 44(1): 25–36.

Ueno, K., K. Kato, and K. Kawai. 2010. 'Effect of Room Acoustics on Musicians' Performance. Part 1: Experimental Investigation with a Conceptual Model', *ACTA Acustica United with Acustica* 96(3): 505–515.

Ueno, K., H. Tachibana, and T. Kanamori. 2004. 'Experimental Study on Stage Acoustics for Ensemble Performance in Orchestra'. In *Proceedings of the 18th ICA*.
Available online at http://lib.ioa.ac.cn/ScienceDB/18TH-ICA/pdf/We2.B2.4.pdf

Woszczyk, W., and W. Martens. 2008. 'Evaluation of Virtual Acoustic Stage Support for Musical Performance', *The Journal of the Acoustical Society of America* 123(5), 3089.