Di Donato (2022) From a PhD To Assisting BioMusic Research. In Vear, G. (2022) The Routledge International Handbook of Practice-Based Research. Routledge. pp. 642-649. DOI: 10.4324/9780429324154-50

From a PhD to Assisting BioMusic Research

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Introduction

One of the possible steps that one can take after a PhD is becoming a post-doc or research assistant. In this chapter, I will describe my experience in transitioning from being a PhD student to a research assistant within a larger team of academic and industry partners. These reflections were made by looking back about two years after I left the position of research assistant. Thus, this chapter is primarily of interest for young researchers, but also informative to the broader community. The research context in which I worked was the multidisciplinary field of electronic music performance at the intersection of music and Human-Computer Interaction. I conducted my PhD studies at Royal Birmingham Conservatoire, Birmingham City University, and later I was a research assistant on the BioMusic project[1] led by Professor Atau Tanaka and hosted at Goldsmiths, University of London. Broadly speaking, in both situations, the research regarded the realisation of bio-musical instruments and the design of embodied interactions to perform live electronic music. Bio-musical instruments are digital instruments that use biological and kinaesthetic body data to generate and process sound during performance. In these works, new technologies were developed combining electromyography (EMG) with Inertial Measurement Unit (IMU) sensors to detect body movements and custom authored software to control electronic audio signal processes through bodily gestures. Practice was guided by two methodologies: User-Centred Design (UCD) and Rapid Prototyping. These were used for the design of gesture–sound interactions, and realisation of software and hardware solutions. This chapter will primarily focus on my own experience and practice as PhD student and research assistant, and not on research outcomes. Please refer to the literature referenced within this text to know more about the research work itself.

Working with the musicians at the centre of the design

In the early 2000s, researchers adopted Human–Computer Interaction (HCI) approaches to create and formally evaluate interfaces for musical expression (Orio et al., 2001; Tsandilas et al. 2009). One well-established HCI approach is User-Centred Design (UCD). UCD focuses on human and context-specific aspects when designing new technologies (Norman and Draper, 1986).
It fosters an iterative pluralistic approach that not only looks at solving singular tasks using a product, but also considers the context in which it will be used, the social interactions that it might enhance or disrupt, the way we interact with these products taking into account bodily actions and emotions when perceiving their feedback or achieving the objectives. The UCD method also includes the usability of a product. It provides guidelines to make the product and its features visible and understandable, to foresee errors and to provide ways for fixing potential mistakes (Norman, 1988). The UCD method was adapted here to be applied in a musical context, and it centred around participatory workshops, rehearsals and performances (Di Donato et al., 2020; Tanaka et al., 2019; Zbyszyński et al., 2020). These were designed to leverage practitioner knowledge in performance

[1] https://cordis.europa.eu/project/id/789825

and to understand their use of the software and hardware, and bring these into the design (Correia and Tanaka, 2017).
Qualitative data about participants' experience while using the proposed technologies were collected and later analysed adopting Open and Axial Coding Methods (Corbin and Strauss, 2014). The introduction of performers' practice and experience supported the investigation of the benefits of our software and the potential issues in a contextualised situation. Here, UCD supported the gathering of vital information regarding interaction design decisions, the workflow and technical computing aspects. By observing participants' musical practice using technological solutions, relevant information emerged that answered the research questions. For example, the degree of adaptability of both the musician and the system through using the body as musical instrument, or highlighting a feature of the system so to stimulate their creativity. Conversely, this process also gave insights into the musicians' adaptation to an instrument, or if it needlessly impaired the musical performance. Although this approach allowed the gathering of essential evidence about musicians' practice, it was tedious and complex to implement. Finding the right balance of stimulating participants during the workshop without biasing their feedback represented a challenge. Technical aspects were another issue. We required several cameras and microphones to capture the workshop and the experience of each participant, which also might be an element of distraction and influence for the participant. To minimise the risks of biasing, data procedures were rehearsed, practiced and evaluated from both the researcher and participant perspective. Practicing and experiencing the data collection was of immense value, especially as a young researcher, when many issues are not fully understood until the theory is put into practice. Time was another critical aspect I had to consider. During my PhD, I worked over an extended period of four years. I had room for exploration, diverging and converging towards the aims of my research multiple times, with a certain freedom of error. By contrast, the BioMusic project ran for a considerably shorter period of 18 months. It required a higher degree of focus and necessitated following a systematic research plan. In this period, I had to respond to my colleagues, but foremost to the funder organisation, in my case the European Research Council, which ultimately is funded by taxpayers, the public. From my experience, iterative approaches to practice research are immensely informative and help gain experience on looking at an issue from different angles and finding that gap in the knowledge. However, it can easily lead to a never-ending research process; thus, it is essential to carefully plan each iteration and make sure they are correctly executed.

Prototyping with musicians, academics and industry

As part of the BioMusic project, we built the EAVI EMG board (Di Donato et al., 2019) (see Figure 5.7.1). The board is the result of a rapid prototyping iterative process. We, the BioMusic research team at Goldsmiths, University of London and Rebel Technology[2], an audio technology company based in London (United Kingdom), worked closely toward the prototyping of the EAVI EMG board. The transition from working on my own during my PhD studies, to working in a team on a research project designed by somebody else, did not happen at the moment when I received my PhD award, nor when I signed the research assistant contract. In my experience, this shift was characterised by daily progressive adaptation to others' way of working and thinking until the end of the project. Maintaining my own identity as a young researcher, sometimes with the fear of making mistakes, and the pressure of contributing to the team and producing research worth taxpayers' money was overwhelming sometimes. Yet, this feeling went away through practice. The act of realising an artefact and the creative process behind had positive impact on the research itself, as well as my own

[2] www.rebeltech.org

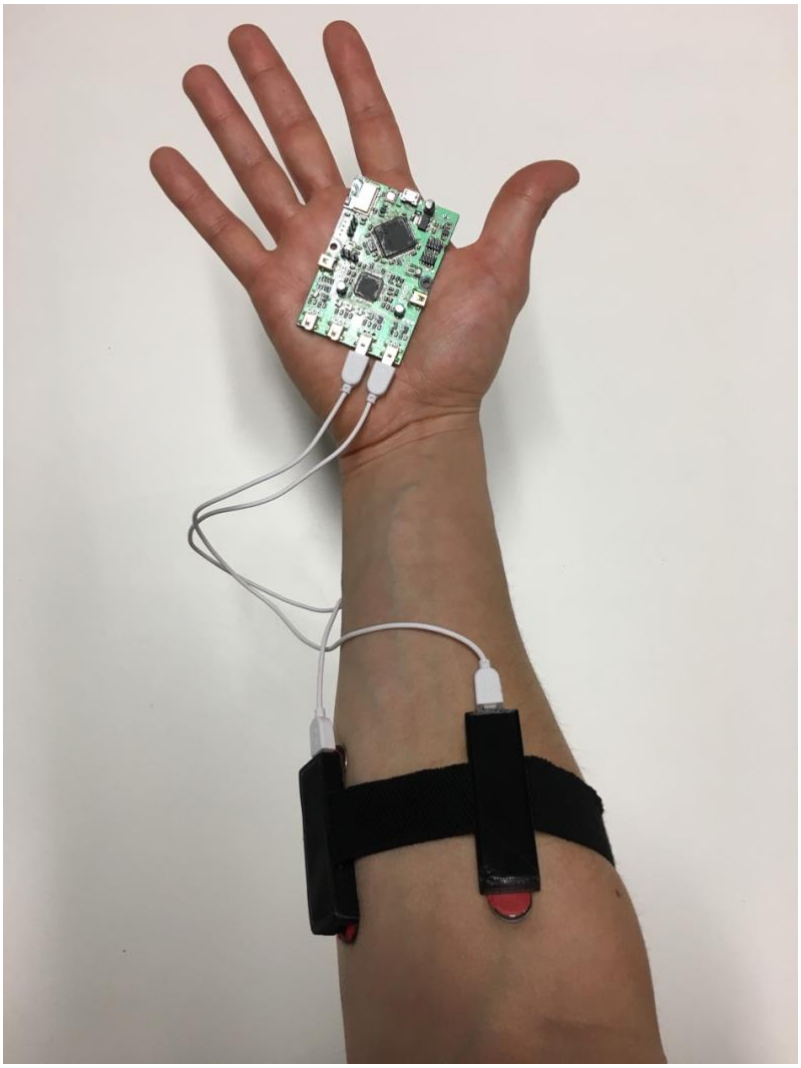

Figure 5.7.1 EAVI EMG board.
Source: Adapted from Di Donato et al. (2019).

wellbeing, through a sense of reward when looking and "holding the research between my hands". The impact that methodologies have on our wellbeing is another important issue in the life of a young researcher, which often is forgotten (Schmidt and Hansson, 2018). From my experience, the sense of reward that practice based research provides is beneficial to both the research work itself and the researchers' wellbeing. Drawing on the experience of working with musicians and dancers in performative settings, we individuated a series of musicians' needs and technical requirements for our prototype. Afterwards, we moved into the software and hardware implementation, which was realised through an iterative process where academic and industrial teams worked closely, constantly sharing ideas, designs and feedback on each other's work. The board and software were then tested through musicians' use of the board in a real-world application, composition, rehearsal and/or performance. The band Chicks on Speed[3] performed using the EAVI EMG board at Muzeum Susch (Susch, Switzerland) on 28 December 2019. Before the performance, together with Dr Federico Visi (researcher and musician on the BioMusic project), the band went through a one-day experimentation and research period. They looked at ways to use creatively the board during the performance through musical and technological exploration, and at a custom wearable solution, so that the board would become part of their performance clothing and not a functional device only.

[3] http://chicksonspeed.com/

To design head movement–sound processing interactions and sound control through shoulder and neck isometric activity, Alex Murray-Leslie placed the board (with IMU sensor) on her head by clipping it onto the hair with a hair clip, and the electrodes attached to the interested muscle groups (see Figure 5.7.2). To track the leg movements and muscle activity, Krõõt Juurak adapted the EAVI EMG board within her tights (see Figure 5.7.3). As in the previous case, this solution was found by looking at both functional and aesthetic aspects. The tights served as a band for the electrodes and the board, so to keep it in place for the whole duration of the performance. At the same time, the wiring and the web-alike disposition of the electrodes blended well with the performer's tights.

Figure 5.7.2 Alex Murray-Leslie with EMG board held in between hair.
Source: Photo credits Silke Brie 2019.

Figure 5.7.3 Krõõt Juurak with EMG board on her left leg and held by the tights. Source: Photo credits Dr Federico Visi 2019.

Through the practice of using of the prototype, we gathered that the EAVI EMG board fosters new ways of interaction with sound, and its flexibility in use permitted it to be customised and adapted to visual aspects of the performance, in which technology has a strong stage presence (see the performance's video[4]). If not through practice, it would have been very dicult to collect this knowledge. However, working with "artists creating experiences that are then deployed and studied in the 'wild' of public performance" poses several challenges, such as balancing artistic and research interests, building relationships from small ideas to bigger projects and finally ethical issues (Benford et al., 2013). Practice-based research can generate substantial research outcomes, yet it can also function as a catalyser for getting othe tangent and gathering a large volume of information that is not relevant to answering research questions. Diverse aspects that fall outside the scope of the research goals can emerge. This is incredibly valuable to highlight innovative aspects of the research, to think outside the box and to foresee future research directions. However, it might be also a counterproductive e ect on the timeline of the current research. As also highlighted earlier, time is a critical aspect for research outputs delivery. In relation to the two periods, practice in the design and prototyping process was the common denominator. The research itself, timeline, relationships with other researchers and industry partners, workflow and other aspects were very different; yet, putting theory into practice and collecting data from real-world applications was the shared

[4] https://vimeo.com/387881683

procedure between the two periods. UCD and Rapid Prototyping supported the musical, scientific and engineering practice alike. In my work, the two fi elds of Music and Computer Science blended seamlessly through practice, yet issues arose when conducting a formal evaluation of the work as a whole. Computer Science benefits from rigorous and quantitative evaluation methods that are dicult to apply in practice-based music research. This is because of the nature of the context in which practice happens. Specifically, unanswered questions were, how rigorous was the evaluation of a creative process, which is wild and prone to diverging and converging at a random pace? How objective are the data? How quantifiable are the data? Stepping into the shoes of the musician instead, different questions arise, such as: how is it possible to evaluate the artistic practice through methods that aim to quantify a hardly quantifiable process, and that leave little room for artistic exploration? What is the contribution of a rigorous evaluation to the artistic work? Is a rigorous approach to artistic practice suited to identify the contribution to knowledge? Will the artwork benefit from it? Ultimately, in my experience, in the evaluation phase of the research, the technological and scientific work served as a tool in support of the artistic practice.

From PhD candidate to research assistant: learned lessons

In the transition from a PhD candidate to a research assistant, I have experienced different challenges of my practice that have contributed to the research. This section lists the primary observations that I made during this period:

- Research practice is the common denominator in this transition. Although, with different dynamics, objectives and timeline, practice is what fuses artistic, scientific and industry research.
- Research practice gives room for realising a diverse range of research outputs: publications, performances, software and hardware. Thus, to provide the community with tangible artefacts as well as knowledge.
- Research practice can support one's wellbeing while working long hours. Practice is conducted through different methodologies and activities that can help keep engaging research daily. The diversity of activities to carry out can be very stimulating but at the same time more challenging.
- Practice is complex to deliver and evaluate because of the many variables that render the research into a continuous divergent process. It provides rich findings, but these can be hard to frame and sometimes out-of-scope to answer research questions.
- Time is a critical factor in Research practice. Time management becomes more complicated when stepping up the academic ladder. Deadlines become tighter and deliverables more complex. Publishing, teaching and delivering other activities while carrying out the PhD research is a precious experience in the transition towards a research assistant.
- Research practice relies on cross-sector collaborations. These became more and more important in the transition towards research assistant and later career stages.
- Greater responsibilities and exciting challenges bring higher expectations when becoming a research assistant. These can lead to additional pressure at the early stages of the career as a researcher and practitioner. Working under pressure, approaching responsibilities methodologically and managing expectations are essential skills to learn while a PhD candidate; and practice is a great school for this.
- Good relationships with your colleagues are fundamental to relieving some of this pressure and focus on research. It applies in different working environments, yet I feel that relationships are critical to fostering the interaction of minds, thoughts and research practices.

Conclusions

Transitioning from my doctoral studies to my post as research assistant has been a continuous process during which practice-based research has played an important role under many aspects. This chapter summarised some of the methodologies and outputs of my research practice, as well as observations made during this period. Practice-based research is an approach that definitely had a strong positive impact on my progression to a research assistant position. While it posed several challenges along the way, they were nevertheless ones that pushed the research practice forward.

Acknowledgements

The presented work was funded by the H2020-EU.1.1. – EXCELLENT SCIENCE – European Research Council (ERC) programme, Grant agreement ID: 789825. I would like to thank all contributors to the BioMusic project, Prof Atau Tanaka, Dr Michael Zbyszyński, Dr Federico Visi, Martin Klang, Geert Roks, Chicks on Speed and Muzeum Susch.

Bibliography

Benford, S. et al. (2013). Performance-Led Research in the Wild. ACM Transactions on Computer-Human Interaction , 20(3), 22, July.

Corbin, J., & Strauss, A. L. (2014). Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory . Thousand Oaks: Sage Publications, Inc, 4th ed. Correia, N., & Tanaka, A. (2017). AVUI: Designing a Toolkit for Audiovisual Interfaces . Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI'17), Association for Computing Machinery, New York, 1093–1104.

Di Donato, B., Dooley, J., & Coccioli, L. (2020). HarpCI, Empowering Performers to Control and Transform Harp Sounds in Live Performance. Contemporary Music Review , 38(6), 667–686, January 8.

Di Donato, B., Zbyszyński, M., Tanaka, A., & Klang, M. (2019). EAVI EMG Board . International Conference on New Interfaces for Musical Expression, Porto Alegre, Brazil.

Norman, D. A. (1988). The Psychology of Everyday Things . New York: Basic Books, vol. 5.

Norman, D. A., & Draper, S. (1986). User Centered System Design; New Perspectives on Human-Computer Interaction . New York: Erlbaum Associates Inc.

Orio, N., Schnell, N., & Wanderley, M. (2001). Input Devices for Musical Expression: Borrowing Tools from HCI . Proceedings of the International Conference on New Interfaces for Musical Expression, Seattle, WA, 15–18.

Schmidt, M., & Hansson, E. (2018). Doctoral Students' Well-Being: A Literature Review. International Journal of Qualitative Studies on Health and Well-Being , 13(1), August 13.

Tanaka, A., Di Donato, B., Zbyszyński, M., & Roks, G. (2019). Designing Gestures for Continuous Sonic Interaction . Proceedings of the International Conference on New Interfaces for Musical Expression (NIME), Porto Allegre, 180–185.

Tsandilas, T., Letondal, C., & Mackay, W. (2009). Musink: Composing Music Through Augmented Drawing . Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Boston, MA, 819–828.

Zbyszyński, M., Di Donato, B., Visi, F., & Tanaka, A. (2020). Gesture-Timbre Space: Multidimensional Feature Mapping Using Machine Learning & Concatenative Synthesis . Proceedings of 14th International Symposium on Computer Music Multidisciplinary Research (CMMR), Springer, Marseille, France.

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Biography

Balandino Di Donato is Lecturer in Interactive Audio at Edinburgh Napier University. He holds a PhD in designing embodied human–computer interactions in music performance from Royal Birmingham Conservatoire. He covered the roles of Lecturer in Creative Computing at University of Leicester and Research Associate at Goldsmiths. Previously, he worked at Integra Lab and at Centro Ricerche Musicali di Roma as a software developer ad artistic assistant. Alongside his academic career, Balandino is a sound artist. He realised award-winning sound art installations (Biennale of Contemporary Art and Design 2018, Biennale ArteScienza 2019) and performed in international conferences (ICMC, AudioMostly, NPAPW, etc).

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