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**Crafting the patch: Composer-performer collaboration at the interface
between experimentation and skill**

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Abstract

Drawing on my own experience in practice, this paper examines issues that performers encounter in rehearsing with a patch operated by the composer. Following the work of Emily Payne I characterise musical performance as a craft practice. From Tim Ingold's work on skilled practices I extract a number of key qualities that are essential to the performer's craft. These qualities allow me to resolve difficulties performers encounter in rehearsing with a patch. I show that, typically, the composer's approach to the patch in rehearsal does not satisfy the qualities of a skilled practice. I propose that, if we change the way we relate to the patch in rehearsal to fit a skilled practice, performers will be better enabled to practice their craft.¹

Introduction: craft and the patch

My focus in this paper is on a specific musical practice. I will address the classical, score-based tradition, in which composer and performer are separate people. A score is specified by the composer, which is interpreted by a trained performer.

When working with live electronics in this practice a patch is added to the score.² There is no common practice with respect to who makes the patch or how the patch is fitted into the music-making. The patch may be made by a computer music designer, transferred to the performer, or operated by the composer. My discussion will focus on a DIY practice of two people: a composer and a performer.³ I will address a practice in which both the score and the patch are specified by the composer at the time of composition, and the patch is primarily operated by the composer during the music-making.⁴

¹ This work is part of my PhD research project at De Montfort University, supervised by Simon Emmerson and Leigh Landy. Drawing on my own experiences as a performer, I am investigating musicianship in electroacoustic music, within a contemporary classical music practice. My primary research questions are:

- How is the performer's musicianship affected by the patch?
- What new elements of musicianship appear as a result of the patch?

In this paper, in accordance with the theme of EMS18, I focus on musicianship as craftsmanship or skill.

² I will commonly refer to the program running the live electronics on the computer as the patch, regardless of which software platform it is implemented in.

³ I differentiate between DIY practices and institutionalised practices because the conventions of an institution (such as IRCAM) affect the composer-performer collaboration.

⁴ My discussion does not pertain to improvisational practices or open scores.

In my paper I will examine issues that performers encounter when rehearsing with a patch operated by the composer. Drawing on the work of Tim Ingold, I will use a framework of craft, or skilled practice, to identify key characteristics of the performer's practice, exemplified in rehearsal (Ingold, 2011).⁵ I will show that these characteristics do not pertain to a composer's approach to the patch in rehearsal. As a result the patch interferes with the skilled nature of the performer's approach, which explains the issues that performers experience when rehearsing with a patch.

Changing the relation to the patch to one of craft or skill may improve the performer's ability to rehearse with a patch. I will argue that, generally, composed patches inhibit taking a skilled approach. Considering how to rehearse with a patch, I will discuss those features that enable the performer to develop a skilled relation to it.

The relation between the patch and skill formation is not a new topic in the study of electroacoustic music.⁶ But this relation presents particular challenges in composed electroinstrumental practices where performers do not engage directly with the inner workings of the patch. The rehearsal, which commonly functions as enskilment for performers, can provide an effective context within which to examine how skill development is helped or hindered by the patch.

Musical performance as a skilled practice

In *Walking the plank* (2011) Tim Ingold elaborates three characteristics of skilled practices, exemplified by the process of sawing a plank:

1. the processional quality of tool use
2. the coupling of perception and action
3. the synergy of practitioner, tool and material

Like sawing a plank, playing an instrument is a skilled practice: Ingold's three characteristics are hallmarks of musical performance.

First, playing an instrument is a continuous process, without *discrete* steps. Performers continually feed the sound, leading it onwards along its trajectory.⁷ The form of the music is not predetermined, but emerges through the making. Second, perception and action are intimately coupled. Highly aware of both the sounding music and the physical sensation of playing, performers constantly tune their playing to the evolving sound. The quality of the outcome depends on the continuous care and attention of the performer. Third, in expert musical performance, performer, instrument and music unite, working together in perfect synergy. Expert performers draw freely and associatively on prior experience and past practice, creatively engaging with their instrument and the musical material.

Rehearsing, as well as being part of a performer's skilled practice, is a process of enskilment. One of the rehearsal's purposes is to achieve Ingold's three characteristics. First, the rehearsal serves to give shape to the piece: to figure out the process of performing the piece through direct engagement with the musical material. Second, in rehearsal performers coordinate their perceptions and actions, seeking solutions through enactment. Third, rehearsing involves a

⁵ I follow Emily Payne's example in characterising musical performance as a craft practice (Payne, 2018).

⁶ see, for example, Green (2011)

⁷ Seemingly, playing the piano does involve discrete steps (pressing the keys). The pianist's movements however, are most definitely continuous.

process of continually reworking the musical material, searching out problems until synergy is achieved.⁸

A composer's approach to the patch – in rehearsal – is non-skilled

While to the performer the form emerges through the making, for the composer the form is pre-designed.⁹ Prior to the first rehearsal, the composer has spent many hours developing the patch, painstakingly elaborating its details. The rehearsal is to try the patch, not to shape the patch. The rehearsal becomes like an experiment, in which a preconceived idea is tested in practice. Typically, the results of the experiment are noted during the rehearsal and the patch is changed for the next rehearsal or performance. This contrasts with the skilled approach of the performer, who unfolds practical activities as ideas develop.

Designing the patch may be a skilled practice for the composer, but rehearsing with it is not. Skill is acquired through frequent, immediate and reliable feedback (provided by the direct coupling of perception and action).¹⁰ But for the composer, feedback from rehearsals is sparse, non-immediate and unreliable. Feedback comes after a considerable delay, long after having designed the patch, in sporadic rehearsals. And it is not always to be trusted, as the performer's playing, which is driving the patch, is always changing.

Performers have a skilled relation to their instrument and to the musical material they perform. But our relation to technology, or the patch, is not skilled. The composer, in the role of patch operator, is not so different from Ingold's machine operator: Ingold's three characteristics do not pertain to our interactions with the patch. First, the patch is operated in discrete steps, by pressing the spacebar. In between those steps, while the performer is continuously feeding the sound, the composer has nothing to do. Second, the patch does not link perception and action: there is no sentient correspondence between pressing a key and the sound that results. Whereas quality performance requires continuous care and attention, the outcome of the composer's actions is predetermined by the patch. Third, the patch has its own memory. It does not rely on the skill or expertise of its operator.¹¹ Rather than being guided by past practice and prior experience like the performer, the composer as patch operator executes step-by-step sequences of determinate motions, built into the patch's design.

Composer and performer have different expectations from a rehearsal with a patch. Whereas the performer expects to shape their performance in rehearsal, the composer expects to test the performance of their patch. Rehearsing is not a skilled process for the composer, and the composer's interactions with the patch in rehearsal are non-skilled. Consequently, a rehearsal in which the composer operates the patch does not function as a process of enskilment for the performer.

How can we approach the rehearsal as a skilled practice and change our relation to the patch? To enable a skilled approach, the patch needs to allow engaging with it improvisationally, to seek out problems and find solutions through enactment.¹²

⁸ According to Sennett (2008, p. 38) an "open relation between problem solving and problem finding ... builds and expands skills ...".

⁹ For the sake of argument, I generalise about the composer and the performer throughout this paper. Please forgive me.

¹⁰ Kahneman (2012) discusses the conditions that are necessary for skill to be acquired.

¹¹ It can be argued that the timing of cues does rely on the skill of the operator.

¹² Payne (2018) emphasises the improvisational nature of the performer's approach when rehearsing.

Examples and discussion

In the next part of this paper, I will exemplify the above. As I describe my experience of these issues in practice, I will use a personal voice.

I will examine an electroinstrumental work from the bass clarinet literature, with which I have performative experience. I chose *Dark Mission* by Paul Wilson as my example piece.¹³ I selected this particular piece not only for its quality, but especially for how much it benefits from a highly skilled performance.

Examining the piece, I illustrate why the performer needs, yet is frustratingly unable, to develop skill with the patch. I show that the patch inhibits taking a skilled approach. I discuss how the patch may be redesigned, implementing Ingold's three characteristics, to provide the means to rehearse for the purpose of enskilment. Then, I imagine a rehearsal that enables the performer to develop a skilled relation to the patch. Finally, I discuss how this manner of rehearsing, befitting a skilled practice, alters the collaboration between composer and performer.

Figure 1: A passage from *Dark Mission* by Paul Wilson, for bass clarinet and live electronics. Cues are indicated by boxed numbers, at which point the performer needs to press a pedal or use the spacebar to advance the patch.

Figure 1 shows a passage from *Dark Mission* by Paul Wilson, our example piece. You can listen to it online, at <https://sonicspaces.box.com/v/EMS18> [EX1].¹⁴

Even without the electronics, this piece is very challenging to play. Playing a sequence of multiphonics like this requires a high degree of skill from the performer. You need to continuously tune your playing to the multiphonics as they evolve. Highly dependent on instrument, reed, acoustics, humidity, and minute changes in embouchure and air pressure, you need to be in synergy with pretty much the whole world to play this fluently.

Faced with this considerable challenge, the performer will practice hard and come to the rehearsal well prepared. But when the composer turns the patch on, all that skill goes down the drain. The electronics distract, making it much harder to pay close attention to playing the multiphonics. Moreover, electronics tend to interfere with multiphonics: they change them. So at first instance there is a loss of skill, that needs to be regained.

¹³ Wilson, Paul, *Dark Mission* for bass clarinet and live electronics, Unpublished, 2013. Score and patch can be obtained from the composer or performer (the author).

¹⁴ Please contact the author should this link no longer be active.

The performer does not have a method for developing their skill in this context. If you have experienced ears you may be able to recognise some of what is happening when you hear the electronics. But performers are often untrained in electroacoustic music, and have no starting point for disentangling this sound world. The electronics will sound to the performer like an unidentifiable blur of sound. As such, simply repeating passages – while the patch is turned on – does not help the performer to regain their skill.

Without a way forward the performer may get frustrated. In order to salvage their skill the performer's first instinct may be to dissociate from the electronics.

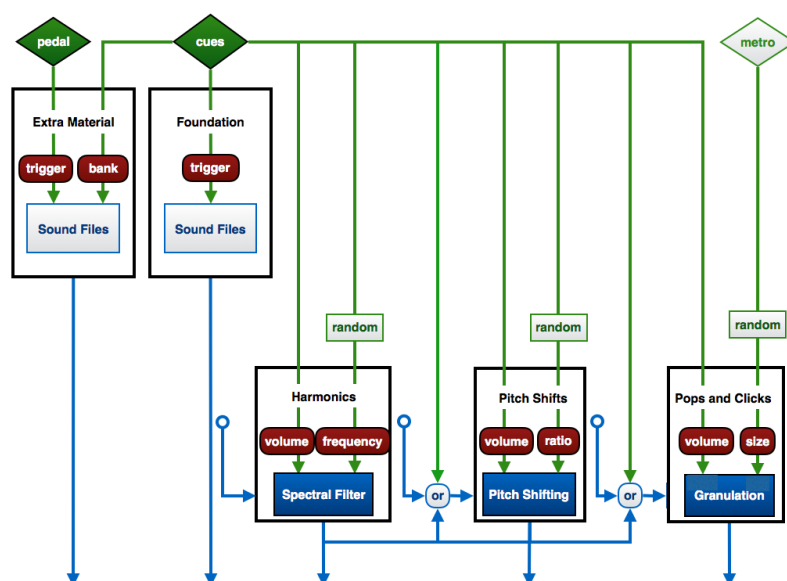


Figure 2: A flow diagram for the patch of *Dark Mission* by Paul Wilson. Audio is shown in blue: blue, filled boxes process audio; blue, non-filled boxes generate audio; and blue lines indicate audio streams. Circular arrow beginnings indicate microphone input and open-ended arrows indicate outputs to the PA. Data is shown in green: green diamonds indicate (external or internal) data input; green boxes process or generate data; and green lines indicate data streams. Rounded boxes indicate compositional parameters, automated from the timeline. The five main sonic layers are indicated by large rectangles and descriptive terms (foundation, harmonics, pops and clicks, etc.).

Having seen the score and the level of skill it requires, let's take a look at the patch. A flow diagram of the patch is shown in Figure 2.

There are three layers of live processing: filtering, pitch shifting and granulation. And there are two layers of fixed electronics: predetermined sound files play at each cue, and extra sound files can be triggered at any time. Cues are used to develop the electronics over time. Cues change the volume, routing and parameters of the processing. Additionally, each cue plays a different sound file. Furthermore, cues select the bank from which sound files can be triggered at will.

Throughout 50 cues the performer is confronted with changes in processing and sound material. In rehearsal, the performer will have to get accustomed to playing within these constantly shifting grounds.

Problematically, the grounds do not only shift from cue to cue. They change when you repeat a cue, presenting you with a key obstacle in developing skill with this patch. This results from

the patch picking some of its settings randomly. The filter has 14 different presets stored, and a random preset is chosen at each cue. If you repeat a cue the patch picks a different preset. Likewise, pitch shifting ratios and grain sizes are set with a degree of randomisation at each cue (or at metronomically scheduled time points). Thus, you never practice the same thing twice.

Like the acoustic part, the electroacoustic part requires a high degree of skill from the performer. Because of the constant and randomised changes in the patch you need to pay close attention as you play, and continuously tune your playing to the patch as it evolves. This highly virtuosic nature, the sense of walking a tight rope, is one of the things that makes this piece great. Unfortunately, we have no method to acquire that level of virtuosity.

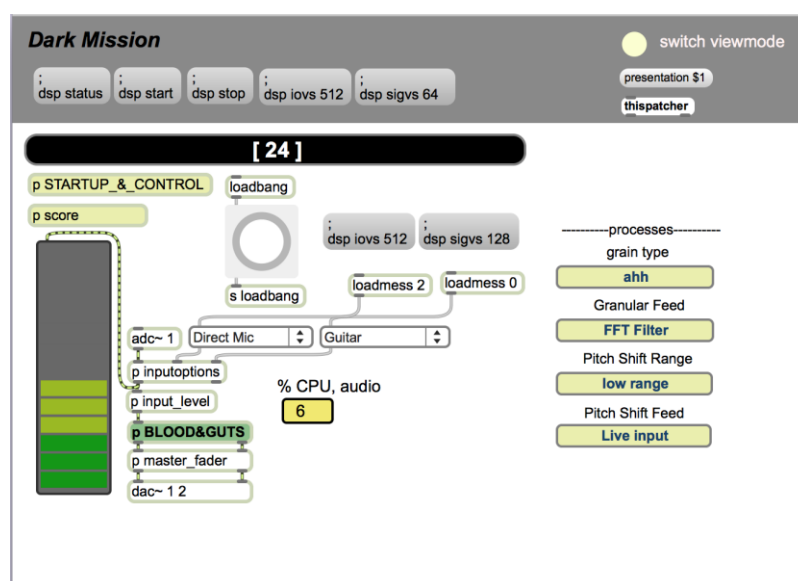


Figure 3: Original top-level patch GUI for *Dark Mission* by Paul Wilson, as it first emerged out of the compositional process.¹⁵ The top-level GUI's prime function is to monitor DSP settings (vector sizes, CPU usage, etc.), which cue is active and, correspondingly, what parameters and routings are used for the processing. One level lower in the patch hierarchy provides monitoring of the score fragment corresponding to the currently active cue, monitoring and revision of the levels of the different sonic layers, and access to the 'blood and guts' of the patch (the implementation of the individual effects). The lowest level of the patch hierarchy contains the programming of cues. This organisation of patch components does facilitate the compositional process. It does not, however, invite a skilled approach to the patch.

The patch itself, as it emerged out of the compositional process (shown in Figure 3), is not designed to facilitate enskilment. It does not provide access to the changes that happen at each cue. It does not rely on or encourage any kind of skill from its user. All you need to do to operate the patch is press the spacebar and everything will happen by itself. The levels move and settings change at every cue without the patch even telling you so.

¹⁵ Before jumping to conclusions about this (or any) patch, consider that patches are a part of the practice in which they were made. The composer shared this patch with me at a very early stage, before he had had a chance to polish it. The patch was then streamlined collaboratively to turn it into a performance patch, well before I optimised it to fit my individual practice, the outcome of which is shown in Figure 4.

In rehearsal, while the performer is playing a challenging bass clarinet part, the composer presses the spacebar. In between the composer has nothing to do, except to look at the score. The composer is checking the patch and checking the performer's playing. He is not exploring nor shaping the patch. If the composer is unhappy with something in the patch, he will note it down and change it for next time. If he is unhappy with the performer's playing, he will ask the performer to play differently.

Meanwhile no enskilment takes place for the performer. The performer is instructed to play their part differently without understanding how that relates to the electronics. This encourages the performer to focus on their part and disengage from the electronics.

How can we redesign the patch such that enskilment can take place? Turning back to Tim Ingold, we know that:

1. You want to be able to shape motions within the patch by continuous control, instead of by stepping through an automated timeline.
2. To link your perception to actions within the patch you want to be able to isolate different actions and effect them manually.
3. You don't want the patch to be set in stone. You want to be able to explore the patch in rehearsal to achieve synergy.

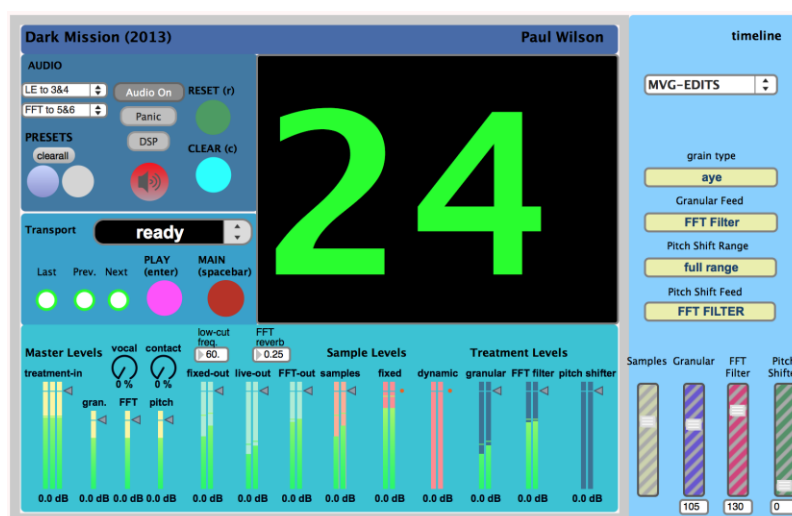


Figure 4: Revised top-level patch GUI for *Dark Mission* by Paul Wilson, designed to facilitate a skilled approach. The main panel, on the left, contains standard GUI components of a performance patch: a large cue display; main controls (audio settings, routing, reset, etc.) at the top left; navigational controls (next cue, previous cue, etc.) below that; and level control (microphone input levels, interface output levels, and individual processing levels) at the bottom. The smaller panel, on the right, provides feedback on and interaction with the timeline: parameters and routings are in the middle, and levels are at the bottom; at the top right you can select or bypass the timeline. Additional GUIs for individual processes and their parameters are contained within a lower level of the patch hierarchy (not shown).

Figure 4 shows a redesigned version of the patch, implementing Ingold's three characteristics. Working with composers, I always say that a patch needs to show the performer what is happening. But in this patch, designed to enable a skilled approach, you don't just see what is

happening; you can make it happen yourself. At the top right of the patch you can stop the timeline, bypassing the cues. Having done that, the top level of the patch gives you direct, manual access to all parameters that are automated from the timeline. You can change levels of the different processes with the sliders at the bottom right of the patch. You can change routings and parameters that are normally set at each cue. If you go a level deeper into the patch, you can stop the random generators, and select different settings that are used for the effects by hand. To explore the patch further, you can adjust additional parameters, not automated from the timeline.

This allows you to take a skilled approach to the patch. You can connect controllers and bypass the cues. Doing so you can couple actions and perceptions. To achieve further synergy you can delve into the patch.

With this patch the rehearsal can start functioning as a process of enskilment for the performer. The patch facilitates repeated practice without the electronics changing on every repetition. It lets you figure out the effect of parameter changes that are automated from the timeline by bypassing that timeline.

Instead of the performer being confronted with a blur of electronics, we can now break the electronics down layer by layer. Doing so the performer can develop a skilled relation to the electronics. Figure 5 shows an annotated version of our score fragment. Sound examples (indicated in the text with [EX#]) can be accessed at <https://sonicspaces.box.com/v/EMS18>.

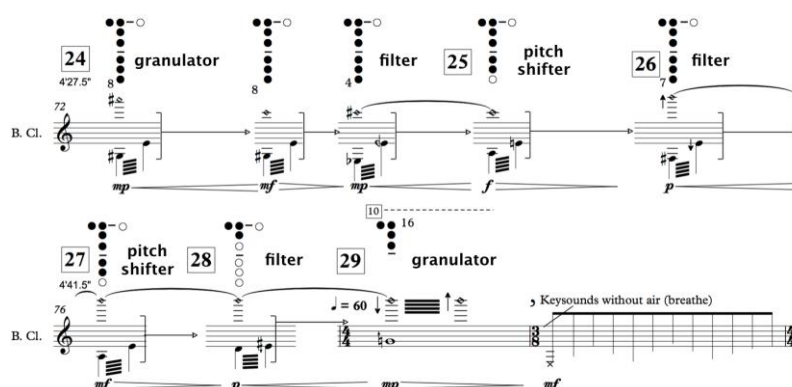


Figure 5: The same passage from *Dark Mission* by Paul Wilson as shown in **Figure 1**, annotated by the most prominent processes at each cue to facilitate listening to the sound examples.

We start with just the fixed layer of electronics, so that the performer can achieve some comfort in their playing of this very difficult passage. The fixed layer never changes and provides the performer with something they can rely on. It can give the performer a starting point, a basic skill level, counteracting the blanket disruption of skill that happened before. Structurally, the performer and the fixed layer make the harmonic changes of this phrase together. [EX2]

Next we can add the pitch shifter. By isolating and playing around with this process the performer can discover how the pitch shifter responds to the different pitches of the multiphonics. You can change the sound of the pitch shifter by changing the balance within your multiphonics. (Concomitantly, you can balance your notes with the pitch shifted notes to

create better resonance or a thicker sounding texture.) The pitch shifter also has a structural role: It comes in at cue 25 and is most prominent at cue 27. [EX3]

Adding the granulator the performer learns that it responds best to key and airy sounds. Although not indicated in the score, the performer can make the sound of the multiphonics more or less breathy and emphasise key noises to shape the sound of the granulation layer. Like the pitch shifter, the granulator adds a structural dimension: It is most prominent at the beginning and end of the passage, and drops in level at cues 26 and 27. Direct granulation (not routed through other effects), used at cue 29, combines well with the key clicks at the end of the passage. [EX4]

Finally, we add the filter. If set at the right level the filter can open up the sound. Because it interacts with the resonance of the multiphonics, the performer may need a lot of time to get comfortable with this layer. Structurally, the filter crescendos while the bass clarinet part crescendos: towards cue 25, cue 27, and cue 29. Feedback can easily build up if the performer lingers before these cues and sits on the filter's resonances. [EX5]

To complete the example, there is one last layer to add. You can trigger extra soundfiles to liven up the texture. I chose to do so after cue 25 and at cue 28. [EX6]

By isolating these processes and building up the passage one layer at a time the performer not only gets a chance for developing skill and engaging with the electronics, but the performer and composer also build up a joint understanding of the passage.

By rehearsing composer and performer can solve problems collaboratively. If the filter explodes the answer does not have to be to simply turn the volume down. Instead composer and performer can coordinate whether the performer did not take care while making a crescendo, the level of the filter is set too high, or the filter level increases too quickly.

If the composer is not happy with the arrival of the pitch shifter at cue 27, he does not have to resort to taking note of it and changing it for the next rehearsal. Instead he can work it out with the performer. The performer may be able to adjust their phrasing and focus their sound to increase the presence of the pitch shifter. Alternatively, the pitch shifter may need to be adjusted in the patch.

By coordinating how the acoustic part and electroacoustic part work together to shape the phrase, composer and performer nuance both patch and performance in rehearsal.

Conclusions

Typically, a patch, once it reaches rehearsal, is a fixed entity. It is not designed to be explored in rehearsal. By redesigning the patch to allow engaging with it improvisationally, the rehearsal can start functioning as enskilment. Taking a skilled approach to the patch in rehearsal can increase the performer's engagement with the patch, while deepening the composer's understanding of the patch's performance in practice. It can re-establish the shared space between composer and performer to include not just the score but also the patch. Furthermore, by shaping the piece in rehearsal, the patch may be crafted, incorporating both the performer's and the composer's voice.

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