

Memory, flux, wayfinding (in future electroacoustic music studies)

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Abstract

Studying electroacoustic music in all its many forms forced us to re-examine all previous notions of ‘music analysis’. Ours rapidly became a multidiscipline. The absence of the traditional ‘score’ prompted borrowing from non-western music and acoustics new forms of transcription, and a range of integrated audio-visual tools has developed. But tensions have emerged, summarised in a pair of phrases I shall critique: ‘in time’ and ‘outside time’ information. The nature of memory has been progressively changing over the centuries. We have only just begun to harness our abilities (less than 150 years old) to ‘hold time’ (not hold it back) in audio and video recording. We appear to be able to do externally the same ‘hop, skip and jump’ that we do in head-space memory. I shall suggest we can build better schemas to perceive these relationships. My holding metaphor is as old as reflection itself – the flow of the river (from Heraclitus to Wittgenstein), with care to allow the riverbed and banks their full role. To what end? I shall suggest a shift from ‘mapping’ to ‘wayfinding’ (after Ingold), from hovering above an abstraction to experiencing the flux from within. In our subject field it makes more sense to ‘study the music’ through experiencing it.

1. Metaphors we live by

Ancient Greek *μεταφορά* (carry across or with):

A figure of speech in which a name or descriptive word or phrase is transferred to an object or action different from, but analogous to, that to which it is literally applicable; an instance of this, a metaphorical expression. (OED online)

This definition does not tell us anything about their active use. Scientists use them all the time under the term ‘models’. They build models of anything from atomic to cosmic structure. Of course in the creative fields their use is in the essence of poetry and music, all the arts of sound and imagination. Metaphors are the stuff of interpreting the world, making sense of it.

We need to be aware that metaphors we use to help us explain the world profoundly influence – even limit – what it is we *can* understand. Metaphors *contain* – as in constrain, keep within bounds – the language we use to describe and explain the world. As in a bottle contains water – it both has some inside and it stops it from flowing away at random. They might also, as I shall try to show, influence profoundly our *point of view* – not opinion, but viewpoint, perspective, sightline, vista.

I want to contrast, to bring together two such metaphors to see if they might help us understand better the subject that we wish to address – electroacoustic music studies. I shall

do this by applying them within a third entity – an analytical *structure* which while taken over from semiotic theory is, I believe, more widely applicable.

2. Flux, flow, the river – Heraclitus and Wittgenstein

Our first metaphor: the river has irrigated our practical, spiritual and psychological lives since the myths of creation. The river combines the amniosis of the ocean with (potentially) an onward and forward rush of energy and excitement – or perhaps on the contrary a concerted struggle to go upstream. I shall try to bring into a relationship a cluster of such ideas of the river: looking at Heraclitus on the one hand – much and often wrongly cited – with Ludwig Wittgenstein who brings us back to a grounded view of language as used (he called it a game) on the other. It turns out that the important difference between Heraclitus and Wittgenstein lies in their view of the relationship of the banks, the riverbed and of the flowing water and the degree of these being fixed or changing. I shall return to that.

Heraclitus's work exists only in fragmentary form and through the quotations of others. His key aphorism for us today has been much misquoted – I shall not (I hope) follow suit. Scholarly sources list up to three aphorisms¹ – the one which is clearly the origin of the later garbled misquotations might best be given –

For, according to Heraclitus, it is not possible to step twice into the same river ...
(Diels–Kranz² B91 tr. Robinson 1987)

This citation is clearly written by someone else (though in the same era) *ascribing* the remark to him. But it has stuck. And it is the version addressed by Ludwig Wittgenstein in the mid-20th century –

The man who said one cannot step into the same river twice was wrong;
one *can* step into the same river twice. (Wittgenstein 2012, p. 304)

Imagine the real Heraclitus saying ‘tomorrow I shall step into the river Kaystros’ – this statement does not cease to have meaning when spoken again after that event. The statement is a play in a language game that only has meaning within its context. Commentators suggest that Wittgenstein placed Heraclitus assertion in the category of a rule statement rather than a language game statement of what is actually – or can be – the case.

There is however a much more nuanced version of the quotation that makes a different point –

On those who enter the same rivers, ever different waters flow.
(Diels–Kranz B12 tr. Barnes 1987)

This articulates the (Ancient Greek) philosophy of the ‘unity of opposites’ – held together by the *logos*. Something is the same (the river), something is different (its flowing water). That

¹ Heraclitus is also given disputed credit for the phrase *panta rhei* (πάντα ῥεῖ – ‘everything flows’) – a perpetual state of flux or becoming. This second citation is (as we shall see) incomplete in a philosophical sense but very poetic.

² Diels–Kranz (DK) numbering is the standard recognised system for referencing the works of the ancient Greek pre-Socratic philosophers, created and revised over the first half of the 20th Century by Hermann Alexander Diels and Walther Kranz.

which holds things together – are the banks and riverbed. These for Heraclitus form the *unchanging* logos – a rational structure giving us the sense for ‘logical’ discourse.

But not for Wittgenstein –

97. The mythology may change back into a state of flux, the river-bed of thoughts may shift. But I distinguish between the movement of the waters on the river-bed and the shift of the bed itself; though there is not a sharp division of the one from the other. [...]

99. And the bank of that river consists partly of hard rock, subject to no alteration or only to an imperceptible one, partly of sand, which now in one place now in another gets washed away, or deposited. [Wittgenstein 1969, no.s 97, 99]

There are two ‘real times’ at work in Wittgenstein’s image: the time of the flow of the river and the time of the erosion or depositing of the banks and river-bed. My job here is not to reconcile these philosophers – I think both add something to our present discussion.

3. Wayfinding

I turn now to Tim Ingold’s ideas about *wayfinding*, navigation and mapping, to see how these might help us as well. For Ingold wayfinding is in a sense a practical description of *what really happens* – not a metaphor at all. But my interpretation will apply the idea within musical flow – moving its meaning (only slightly) towards imaginative journeys of experience.

I argue that while dwelling in the world entails movement, this movement is not between locations in space but between places in a network of coming and going that I call a region. To know one’s whereabouts is thus to be able to connect one’s latest movements to the narratives of journeys previously made, by oneself and others. In wayfinding, people do not traverse the surface of a world whose layout is fixed in advance – as represented on the cartographic map. Rather, they ‘feel their way’ *through* a world that is itself in motion, continually coming into being through the combined action of human and non-human agencies. [Ingold 2000, p.155]

It seems to me that wayfinding is constructed from a viewpoint within the experience where mapping is constructed from above. “To use a map is to navigate by means of it: that is, to plot a course from one *location* to another in *space*.” (p.219) So a move to wayfinding takes us from a more architectural structural viewpoint towards one of an organic, environmental and ecological journey. Ingold makes distinctions rather than value judgements here – both map navigation and wayfinding may be required and have their uses. And a kind of translation between the two is possible if we learn the map’s detailed code.

These two metaphor groups I believe hold a clue as to how we might think of our subject. I turn now to an encounter with the music.

4. Can there be an objective description of 'the work'?

We shall start with an examination of an ideal which makes a valuable contribution to this discussion. The work of musicologist and semiotician Jean-Jacques Nattiez is largely based on the 'tripartition' of musical discourse (adapted from the work of his teacher Jean Molino).

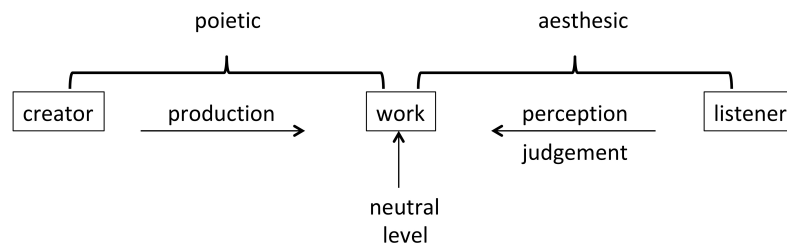


Figure 1 The tripartition (after Nattiez (1975, p.52))

First a summary (see Figure 1 after Nattiez (1975, p.52)³): the tripartition designated the 'neutral level' ('niveau neutre'), an existential entity (the 'music itself') addressed from one 'pole' (direction) by its creation (poiesis) and from the other by its reception (aesthesis). The poietic pole is constituted of all the compositional and creative inputs, while the aesthetic pole includes the effect on the receiver (including interpretation ('meaning') of the music).

It is important to add that both poles can include contextual and social dimensions, examined through an interdisciplinary network of tools. As we said these two both address the 'neutral level'. For Nattiez this was essential – to ground a semiotic analysis there needed to be an agreed object of study – sometimes described as the *trace of the sign*. Ideally this was seen as somehow free of either pole. This also tended in practice to be interpreted as a kind of score – with some ambiguity as to whether this was prescriptive (used as the basis for performance) or descriptive (a from-performance transcription). Nattiez's work comes (at least in part) from an 'ethnomusicology' tradition, using for example Inuit vocal games (*katajjaq*) in one analysis, based on detailed transcriptions of recordings (Nattiez 1983), as well as parallel work on Wagner's *Tristan* and Varese's *Density 21.5* (based on the traditional performance scores) (Nattiez 1982, 1990). Both the poietic and aesthetic *processes* point towards (address) the neutral level.

I will focus on a brief but intense debate between Jean-Jacques Nattiez and François Delalande, a French musicologist specialising in electroacoustic music. In 1986 Delalande published an article 'En l'absence de partition : le cas singulier de l'analyse de la musique électroacoustique' (Delalande 1986) in which he cites and summarises Nattiez's own split of the idea of the neutral level into three 'meanings': neutral in the object (the work), the neutral as a method, and neutral as a reference (to which the poietic and aesthetic are pointed and hence anchored). Delalande however observed that we can *only* create a transcription through perceptual information from a listening that is inevitably part of an aesthetic process. And I observe in addition that clearly if a transcription were to be created from the composer's recorded actions that too would retain its poietic marks. Furthermore the final fall back position that the 'scientific' representation of the acoustic signal represents the 'work in itself'

³ The English translation (Nattiez 1990) simplifies this diagram and replaces 'neutral level' with 'trace' – though the original term is much used throughout the text.

becomes problematic *the moment it needs to be examined* – that is as soon as we need to break it up into operational units (as with the individual phonemes of spoken language, for example) which are not objectively given⁴.

In all these cases there is choice and interpretation – depending on the need at hand. Examined from the poietic side there is one set of operational units, processes, interactions – and from the receiver's (aesthetic) point of view quite another. So Delalande concludes his article with a section headed very directly: 'With electroacoustic music, neutral analysis is impossible' (1986, p.57). Thus transcription itself cannot be 'neutral' or 'objective' – even machine transcription. Yet in concluding 'there is no neutral (level) analysis' we have not abolished all concept of 'the work', and certainly not at all that of the flux of the performance – this will not let us off the hook. My intention will not be to resurrect the neutral level – far from it. But how can we grasp this 'thing' that flows through our fingers as we try to hold it so we can examine it? Our desire to 'fix' time somehow – we glimpse the live flux fleetingly as it moves rapidly on to be stored away and age in our memory. How do we grasp the ineffable? The recording itself might be a start – it *seems* to capture the in-time to store outside time.

5. From Metaphor to Model

Let us build a model that might help shift our perspective (see Figure 2).

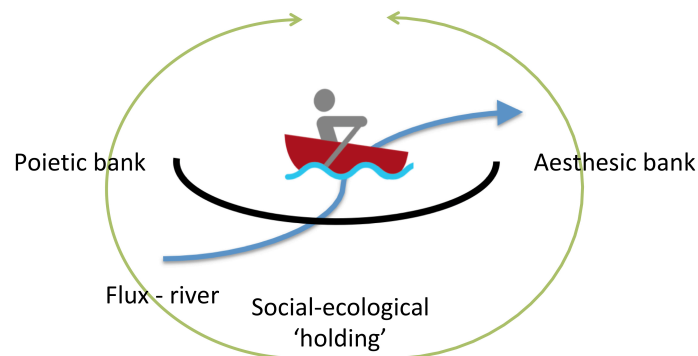


Figure 2 The basic model

This is built from four elements –

1. The performance flows – the flux, the river
2. The river is contained – within its banks and riverbed
3. Someone experiences it and seeks to find their way in and through it – the wayfaring boat
4. The whole is further contained in a social and ecological 'holding'

On one bank the performance is imagined, planned and created – no assumption is made that this is an individual activity – all representations of an individual could more likely be a networked 'crowd' of creative forces including social, institutional, environmental and ecological.

⁴ While this may be given to us already in the western score tradition – it is not in our electroacoustic world.

On the other bank it is received and maybe reflected upon over time – strictly reading the model the people in the boats inhabit this bank – but let us not be too procedural. In either case the experience comes from immersion in the river – I reiterate this is the experience time of performance – we shall return to more distant (bank-side) observation perspectives in our further discussion.

I acknowledge that a swimmer might have been a more accurate metaphor for experience of the river's flow – but somehow that didn't quite feel right. Ingold sometimes uses the term 'navigate' so I drew a boat. I interpret only a solo navigator here – the boat is not (yet!) for multiple occupancy. The shell of the boat is our embodied perception system – while for many musicians the ear may claim some precedence, I intend an embodied inevitably integrated whole. There may be a live musician component and/or a site-sensitive soundworld – let alone the sense of the totality of the social and eco-system enveloping the performance.



Figure 3 A group experience

There may be a crowd of us – perhaps pulling in many directions – perhaps linked, sharing or networked together somehow (Figure 3). The river could be an internet mediated flow – effectively projecting separate rivers into a singular space. Time absolute may then be ambiguous – there is no meaningful central clock to an internet performance. Different locations may have different time-slipped components. That discussion is for another day.

6. In- and outside-time – nothing is 'outside time'

Of course nothing is *really* outside time. A written word appears to be outside time – but as soon as it is read it is in time. Reading takes time. So too with a map – or a music score. These devices can only be used in time – and this takes time. That said 'in-time' and 'outside-time' is a useful pair of terms in music. I came to them through the writings of Iannis Xenakis but this distinction has been made in other words by many other composers and writers – especially in the modern period.

The systems, tools – and most importantly the unordered materials, sketches etc. – are deemed somehow *outside time's flow* – more accurately we might acknowledge they remain outside *performance* time. But of course we still inhabit a world of time as we painstakingly assemble the music. Such distinctions break down – or are at least undermined – in the electroacoustic world. The tools, processes and materials we use are often already imbued with time *a priori* – especially if we use recordings – of course these may be perhaps fragmentary, as if we worked in a kind of mosaic manner gluing bits of time together. Come to think that's exactly what we did with tape. In some of my diagrams in this paper I retain this distinction to tally with the writings of others but I declare it is under scrutiny.

Xenakis's belief in the 'outside-time' is a ghost of Platonic idealism. The traditional western music score sometimes also appears to gain this special status; it allows – even encourages – the abstraction of (say) a Beethoven symphony to something somehow existing in an eternal timelessness, separate from all its performances. But not only after the event – this seems to remain deep in a certain perhaps ancient view of the creative imagination. Anton Webern in his 'Path to the New Music' confirms that he, Alban Berg and Arnold Schoenberg (the so-called Second Vienna School) worked from 'an intuitive vision of the work as a whole' which came in a flash of inspiration, to the details (Webern 1963, p.54 (orig. 1932)) – thus a holistic view created in an instant, outside of performance time. I will leave further discussion of this philosophy for another day. But we need to turn to its consequences in our field.

7. Approaching the bank and into the flow – the creative imagination

Let me argue through the metaphor that the further from the bank, the further we are from the experience of the time of performance. On the poietic bank the distant view may imagine a river not yet in place across the landscape, its routing only vaguely foreseen. Over creative compositional time we approach and the river's potential elements come steadily into focus as the time of performance nears⁵. As we touch the flux we are there *at this moment of performance time as the river becomes real experience*. We must be careful with the metaphor here: you cannot make one bank of a river. Even working on your own in a studio you remain the first listener. So you have a kind of double, a mirror opposite you on the other bank (a *Doppelgänger* – an imaginary other). You may try to imagine reception of what you do – even to the entire structure of any such act of creation. You remain the hypothetical first performer, too⁶.

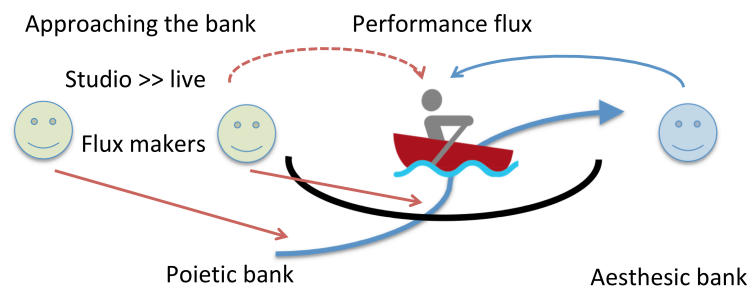


Figure 4 Towards the bank and into the flow

See Figure 4. In those traditions that work with improvisation, live or interactive electronics that relationship may work somewhat differently. There is a sense in which the poietics remains on the one hand more apart from performance time – a poietics of options, choices, strategies – based on a history of experience. This combines on the other hand with an almost

⁵ To experience the composer's options is one immensely powerful tool to come out of the TaCEM project (Clarke, Dufeu and Manning 2020, 2021 (these Proceedings)). Using 'interactive aural analysis' the user can 'play' with many of the technical possibilities (organisation, transformations etc.) originally available to the composer, hopefully leading to a greater understanding based on experience of the sound.

⁶ This extends to those studio traditions that consider concert diffusion to be the true completion of the work – and hence 'imagine out' the work to a potential performance space.

real-time poietics – the possibilities for different actions, flow patterns and forms, only placed into performance time in response to immediate surroundings on either bank⁷.

When the time of performance is over we may observe the same changing layers of time-scale as we move away from the river on its aesthetic bank. There emerges a world of reflection where we can scan our memories – attempting ‘to shift the trace of the performance’. Yet again we are confronted with somehow ‘fixing’ those memories before they fade. We may want to capture and represent a range of information from the memory of the performance: from the sound itself, through to its effects on us – what we *felt*⁸.

8. Offloading memory – evocation, recall, replay – time compression

The offloading of human memory to external support started with writing, continued with mapping and has accelerated in recent centuries. Photography added image of people and place, sound recording and film added the dimension of time capture. External memory crucially allows repetition. Clearing the need for extensive memorisation of information, words, people, routes to places, images, sounds and music left space for other creative mental activities. But internal embodied and external supported memory are inexorably glued together in a dynamic and symbiotic relationship. We shall now explore an important consequence of that.

I want to get back to grounding our use of scores (and other transcriptions) in experience – potentially enhancing that experience. Let us return briefly to the world of around 50-60 years ago when the attempt to capture the unwritten (and unwritable) experience of electroacoustic sound was relatively new. A substantial number of descriptive graphic scores from a range of genre practices are best described as ‘evocative transcriptions’ of electroacoustic music. The performance-diffusion scores from the French tradition were relatively straightforward examples only needing to show salient features to be brought out in performance on loudspeaker systems⁹.

For an analysis (whatever we mean by that) we require more than merely salient features for performance and need to define salient features that function within the analysis questions (Emmerson & Landy 2016). Also, for practical analytical purposes, we may need to glance at two sections of a work or a performance which are some minutes of performance time apart and ‘see’ their similarity, contrast, transformation, relationship. Clearly we could always have done this in the western score tradition so this has an element of ‘catching up’ with that tradition.

But what is ‘glancing at’ or seeing such representations? What does it do? In the western score tradition some trained musicians have the ability to ‘think’ the music from reading the score – they are not necessarily recalling a past performance but synthesising a new one! In our field it’s a bit more complex. This ‘seeing and imagining’ can only be minimally true for the reader of electroacoustic music evocative scores who has not heard the work before. An

⁷ The closer we move towards the flow of the moment the more we prepare and respond to our embodied relationship to those on the opposite bank (preparing to clamber into the boats).

⁸ This last is the subject of the chapter ‘Feeling Sound’ (Emmerson 2018) – I believe we need more accounts of what the music actually *does* as much as what it *is*.

⁹ The ‘reading/listening score’ (*Mitlesepartitur*, *Hörpartitur*) of those years required more detail, but even so only showed a small proportion of what might be demanded for Nattiez’s neutral level ‘trace’.

evocative transcription is a function of *memory* – it only really works via *recall*. Here we recall and compare two separated memories of the previously heard. That's why I used the term 'glance' above. The glance triggers a memory *gestalt* – some kind of time-shape structure. I insist there is a spectromorphological component of this process.

I want to move forward the discussion of timelessness into the more flexible notion of *time compression* (or expansion) – and the key link for this is memory and the way we can recall past musical (or sound) experiences. 'Recall' has two shades of meaning here: first – retrieve a memory and bring to focused attention, as well as secondly the 'play through' of the memory itself. I might recall the fact I took a walk in the park yesterday. But then I might recall the details of that walk step by step as I took in the changing soundscape – a soundwalk. But we might call on an immensely powerful tool of the imagination at this point. Our recall may not be – need not be – the 'real time' of the original world event. It does not usually take 5 seconds to recall a 5 second moment, nor 40 minutes to recall even a quite detailed soundwalk of that clock time. There is a paradox here – perhaps the longer the recalled event the faster this recall can happen – that is I can recall a 20 minute piece in an instant – or more accurately 'a very short time'. Especially if prompted by an image. This is the ability to recall in what I want to call *compressed time*. This is available to everyone – it is an evolutionary imperative – we need it.

I wrote earlier of the progressive off-loading of memory onto external devices. *This process continues!* If our smart memory is now cloud stored and available 'from any device, anywhere' we do not yet know the effect this will have on the memory we carry around inside our heads. It may be that our perfect evocative transcription *may work differently for my generation than for its successors*. Evocation as I have just described it only really works with a good human memory. But this is changing: maybe a device can scan my eye movement and scrub a soundfile, pick out a fragment or gesture. In short this is no longer evocation (based on recall from internal memory) but replay (of externally supported memory).

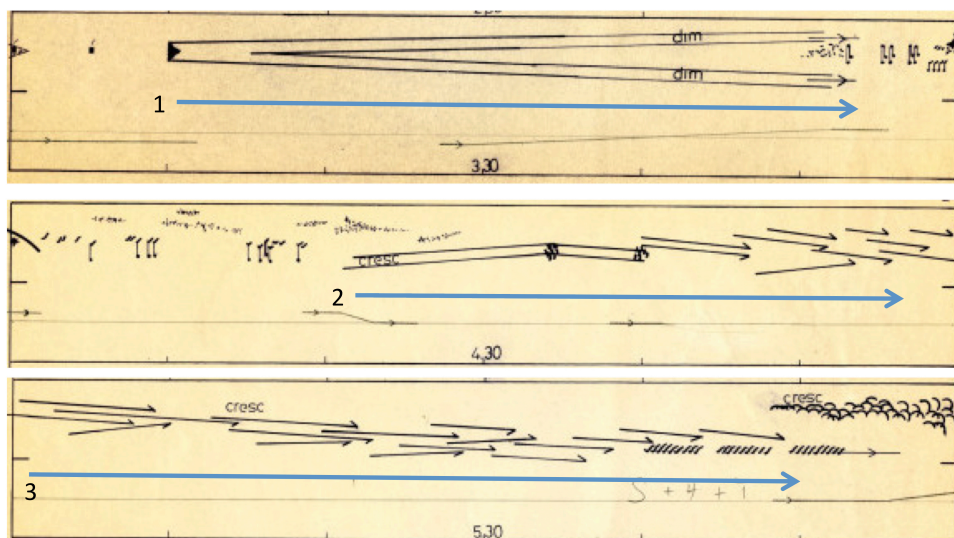


Figure 5 Three slopes from Denis Smalley's *Pentes* (1974) (extract from the composer's original diffusion score)

Let me take as an example the three extended ‘slopes’ in the first part of Denis Smalley’s work *Pentes* (see Figure 5). Perhaps I could think these through (that is imagine the sound) without any evocative transcription at all – I know the piece so well. But maybe not so accurately without this written graphic prompt – so it helps! It has a mnemonic function as we have said – rather like the earliest graphic notations of western music. But let me move this example outboard to external memory. I can with increasing ease simply remind myself of these three core slope profiles of the piece by simply playing them back ‘for real’ – even possibly using a voice-activated or eye-track activated instruction, through a retrieval application. That has until recently meant 10 seconds of sound is recalled in 10 seconds of play – compared with the greater flexibility of our internal memory. However I can now simply play these examples at (say) 8x speed without change in pitch/frequency. This is a start but surely more is to come¹⁰. The challenge is for the development of apps modeled on our cognitive functions – including shape and time compression – but which can operate on externalized memory devices. The technology will need to adapt to the power of our imagination. I hope that enhances, not replaces it.

9. Changing the drone perspective

Our point of view is our point of perception and experience. Perhaps the drone is one of us – one who studies electroacoustic music.

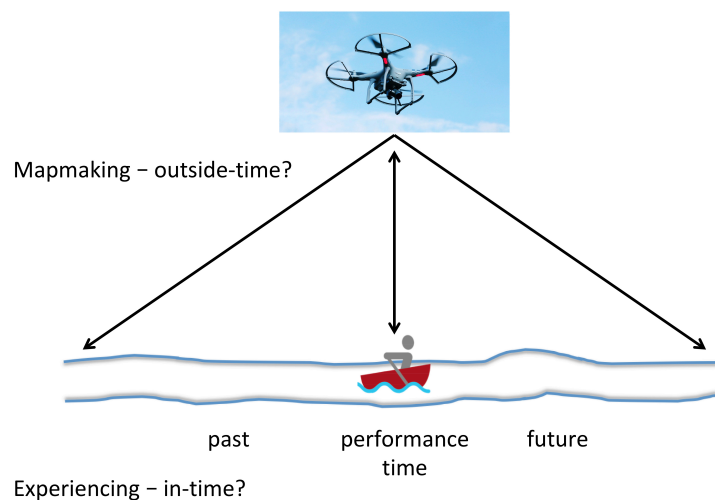


Figure 6 Mapping from the drone perspective

Modern mapping has a drone perspective (Figure 6). The abstraction of our music has focused on mapping – I mean that in the broadest literal sense – the making of a cartographic map, scaled into orthogonal Newtonian units of frequency and time – and if we are lucky, space. While useful for some specific tasks these are removed from perception, experience and *felt* time and space – or should that be place. I might have called this discussion ‘coming down from the drone perspective’. Thus I want to negotiate a soft landing or at least a more engaged

¹⁰ There are other similar processes. As we scan our score to and fro with our eyes, this is a form of scrubbing the sound. I wonder if I could train myself to imagine it backwards?

low level hover over (near) the experience of the boats – at least to ensure the drone view serves to a greater extent the experiential perspective (Figure 7).

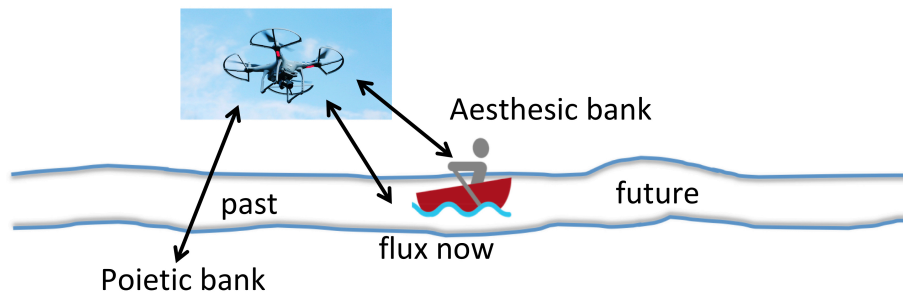


Figure 7 Hovering down to nearer the flow

Our drone can observe both banks as well as the flow. The ideal listener at a performance experiences from within the flow – not from a drone flying above. The drone inevitably maintains *some* distance from the experience. Of course we *can* switch on or off this kind of ‘mapped’ listening, especially of music we know well. The surrender to the moment of the flux can be suspended (at least in part). This is especially true for ‘academic’ listening or critical comparative analytical listening when our drone view moves to greater distance. Conversely switching the inner critic/analyst off brings us back down closer to river level and embodied experience.

The water runs through our fingers but we somehow try to grasp that flux in the formation of memory. We *view* it (with Delalande) from one bank or the other – or *experience* it from within the flow itself. We probably need all of these perspectives the better to understand our subject field.

10. Synthesis – time continuum

We shall attempt to develop a model designed to relate the ongoing flux to the apparently more ‘slow moving entities’ that lie further from the time of performance and experience. These may have a richer relationship if presented as a continuum. In terms of our river view: what we are trying to do is to contain the flow; the banks are ‘nearer’ the flow time the closer you are to the river itself; the further away the more contemplative – at a different time scale to that of the performance, allowing iteration, reconsideration and analysis, and eventually greater understanding of the experience. Understanding is an emergent quality, one that may be different for each person. It arises from a multidiscipline or (after Pierre Schaeffer) an interdiscipline.

Let us try to connect the pieces together. This diagram (Figure 8) is speculative but intended to stimulate ideas as to how future studies might have a view centred and grounded on the performance experience – not presupposed to be individual. This model can and does apply to a holistic situation in the world – an ecology if you like.

On the *poietic bank* we see closest to the flux a video of the Max patch which in this case runs the installation. This has been derived from the backdrop of a mound of creative materials and ideas, collected, sorted, worked at and worked out.

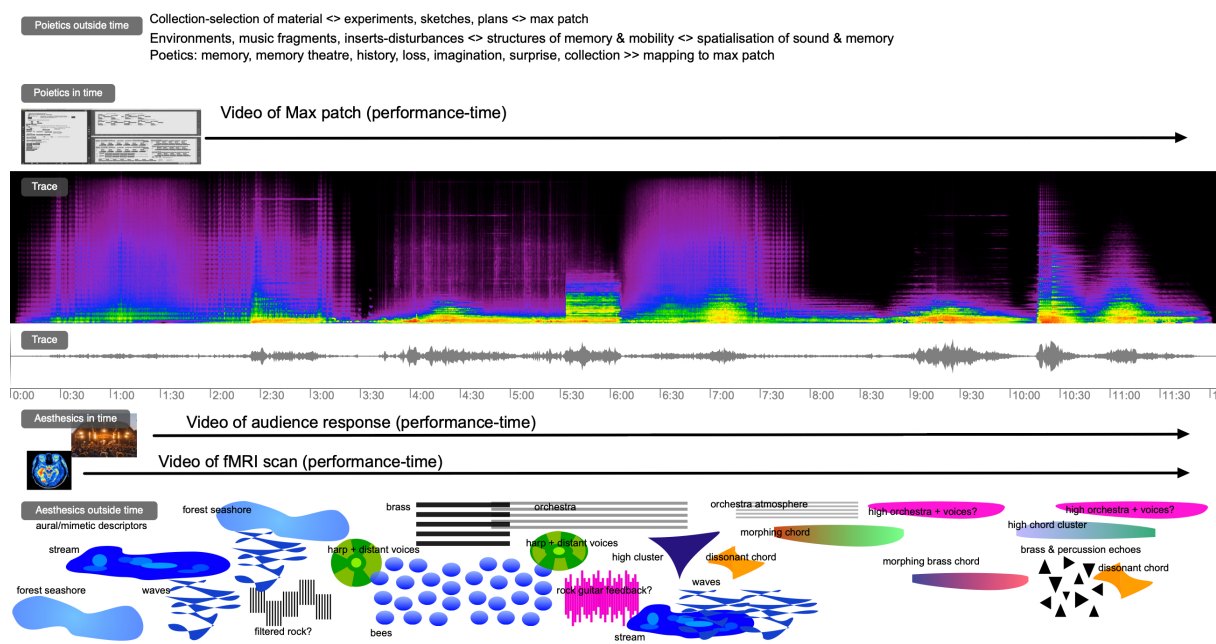


Figure 8 Simon Emmerson *Memory Machine* – poietics, trace (of flux), aesthetics [EAnalysis image¹¹] (Emmerson 2023)

The core of the example remains the *experience of the flux*, of which the representation is the *trace of the flux* (the river). Here maintaining a Newtonian construction – a standard pair of frequency and amplitude traces. It is not neutral.

Thirdly the *aesthetic bank*: I have fancifully imagined a video of an event venue with participants, for some genres of music a rich source of understanding of the experience. To this I have imagined a synchronised video of an fMRI scan to link our research to emerging neuroscientific understanding of brain functions in music perception. Finally the move to evocative transcription which I discussed earlier in this paper.

There are many further annotations and additions we might think of to enrich this river view. We shall see emerge new methods of revealing and showing the creation and reception of the music – and perhaps new ways of capturing and representing the flux itself.

11. Conclusion – grounding

To construct this fanciful representation of a ‘study’ has involved some creative short-cuts. But I hope I have communicated the message that I believe we should refocus at the level of the experience. That experience is elusive, yet while we cannot easily grasp it, we must try to focus on it. The ‘mapping from above’ will not disappear but needs to be balanced by a more grounded point of view – from within the experience itself.

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¹¹ This should ideally be presented as a video thus having a real time axis with our point of view hovering close to the experience of the work (as designed into Pierre Couprie’s *EAnalysis* software).

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