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Live Patching and Remote Interaction: A Practice-Based, Intercontinental Approach to Kiwi

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Abstract. This paper introduces, documents and reflects on an intercontinental live patching experience based on simultaneous remote interaction using the software Kiwi, and that can be subsumed under several features of Ubiquitous Music. The experience involved two academic groups based in three different universities between Brazil and France, namely, a research group from the two Brazilian Federal Universities of Acre and Paraíba, and a working group based at the University Paris 8 in France. The intercontinental simultaneous interaction may trigger reflections on the implications of the presence/absence of the human being, on the implicit patterns of territorialisation reproduced in the context of intercontinental live patching, and on the operative action of mnemonic processes within the practice.

Keywords: Music composition, epistemology of music composition, computer music, Live Patching, Remote Interaction, Kiwi.

1   Introduction

This paper introduces, documents and reflects on an intercontinental live patching experience based on simultaneous remote interaction using the software Kiwi. Previous diffused live patching experiences include a proxy for the Pure Data community, called *peer data*, that was developed by IOhannes m zmölnig, and allows multiple users to concurrently intervene on the same patch; *peer data* was successfully used in the context of the *blind date* project by Pd~Graz, which will be discussed further on. There are other approaches to remote collaboration on Pure Data, such as the project *Destino Pirilampo*, by Luzilei Aliel da Silva and José Eduardo Fornari Novo Junior [1], where remote users send signals to a unified central patch, but do not have control on the patch itself.

This experience can be subsumed under several features of Ubiquitous Music. First of all, according to the understanding suggested by Luzilei Aliel and José Fornari, it qualifies as a particular type of "electroacoustic music, in which electronic devices are now ubiquitously interconnected to make music together" [1]; secondly, as Keller *et al* maintain, this very same "multiplicity of interconnected devices" replaces the operativity of "identifiable musical instruments" as well as the complex "social paraphernalia" (scores, concerts, set rituals, a clearly defined audience separated by the musicians, etc.) that characterise typical musical practices [2]; finally, the particular set

of material circumstances involved in the experience implies the encounter and clash between the human presence/absence and a characteristic territorialisation of creative actions, that evokes Keller and Lazzarini's formulation of "ecologically grounded creative practice" [3].

The Kiwi project originated from a social, scientific and musical context that is in constant development. Interaction and collaboration through digital media are taken as key concepts in the current social context. Cloud computing permits to explore the potential of digital processing and storage of information through the mediation of communication networks – mainly the internet.

The project ANR MUSICOLL[4] (2016-2018), in partnership with the CICM [5] and the private company Ohm Force [6], conducted research centered on collaborative and portable real-time music, with the development of a new tool for this practice: the software Kiwi [7]. After the finalisation of the project in 2018, all these objectives were successfully achieved. However, the creative potential of Kiwi was scarcely considered.

The practice of live patching functioned as a starting point for a new approach to Kiwi. The principle of starting a patch "from scratch" in a collaborative, simultaneous practice, working together on the same patching canvas from different parts of the world will hopefully help the visualisation of a series of original properties belonging to this new software. This would eventually let a series of new practices emerge, freely from the canons and prejudices of dominant academic schools of composition.

This project was initiated by the association of two different groups, that collaborate with the same tools of digital musical creation: namely, the research project Live/Acc/Patch, based in two different Brazilian Federal Universities (Acre and Paraíba), and the working group associated to the module *Introduction à la programmation avec Kiwi, Max et Pure Data 1*, from the University Paris 8.

This collaboration, therefore, unites two different countries, France and Brazil, as well as two different conceptions of music-making, with their own intrinsic know-hows. The use of the software Kiwi as a shared tool constituted the intersectional space of this collaboration, that resulted in a particular medium-specific practice of music-making, distinctive of this interinstitutional, border-crossing app.

2   Live/Acc/Patch

Live/Acc/Patch is a research project initiated in 2018 through the mutual finding of the Brazilian National Council for Scientific and Technological Development (CNPq) and the Federal University of Acre (UFAC), as part of the national Institutional Programme for Undergraduate Research (PIBIC).

The project aims to explore viable connections between collaborative live patching and the learning of patching programs such as Pure Data [8]. A first part of the project involved practising collaborative live patching with users already initiated with Pure Data. A second, ongoing part of the project consists in working closely with users not initiated to patching software, with the aim of transferring to them basic notions of live patching.

2.1 Live coding and live patching

The term "live patching" derives from the concept of "live coding", defined by Thor Magnusson as a "form of musical performance that involves the real-time composition of music by means of writing code" [9]. Live coding emerged as a creative practice and as a research area in music in the last 15-20 years. Collins *et al* situate live coding within a new performance area based on risk, unpredictability and, therefore, in the possibility of unexpected developments [10]. Magnusson illustrates the transition from score to algorithm heralded by live coding as a new form of creation of musical meaning [9].

While live coding is a general term that may (or may not) evoke TUIs, or textual user interfaces, live patching refers to the same practice applied to GUIs, or graphical user interfaces [11]. The increased appeal and smoother learning curve granted by GUIs makes them more indicated for the collaboration and educational purposes of the Live/Acc/Patch project. In terms of previous collective live patching experiences, a crucial reference is represented by the *blind date* and *rec.wie.m* projects by the Pd~Graz association [12][13]. Even with this advantage, the project demands the formulation of strategies aimed at facilitating the understanding of patching languages and accelerate learning for users without any experience of this type of apps.

3 From Pure Data to Kiwi

Soon after its start, the Live/Acc/Patch project partially relocated to the Federal University of Paraíba, in João Pessoa, some 4,000 km away from Rio Branco. There, a collaboration with the University Paris 8 was soon established, based on the use of Kiwi. So far, Pure Data had been used as the only patching program for the project. This involved various challenges, involving mainly the impossibility (or difficulty) of working simultaneously on a patch. Initially, then, the group had started working collaboratively on live patching practices, interacting consecutively in turns on the same patch. Later, after splitting between the states of Acre and Paraíba, group members had started working remotely, each of them saving patches on shared cloud folders and intervening on structures already initiated by the others.

The collaboration with Paris 8 introduced the possibility of using Kiwi as a tool that could effectively alleviate the difficulties connected to the huge distances that inscribed collaborative interaction in the project. Project members soon decided that Kiwi would by no means supplant Pure Data, and that the two, on the contrary, would coexist within the project.

3.1 Characteristics of Kiwi

The collaboration model offered by Kiwi is centred on the sharing of the working space, that is, the patch canvas; however, the control parameters and the audio signals are kept only locally. The extreme similarities between Kiwi and Pure Data helped Live/Acc/Patch members to painlessly transition from one language to the other and back. An important characteristic of Kiwi consists in the presence of rooms where collaborative patches can be created and put at the disposal of the other members of the network. All users connected to the server have access to a list of rooms: they may download, delete, upload, rename, duplicate patches from this window. Most

importantly, each room allows for multiple users to be connected at the same time, each making real-time modification on the patch. In fact, the instances of intercontinental collaboration discussed in this paper happened, each of the times, within the limits of a specific room.

4 The Module *Introduction à la programmation avec Kiwi, Max et Pure Data 1* at University Paris 8

The second working group that participated in the international collaboration was the class of the module *Introduction à la programmation avec Kiwi, Max et Pure Data 1*, offered to *Licence 2* (second year undergraduate) students of the music department with CAO (computer-assisted composition) specialisation, of the University Paris 8. The module teaches basic notions of modular graphic syntax for audio synthesis and processing, that is, the basic principles of Max, Pure Data and Kiwi. The course also covers notions of digital signal processing and electroacoustic composition.

4.1 Learning with Kiwi at the University Paris 8

The 2019 class that participated in the international collaboration is composed of roughly ten students, the majority of whom is a total beginner in terms of computer-assisted composition. The first eleven lessons covered notions of digital processing and an introduction to electroacoustic composition, including frequency and amplitude modulation, delay, flanging, pseudo-flanging and sampling. Kiwi was only introduced during the seventh lesson, when students had already familiarised with basic principles of patching. For them, the specific aim of the international collaboration consisted in the opportunity of an additional creative activity, useful to complement classroom learning.

In addition, two patches were created collaboratively by the class, independently from the international collaboration. These two patches focussed on frequency modulation, and are available on the Kiwi server as KiwiMaxPd2019 and KiwiMaxPd20192. This last patch contains four instances of a basic model of John Chowning's FM synthesis [14].

5 Simultaneous Intercontinental Live Patching

After a series of local practices intended to familiarise quickly with Kiwi as a patching environment, towards the end of 2018, the members of the Live/Acc/Patch project started live patching between the two Brazilian states of Acre and Paraíba. In April 2019, three attempts at intercontinental live patching between France and Brazil were made.

5.1 The first interstate sessions in Brazil

A first set of interstate sessions occurred between Acre and Paraíba in the last months of 2018. Sessions are available on the Kiwi server as LIVE-ACC-PATCH

UFAC/UFPB followed by consecutive numbers. A total of four sessions was created between October 17th and November 28th.

5.2 Intercontinental appointments

Relevant intercontinental session included a test session on April 11th (available as LiveKiwi 11-04-2019), three smaller group rehearsals on April 17th (available as kiwitest 17.04.19; kiwitest_2 17.04.19; kiwitest 17.04.19 (versao 2)), and a final collaborative event on April 18th (fig 3), which was split into consecutive sessions (available as LiveKiwi 18-04-2019 and LiveKiwi_v2 18-04-2019). Importantly, due to some repeated server failures during the test session on April 11th, participants based in Brazil resolved opening a separate session room on that day (available as ACRE-PARAÍBA TEST) that eventually worked smoothly. Thanks to the help of the Kiwi developers, the server problem did not reappear on the following session days.

5.3 Reflections on Kiwi, live coding and simultaneous remote interaction

The different sessions mentioned above were useful in order to formulate critical and analytical reflections on the set of operativities, functionalities and conceptual nodes that are at stake when opting for using Kiwi.

The practical and conceptual limits of simultaneous remote interaction. The most appealing feature offered by Kiwi is, by far, the idea of collective interaction on patching being potentially simultaneous and remote [15]. While we have abundantly enjoyed these two characteristics along the various sessions, the aforementioned problems that occurred upon the first intercontinental test on April 11th triggered a broader reflection on the unconditional desirability of simultaneity in the context of remote interaction. In other words, is it always absolutely necessary to interact right at the same time? More importantly, is it always safe and reasonable to rely on simultaneity?

Kiwi does in fact allow for simultaneity to be temporally dislocated. Patcher rooms that have been created several months ago are still available now for users old and new to access and modify them. Kiwi stores collective patchers and never concludes them: on the network, they remain open for the community to keep modifying them. In this sense, collective events involving (or not) different places could also potentially be temporally disphased, and this is certainly a future development that needs to be taken into consideration.

Another important conceptual node is remoteness, which could be described as the simulation of a presence *in loco*, that manifests itself via patching operations on the computer screen. In considering systems of biometric detection, Joseph Pugliese borrows from Derrida the expression "metaphysics of presence" and identifies a series of potential failures involved in the technological exercise of recognising and passing on the indicators of human presence [16]. For the sake of this work, thus, it is useful to ask what are the limits of the simulation of presence in the context of live coding. More specifically, what fundamental losses relative to live patching are implied when users interact remotely? And, from a totally opposite perspective, does the possibility of

remote interaction make the choice of Kiwi over other patching programs meaningful and desirable only when remoteness is actually in place?

During the various remote sessions mentioned above, project members found themselves relying on textual comments on the patching canvas in order to make up for the absence of verbal communication with distant participants. The written text, in this case, operated to bridge a metaphysical gap in the interaction with other humans. This need for immediate verbal contact undoubtedly makes non-remote interactions meaningful and pertinent, alongside remote ones. In fact, again upon the April 11th server failure, the alternative session room opened by participants based in Brazil (available as ACRE-PARAÍBA TEST) soon ended up consisting in an interaction between two users that were working simultaneously on two different machines, occupying the same physical lab in Rio Branco, Acre. In this case, the interaction happened in the actual presence of the two participants, who had the possibility of establishing a higher level of empathy during the collaborative work, due to the possibility of immediate verbal and non-verbal communication. On top of being extremely meaningful when compared to remote interaction, this type of close and simultaneous interaction bridges an important gap in existing patching software: as mentioned above, in fact, collaborative live patching on Pure Data in the context of the project could only be consecutive, one-at-a-time interaction between users.

The geopolitical implications of remote live patching. As suggested above, relying on simultaneous interaction might be potentially problematic, as simultaneity demands high performance over a very specific and limited amount of time, and this might not be available to everyone, anywhere and at any given time. Geographical variation might also predict dramatic changes in connectivity, machine performance, etc. Difference in time zones might also be relevant, especially given the 7-hours gap between Rio Branco and Paris, João Pessoa being, at that time of the year, 2 hours ahead of Rio Branco and 5 hours behind Paris. These differences had a relevant influence on the practicality of the intercontinental sessions.

Although one of the principles that orientated the collaborative work was horizontality, the project ran the risk of aligning itself along very specific Cartesian coordinates of power and normativity [17]. However, given the commitment of the authors of this paper with forms of decolonial politics, this was aptly avoided. In fact, it is safe to affirm that the collaboration between the French and the Brazilian side of the project has remained horizontal.

Geopolitical or territorial conflict is a powerful metaphor that comes to mind when considering the concurrent activity of a relatively high number of agents on a patch canvas that is spatially limited. In this particular context, live patching does indeed become akin to fighting for a limited number of resources, or to fighting to secure some territorial control. Participants have the freedom to delete the objects or interrupt the connections created by others, and this tends to happen a lot depending on the number of simultaneously active users. The connection between the visual mapping of the GUI and the possibility of interaction of multiple concomitant users that characterises Kiwi permits to visualise the affinity between live patching as a musical activity and the politics of territorialised desire that inscribes human actions in space. In this sense, collaborative live patching is often the embodiment of some type of conflict, and it is possible to argue that this gives a particular, irrenunciable twist to the aural results.

Live patching, memory and the work on fragments. Obviously, the reference to conflict here is only symbolic and does not reflect the general climate of amity and comradeship that characterised the intercontinental sessions. These reflections, however, are useful in order to unearth the social and cultural implications of this type of activity. In this sense, another important "conflict" that characterised the first test session on April 11th was the divergence between a number of users that started from pre-patched, sizeable structures, and a number of users that attempted to build structures gradually, object by object. Soon after the test session, it was decided that pasting big structures was to be avoided, and that the live activity was to be implemented by working gradually.

Now, working gradually in real time with other users by interacting with, and at times by undoing, one's work involves activating memory in order to recall exact syntaxes, functionalities and even object names that might not always be ready by rote. In this context, the multiple dialectics between remembering and forgetting, and between retaining and effacing [18], produce a series of mnemonic fragments that play a crucial role in the dynamics of live patching. Participants end up relying on sketchy processes of recollection, rather than consolidating a steady corpus of program-specific knowledge. Here the aesthetics of the well-crafted, completed digital artefact, is supplanted by a poetics of the incomplete, of the experimental, of the open-ended.

6   Final remarks

The ongoing research reported in this paper permits the drafting of important conclusions and notable perspectives for the future collaboration between the groups involved in the intercontinental sessions.–The key node of the whole process is the meeting of local and global ecosystems. The patches LIVE-ACC-PATCH UFAC/UFPB and KiwiMaxPd2019 were developed locally by the Live/Acc/Patch group and the University Paris 8 class respectively. In this way, each ecosystem created specific patching strategies. During the first international session, these different strategies both met and clashed with each other, resulting in the emergence of a common collaborative practice, that culminated in the last session.

The complexity of the intercontinentally developed patches results from the combination of small elements that interact dynamically and turn into autonomous structures. With international live patching, the issue of temporality in simultaneous creation gains a new dimension. An entirely open, collaborative and non-hierarchical approach may be considered a downside by software developers. However, with Kiwi all the participants retain the same, unrestricted rights. In addition, the operations on each patch do not leave genealogical traces, that is, it is impossible to ascertain who created a specific object or comment on a patch. In this way, potential hierarchical barriers (i.e., lecturer vs. student or group X vs. group Y) are totally avoided. Kiwi and the know-how of live patching promoted by the Live/Acc/Patch group attest to an engagement with creative musical collaboration and computational development.

In this sense, this experience confirms the operativity of a common behavioural pattern in computer music history: the development of new tools is intrinsically connected to compositional and social issues that have specifically to do with musical

creation. In terms of the future developments of the intercontinental collaboration, two perspectives need to be highlighted. Firstly, in order to make up for Kiwi's technical limitations, it is possible to integrate the Faust language [19]. Secondly, From the point of view of musical performance and its morphological implications [20] live patching may perfectly be combined with experimental concert practices based on improvisation, open works and aural complexity.

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