Chapter 5
Chasing a Feeling: *Experience* in Computer Supported Jamming

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Abstract Improvisational group music-making, informally known as 'jamming', has its own cultures and conventions of musical interaction. One characteristic of this interaction is the primacy of the *experience* over the musical artefact—in some sense the sound created is not as important as the feeling of being 'in the groove'. As computing devices infiltrate creative, open-ended task domains, what can Human-Computer Interaction (HCI) learn from jamming? How do we design systems where the goal is not an artefact but a felt experience? This chapter examines these issues in light of an experiment involving 'Viscotheque', a novel group music-making environment based on the iPhone.

5.1 Introduction

This volume offers a glimpse into the diverse ways in which music making practices are being influenced by computational support. Augmented traditional instruments (McPherson and Kim 2013, this volume) artificial musical intelligence (Gifford 2013, this volume), live coding (Stowell and McLean 2013, this volume)—each of these musical contexts has specific cultures and challenges. Some of these musical contexts existed in some form prior to the advent of their enabling technologies, others did not.

Creative, open-ended task domains are a hallmark of 'third wave' HCI (Fallman 2011), and music interaction is a natural fit for this growing body of theory. Improvisational group music-making is one such musical practice which presents new challenges to the interaction designer. In this chapter, we consider the practice of improvisational group music-making and its relationship to HCI.

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In this chapter we shall use the term 'jamming' to refer to the practice of improvisational group music-making. In particular, we refer to music-making contexts where a primary motivator for participation is the feeling of the activity itself. The primary motivation is not financial remuneration, the adulation of an audience, or the preservation of a recorded artefact for posterity. This definition is open to criticism; the term jamming may be used to describe musical contexts which do not satisfy all of these criteria. Also, reducing the motivations of a jamming musician to a single factor is impossible; the expert jazz musician may still do what she does simply for the thrill of it, even when she is paid for her gigs and there is an audience to applaud her. It is, however, necessary to define terms for the sake of clarity, and this is the definition we shall use in this chapter.

As well as a discussion of the nature of jamming and its implications for HCI, we present a case study of computer supported jamming. Drawing on the author's own training and experience as a jazz guitarist, we have designed the Viscotheque digital musical instrument (DMI). Viscotheque is an iPhone-based mobile musical instrument and associated infrastructure designed with jamming in mind. We conducted a longitudinal study of the system involving musicians familiar with the practice of jamming. We present some observations from this study in Sect. 5.4, as well as some implications for the design and evaluation of interactive systems for improvisational music making in Sect. 5.5.

5.1.1 Improvisational Interaction

The degree of improvisation inherent in a group activity can be seen to lie along a continuum. Some activities are largely pre-scripted, others contain both scripted and unscripted elements, still others are completely unscripted. Group activities which fall at the more improvisational end of this spectrum can be difficult to make sense of to the uninitiated. When roles are fluid and ill defined; when outcomes are not pre-determined but negotiated on the fly—how do improvising groups do what they do?

The canonical example of an improvising group in music is the jazz ensemble (MacDonald and Wilson 2006). From a simple trio all the way up to a big band ensemble, improvisation is an integral part of what it is to play jazz (Berliner 1994). Of course, improvisation is not unique to jazz; it is a feature of many other musical styles and traditions, and many non-musical activities as well, such as improvisational theatre troupes (Sawyer and DeZutter 2009). Scholarly work on improvisational music-making has largely been concerned with jazz, although rock-influenced 'jam bands' such as The Grateful Dead have been considered as well (Tuedio 2006).

A great deal of skill and training is required to participate in improvisational group music-making at a high level. Each musical utterance must be made in response to the current musical context, including the contributions of all the other musicians. The jamming musician must both play and listen, act and react; balancing the desire to be fresh and original with the economies of falling back on familiar

patterns and the need to fit musically with the other musicians. Managing these tensions means that improvisational groups are inherently fluid; the actions and roles of the group members are not pre-ordained, but negotiated and re-negotiated on-the-fly. While each member of the group brings their own experiences and sensibilities to the activity, the creative output of the group is not the singular vision of any of the individuals, or even the sum of their individual contributions: "in collaborative improvisation, a creative product emerges that could not even in theory be created by an individual" (Sawyer 2007).

5.1.2 The Feeling of Jamming Together

Musicians have their own vocabulary for talking about what they do when they jam together. This vocabulary can help us to understand the process of jamming as experienced by its practitioners. In Ingrid Monson's interviews with professional jazz musicians, the metaphor of dialogue or conversation was used to describe the act of improvising together (Monson 1996). High points in their music-making were described as 'saying something', expressing something meaningful through their playing. This is a helpful metaphor: conversation connotes a sharing of ideas, a call-and-response paradigm, the potential for intimacy and shared vocabulary. 'Grooving' is another term used by musicians to describe the feeling of playing together (Doffman 2009). This term has subtly different meanings depending on usage. It can refer to a specific beat or rhythmic pattern, or the practice of playing early on certain beats and late on others. It is also used by musicians to refer to peak moments in a performance. In this latter sense, grooving is not simply a cognitive state, it has an affective and embodied dimension—it is *felt* (Ashley 2009).

Jamming groups do not always reach these lofty peaks. One day a group might really be in the groove, the next day they may be flat. When it works, though, the experience of jamming together can provide a sense of satisfaction and connection with others that few other activities can (Mazzola 2008). The sensation of being 'in the groove', while difficult to describe in words, represents a real shared experience prized by musicians across many different musical traditions (Lamont 2009).

The theoretical lens of flow theory (Csikszentmihalyi 1991) is often used to examine 'peak experience' in jamming, and indeed instrumental music-making in general (Wallis et al. 2013, this volume). Although Csikszentmihalyi was originally concerned with flow experiences in individuals, Sawyer (himself a jazz pianist) has described flow in improvisational groups, including as jazz ensembles (Sawyer 2006). Flow describes the state in which an individual's skill level is commensurate to the difficulty of the complex task being performed. The intrinsic pleasure of finding flow in an activity provides an explanation for why some activities are inherently pleasurable and satisfying, even when they provide no discernible reward (outside of this satisfaction). Flow is a theory of *intrinsic motivation*, as distinct from the extrinsic rewards which often motivate participation in a given activity.

Ultimately, it is immensely satisfying to be a part of a jamming group in this state of flow, and the feeling is contagious (Bakker 2005). Given our definition of jamming from Sect. 5.1, we suggest that this experience of 'peak jamming' is the ultimate goal of the jamming group; it is what keeps the musicians coming back to jam sessions. We are not claiming that this is the case for any particular jamming group, people and motivations are too complicated to make these kind of normative claims. If it is true, however, that there *exist* music-making groups and subcultures for which the felt experience is paramount, we must be mindful of this as we seek to design interactive digital artefacts to support this jamming.

5.2 The Smartphone as a DMI for Jamming

Modern 'smartphones', with their capacitive multi-touch screens and array of other sensors (Essl and Rohs 2009), are affording groups of musicians new avenues of creative engagement. Smartphones are but one material form-factor being utilised for DMI design (see Paine (2010) for a taxonomy of DMI design approaches), but their affordability and availability provide obvious advantages over custom hardware. In this, musicians are finding new ways to jam together, and to share in that familiar collaborative, improvisational experience (Tanaka 2006). The instruments may be different to the jazz band, but at some level the goal—to experience that feeling of flow—is the same.

Fallman (2011) is careful to point out that technology does not necessarily make things 'better', and HCI practitioner must be careful when wading into the domain of ethics. An optimistic reading of this trend may consider it a 'democratisation' (Tanaka 2010) of music-making. The experience of jamming is being brought within the reach of anyone with an appropriate phone in their pocket. The nature of a phone as a constant companion also opens up the possibility of spontaneous jam sessions, turning idle moments and new acquaintances into opportunities to jam. A more pessimistic interpretation of this trend may lament the dumbing down of a complex, skilful activity, and perhaps a loss of the nuance and ceremony surrounding jamming. The truth probably lies somewhere between these two poles, but it is important to remember that this next chapter of ubiquitous digital musical interaction has not yet been played out.

5.2.1 Analysis and Evaluation

Designers of DMIs are aware of the need to build tools which afford expressivity and that sense of 'saying something' (Dobrian and Koppelman 2006). However, determining both the nature and degree of success in this endeavour is a difficult task (O'Modhrain 2011). Evaluation techniques from more traditional HCI have been adapted for musical interaction contexts, such as setting basic musical tasks

(Wanderley and Orio 2002) which are comparatively easy to assess. Jamming, however, is not amenable to this type of reductionism. Indeed, 'mistakes' such as wrong notes are often sites of inspiration, perturbing the musical status quo and having an overall positive effect on the trajectory of a musical performance (McDermott et al. 2013, this volume).

For tasks which involve the production of an artefact, such as a document or other representation of knowledge, the success of the activity or interface can be measured by the quality of the artefact produced. Jamming, however, is not primarily concerned with the production of an artefact, and indeed there may not be any persistent tangible result of a jam session.

This is not a problem *per se*, but it does present challenges. How do we make design decisions without a meaningful metric for comparison? How do we reconcile our desire to have a nuanced view of the human, felt experience so central to these systems with our longing as data-driven scientists to crunch numbers, generate metrics, and compare p-values?

In jamming, HCI is confronted by a teleological difference between creative, improvisational tasks (such as jamming) and more 'prosaic' ones (Springett 2009). In a word processor, the ultimate goal of the user is the production of a high-quality document. The contribution of HCI theory is to make this task as pleasant an experience as possible. In an improvisational computer-music environment, the goal of the participant is to have an experience: of flow, connection, groove. The musical output of the system is merely a means to that end. In these two different contexts the role of the *created artefact* and the *experience of making it* are reversed. In what ways can the tools of HCI theory still be useful, and where do they fall down?

The recent emphasis on user experience (UX) provides some opportunities for designers of DMIs for jamming. In UX parlance, jamming falls into the category of 'an experience' (Forlizzi and Battarbee 2004)—it has a well defined beginning and end. Subjective reports, such as questionnaires and semi-structured interviews, are a common way of building a picture of the experience of participants with technology.

Bardzell and Bardzell (2008) suggest an approach based on criticism, rather than evaluation. Drawing on twentieth century critical theory, their proposed interaction criticism prescribes "interpretive analysis that explicates relationships among elements of an interface and the meanings, affects, moods, and intuitions they produce in the people that interact with them". Interaction criticism proposes four loci of analysis: the designer, artefact, user, and social context. These elements are all deeply interconnected, the aim of this approach is not to claim any independence between them. Rather, they provide a much needed common basis and vocabulary for examining interactive digital environments for complex activities like jamming.

The concept of criticism, rather than evaluation, also provides an explicit scope for expert judgements. As Bardzell notes, expert judgements happen all the time in design, whether implicitly or explicitly. This has always been true for the design of musical instruments, which tend to evolve (and stabilise) within their cultures and communities of use. The violin is not the result of a rigorous series of controlled experiments to determine the optimal size and shape for the violin body. Musicians and craftsmen made expert judgements at many points in the design process,

based on their experience and observation of the instrument as a tool for music making. We must not be afraid to take the same methodological stance in the design of DMIs.

5.3 Jamming in Viscotheque: A Case Study

So, to summarise the key points so far:

1. Jamming is a complex activity, involving the interaction of many entangled processes and musical contributions.
2. Jamming is about chasing a felt experience—when it works, it feels *amazing*.
3. We need to keep this experiential and subjective focus as we design and evaluate computer supported jamming with DMIs.

The Viscotheque is an iPhone application designed with these considerations in mind. The design process has been motivated by the question: 'what does it feel like to jam together using a new, smartphone based instrument? ' In the remaining part of this chapter we share some observations from a field trial of the instrument.

5.3.1 Designing the Viscotheque Application: Mapping and Feedback

In any DMI, the key design decisions to be made are related to the mapping of the input manipulations (finger touches, device orientation, etc.) to the feedback (sonic, visual and tactile) provided to the musician (Miranda and Wanderley 2006). The Viscotheque instrument is necessarily constrained to use the iPhone touch screen and sensors. This affords certain modes of physical interaction and precludes others. However, constraint is a natural part of any instrumental design, and even extreme constraints have been shown to allow for a divergence of creative practices in the hands of skilled musicians (Gurevich et al. 2010).

The Viscotheque is best described as a multi-touch sample triggering and manipulation tool. The iPhone's screen is partitioned into four different zones, each of which triggers a different audio loop. Each loop is a short (4–8 s) audio clip of a single instrument (guitar, piano, drums or percussion) playing a simple pattern. The patterns are each one bar long, so that looping them results in a continuous stream of music with a constant pulse. The four different samples are not matched to each other—they have different tempos, accents and key signatures. This is by design, so that any coherence between the loops will be as a result of the effortful interaction between the jamming musicians.

Touching the screen with one finger triggers the sample associated with that zone, and the sample continues to play on a loop while at least one finger remains touching

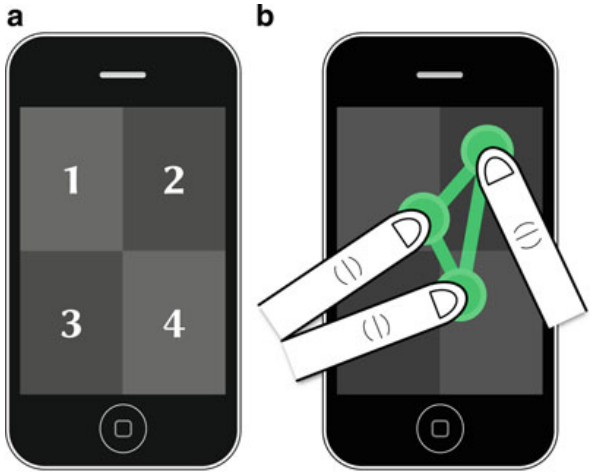

Fig. 5.1 Viscotheque app interface. The four zones are shown in (**a**). Upon touching the screen, the dots provide feedback as to the position of the fingers—the screenshot presented here (**b**) shows three fingers incident on the screen

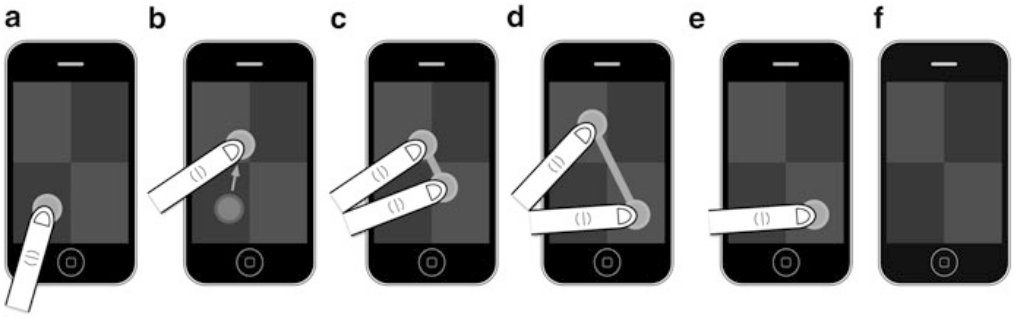

Fig. 5.2 An example of sample playback and manipulation on the Viscotheque interface. (**a**) Single touch down starts loop playback. (**b**) Dragging the touch on-screen adjusts lowpass filter cutoff. (**c**) Second touch, no immediate change to sound. (**d**) Loop continues to play, 'stretch' gesture applies slowdown effect. (**e**) Second touch removed, loop continues to play (at slower speed). (**f**) Finger removed, loop playback stops immediately

the screen. Adding a second or third touch mutates the original loop rather than triggering a second loop in parallel. When the last finger is removed from the screen, the sound stops immediately.

Dragging a finger around on the screen or adding more fingers changes the processing applied to the sound. Up to three different fingers can be used at once (see Fig. 5.1), and the effect the finger position(s) has on the sound depends on the number of fingers on the screen. When just one finger is dragged across the screen, a low-pass filter is applied. When two fingers, the volume and the playback speed are modulated; when three fingers, a pitch-shifting effect is applied.

This interface allows for complex multi touch gestures, potentially involving several fingers, which affords the musician a large sonic range in which to create and respond in a jam (see Fig. 5.2). With regard to the mobile music interaction design patterns proposed by Flores et al. (2010), the Viscotheque is primarily a 'process

Fig. 5.3 Participants jamming in Viscotheque (visual feedback display shown on *left*)

control' interface. The musician is in control of starting, finishing and manipulating a stream of musical material, potentially processing it to such a degree that it is unrecognisable as the original sample.

The Viscotheque interface was designed for real-time interaction. As discussed in Sect. 5.1.1, the interplay of improvisational music-making requires instantaneous choices to be made about how to contribute musically to the overall sound at any given time. For this reason, touching or dragging fingers on the screen is designed to have an immediate effect (although sometimes this may be subtle). This closes the feedback loop between the musician and the environment, allowing them to explore the extent of their sonic agency. The mappings are designed to be intuitive, using conceptual metaphors wherever possible, such as 'up' and 'down' in relation to pitch and volume (Wilkie et al. 2010).

Each musician controls their own sonic output, one musician cannot affect another's sound. Each musician's sound is mixed together and played through the same set of speakers, the musicians do not have an individual 'foldback' speaker to monitor their own contributions in isolation. The musicians must take care to listen to one another, and not to simply make the loudest noise possible and drown one another out.

To aid the musicians in orienting themselves, particularly as they are learning and exploring the instrument, visual feedback is provided to all participants on a large screen. The screen provides an indication of the gestural state (that is, the finger positions) of all the musicians at the current moment in time (see Fig. 5.3). Each participant's fingers are colour coded to match the colours on their own device screens.

5.3.2 Architecture

The Viscotheque environment in totality consists of any number of iPhones (or indeed any iOS device) running the Viscotheque application, plus a central laptop

(the Viscotheque server) which hosts the audio sampling engine and generates the real-time visual feedback. The Viscotheque server is implemented in the Impromptu audiovisual programming environment (Sorensen and Gardner 2010).

Each iPhone sends Open Sound Control (OSC) messages over the wi-fi local network to the server. Upon receiving these control messages, the appropriate processing is applied to the sound, and all the musician's sounds are played back through a PA system. Although the mobile devices cannot be used without the server, we shall often refer to the iPhone running the Viscotheque application as the 'instrument'. A central server architecture was used to allow for more complex audio processing and to facilitate logging of the interaction data for later analysis.

The Viscotheque is designed for co-located musicians, all participants jam together in the same room. While there is no technical reason to impose this restriction, peak moments in jamming are shared experiences, and non-verbal and embodied modes of communication are an important part of this activity.

A previous iteration of the Viscotheque system is described in more detail in Swift et al. (2010).

5.3.3 Experimental Approach

We conducted a series of experiments to study the nature of jamming in Viscotheque. Twelve participants (recruited from the university's music school) were divided into four groups of three. The primary instrument played varied between the musicians, and was one of either guitar, piano, or voice. Each musician's training was in the western classical tradition.

Each group, having no initial experience with the Viscotheque DMI, attended four jam sessions over a 4 week period. The groups were kept consistent over the 4 week period to allow the musicians to build a musical rapport. We observed the musicians as they explored the possibilities of the interface and began to develop their own styles and techniques as both individuals and coherent groups (Fig. 5.4).

These jam sessions were recorded in detailed system logs and also with a video camera which recorded the entire session (a still from one of the sessions is shown in Fig. 5.3). After the jam, the participants took part in a semi-structured focus group interview to discuss the experience, as per Stewart et al. (2006).

One key decision regarding the experimental design was to leave the sessions as open-ended as possible. The participants were not given any training in using the interface, although they could ask questions about the system in the interviews. No instructions were given to the groups about what they were trying to achieve, although as musicians familiar with 'jamming' they brought with them their own expectations of what to do in an improvisational setting.

The goal of the experiment was to see what patterns and cultures of use would emerge as the groups learned to jam together in Viscotheque. While the semi-controlled 'laboratory' setting opens the work up to criticisms of sterility and inauthenticity, there are significant advantages to being able to log every finger

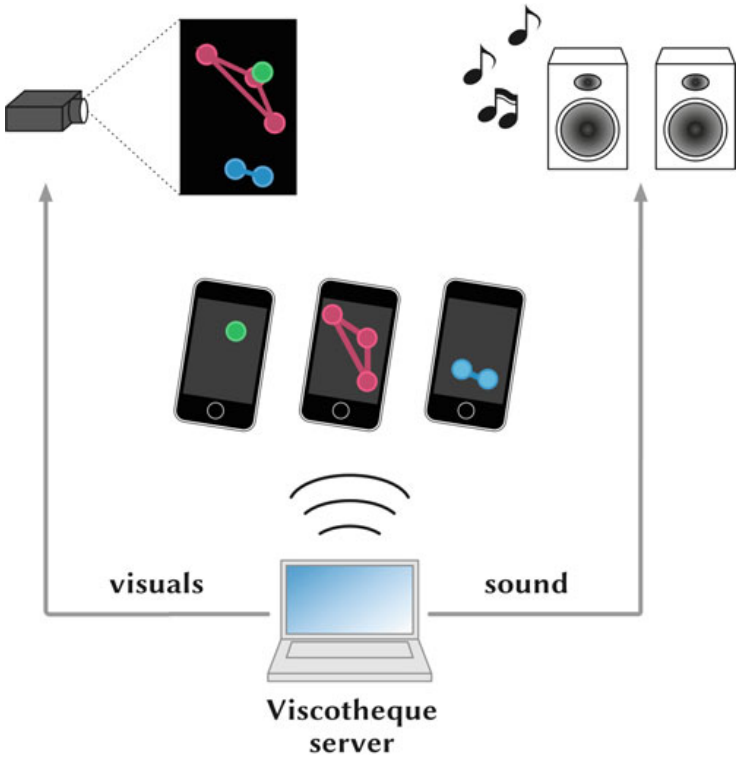

Fig. 5.4 Viscotheque system architecture. The musicians, represented by the iOS devices, are co-located and presented with real-time sonic and visual feedback

trace and capture every facial expression. More than this, though, the goal was to see how the participants described the experience, and to see if the groups experienced moments of deep satisfaction and euphoria associated with the best parts of improvisational music-making. How did the best bits happen, and what did they *feel* like?

5.4 Results

The video recordings of the sessions show encouraging signs of immersion and engagement between the participants. At various points heads were bobbing, shared smiles were visible, eyes were closed—all good (although potentially misleading) indicators of the depth of musical connection and engagement between participants.

The sonic interaction did not always conform to what would conventionally be defined as music. As they familiarised themselves with the sonic possibilities of the interface, the musicians at times created some dissonant and chaotic soundscapes. However, there were moments which were much more sonically coherent, at least to the western ear. The participants, in the interviews, described a conscious effort to 'match' or 'fit' with the musical contributions of the others.

In the designer's view, the interaction between the participants was largely chaotic, with each participant attempting to find a sound they liked, or which was in some way compelling. A sound may have been compelling for a number of reasons, such as novelty, an interesting timbre, a catchy rhythm or melody, or some other factor. Once one of the participants discovered such a sound, there would be a concerted effort from the other participants to fit with this sound, and to produce a sound which was sonically coherent in the current context. Sometimes the participants were able to achieve this, and sometimes they were not able to before the original compelling sound—the catalyst—disappeared, perhaps because of boredom or a lack of skill. When these moments of coherence did occur, they sometimes persisted for a short time (up to 60 s), as the musicians made subtle variations to their sounds in an attempt to develop the groove further. Then, after this time, these moments of coherence would disappear, either gradually dissolving or catastrophically breaking down.

The group interviews provide the participants with a chance to reflect and discuss the experience directly after it occurs. Reflecting on one of their sessions, group 3 described a deep satisfaction and enjoyment reminiscent of that discussed in Sect. 5.1.2. Participants are labelled P1–P12, interviewer is denoted by INT.

P7 *And then, and then you just, like, kindof recoup, and go back, and something—like there's points where there's something where it just all works, and for a second you just get that 'holy crap, let's just bottle this right now'*
P8 *(laughing) Yeah*
P9 *Yeah*
P7 *Grab it, and just seize onto it, and figure out what exactly it is, because this is awesome*

Similarly, in group 2

P4 *For me, it's similar to other experiences I've had with other musicians, it's that moment of 'that's really cool', and yeah . . . it only really comes from playing music with other people, but it's like (clicks fingers) just a feeling where you go 'wow, that's clicking and that's awesome'. Yeah.*
INT *Do you think it can . . .*
P4 *It's something where you're working together, everyone's contributing to this really cool sound, yeah.*
INT *Yeah, sure.*
P5 *It was a lot more fun this week. Last week was more of a puzzle, trying to work it out, but this week it was a lot more free.*

Again, in group 3

P7 *Yeah, I think what I enjoyed from it was the points when something would . . . you could just feel that little *click*, and it would just, you just kindof went 'bang! ' – fell into this position, and it was like – 'ok, this is it, we're here, we've got it' . . .*
P8 *yeah*

P7 *. . . and then it would just be, like,* P8 *would start doing this, just a little tap or something like that, and then it would work . . .*
P9 *yeah*
P7 *. . . and then* P9 *would just bring up something like that, and I would just, kindof, be messing with this thing, and it would all just accidentally fall into place.*
P8 *(emphatically) Yeah, I wasn't even *trying* to make it work, it would just work . . .*
P7 *. . . and it was just experimenting, yeah. And then when it worked, or when we found something that we all linked, it was, like—'bang! ', it was just, like, you know . . . a lion pouncing on a zebra, or something.*
ALL *(laughter)*
P9 *. . . just flick the switch, it was like, 'bang', it worked.*

The groups described moments of frustration as well. Sometimes this frustration was directed towards the interface, sometimes towards their inability to make the sound that they felt the musical context called for, and sometimes the group's unwillingness or inability to listen to each other and try and play together.

While a few short excerpts with minimal context taken from 8 h of group interviews cannot convey the whole picture, it is clear that at times the participants are describing a felt experience akin to that of being in the groove. This was an exploratory field trial—the lack of a control group makes it difficult to be specific about the causality of these experiences. Indeed, this is one of the most difficult problems in DMI research, particularly in a jamming context. These results are presented here to give a concrete example of the issues discussed in Sect. 5.2.

5.5 Chasing a Feeling

The design approach taken by Viscotheque was motivated by an analysis of (and first hand experience with) the problem domain of jamming. In musical HCI, as indeed in all forms of HCI, this is a vital first step. In particular, the improvisational nature of jamming and skill required for fluency impose different instrumental constraints to those in more structured forms of music-making.

Four weeks is a very short time over which to examine the evolving practices of jamming in with a new instrument, even for musicians trained in the skills and conventions of jamming. Indeed, we hope to conduct longer studies in the future, and with more diverse users, including non-musicians. However, we are encouraged at the descriptions of the peak moments experienced by the musicians in this short time. This feedback, as well as the insights taken from the observations of the jamming groups in action, will be used to further shape and refine the Viscotheque interface.

The problem of chasing a feeling manifests itself in two ways in the design of DMIs for jamming. Firstly, as discussed in Sect. 5.1.2, the ultimate goal of the jamming group is a feeling; an experience. Yet experience can be so fickle;

so subject to forces beyond our control, and certainly beyond the control of the interaction designer. Our moment to moment experience is influenced by the complex web of relationships and influences that enfold us at every moment and in every aspect of our lives.

The second manifestation of this problem is in evaluating the success of our DMIs. In this sense we are not the musicians chasing a feeling ourselves, we are the designers and HCI practitioners trying to pin down the moments and antecedents of a specific feeling in others. This is an increasingly common problem in HCI more broadly (see Sect. 5.2.1), perhaps musical HCI can lead the way? Going forward, there are four approaches which seem promising:

- **Expert judgements**: can we have experts assess the participant's activity and assign a score based on their knowledge of the task domain? This is the approach taken by Bryan-Kinns and Hamilton (2009). A mature discipline of Interaction Criticism (Bardzell and Bardzell 2008) could provide a foundation for these expert judgements.
- **Qualitative data analysis**: this includes qualitative analysis of interviews, such as the Discourse Analysis method presented in Stowell et al. (2008) and the Grounded Theory approach of Glaser and Strauss (1967).
- **Unsupervised learning**: should we restrict ourselves to statistical techniques which require no class labels, such as clustering and novelty detection? This way, we avoid the need to calculate a definitive and meaningful dependent variable. Data can be naively grouped and partitioned, and then the meaning of the groups and patterns can be interpreted by the researcher. Text mining techniques may be applied to the interview transcripts as well.
- **Rich data collection**: Another approach is to measure the participants more closely, including biometrics such as EEG (brain), ECG (heart), EDA (skin) and EMG (skin) (see Nacke et al. 2010). A noted by Stowell et al. (2009), this is an exciting possibility for evaluating DMIs, but work needs to be done to provide justification for the meaningfulness of the obtained measures.

5.6 Conclusion

The Viscotheque DMI was has been developed with careful consideration of the musical and experiential context of jamming. Preliminary field trials suggest that the potential is there for the interface to support rich jamming experiences, and we continue to pursue those goals.

Music interface research in HCI has long felt the need to justify its design decisions with techniques more suited to technologies in the workplace. As HCI continues to explore issues of experience and technology, music interaction designers are increasingly liberated to affirm the real reasons we build the tools that we build—the ability of music to bring joy to the heart. We have not forgotten *why* we jam, hopefully we are increasingly able to justify our design decisions in mainstream HCI discourse.

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