

Jukola: Democratic Music Choice in a Public Space

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ABSTRACT

Jukola is an interactive MP3 Jukebox device designed to allow a group of people in a public space to democratically choose the music being played. A public display is used to nominate songs which are subsequently voted on by people in the bar using networked wireless handheld devices. Local bands and artists can also upload their own MP3s to the device over the Web. The paper presents a field trial of the system in a local café bar. As well as the value in affording a democratic musical outcome, more importantly the whole process of voting and choice created a rich source of social value and interaction in the form of discussions around music, playful competition, identity management and sense of community.

KEYWORDS

Music, voting, public space, jukebox, field work, MP3, handheld, public display, identity, collaborative choice, competition, game play, café-bar, ubiquitous computing, wireless network, community

INTRODUCTION

Music plays a significant role in the everyday lives of people in the way it influences individual and social experiences. Studies in the field of musicology have highlighted some of the key ways in which these influences are manifest [e.g. 1, 2, 9, 11, 19]. Music is used, for example, as a means of mood control and for creating and enhancing particular emotional and physical states [7]. It is used as a trigger to personal and shared memories. As a cultural medium, music is also appropriated by people as an important social resource. People use music as a means of creating and projecting their character and identity and for understanding the identity of others [1, 2, 9, 11, 19]. Music choice can also be used to establish, reinforce or undermine group belonging and other social relationships [7, 11].

Music in public places is also significant to people, being appropriated as a device for structuring social action. All types of music have certain connotations and physical characteristics that suggest appropriate ways to behave, relate, and even the right topics of conversation. The musical ambience created in a public place can therefore be used to get people in the right mood for behaviour within those social settings. It provides cues that help people understand the meaning and character of the place and the particular occasion [6].

Given these influences of music, control over the music in public spaces is an important concern from the perspective of both the owners and the users of the space. Technology plays a vital role in shaping the way music is controlled in these public settings, with different affordances for how control is distributed and managed across both patrons and owners of a particular space. For example in a public bar, a hi-fi system behind the bar maintains all control over the music with the owners of the bar. This allows the owners to present a certain musical identity and atmosphere to the clientele but limits the opportunities available to the clientele for influencing social interactions and relationships through music choice. Conversely, a Jukebox relinquishes some of this control over music to individual patrons of the space, albeit from a pre-set pool of music. In this case though, the music choice of particular individuals is subsequently imposed on the rest of the clientele in that space.

New Ubiquitous Computing music technologies are emerging that offer a more democratic music choice that reflects the ongoing musical preferences of people within a particular public space. For example, in Music FX [17], active badge sensors are used to detect which people are present in a gym. Using pre-existing profiles of the musical preferences of all those individuals present, the system determines a suitable music choice based on the overlapping set of preferences. Another system, HPDJ, [3, 10] uses sensors to determine physical and physiological responses of a crowd to the music and uses this feedback to automatically sequence and mix the music in nightclubs.

While these technologies can successfully determine a democratic choice for the music in public spaces, the emphasis is on *outcome* alone. Through automating the music choice the “disappearing computer” in these examples removes the very *process* of choice. Yet this process can be an important context for social value and experience. The *process* of music choice offers a point for social engagement with music as a cultural object. It is through such acts of engagement that the social importance and meaning of music can be manifest in everyday life [19, 4]. In this respect we do not want the computer to disappear but rather offer possibilities for such engagement.

In this paper, we present Jukola, an interactive MP3 jukebox that allows *active* and democratic participation in the choices about music in a public place. In contrast to many of the emerging generation of MP3 jukeboxes (e.g. eCast NetStar), which offer much the same functionality as traditional jukeboxes, Jukola uses a combination of public displays and wireless handheld technologies to allow nominating and voting for songs to be played in the public setting. Music choice through nomination and voting in this way is designed to allow a much greater social engagement with the music and the social values this produces (compare engagement created by related voting based technologies such as Active Class [18] and the recent phenomenon of TV SMS voting [e.g.12]).

JUKOLA

Jukola is made up of a number of different components which all afford different levels of control over the music choice. Music is stored as MP3 files in a database on the main unit that also comprises standard CD ripping and MP3 collection management software. Being connected to the Internet, the device also retrieves from freedb.org and amazon.com, related information and images about the song, such as artist and album names and collaborative filtering information (e.g. “people who like this song also like these artists”). The owner of the space creates an initial pool of music and organises it into different collections that can be activated according to the musical ambience appropriate for that space at different times of the day or week.

The main Jukola unit serves various different clients over a wireless network. The first of these is a 15-inch touch screen display that is situated in the public part of the bar (see figure 1).



Figure 1. Touch screen public display for nominating songs in the bar.

The interface on the public display (see figure 2) essentially allows clientele to browse through the music collection and nominate songs to be played by pressing on them.

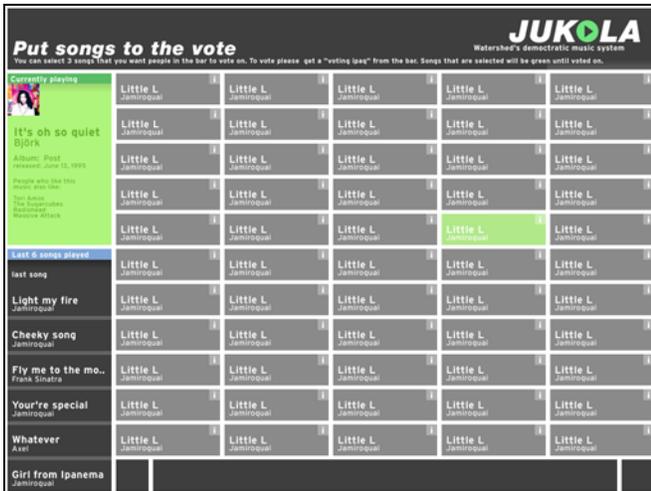


Figure 2. The interface for the public display.

A nominated song remains highlighted in green so that other people coming up to the display can see what others have chosen. Unlike a

traditional Jukebox, the nominated song is not guaranteed to be played. Rather, it is subject to voting by other people in the public space. The interface also presents information about the song that is currently playing (top left of figure 2) as well as a short history of the recent vote winners (bottom left of figure 2).

The main unit also serves numerous handheld clients (HP iPAQs) distributed on the tables throughout the bar (see figure 3).



Figure 3. The handheld client used to vote for next song.

The interface on the handheld client presents four candidate songs for the next song to be played. These candidate songs are drawn from the list of songs nominated on the public display as well as at random from the selected collection (the ratio of random to nominated songs is dependent on number of songs currently nominated). While the current song is playing, anyone in the bar with access to one of the handhelds can register their vote simply by touching on one of the four candidate songs. Each iPAQ allows one vote per voting round - a voting round being the duration of the song currently playing and represented by a timeline at the top of the display. A vote can be changed at any point during the voting round. The percentages of votes for each song are presented dynamically throughout the duration of the voting round so that people can monitor ongoing voting performance. The song with the most votes at the end of a voting round is the song that then gets played. The handheld clients also display information about the currently playing song. Further information about each song can be found by pressing on their respective “i-buttons” (at the top right of each candidate song). This includes information such as the album from which the song is drawn, release dates and information about related artists.

The final component of the system is the web page. The web page provides a playlist history of the songs played by Jukola on any particular day (see figure 4). People simply click on the day in which they are interested to reveal the playlist for that day. One aim here is to provide people with some sense of the musical ambience for the place. A second purpose is to allow people who have previously visited the bar to reminisce about the music played on a particular evening when they visited the bar. This draws on findings in the sociological literature about how people use musical references to talk about particular occasions and events of special importance to them and friends who may have been there with them. “This is our song” is a canonical example of this type of

activity. The same playlist also provides a vehicle by which songs can be hyperlinked through to on-line vendors such as Amazon.com (this draws on observations from earlier field work on lost impulses whereby people hear songs in the environment they wish to buy but then subsequently forget about them when an opportunity to purchase arises [e.g.15, 16].



Figure 4. The web interface.

The second key feature of the web page is a music upload capability that allows the broader community to contribute to the general pool of music in the Jukola database. MP3s can be uploaded over the Internet to the Jukola system within the obvious confines of copyright laws. For the purposes of the field trial, copyright restrictions essentially limited this feature to unsigned bands that wanted exposure for their material. However, there is no reason why, with the appropriate royalty payment mechanisms in place, such a feature couldn't be extended. A vetting procedure was used by staff to check an uploaded MP3 file before admitting it to the Jukola database and an appropriate collection.

THE STUDY

In order to understand the experiences of using Jukola in a public space we conducted a field trial over the course of a week in the café bar of the Watershed - a local arts and digital media centre in Bristol. Prior to the installation of the Jukola system, ethnographic observations and interviews were conducted to ascertain background context about the Watershed, such as atmosphere of café/bar during different times of the day and week, the range of clientele and their activities in the bar. Interviews with the bar staff also allowed more specific details about the use of music in the bar and how they manage it.

For security purposes during the trial, people needed to register to use one of the handhelds. This took place either at a dedicated registration desk or in situ at people's tables. People would then return the handhelds to the registration desk at the end of their evening along with a questionnaire they had been asked to complete.

Observations of people's interactions with the system were conducted throughout the week. Where possible video recordings were made of particularly interesting interaction episodes for further analysis. In depth interviews were conducted with clientele, both as groups and as individuals. These were conducted in the bar wherever people happened to be sitting, during a period of Jukola

use or immediately afterwards. These involved both general questions around their visit to the Watershed and experiences with the system as well as unpacking the details of specific example episodes of use. Where possible these interviews were used to elaborate on specific observations made of the people using the system. There were also opportunities for briefer informal comments to be collected when people returned the handheld units. Short questionnaires were also used to find out the experiences of the clientele who had used the Jukola in the context of their particular visit. After the trial, in depth interviews were carried out with the Watershed staff in order to get their personal reactions on the system, their views on the more general impact it had on the café/bar, and the ways in which it had affected behaviour in relation to the way they could manage the music. In addition, logs of the Jukola web page were collected, as were the written comments submitted via the web page.

The Watershed café bar

The Watershed offers various amenities including an arts cinema, photographic dark rooms, conference and training facilities and various exhibition rooms. As well as serving people using the amenities, the café bar is well established as a venue in its own right with people visiting there who are not explicitly using the other amenities available.

Because of its status as a media centre, the Watershed, is has acquired somewhat of a reputation for attracting an "artsy", "intellectual" clientele. In actuality, it attracts a much wider diversity of people, including students, business people, elderly people, families, individuals, and groups. People in the café/bar read newspapers and books, make notes, eat, drink, talk, meet, find out what is going on, use the internet, relax, use mobile phones and wait (for friends to arrive or a film to start). Many activities are social, typically between acquaintances, although there are also solo visitors. Regulars describe the place as "unusual" in providing a "creative social hub" or a "sort of centre point for activities" that suits "all walks of life". The café/bar starts the day empty, gradually fills until lunchtime, quietens until mid afternoon and then starts to pick up steadily towards the evening. On Friday and Saturday nights, in particular, the venue can be very busy.



Figure 5. The Watershed café bar.

Physically, the Watershed is split into different components: a larger main bar area off which there are an entrance hallway and corridor-type room (see figure 5). The main area in the centre is the largest room that holds the actual food and drinks bar. Small tables

are located along the main wall, throughout the room and on the raised platform. The tables are small, but can easily be pushed together to accommodate larger groups. There are standing areas immediately in front of the bar and between some of the tables. There are various other supportive surfaces and shelves on which standing people can gather round and rest drinks. There is also an interactive table surface from which people can surf the Internet and check email. The walls are adorned with classic images from cinematic history as well as posters for upcoming films to be screened there. Scattered around the various surfaces are leaflets and postcards advertising upcoming exhibitions, films, conferences and courses. Further tables exist in the entrance and corridor rooms. Music in these areas is less audible than in the main area.

Music control in the Watershed pre-Jukola

Music is played in the Watershed café/bar almost constantly. Prior to the installation of Jukola, the music was based around a standard tape deck. Any member of (bar) staff was allowed to choose a tape to play, though some individuals were particularly involved and the duty bar manager could veto anything they felt inappropriate. The staff was adept at using a combination of volume and genre to achieve the right atmosphere and level of social control.

The tapes played are either whole albums or compilations that have been specially constructed by some of the bar staff with a particular interest in music. The choosing of albums and the construction of compilations are done with a great deal of pride and passion. To a certain extent, some of the bar staff regard themselves as arbiters of good taste and very much enjoy talking about new music.

“We do play a lot of very interesting music, not very well known music, a lot of underground stuff, that customers really get off on and come up to the bar and say look what the hell is this it’s brilliant, where can I get this, who’s it by. Not introducing them to new styles of music necessarily, but just stuff that they would love if they’d heard, you know no one’s ever played it to them before, but it’s right up their alley and they can’t believe they’d never heard it.”

To facilitate the choice of appropriate music, the tapes are organised according three colour-coded categories loosely designating when they are supposed to be played – “Green” for the daytime, “Yellow” for weekday evening, and “Red” for Friday and Saturday nights. “Green” music is subdued and relaxed background mood music and more “middle of the road”. “Yellow” music is slightly more upbeat and “Red” is livelier still. Editorial control now resides with one bar manager who takes considerable pride in this task.

Some of the music savvy bar staff enjoyed the fact that they could control the music both in terms of creating the mood for the café/bar and in terms of what they personally wanted to listen to.

“We all bring our own tapes in and as long as they are acceptable we are allowed to play them. That’s one of my favourite things about the job, having input into the music myself... I bring in my own tapes and they are exactly they are really wicked journeys of music. I get a lot of pleasure from listening to them in the [bar]...I do put a lot of tapes on here, more than most people. It is the control; it is because I can decide what I want to listen to. Not as much here as it would be at home when I am really listening to it. Most people here don’t care as much as I do. They won’t run to the tape player as soon as the tape finishes.”

There is an inherent tension here in controlling music for the clientele and controlling music for themselves. In particular because of the broad range of visitors there were limitations on the types of music that would likely be deemed acceptable. As the bar

manager with editorial control said:

“At the end of the day any given day of the month there are people here who have come to see a film, there are people here for a conference, and there are people here for a managers meeting. If there is something on that is really, really, you know, off the wall, a bit unusual, I am going to hear about it it’s me that the complaints come back to... it’s not just a venue for music! If we were a venue that was specifically set up to play music for people then brilliant...we are a bar within a media centre and we have to think of all the customers, that’s why for instance in the day we keep the music very middle of the road.”

Ultimately, the view of the senior members of the bar was that:

“You have to look at it at the point that the music is there for the customers not the employees. In the end although I pay attention to what the bar staff have got to say, it’s not my overriding concern. It’s what the customers think that is more important to me.”

Clientele control of the music with Jukola

With the installation of Jukola the control over the music was no longer completely in the hands of the bar staff but rather was distributed across both staff and clientele. One of the primary reasons people gave for enjoying Jukola centred around music control and a sense of being “involved” in what music was played.

“If it is just down to people behind the bar you can just walk in and think oh my god. At least you have, even if they have decided what goes on at the server, you have a little bit of sway to get it round to what you want to listen to”

“You are never going to keep everybody happy. But at least if people feel they have some control they are less likely to complain about it.”

This notion of control here goes beyond simply the notion of music choice in purely *outcome* terms. It is necessary to consider more broadly the whole *process* of choice that people go through rather than simply the *outcome* of the choice. It is in this broader *process* of music choice where there is a rich source of social value and interaction. The ensuing discussion centres on these values.

Voting and nominating as group process

While handheld devices are usually seen as individual resources, with the Jukola system they were typically observed being used as a shared device among a social group of people sat around a particular table. So while it was only 1 vote per iPAQ, this vote got shared among a particular group. As a consequence a particular vote for the next song was something that was negotiated among the group. The possibilities for the next song, then, became a point of discussion for the group: a key reason cited why people enjoyed Jukola. Being a group resource, they typically remained vertical in their cradles on the table creating a persistent visual display that a group could look at. People were observed pointing to the handheld displays as they talked and would lean into the device to focus their visual attention and help orient the attention of others to what they were looking at (see figure 6). People talked about which of the song options they recognised or didn’t recognise, which one should they as a group vote for, which ones they thought would win.



Figure 6. A couple sharing the device while discussing their vote.

While the handheld units were able to be positioned around other artefacts such as glasses and plates to allow multiple people at the table to view, there were times when some people in the group could not see effectively as a result of their position. For those in the group who couldn't see the screen where it was positioned, people commented it was more difficult for them to get involved with the voting. In response to this people made explicit efforts to get involved. For example, people facing the back of the handheld displays were sometimes observed trying to lean over the top of the handheld in order to get a glimpse of voting options. Other groups would explicitly read out the options so that everyone would then comment.

“OK so we've got Baby Mammoth, Ultrascene, Thievery Corporation and Beth Gibbons”

Of note here was also the micromobility [14] of the handhelds around the tabletop which played a role in organising the negotiated voting process. There were occasions when people were observed reorienting the cradled devices to allow others to see the information necessary to make a vote, or even to explicitly hand over temporary control of the vote to someone else in the group:

“You could have it in the middle of the table so that you could swivel it round – if it was attached to the table but could swivel.”

INT “So you've actually been moving it around?”

“Yeah we've all been looking at it. We've been fighting over what to vote for”

INT: “So why have you been moving it around”

“We all want to view it at once – we have to ask each other what is on the screen”

“To see who is winning.”

The relatively limited interaction possibilities and shallow hierarchy of the interaction architecture on the handheld client were also key here. While some individuals using the handhelds expressed concern about limited functionality and interaction possibilities of the devices, enhancing these would have damaged them as a social resource. For example, the limit of 4 candidate songs created a focus for the discussion, while the limited possibilities for interaction kept the main voting page available for the majority of the time creating a persistent conversational resource for the group.

Maintaining group cohesiveness was an important factor here. In this respect, a key feature of the handhelds was the ability to exercise influence over the music choice from the tabletop. This

was not simply an issue of convenience but more the case that it allowed ongoing music choice for groups of friends without having to disrupt their physical cohesiveness around the table and the social relations this entails (cf [13]).

The interaction with the handheld displays did not require the continuous attention of the people using the devices. People were seen to drop in and out of interaction with the device as other tasks and activities demanded more or less attention. There were numerous observed examples of conversational threading back and forth between Jukola-based content and other topics of conversation. These shifts were observed to occur around points of information change in the interface such as a new round, a winner announcement or an update in the voting progress.

... “Oh oh oh next one is coming guys” “so what is coming up” “we have got DJ food...I'm not fussed on any of them”

Glance monitoring of the changes afforded by the persistence of the vertical handheld display on the tabletops encouraged this type of behaviour.

While these observations indicated successful foregrounding and backgrounding of Jukola-based interactions, some of the interviews highlighted that this interpretation was only partially correct. That is, a number of people independently commented how they had actually found the handheld at the table difficult to ignore – particularly with the novelty of initial use. They found that their conversations seemed to gravitate too strongly towards the content on the handhelds. For them the device was foregrounded too much.

We've both been having lots of fun with it. We both keep looking at it instead of having a conversation.”

INT “Is it stopping you talking”

“Well kind of but we are starting to have conversations now and occasionally glance over”

“Sometimes you feel a little kind of rude looking at it because you are not listening to what other people are saying – but its quite nice as well”

Collaborative nominating

Nominating music on the public display was also something done in small groups as well as by individuals. Collaborative browsing of the music collection and discussion over what should be nominated was observed throughout the week. People would also use the display to see what other people had nominated. Again, as can be seen from figure 7, people would point to the display as they were talking and orient the attention of others to the content on the screen.

For some groups in particular, the process of thinking about the different nominations became very engaging. In one instance, where two friends were interacting with the public display, one of the pair was observed pointing to a song on the screen and acting out a dance along to it as though it were actually playing.

In contrast to the ongoing use of the handhelds at the table, the use of the public display was something an individual or a group would do only once or twice during the evening. This was due to the effort of going up to the display and the fact that it meant breaking up of the group configuration at the table. So, when people did go up to the public display, they would spend time there and nominate a collection of songs as opposed to going up more frequently and nominating an individual song. What was notable, though, was that the public and handheld components were used together by people as a system rather than in a mutually exclusive manner. For

example, the nominations that people made on the public display were not just a conversational resource while at the public display but became a topic of conversation for people on returning to their tables. People would talk about their nominations with the rest of the group on the table and look out for their nominations appearing in the options for next song.



Figure 7. People using the public display as a shared resource while discussing what to nominate.

Identity and group belonging

A key issue in the musicology literature is the relationship between musical preferences and identity and the way people use music as a means for defining and affirming group belonging and non-belonging. A key value of the Jukola system was that it provided people with the keys to be able to express information in relation to their individual and group identity. This occurred at the public display, where small groups would gather round the display to discuss which songs to nominate or comment on the highlighted nominations of others. It also happened around the handheld computers during the previously mentioned discussions of candidate songs or ongoing monitoring of voting. Such identity conversations were not just about music genre associations in which certain choices would be praised or denigrated but also more general identity characteristics such as age and race. For example

“I thought it was a reflection of the time of evening we got to that we were getting to tracks we didn’t know at all – whereas earlier in the evening there was stuff the old people knew well” – [laughs at their mock oldness]

Some of the musical discussions were references to a group’s past using them to affirm group bonds and friendships:

“If we had those [songs] it would be like oh yeah do you remember this tune – we were out 2 years ago in Southampton and we heard this track – it was wicked man -and then voting for it to come on sort of thing.”

As well as within-group identity and group affirmation conversations, people also commented how knowing what was playing and what people were voting on helped them understand something about the identity and tastes of the other people in the bar.

“It’s kind of a fun game to see what everyone else is voting for... It’s just interesting to see what everyone in here likes. I was quite surprised Coldplay got played”

An important feature of this identity understanding was the linking between the online-networked information about voting progress and the other attributes (e.g. clothing styles, age) perceived about people by virtue of being collocated in the bar. In this respect, it was not just the networked nature of the technology that played an important role but also the way in which it was situated within the physical environment. More explicit associations were also possible as a result of the presence of the handheld displays on the table that advertised to others in the bar something about the people on that table.

“In the same way as wearing band tee-shirts or labels or something, what your table says is saying something about who you vote for on the jukebox which generally people like don’t they – to advertise that about themselves...and then there would be all jokes – you’d nip over to someone else’s table to vote for the Britney songs – you wouldn’t want that on your own.”

People were also trying to explicitly link the online voting feedback with physical behaviours in the environment in order to determine which specific groups or individuals were voting for a particular song. The following quote shows how one group would look out for when other groups pressed the handheld displays and then determined what they voted for by looking at the changes on the handheld displays.

“And also at the beginning when there weren’t that many people around you could tell who on different tables would vote for what because you would see them press the button and then you would see that your screen had changed and you’d think ahh you know what they are like”

At a broader level, the whole concept of choosing music together with other unrelated people in the bar, actually created a sense of belonging to the bar’s community and feeling part of a shared experience.

“It creates a nice kind of group feel to the place. It brings the whole bar together. You are all playing the same game. The group thing outweighs the definite choice thing you get with a normal Jukebox”

“I thought aswell if you are in a busy bar and everyone has got there own one then it makes it quite interactional. It makes you feel like your part of space – and other people you can go and talk to other people and go oooh I’d vote for that too.”

Tactics and strategy in voting

Voting behaviour was not simply restricted to choosing the favourite song on the list but rather there were many examples of more strategic voting going on - this was a source of fun and engagement for people. People would use the real-time feedback on the handheld displays about percentage vote distribution across candidate songs and used this information to make choices about how to vote.

“You sit down, you think well that is ok I can vote on the songs and they you notice that you have got all sorts of fun stuff like see how other people are voting so you can tactically vote. I love the way that it does the count down thing so it knows how long the MP3 is so it counts down to when you can vote on the next thing.”

For example if a song that was disliked looked like it was going to win, people would vote for anything else that would have the best chance of stopping the disliked song coming up. Comments were made about how people did not want to “waste” their votes. So, if the song they actually wanted did not look like winning people would vote for a second favourite where their vote would actually count towards influencing the music. Votes were thus sometimes

changed throughout the voting cycle. With this in mind timing became an important issue to some people who used the system. Some voting at the beginning of a cycle was done simply as a bluff in an attempt to influence the behaviour of other people in the bar with the full intention of then shifting votes at the last minute to gain a desired outcome. Ongoing monitoring of the votes was crucial to this kind of behaviour. People would make attempts to work out how percentages converted into actual voting figures allowing them to make more informed choices about their strategy.

“I wanted the Ozomatli song and I’d seen it had come up earlier and we’d lost out on the vote that time and I realise that this time the way it was working was that everyone was getting just one vote so if we’d have put our vote on Ozomatli then we’d definitely get it – so we were doing tactical voting.”

There were even examples of within-group strategic voting in order for an individual to gain control over his/her group’s voting resource. One group described this as Stealth voting:

“And once we’ve voted for something we need to keep an eye out for stealth votes – for when the time is coming to an end and people doing last minute votes...people on this table actually will sneak it away from somebody at the last minute to change the vote.”

Competition and game playing

A common theme that emerged in the interviews was the notion of friendly competition and winning and losing. The activity of voting was something that was appropriated for game-like social behaviour.

“Its like musical bingo, a competition to see which tune wins – yay.”

If a person voted for the eventual winner they seemed to feel a sense of pride about the fact that they were able to select the winner. They also expressed a mild disappointment about the times when they kept “losing”.

“Its so disappointing when you lose.”

There was a sense that the voting was something that they should be good at rather than simply a means by which they could democratically express their choice preferences about the music. In this respect, the experience of voting on the music can be seen to be a richer experience than it might at first seem. Part of this was the sense of playful competition and part relates back to the issue of how music can define group belonging and non-belonging. This could be seen in people’s expressed sense of pride when someone commented positively on their music nominations and choices.

The prospect of winning and losing created an ongoing sense of anticipation throughout the voting cycle. In the same way that backing a particular horse while watching a horse race creates a sense of tension and fun so to did the ongoing voting feedback. Some people would monitor the votes because of this fun sense of anticipation. This became more notable as more handheld computers were distributed throughout the bar, the greater number of voters creating a much more dynamic scenario. Some groups played prediction games focusing not just on their personal choice but also on the competition of guessing which song would eventually win.

“We were predicting weren’t we – saying well that one will win probably because that one we’ve heard of...We just kept on saying right well we think that seeing that it’s a Massive Attack song it might get voted but no wait a second its from the new album so they wont have heard it.”

The playfulness of the voting became so compelling for some

groups that it even came to dominate over the music itself:

“The other thing that we did find at first was that it was sort of distracting because we cared more about what we were voting for rather than listening to the song that had won the vote. So sometimes we would get the song on that we wanted and it would be great but we didn’t care. We weren’t listening to the song we were voting for the next one.”

Other game-like social behaviours were based around the relationship between nomination and voting behaviours. For example, upon returning from nominating some songs on the public display, one woman commented how she just wanted to see whether her partner would be able to guess which tunes she had nominated when they came up in the candidates list. Some people played friendly sabotage games where they would deliberately vote against the songs nominated by a group member or vote for the least popular song simply to “wind people up”.

“I nominated my eight favourite tracks and then they conspired against me and voted for the other stuff.”

The ability to appropriate the device for these simple game-like behaviours gave the device a sense of fun for a wide range of ages providing what one father with his family called a “common ground for the Big Kids and Little Kids”.

Learning about and experimenting with new music

One of the key values of the system was learning about new music, with both the public display and handheld displays playing their own role here. Most obvious was the information about the song currently playing, shown on both the public screen and the handheld computers on the tabletops. This was valuable to people in two ways. First, in putting a name to the song being played that they had heard before or simply liked:

“That part was interesting – hearing something and then seeing exactly who the artist was being able to see that in front of you.”

Second it put a song to a name they had heard about:

“Oh Amon Tobin...A mate in Reading has a couple of his albums but this isn’t quite what I was expecting – I was expecting something a little bit more up beat and weird but fair play.”

Glancing at the handheld displays on the tabletops provided a low effort, ready-to-hand means by which this information could be found without being disruptive to ongoing activities in the bar. One woman commented that while she really loved music she no longer had the time necessary to invest in discovering it. Having the information in the moment of the song being played would allow her to learn enough to subsequently go and buy some new music.

The learning about new music was not simply providing visual information about a song in the right place at the right time. Much of the value in relation to learning about new music was derived from the voting process itself.

“[It] makes me more aware of the music, which I tend not to pay attention to – this is a good thing!”

The engagement with the task helped people to process the information such that they could remember it more:

“You automatically remember stuff you voted for (committed to it). Because you can bring up extra information as well.”

There was also evidence for more experimental voting behaviour explicitly for the purposes of finding out about new music.

"I think initially you go for whatever you know but after a while you try new things – I mean when the mood changes. I think on the big list you go for what you know but then when you've got a list of 4 songs you kind of think well maybe you don't know any of them so randomly try that or. So I voted for one where I thought well I've seen posters for them and somebody mentioned them and I don't think it's the kind of thing I'll like but I'll try it and see what they are like. So that was good – it's a bit of both and that's what's nice about it. You've got the balance between just you voting for things that you know and your choices but there is also a bit of experimentation and that's a nice balance."

What is important here is how information provided in the song candidate list gets interpreted within the context of a rich source of knowledge about music picked up by individuals and groups outside of the context of the bar. For example, friends' music collections, reviews in magazines, posters, and word of mouth, were all examples of people linking the information about a song with a broader context of music knowledge.

"I was quite interested because there was a Belle and Sebastian track and I'd read about the album and I'd wanted to hear about it so I was impressed but no one else voted for it"

The collaborative filtering information (people who like this song also like these bands) was also something that fed into people's conversations and decisions about voting and was particularly important for unknown and unfamiliar bands. This helped encourage people to occasionally try new things out.

"I like the bit on it that says people who like this also like this like they do on loads of [web sites] because when you think about people uploading their own music or something really obscure on you kind of think how is that going to get any votes but by making those kind of connections then people try it out more."

Trying things out was also something that was afforded by the public display because nominations incurred no financial cost. People commented that this allowed them to be more experimental with some of their nominations.

"I voted for Beth Gibbons. I wanted to know what she sounded like. Because it is free you don't mind. When you are going to put money in a jukebox you always go for stuff you know you like... I think there is a reluctance to try something you haven't heard before."

Related to this was an issue about how for certain individuals the nomination set-up actually reduced the social evaluation apprehension associated with choice on a normal jukebox. Because the nomination was free and because there was a diffused responsibility due to the rest of the bar voting, these particular people felt more freedom to choose experimentally (cf. *Deindividuation*, Festinger, Pepitone and Newcomb, 1952).

While the public display was less ready to hand for people to find out what song was currently playing, the short history of recently played tunes provided an additional resource for finding out about the music played. This recent playlist feature had an important property in that it afforded learning about music with less frequent monitoring. So, if people had not registered the information while a song had been playing, they could still find out something by referring to the recent songs list on the public display. Some of the bar staff in particular commented that this was useful because it allowed them to intermittently look at the display for information while walking by during the course of their other activities.

"It says what is playing it says what has been played. That was really, really good because you can go up and find out exactly what

a tune was, I really rate that bit, and then the fact that it says the last 6 tunes I really rate that as well. Yeah because you hear a tune and you don't get a chance to go up straight away and then you can still find out what it was. That is such a good function, I can't stress that enough because you just don't get that normally anywhere you are, it is such a mission to find out what a tune is. I have written down quite a few tunes and I am going to buy similar stuff I have heard."

Another interesting point about the public display was that they were used by bar staff to steer the music choice in an altruistic sense to inform people about music. For example, they nominated less mainstream songs, styles and artists that they thought people might enjoy listening to that they might not otherwise have tried.

"If there were no nominations on there and it was just on random play, then I would think I know some really nice tunes on there that people would love that won't get selected because people won't know what they are. So I would go on there and maybe just stick a few on. That was more just to get certain stuff played that wasn't getting played because people hadn't heard of it."

Contributing MP3s to the database

Away from the physical setting of the Watershed bar, the ability to upload MP3s to the device over the Internet provided interesting opportunities for people to extend the process of music choice. This idea generated a lot of interest among the clientele and staff:

"The upload thing has caught a lot of people's imaginations. We are probably going to stick with the uploads because it is just such a nice thing to do."

Numerous local bands uploaded their own MP3s to the database which, an impressive outcome given the relatively short duration of the field trial.

"This is a great idea. About time Bristol-based musicians had a platform like this."

While the web pages allowed "remote" control of the musical environment, the value of the upload was not purely detached from the physical space itself. Much of the value in uploading songs was still derived from the experience of being in physical space of the bar subsequent to having uploaded something. Some of the members of the bands who had uploaded music would then come into the bar to see if the song appeared on the public display or if it got played. There was excitement at the prospect the song would appear but there was also some expressed disappointment if they found there it wasn't there¹.

Along similar lines a number of people commented how the uploading feature could become an integral part of the night out. Again, the *process* of creating the music for the evening was something that would be inherently social and something tied in to the subsequent experience of being in the physical space of the bar.

"If I was going to come up with some mates there would be a point in uploading something because you think we'll vote for that for the sheer fun of it. I wouldn't do it on my own but in conjunction with other people I probably would do it [upload some music] actually. In fact it could become – its funny, when you think about it, it could become a build up to a night out in a funny kind of way. So you are

¹ The uploaded songs went through a vetting process and so were not guaranteed to appear. Another factor here was that the database was organised into the daytime, evening and weekend collections. An uploaded song might be in the day time collection and therefore for someone coming in the evening when the evening collection is active, it may appear to the uploader that their song is not on the system

getting ready to go out and you think ah lets upload some stuff and we'll vote for that when we get in there."

Staff Control of the music with Jukola

While the experiences of the clientele were positive with respect to Jukola, there were certain tensions created with staff, in particular those for whom musical control was an important part of their identity. One of the key frustrations for the staff was that certain songs would get repeated throughout the day, in particular because of the natural tendency for most people to vote for the familiar.

"One of the worst things is you get tunes playing over and over again. As a customer that is not a problem, because you are not here all day, but as a member of staff you are here all day and you don't want to hear let's get it on by Marvin Gaye once every 45 minutes whether it's a good tune or not. That is one of my biggest criticisms of it. You could certainly reduce that problem."

The issue here is not simply about the frustration of hearing the same song but also that certain staff members felt a certain pedagogical drive with respect to music. In order to buy back a certain level of one bar actually switched the public display off for a while to prevent clientele from nominating for a period. This allowed a more random set of songs from his music collection to be played. On a small number of other occasions the same staff member found ways to buy back control by repeatedly clicking the emergency song-skip function until he found a song he wanted to hear:

"I would just let it play through, but if I had a spare minute then I would go and click next until a song came on that I would want to hear and then I would go oh yeah, that's a brilliant tune, let's have that, turn the volume up."

Practicalities of collection management

The system had offered the staff a level control over the music via the collection management functionality. This is something that could have alleviated some of the frustrations with song repetition by having larger collections and more regular changeovers. However, for a week-long field trial of the system there was limited time for the staff to invest in creating a really extensive collection and maintaining it creatively in an ongoing manner. For the trial, the benefits of this behaviour did not justify the effort but there was evidence that this would emerge over time and that staff would enjoy a more creative engagement with the device.

"If I had all the time in the world I would go to town. I mean I love music it's a big passion and a hobby of mine. I would create all sorts I'd have collections that were randomly selecting from a huge pool of tunes that were all appropriate to a certain time of day, you would have ones where you create special playlists, where you go right, it's really buzzing in here now, let's have that special party play list that you only play when it's really buzzing in here, play entire albums...have a Thursday line-cleaning play list just for Simon that's just full of hippy music that keeps him really calm when he's cleaning the lines."

But there are also some design issues to explore here in order to facilitate some of this behaviour. Staff for example, tend to manage and create new musical content during their spare time be it breaks during the workday or at home. Facilities for remote collection management would be worth considering in the same way, as there is the possibility for remotely adding MP3s. Secondly, content management would need to take place while the Jukola is active. This would require a facility for listening to content for the purposes of organising music while it also plays a different audio stream in the public bar. Third, more control needs to be given over to the order of music play order to allow staff to sequence music

like a traditional DJ. Their comments implied that this was something they would like to do.

"On a Tuesday afternoon I would sit back in the back office and create a little play list for this coming Friday night and handpick maybe 20 MP3s and put them in a really good order so you get a nice build up."

DISCUSSION

By providing different ways for tightly and loosely coupled groups of people to interact around music and choice – through negotiation, discussions, learning and playful competition – Jukola provided new structures on which social interaction in a public setting could be built. There are several significant characteristics of Jukola that facilitated the experience and that can offer more general design insights for technologies in socially oriented public settings:

- The handheld was primarily a group rather than individual resource. Crucial to this group use was the vertical cradling of the displays on the tables, narrow scope of song choice and shallow information hierarchy – all creating a focal point around which social exchanges and conversations among tightly coupled groups could be built.
- The physical position of the handhelds on the tables respected the natural social interaction that occurred around tables in the bar and the physical cohesiveness of the groups that creates a social intimacy.
- The networked connectivity allowed information to be communicated and understood between loosely coupled groups on different tables. While minimal, this information was nevertheless sufficient for people to make interesting social inferences about collocated others. It is the combination of online connectivity and physical collocation that created a powerful sense of community.
- The task did not require continuous attention for a successful outcome allowing it to be foregrounded and backgrounded during the course of other activities in the bar. This facilitated its ability to fit in with the traditional social behaviours in the bar.
- The experience with the device was not isolated in time and space but rather threaded into people's experiences before and after their visit to the Watershed. This was created explicitly through the upload and playlist review/purchase features of the web page. It was also created more implicitly through the other musical knowledge sources and context brought to the task and then taken away again through the learning and experimentation facilitated by the device.

In conclusion, the paper has presented a ubiquitous computing technology for democratising music choice in a public setting, providing some level of control both the owners of the space and its clientele. What we hope to have shown through the fieldwork is the social values of designing a system to enhance experience of music choice in a public setting, not just in *outcome* terms but also in terms of the choice *process*. Such a shift in perspective, we believe, has broader implications for the design of other ubiquitous computing technologies in social environments.

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