

# **SAME**

D5.2 FIRST EVALUATION REPORT 1 (42)

Sound And Music for Everyone Everyday Everywhere  
Every way

S. Oksanen, J. Kleimola and V. Välimäki (Eds.)

31 Aug. 2009

# **SAME**

## **D5.2 FIRST EVALUATION REPORT**

<i>Version</i>	<i>Edited by</i>	<i>Changes</i>
V0.1	Sami Oksanen, TKK	Data tables, introduction and appendix
V0.9	Sami Oksanen, TKK	First full version
V1.0	Sami Oksanen, TKK	Final version

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## 1. INTRODUCTION

This is the first evaluation report, which documents the outcome of a special SAME project event, which was organized by IRCAM in Paris, June 16-19, 2009, as part of the Festival Agora 2009.

Project partners designed and implemented nine (9) prototype systems, which were demonstrated for visitors of the Festival Agora, who consisted of the general public interested in the event and of experts. The demonstrated prototype systems are described in detail in Deliverable D5.1 – First Sample Applications.

Questionnaires were prepared for every demonstration. The blank questionnaires are available as an Appendix to this report. The manually filled questionnaires obtained in Paris during the special event were scanned and were made available to all partners via an FTP site by IRCAM. Additionally, audio recording of an expert user feedback session together with video clips and several photos from the event were uploaded to the FTP site so that all partners could access them.

The questionnaires consist of two parts: one general concerning the whole prototype set and another specific to each prototype. In addition, general data about the subjects were gathered, such as their sex, age, nationality, occupation, and various aspects of their musical activities. The demographic analysis of the visitors is presented in Section 2 of this report.

The main purpose of this document is to analyze the questionnaires obtained during the special event. Statistical analysis of all answers is presented in several tables, including the average score and standard deviation for each question. User feedback given by participants is analyzed to reveal their positive and negative opinions about each prototype. Conclusions are made based on these analyses. This user feedback will be used for planning the future steps in the SAME project.

## 2. DEMOGRAPHICS

We collected 39 questionnaires: 26 from the public sessions and 13 from the experts. Based on this feedback, we present first the demographics of visitors for both sessions, and then repeat the procedure for public and expert sessions separately. The presentation for each group is given as a short summary in four paragraphs (background; music making; music listening; relationship with new technology) and as a table of top 3 answers for each question category.

### 2.1 All visitors

The visitors came mostly from EU countries, but there were also attendants from USA, South Africa, Japan and Chile. 87% of all visitors were male, with the average age of 33 (30 median). One third of the visitors did not reveal their occupation, 1/3 were affiliated with the academia, and of the remaining 1/3, most were working as composers or musicians.

About 85% of the visitors played some instrument, and because the average age of the visitor was relatively high, the average playing experience was also quite long (18 years, 15 median). The average hours per day spent playing the instrument was 2 (2 median). Stringed instruments seemed to be the most popular instrument family among those who played – piano was the clear favorite.

Visitors mixed different music genres in their listening habits quite broad-mindedly, for example classical music was listed alongside with genres such as rock, jazz and electronic. 90% of the visitors listened music every day, 36% even several hours per day. Everyone listened to music at least once a week. The most typical listening situations were at home, live concerts and radio, followed by portable device

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(13%), car (9%), club/pub (7%) and discotheque (6%). The music was enjoyed mostly via headphones, computer speakers and stereos. 13% reported using multichannel or 5.1 systems.

We also surveyed how visitors related themselves to the new technology. On a scale from -5 to 5 (dislike/like to use new technology), the average among all visitors was 3.5 (N=31, standard deviation 2.86).

**Table 1.** Top three answers for each category (all visitors).

Category	I	%	II	%	III	%
Nationality	French	44	Italian	21	Swedish	8
Occupation	student	21	composer	16	musician	7
Instrument family	stringed	63	woodwinds	16	pc/electronics	7
Instrument	piano	42	Guitar	14	clarinet + flute each	7
Preferred genre	classical	19	all kinds	12	contemp + electr. each	6
Listening situation	at home	27	live concerts	21	radio	14
Music system	headphones	25	computer	24	stereo hifi	24

## 2.2 Experts

One third of the collected questionnaires (13) originated from the expert session (when looking at the percentage figures below, one should bear in mind that the sample size of the group is quite low). People in this session were all males, with the average age of 37 (35 median). The expert group consisted mostly of composers, primarily from France.

All experts played some instrument, the average experience with the instrument being 21 years (16 median). The average hours per day spent playing the instrument was 2.4 (2 median). The experts were less diverse in their choice of instruments than people attending the public sessions.

The experts were also more focused on their musical taste, mostly inclined towards classical and contemporary styles. They were also very active in music listening (92% listened every day, 31% several hours per day). The most typical listening situations matched those of all visitors, except that they did not listen music at club/pub/disco scenes. Also the music systems employed were similar to the average case, although multichannel use was slightly more popular among experts (20% vs. 13% for the average case).

Experts could be considered as early adopters of new technology, scoring 4.25 out of 5 (N=12, standard deviation 1.48).

**Table 2.** Top three answers for each category (experts).

Category	I	%	II	%	III	%
Nationality	French	58	American	16	Italian/Japanese, each	8
Occupation	composer	36	musician	7	researcher	7
Instrument family	stringed	56	woodwinds	28	electronics/brass	6
Instrument	piano	39	Guitar	17	clarinet	17

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Preferred genre	classical	25	contemporary	20	all kinds	10
Listening situation	at home	34	live concerts	24	radio/portables	16
Music system	stereo hifi	25	headphones	23	computer	23

### 2.3 Public sessions

Two thirds of the collected questionnaires (26) originated from the public sessions. 81% of visitors in these sessions were male, with the average age of 30 (27.5 median, somewhat younger than the experts). The sampling of the nationalities and occupations was more diverse than in the expert group. The largest group consisted of students.

85% of the visitors played some instrument, the average experience with the instrument being 16 years (15 median), which is 5 years less than the experts. The average hours per day spent playing the instrument was 1:45 (1 median), which is surprisingly high. This indicates that also the public sessions were attended by people who were active music makers. However, most attendants had music as their hobby, not as their main profession. Piano was the most popular instrument, but the range of the played instruments was more diverse than with the experts.

Although classical music was also the favorite style of non-expert attendants, they seemed to listen to music that is more of an electric rather than acoustic nature. 88% listened music every day, 38% several hours per day. The most typical listening situations were more social than those of the experts.

The people attending the public sessions were not as keen with new technologies as the experts, scoring 3.05 out of 5 as the average (N=19, standard deviation 3.42).

**Table 3.** Top three answers for each category (public sessions).

Category	I	%	II	%	III	%
Nationality	French	38	Italian	27	Swedish	12
Occupation	student	31	composer/musician/professor/engineer, each			7
Instrument family	stringed	71	woodwinds/computer/voice, each			8
Instrument	piano	35	guitar	6	computer	6
Preferred genre	classical	17	all kinds	13	electronic	11
Listening situation	at home	24	live concerts	20	club + pub + disco	18
Music system	headphones	26	computer	25	stereo hifi	24

### 3. DEMONSTRATIONS

The following nine demonstrations were prepared by the SAME project partners and presented during the Agora Festival. The demonstrated prototype systems are described in detail in Deliverable D5.1 – First Sample Applications.

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**Audio Explorer** is a mobile active-listening application that allows users to interactively de-mix commercial stereo recordings into different channels while being streamed to their mobile devices, also offering interactive re-mixing possibilities based on previously separated channels.

**Fishing Game** illustrates novel technologies on gestural sound control and embodied listening. Pour yourself a glass of champagne or brush your teeth! Mimic one of these actions holding your cell phone, and you'll hear the sound. The system makes use of a gesture recognition and analysis system, driving a sound engine. This illustrates emerging uses of embedded sensors in mobile phones.

**The Grain Stick** installation offers a collaborative interactive experience featuring music by Pierre Jodlowski. One or two participants shake a virtual tube by means of two manual sensors that set off a waterfall of sound grains (like a rain stick) in a sound space spatialized with WFS technology. The sounds of the grains overlap the surrounding soundscape and percussive sounds that are controlled triggered by the users' movements. The virtual stick can be used by one person alone with both hands or by two users.

**The Orchestra Explorer** installation offers an active experience with prerecorded music. Users can navigate and express themselves in a shared (physical or virtual) "orchestra space". Sections or single instruments of an orchestra populate this space that users can navigate by activating and listening to one or several sections of the orchestra. The mobile phones are used to detect the user's movement, to activate and control the music sections, and to present the user's position in the orchestra space on the phone's screen. The music rendering is either based on 3D sound via loudspeakers (using WFS) or on the mobile phone using headphones.

**Sync'n'Move** enables users to experience novel form of social interaction based on music and gesture, using mobile phones. Users move rhythmically (e.g. dancing) holding their mobile phones and the group of users takes part in a synchronization task. The information from this task is measured and used to modify in real-time the performance of a pre-recorded music. Every time the users are successful in the synchronization task, the music orchestration and rendering is enhanced; while in cases of low synchronization, i.e. poor collaborative interaction, the music gradually corrupts, loses sections and rendering features, until it becomes a very poor monophonic audio signal.

In **pyDM: Expressive Control of a Piano Performance** demo, a computer-controlled piano performs a piece of music. This performance is controlled by a mobile phone. Each command on the phone controls different aspects of the performance such as tempo, dynamics, and articulation. These values can be adjusted separately, or grouped together in a dedicated space where different basic emotions can be expressed (e.g. happiness, sadness, tenderness, anger) with a moving dot. The color and dimension of this dot changes according to the emotion expressed. The program can be controlled using a mobile phone graphical interface, or by tilting the phone, as well as by shaking it in different ways to express different emotions.

In **Mobile Expressive Music Performance** demo a mobile phone is used for controlling the emotional expression of ringtones. The user chooses an emotion for his/her ringtone. The ringtone is sent to a server where the ringtone is processed using the KTH performance system for expressive music performance and returned to the user's handset with the desired emotional expression. The KTH performance system controls different aspects of the performance, such as tempo, dynamics, articulation, orchestration, by associating pre-assigned values for each emotion.

**Zagora** is a context-aware mobile music player, which detects the ambient situation using audio analysis and retrieves a playlist of suitable music for you. The Zagora player carries out advanced audio processing to differentiate between situations like street, restaurant, car, office, and meeting, and uses the situation information to filter down an online music catalog. In a few clicks, you are able to see the

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current audio analysis results, generate a playlist online, and start streaming music. Finally, all resulting playlists can be browsed for other similar online music in a single click.

**Mobile Sonic Playground** demonstrates several examples of individual and collective sonic applications using mobile phones as musical instruments and sounding toys. The user interacts with the phone accelerometers and keypad keys, and generates control events that are captured, processed and rendered to sound using the phone embedded Mobilophone framework. Several playing styles and synthesized sound selections are available.

## 4. USER FEEDBACK

In this section the user feedback considering each demonstration is presented. The user feedback was collected using a feedback questionnaire described in Appendix. There was also a version written in French in case needed. Each participant was given the questionnaire and was instructed to fill it during the demo sessions or immediately after the demonstration. The information was collected anonymously; partially filled questionnaires were accepted also.

User feedback of each demonstration is presented as follows. First, a short summary of the feedback with additional comments and observations is given. Next, the related questions are presented with corresponding statistics in tables. Finally, the answer distributions are visualized using box plots.

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## 4.1 Audio Explorer

The application was found to be interesting, and in most of the cases the functionality of the application was easy to understand. When investigating the easy of understanding how the application works, the standard deviation of the answers was higher ( $\sigma=2.62$ ) among the public sessions compared to the expert session ( $\sigma=1.51$ ). The overall feedback considering this application was positively balanced. Both groups considered that they felt being in control of the application and saw that there is possibility for this kind application in the future. The majority of both groups thought that a basic knowledge of separation method and remixing principles would be required to fully enjoy from this application. There is also interest for the possibility of sharing the separation files between the users. The preferred method for separation and remix control parameter adjustment is the device rotation method; the keypad method received also support.

In the future, the users would like this application to have more sophisticated graphical user interface and probably implementation of a multi touch screen control feature. The functionality of this application could be improved by multi track manipulation feature and with more versatile control and filtering options. The future challenges of this application develop further, so that it could be used with any kinds of music samples. The users suggest that possible users for this application in addition to regular people could be musicians, disc jockeys, musicologists. In the future, the application could be equipped with sensitive sensors and could work in real-time, for example while running with every vibration of each step the baseline gets amplified or when people talk to you from the right side you can move the music to your left and not have to stop the music.

**Table 4.** User feedback questions and examined features which were used to gather information from the Audio Explorer demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\Sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	11	2.45	1.51	18	2.22	2.62
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	9	2.89	1.05	15	1.87	1.81
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	11	1.91	1.87	16	2.50	1.71
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	11	1.18	2.14	16	2.38	1.82
	b) Uninteresting vs. Interesting	11	1.73	2.41	17	3.06	1.75
	c) Nothing for the future vs. Something for the future	11	1.27	3.17	16	2.63	2.16
	d) Not engaging vs. Very engaging	11	1.36	2.54	16	1.56	2.13
	e) did not enjoy it at all vs. I enjoyed it very much	11	0.82	2.04	16	2.38	1.71

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**Table 5.** User feedback questions and examined features which were used to gather information from the Audio Explorer demonstration. The multiple selection questions and related answer distributions. Note that one could give answers to multiple options in each question.

Question		Experts		Public	
		N	%	N	%
Q5	<b>Do you believe a "normal" user (alien to separation method/remixing principles) would lack of knowledge in order to enjoy the application</b>				
	a) No	4	36.4	6	35.3
	b) Yes	7	63.6	11	64.7
	Total number of persons who answered in this question	11		17	
Q6	<b>What do you think of the possibility of sharing separation presets between users?</b>				
	a) Good idea	4	36.4	8	47.1
	b) No interest	3	27.3	5	29.4
	c) Don't know	4	36.4	4	23.5
	Total number of persons who answered in this question	11		17	
Q7	<b>Do you prefer separation and remix control parameters to be driven:</b>				
	a) By device rotation	7	63.6	9	52.9
	b) By keypad button pressing	4	36.4	8	47.1
	c) Don't know	1	9.1	1	5.9
	Total number of persons who answered in this question	11		17	

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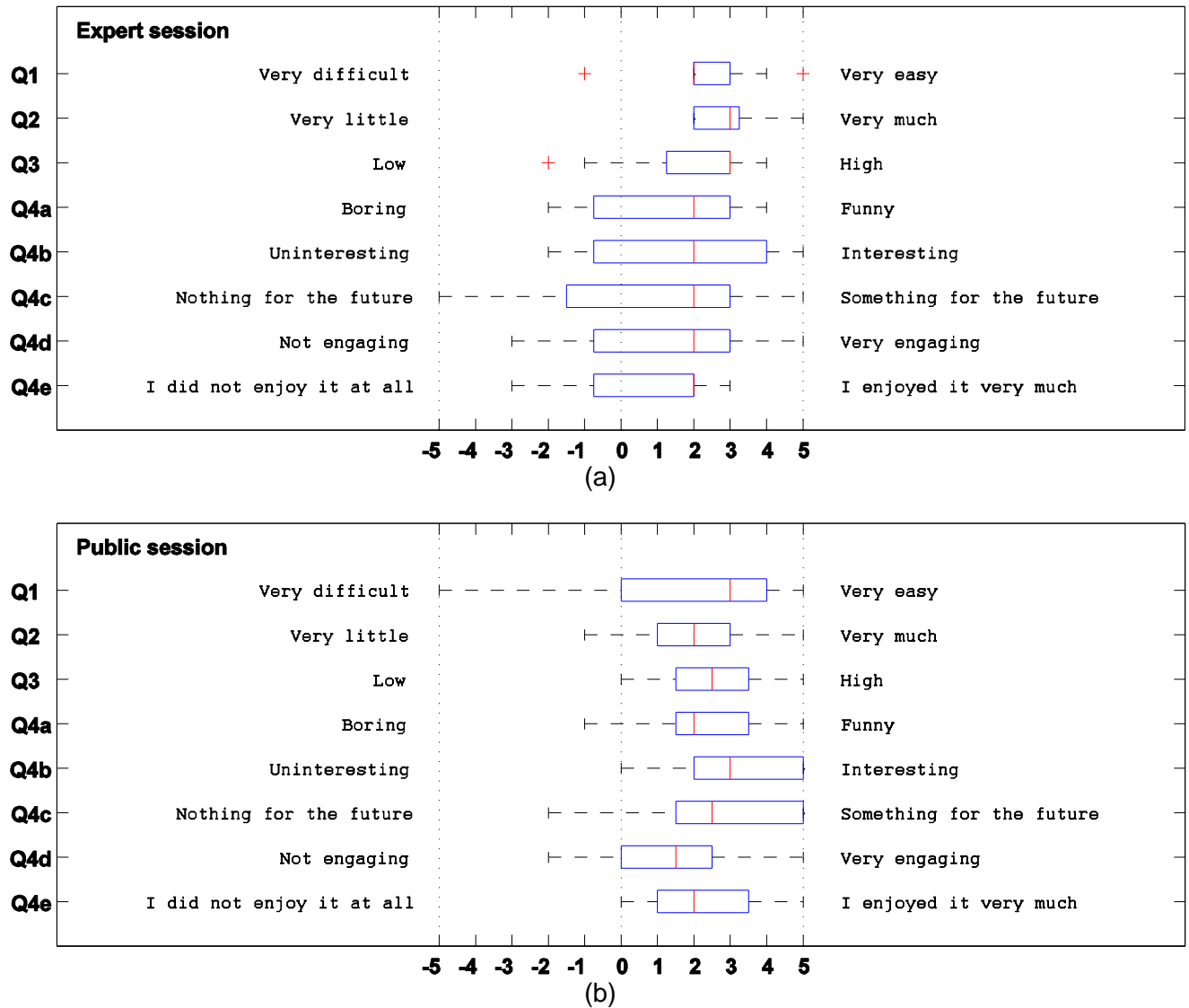


Figure 4 Box plots of the answer distributions for the questions described in Table 4, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

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## 4.2 Fishing Game

Both the experts and the people attending the public sessions understood the operation of the application very well, scoring median 5 for both groups. Even the experts reported themselves to be quite well in control of the application (even more than the people from the public sessions), which was uncommon when considering all the demonstrations. The level of interaction was also highly rated (3.50 on the average for the experts and 2.86 for the public). Both groups found also the application to be interesting and enjoyable. The level of engagement was slightly higher for the people attending the public sessions.

The freeform feedback included answers such as 'funny', 'potential for general public' and 'useful in many games'. However, there was also criticism that suggested that the future work should find proper usage for the application.

**Table 6.** User feedback questions and examined features which were used to gather information from the Fishing game demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\Sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	10	4.50	0.71	15	3.53	2.33
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	10	3.30	1.70	13	2.46	1.66
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	10	3.50	1.18	14	2.86	2.44
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	10	3.90	1.10	15	3.67	1.91
	b) Uninteresting vs. Interesting	10	2.70	1.95	14	2.43	1.79
	c) Nothing for the future vs. Something for the future	10	2.00	3.16	14	2.00	2.66
	d) Not engaging vs. Very engaging	10	1.80	1.99	13	2.46	2.15
	e) I did not enjoy it at all vs. I enjoyed it very much	10	2.10	1.79	14	3.07	1.94

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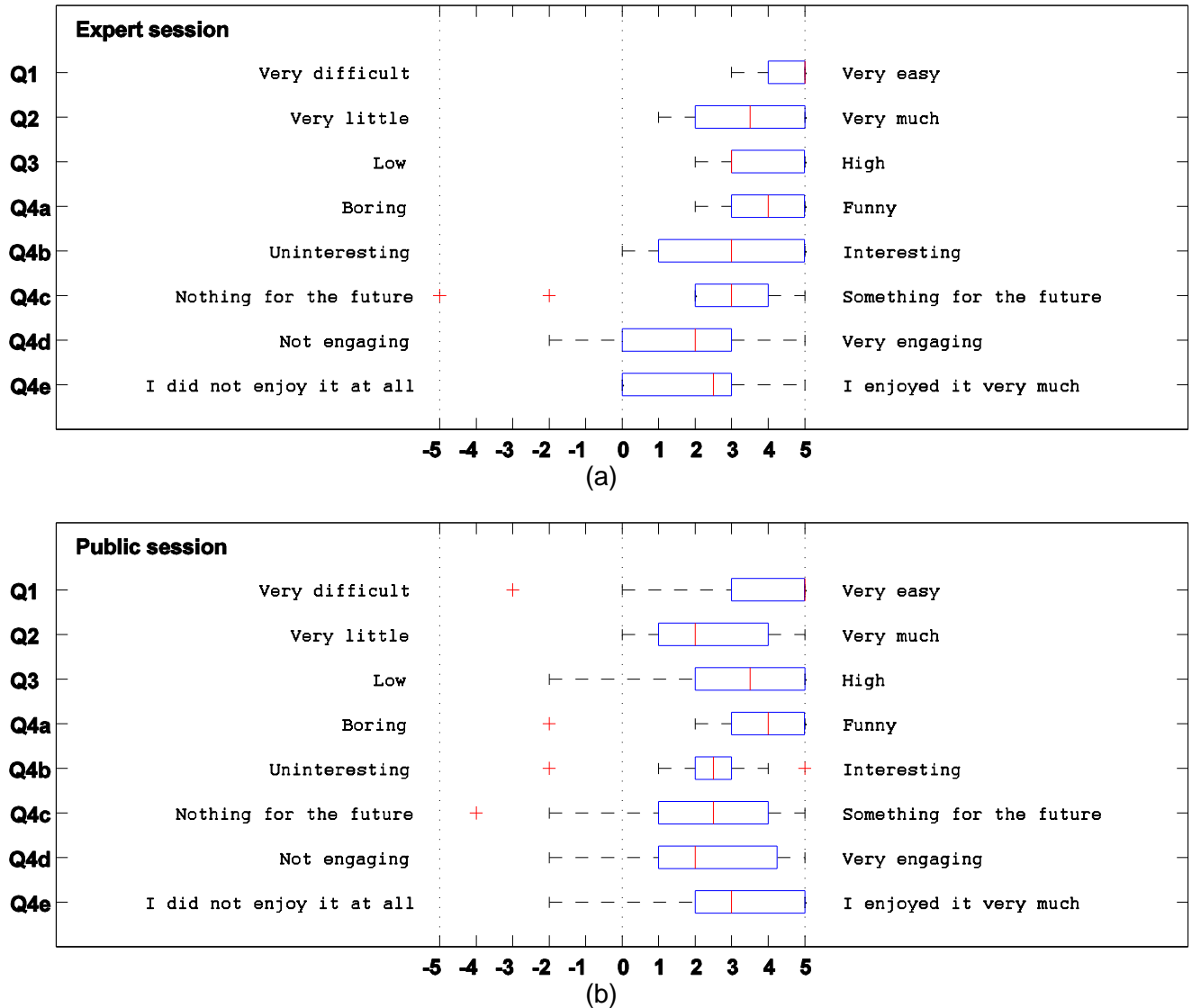


Figure 8. Box plots of the answer distributions for the questions described in Table 6, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

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### 4.3 Grain Stick

The GrainStick received positively balanced answer distributions in both groups. The functionality of the application was easier to understand for the experts (ave=3.33) compared to the public (ave=1.54). Both groups reported of being in control of the application. About 80% of the experts reported of having tested the application, among the public the number was 73.3%. Mainly this application was tested alone, but there were occasions when this application was tested in interaction with another person. Both groups considered that the level of interaction was high. This application was also judged to be funny, engaging and interesting, both groups also saw a potential for this application in the future. Experts reported that with this application, the level of immersion was higher compared to the daily music or film listening experience, among the public there was not a significant difference in the level of immersion in between this application and daily music or film listening experience.

In the future the users would like to have more control of the sounds, such as timbre and pitch. The overall control of the application could be increased by letting the users to place the percussive instruments freely in the sound scenery. This application could be used in addition to personal entertainment in music industry and landscape music creation.

**Table 7** User feedback questions and examined features which were used to gather information from the Grain Stick demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\Sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	12	3.33	1.15	24	1.54	2.21
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	13	3.23	2.09	20	1.95	2.31
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	13	3.54	1.61	22	3.86	1.67
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	13	3.69	1.18	24	3.29	1.73
	b) Uninteresting vs. Interesting	13	3.62	1.19	24	3.96	1.65
	c) Nothing for the future vs. Something for the future	13	3.69	1.49	24	3.79	1.86
	d) Not engaging vs. Very engaging	13	3.85	1.07	24	3.42	1.84
	e) I did not enjoy it at all vs. I enjoyed it very much	13	3.77	1.24	24	3.54	2.11
Q5	<b>How immersive/enveloping is your daily music or film listening experience?</b>						
	No immersion Vs. Full immersion	12	-0.17	2.76	24	2.17	3.03
Q6	<b>How immersive/enveloping would you consider your experience of GrainStick?</b>						
	No immersion Vs. Full immersion	12	2.92	1.38	23	1.52	3.03

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**Table 8.** User feedback questions and examined features which were used to gather information from the Grain Stick demonstration. The multiple selection questions and related answer distributions. Note that one could give answers to multiple options in each question.

Question		Experts		Public	
		N	%	N	%
Q9	<b>Do you feel that you listened differentially to the music of Grain Stick because you were able to control it?</b>				
	a) No	2	20.0	4	26.7
	b) Yes	8	80.0	11	73.3
	Total number of persons who answered in this question	10		15	
Q10	<b>Did you play the Grain Stick?</b>				
	a) By yourself (both hands)	5	55.6	13	81.3
	b) With another person	2	22.2	4	25.0
	c) Both	2	22.2	2	12.5
	Total number of persons who answered in this question	9		16	

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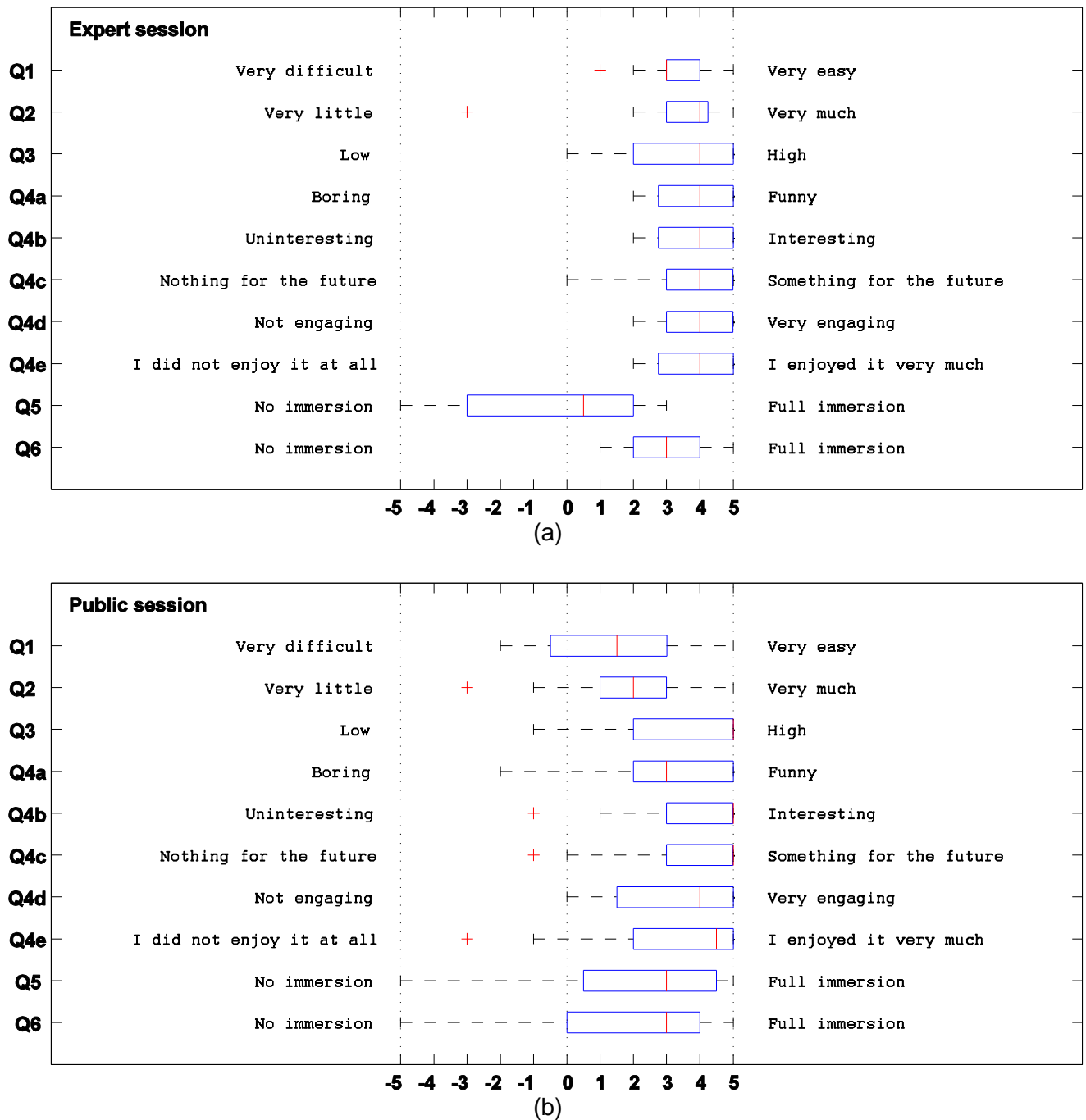


Figure 6. Box plots of the answer distributions for the questions described in Table 7, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

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### 4.4 Orchestra Explorer

The functionality of the Orchestra Explorer application was found very easy to understand among both groups. The feedback suggests that the user feels to be in control of the application, the feeling was stronger among the public. The level of interaction received neutral (average 0.11) overall score among the experts, but higher among the public (average 2.54). The deviation in the answers was much higher among the experts; the public opinion was rather unanimous.

In the future, the users would like to have a feature which enables one to listen to at least two instrument tracks simultaneously to gain more information of the interaction in between. This application could be used for example in educational purposes. The potential users for this kind of application could be students, musicians, disc jockeys and musicologists. The scope of this application is also suggested to be expanded from the classical music into the field of pop music. This would make it possible to use this application in real-time remixing of multitrack recordings.

**Table 9** User feedback questions and examined features which were used to gather information from the Orchestra explorer demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\Sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	10	3.90	1.52	13	4.31	1.18
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	8	1.00	1.93	13	4.15	0.80
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	9	0.11	3.06	13	2.54	1.98
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	9	0.11	2.62	14	2.14	2.28
	b) Uninteresting vs. Interesting	9	0.78	3.19	13	1.77	1.24
	c) Nothing for the future vs. Something for the future	9	1.33	3.39	14	2.86	1.75
	d) Not engaging vs. Very engaging	9	-0.33	3.12	13	1.92	1.89
	e) I did not enjoy it at all vs. I enjoyed it very much	9	0.11	2.98	13	2.38	1.50

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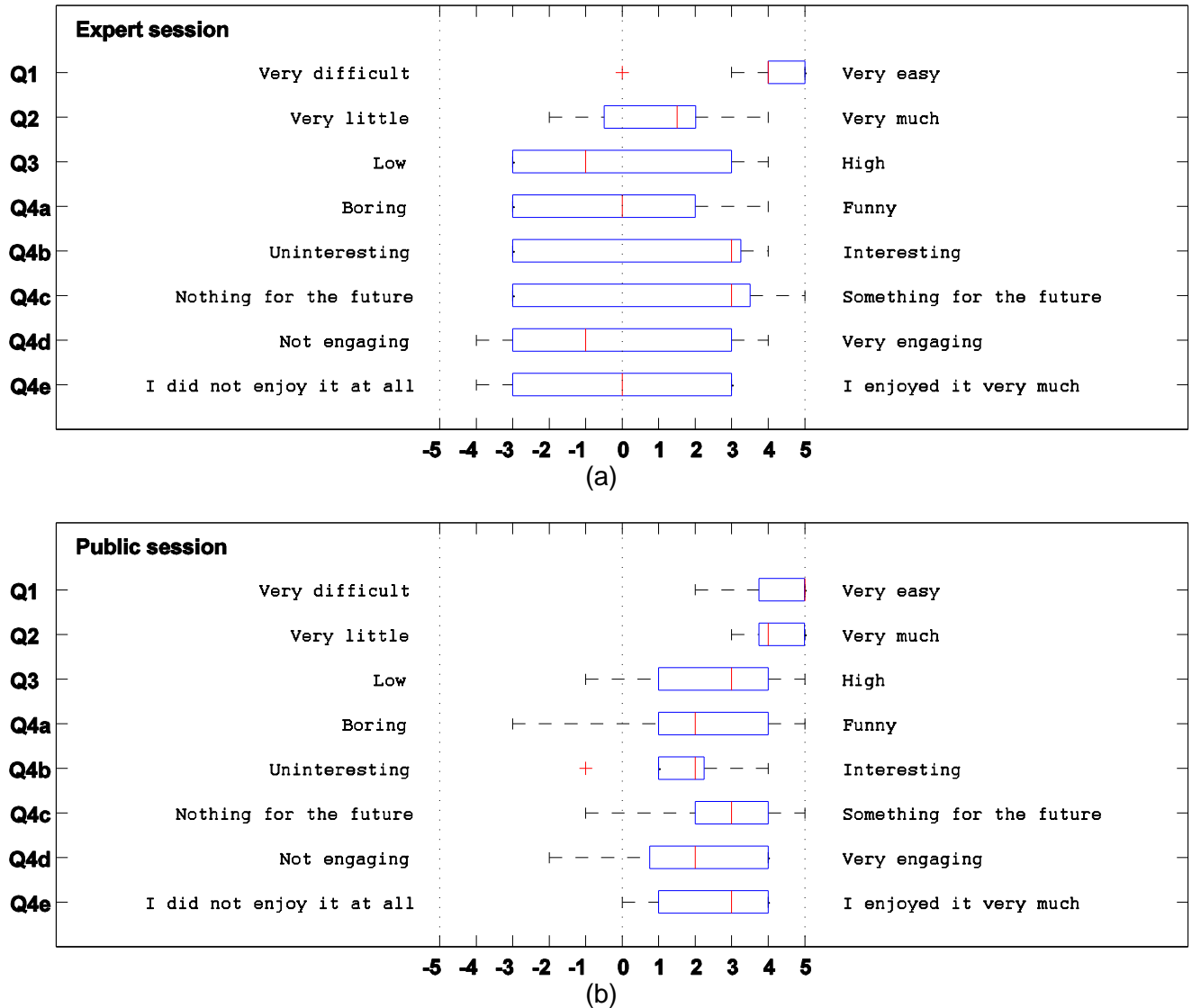


Figure 5 Box plots of the answer distributions for the questions described in Table 9, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

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## 4.5 Sync'n'Move

The basic operation principle of the application was clear to the users, the median of the public answers being full 5. The general feeling of being in control of the application was higher within the people attending the public sessions (the experts were neutral in this regard). However, the basic idea of this demonstration was to let two persons synchronize their movements, so there would have been no challenge involved if the skill level of the application was set to be too low a value.

The level of interaction was felt to be quite close to neutral, slightly more so with the experts. This might be so because all visitors did not have time to try the application personally. The public also found the application to be more interesting than the experts.

One of the suggestions from the freeform feedback was that the application could be expanded to allow synchronization between groups of people, which sounds interesting.

**Table 10.** User feedback questions and examined features which were used to gather information from the Sync'n'Move demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\Sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	9	3.56	1.74	10	4.30	1.57
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	8	0.38	2.62	9	2.11	1.83
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	9	0.78	3.03	10	1.70	1.77
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	10	0.70	3.02	10	2.00	3.27
	b) Uninteresting vs. Interesting	10	-1.00	3.13	10	0.70	2.54
	c) Nothing for the future vs. Something for the future	10	-0.20	3.19	10	1.50	2.76
	d) Not engaging vs. Very engaging	10	0.10	3.03	10	0.90	2.33
	e) I did not enjoy it at all vs. I enjoyed it very much	10	-0.30	2.63	10	1.40	2.67

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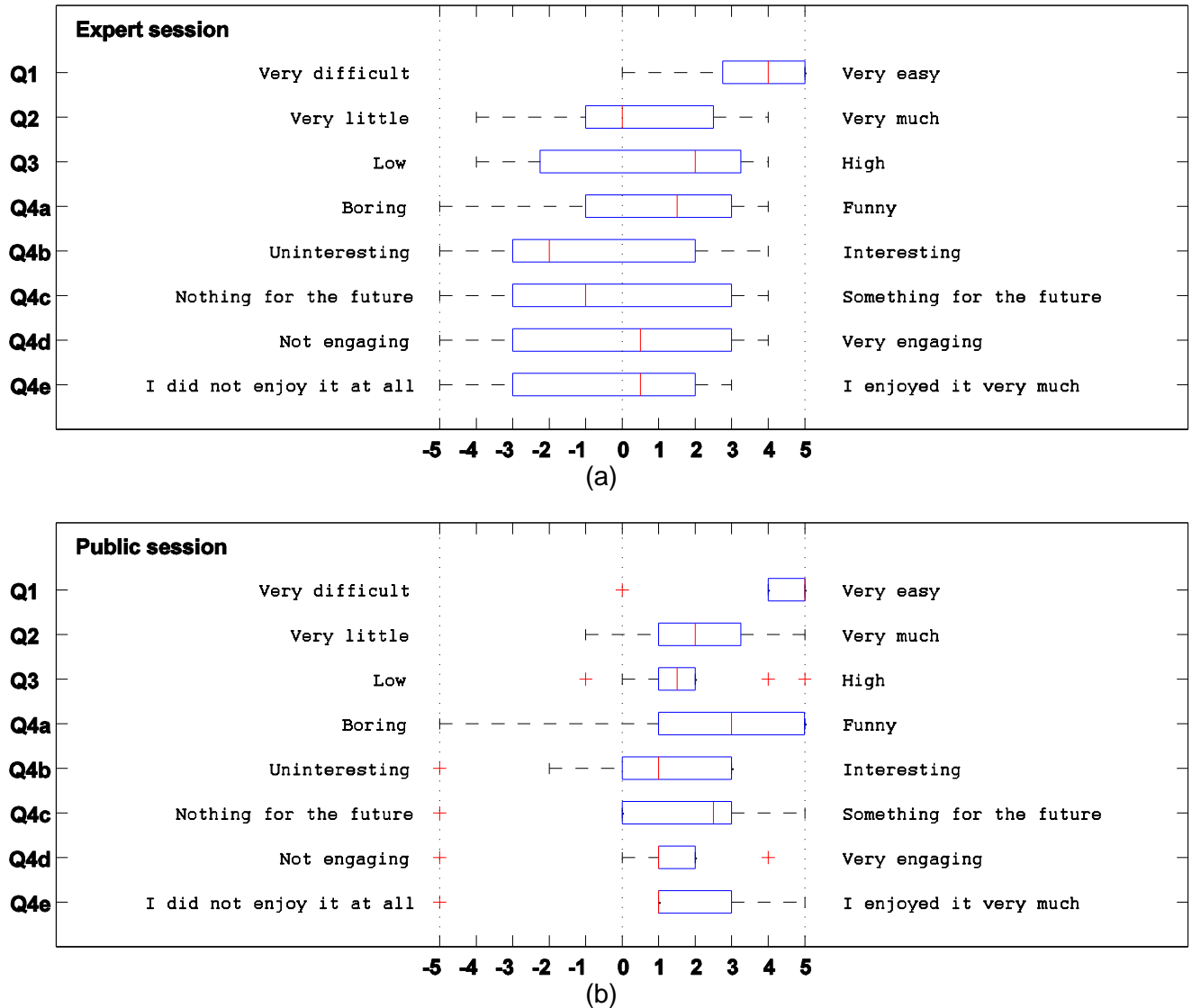


Figure 7. Box plots of the answer distributions for the questions described in Table 10, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

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## 4.6 pyDM: Mobile Expressive Music Performance

The pyDM demonstration received positively balanced feedback from both evaluation groups. This application was found out to be very easy to use. The users felt that they were in control of the application. The expression of controllability was higher among the experts. The level of interaction was rated higher by the public compared to the experts. The deviation in answers was greater among the experts. The feedback from the public was in general more positively balanced.

In the future the users would like to have more developed mapping and gesture registration. The user interface could also be developed to be more advanced. The users would like to have more personalized features, such as individually defined moods and modulation parameters. The mood or emotion changes could be linked or synchronized into the structure of a piece of music. Based on the feedback, the users see that this application has potential in the future and could even become a standard feature in the modern mobile devices.

**Table 11.** User feedback questions and examined features which were used to gather information from the pyDM demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	12	4.50	0.80	23	3.61	1.75
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	11	1.73	3.07	21	3.05	2.01
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	12	0.92	3.48	23	2.91	1.68
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	12	1.75	3.05	23	3.26	1.79
	b) Uninteresting vs. Interesting	12	0.42	3.20	23	3.13	1.66
	c) Nothing for the future vs. Something for the future	12	1.67	2.67	23	2.35	2.04
	d) Not engaging vs. Very engaging	12	0.75	3.14	22	2.36	1.50
	e) I did not enjoy it at all vs. I enjoyed it very much	12	0.92	3.03	22	2.95	1.59

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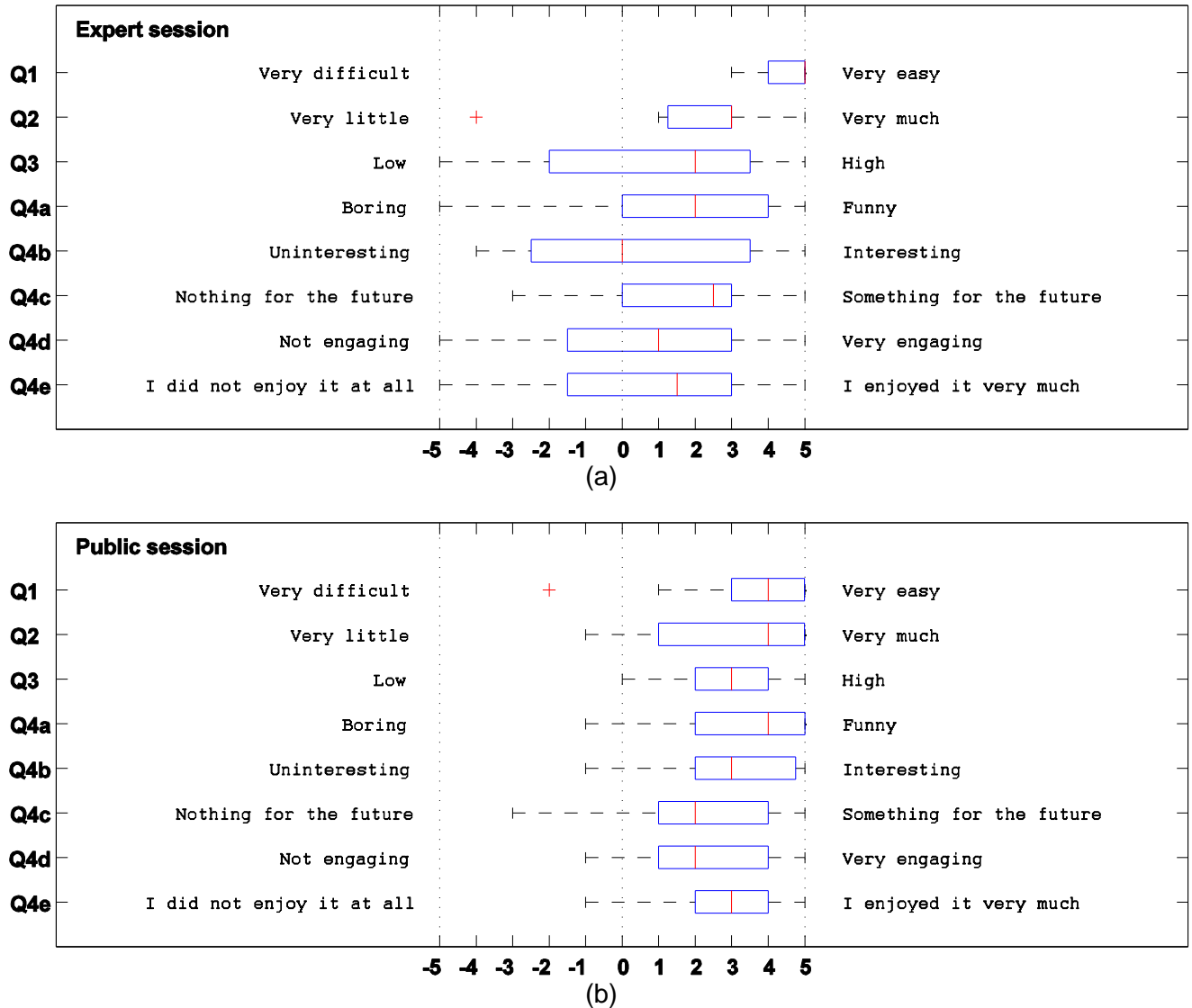


Figure 3. Box plots of the answer distributions for the questions described in Table 11, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

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### 4.7 Mobile Expressive Music Performance

Both groups reported that the functionality of this application is easy to understand. The impression of being in control of the application was also rated on high level in both groups. The level of interaction was considered to be higher among the public sessions; the expert's opinion was more diverse. The expert's opinion fell into slightly negative level in Q4. On the other hand, the overall level in Q4 received positive evaluations from the public sessions.

In the future, the users would like have more available emotions to choose from. This application should probably be targeted for the large audiences, because it is simple to use and was rated funny among the public sessions. The platform independency or compatibility with several platforms would increase the amount of potential users.

**Table 12.** User feedback questions and examined features which were used to gather information from the Mobile Expressive Music Performance demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\Sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	10	3.90	1.29	15	3.20	1.93
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	10	2.10	2.60	13	2.54	1.71
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	10	-0.30	3.23	14	1.36	1.98
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	10	-1.20	2.82	15	1.80	2.37
	b) Uninteresting vs. Interesting	10	-1.30	2.67	15	1.53	2.07
	c) Nothing for the future vs. Something for the future	10	-1.70	3.30	15	1.80	1.93
	d) Not engaging vs. Very engaging	10	-2.00	2.45	14	1.36	2.53
	e) I did not enjoy it at all vs. I enjoyed it very much	10	-1.50	3.27	14	1.79	1.85

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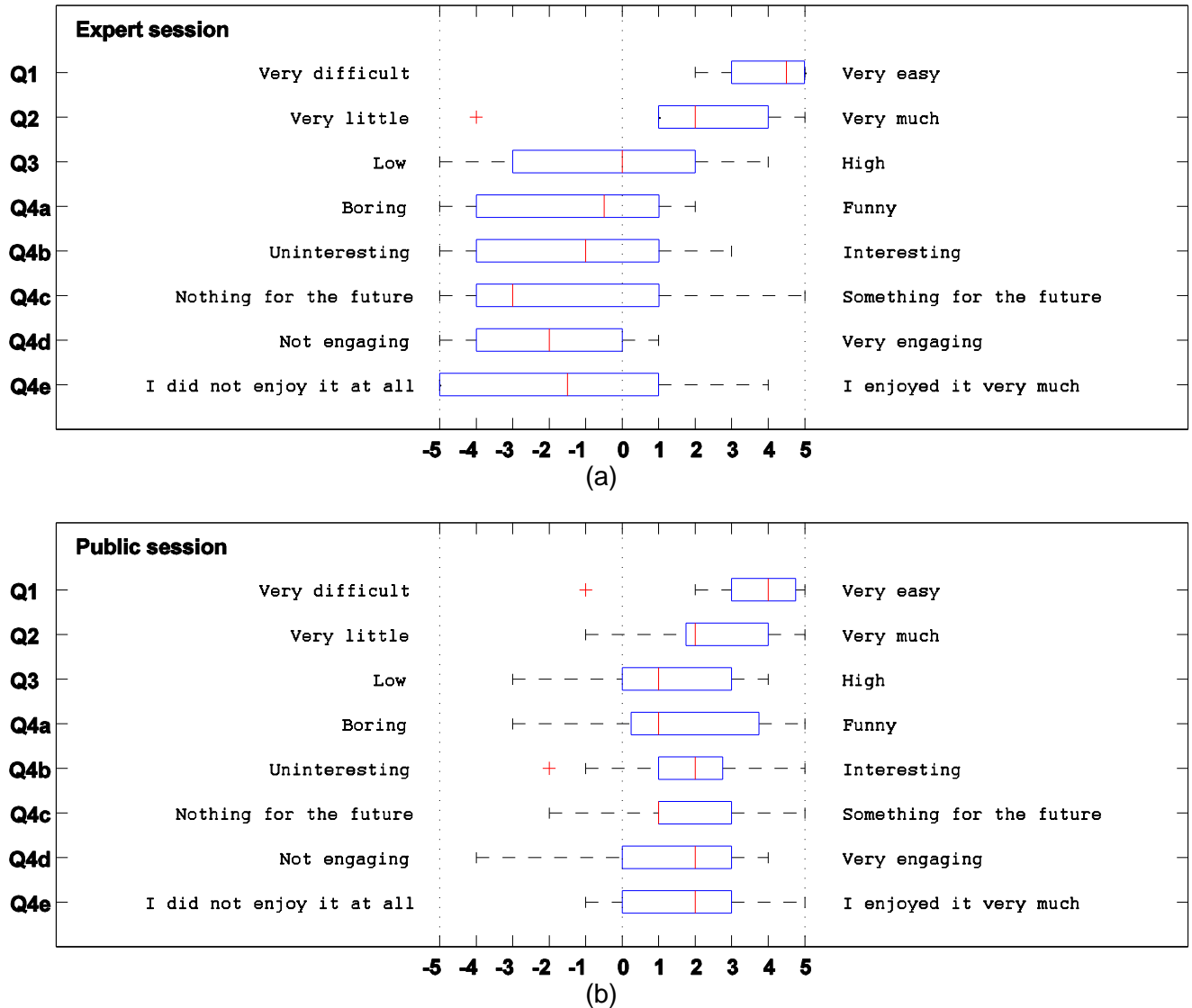


Figure 9. Box plots of the answer distributions for the questions described in Table 12, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

## 4.8 Zagora

The overall feedback among the public session received more positive evaluations compared to the feedback received from the expert session. Among the experts the application was judged very easy to use. The feedback received from the public session suggests that some of the persons find out that the application is not so easy to use. The feedback from the public sessions suggests that the users feel that can control the application in a way they wanted. The experts gave lower ratings for the control aspect, this may refer to the fact that experts want to have more control over the features of the application.

The level of interaction between the user and the application received rather neutral evaluations, this can be partly explained by the demonstration environment, and the users were not able to test this application in different acoustical environments. Among the public sessions the Zagora application was found out to be an interesting application and to have potential in the future. The expert opinions were distributed rather widely, but the overall evaluation was rather neutral. In the future the users would like to have an application which could be more personalized and possibly more engaging.

**Table 13.** User feedback questions and examined features which were used to gather information from the Zagora demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	13	4.69	0.63	11	2.55	2.54
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	10	-0.70	2.41	10	1.50	2.51
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	13	-0.85	2.54	11	0.91	2.12
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	13	-0.92	2.50	11	1.73	3.17
	b) Uninteresting vs. Interesting	13	-0.92	2.66	10	2.00	2.79
	c) Nothing for the future vs. Something for the future	12	0.25	3.19	10	2.60	1.43
	d) Not engaging vs. Very engaging	12	-0.58	2.78	9	1.22	2.54
	e) I did not enjoy it at all vs. I enjoyed it very much	12	-0.08	2.71	10	2.00	1.49

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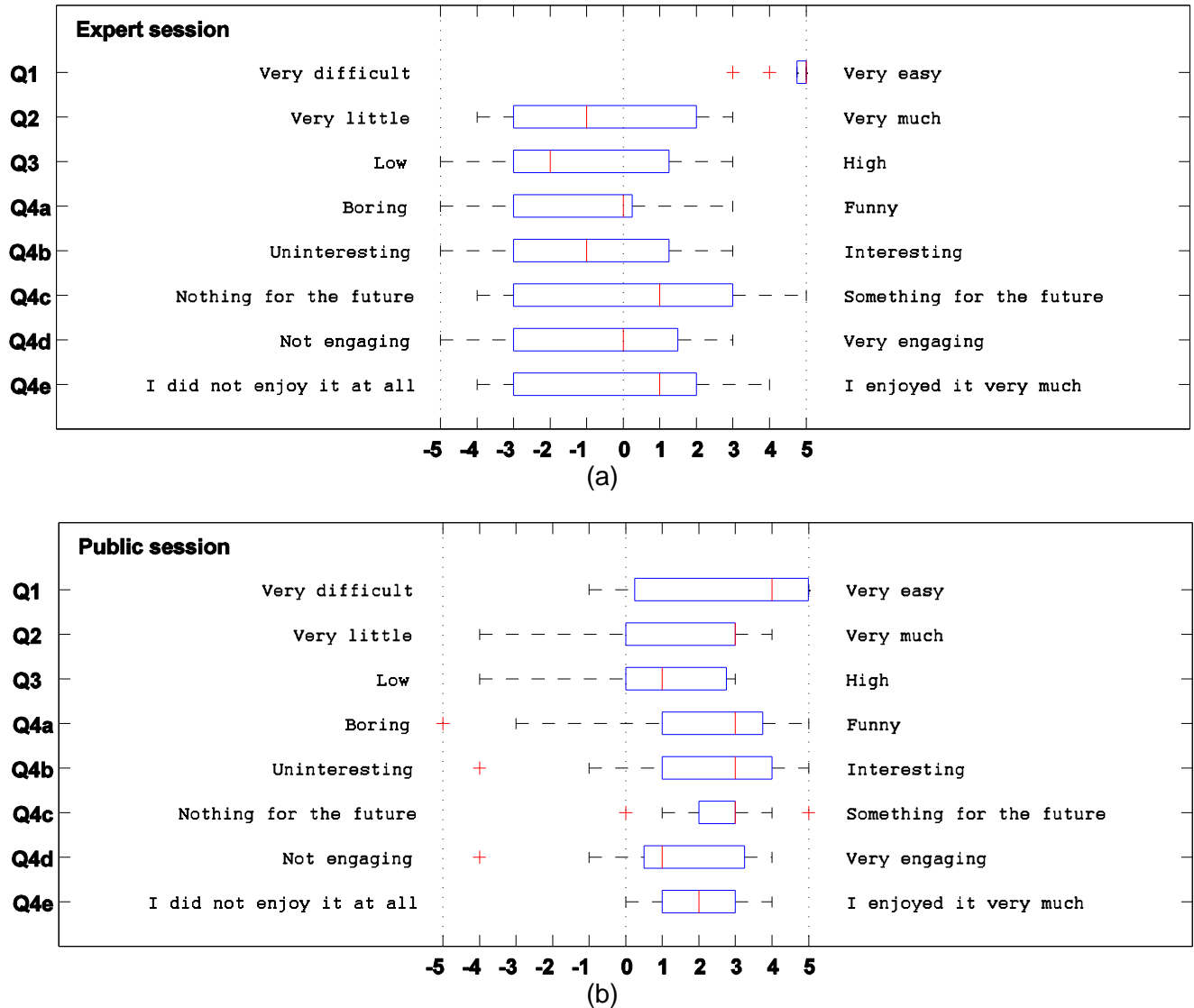


Figure 1. Box plots of the answer distributions for the questions described in Table 13, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

## 4.9 Mobile Sonic Playground

Experts understood the basic principle of the application slightly better than those attending the public sessions, but in general, and despite the rather technical approach of the application, the operation was relatively clear to the visitors. During the sessions, very few of the participants interacted with the application by themselves. This is indicated especially by the experts whose answers were neutral in this regard (the public felt that they had more control over the application).

The public found the application also to be more interesting than the experts. Looking at the freeform feedback, one of the expert wishes was that the application would benefit from higher level tools (such as sequencers and remixing applications) that would sit on top of the phone synthesizer. Another wish was that the synthesizer could be more powerful. Both points are valid, and they will be addressed in later development stages. However, it was a good sign that the public gave relatively high scores (i.e., > 2) to the application in all categories of question Q4.

We also queried what the users would like to see in the final version of the application. Both the experts and the public had similar expectations: the ability to make songs and instruments was considered to be more interesting than the sounding toys. However, we do think that the results might have been different, had the same question be asked from children. The public favored the ability to make sequences, while the experts had slightly more interest in instrument sculpting. The visitors also wanted to have full control over pitch and timing, which is understandable taking into account the fact that 85% of the visitors played some musical instrument. Gestural control and collaborative use were preferred over keyboard and private scenarios by both groups.

**Table 14.** User feedback questions and examined features which were used to gather information from the Mobile Sonic Playground demonstration. The questions and the related features which were to be evaluated, answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question		Experts			Public		
		N	$\bar{x}$	$\sigma$	N	$\bar{x}$	$\sigma$
Q1	<b>How easy it is to understand how the application works?</b>						
	Very difficult vs. Very easy	12	3.75	1.42	10	2.80	1.87
Q2	<b>How much do you feel in control of the application?</b>						
	Very little vs. Very much	11	0.91	2.74	8	2.63	1.41
Q3	<b>How do you find the level of interaction?</b>						
	Low vs. High	12	-0.92	2.97	9	2.67	1.73
Q4	<b>What do you think about this application</b>						
	a) Boring vs. Funny	12	-0.83	2.48	10	2.30	3.23
	b) Uninteresting vs. Interesting	11	-0.27	2.10	10	2.00	3.02
	c) Nothing for the future vs. Something for the future	11	-0.27	2.69	10	2.60	2.37
	d) Not engaging vs. Very engaging	12	-1.08	2.50	10	2.40	2.46
	e) I did not enjoy it at all vs. I enjoyed it very much	12	-0.58	2.27	10	2.30	2.50
Q8	<b>How interesting would it be to (Not interesting Vs. Very interesting):</b>						
	a) Make or edit sequences/songs	11	2.82	1.25	10	3.50	1.58
	b) Make or edit sounds/instruments	11	2.91	1.51	10	2.90	2.38
	c) Share sequences or sounds	11	0.91	2.66	10	2.90	2.42
	d) Play over a background track (karaoke)	11	-0.18	3.37	10	1.30	2.95
	e) Play with sounding toys	11	-1.36	3.23	10	1.40	2.88

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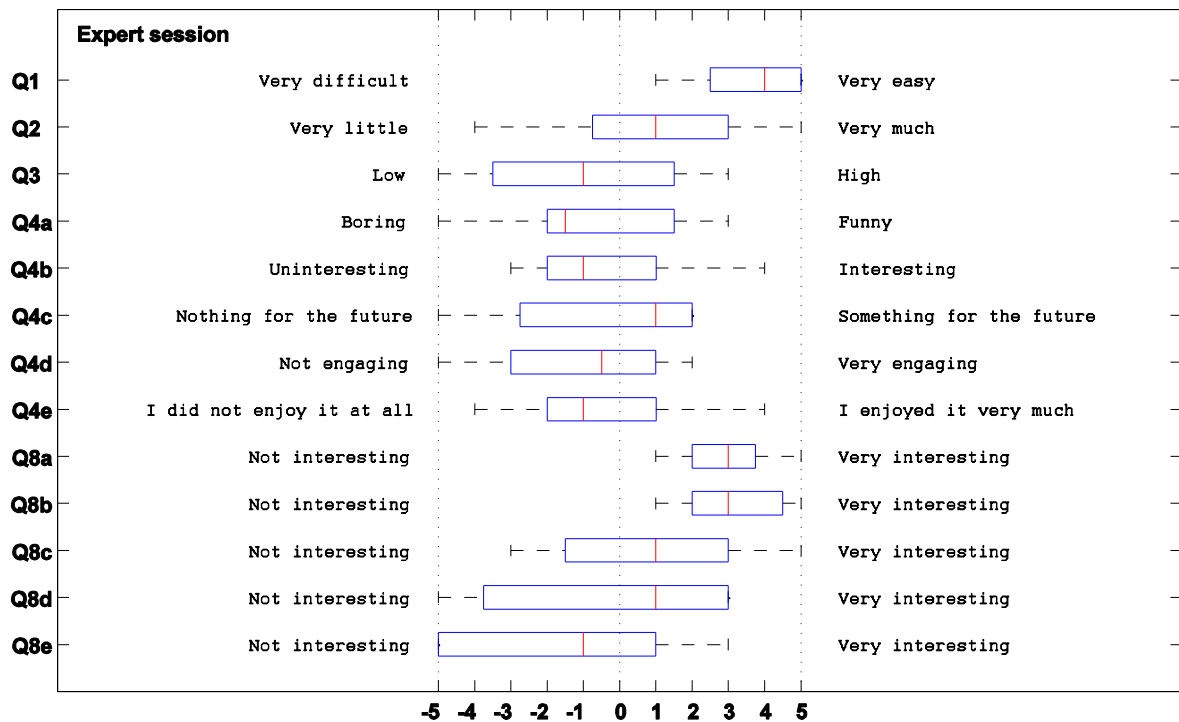
**Table 15.** User feedback questions and examined features which were used to gather information from the sonic playground demonstration. The multiple selection questions and related answer distributions. Note that one could give answers to multiple options in each question.

Question		Experts		Public	
		N	%	N	%
Q5	<b>How much freedom would you like to have when playing with the application?</b>				
	a) I just want to change the character	2	28.6	3	37.5
	b) I would like to control when the next note starts and stops, but want the pitch to be predefined	0	0.0	4	50.0
	c) I would like to control both start/stop times and the pitch of the notes	6	85.7	7	87.5
Total number of persons who answered to this question		7		8	
Q6	<b>When playing notes, I would rather use:</b>				
	a) Gestures	7	77.8	7	77.8
	b) Keypad	2	22.2	2	22.2
Total number of persons who answered to this question		9		9	
Q7	<b>I would prefer to use the application:</b>				
	a) alone	4	40.0	3	30.0
	b) with friends	7	70.0	7	70.0
Total number of persons who answered to this question		10		10	

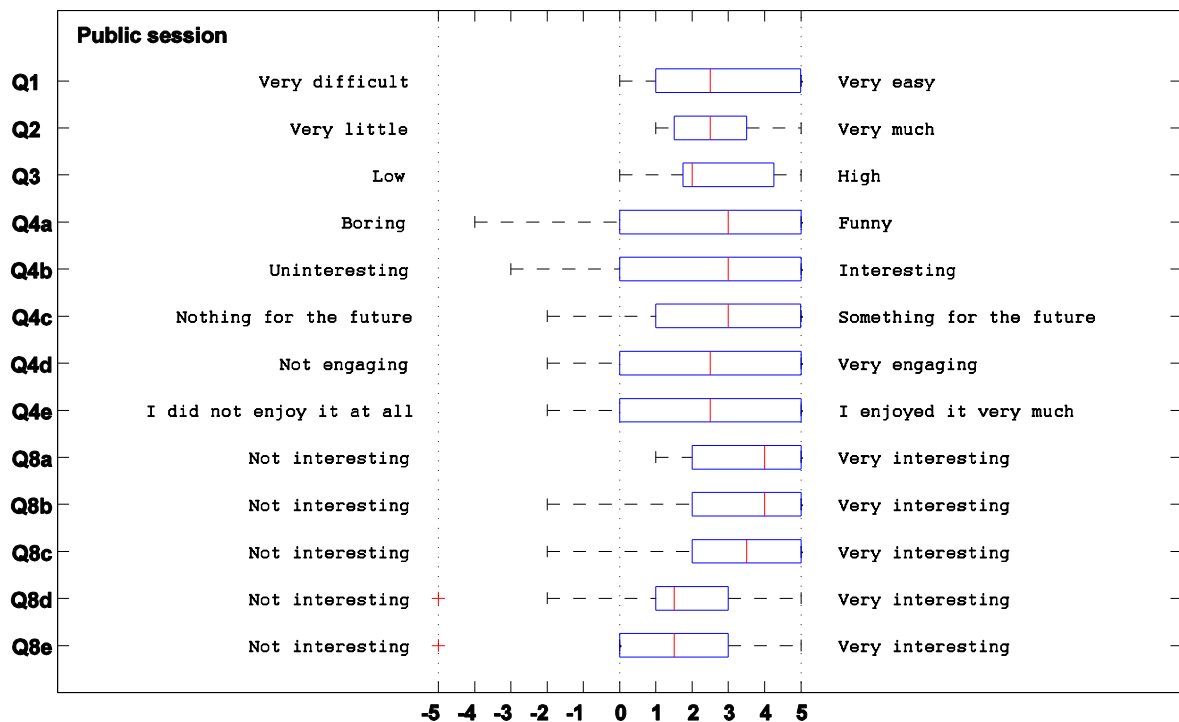
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(a)



(b)

**Figure 2.** Box plots of the answer distributions for the questions described in Table 14, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

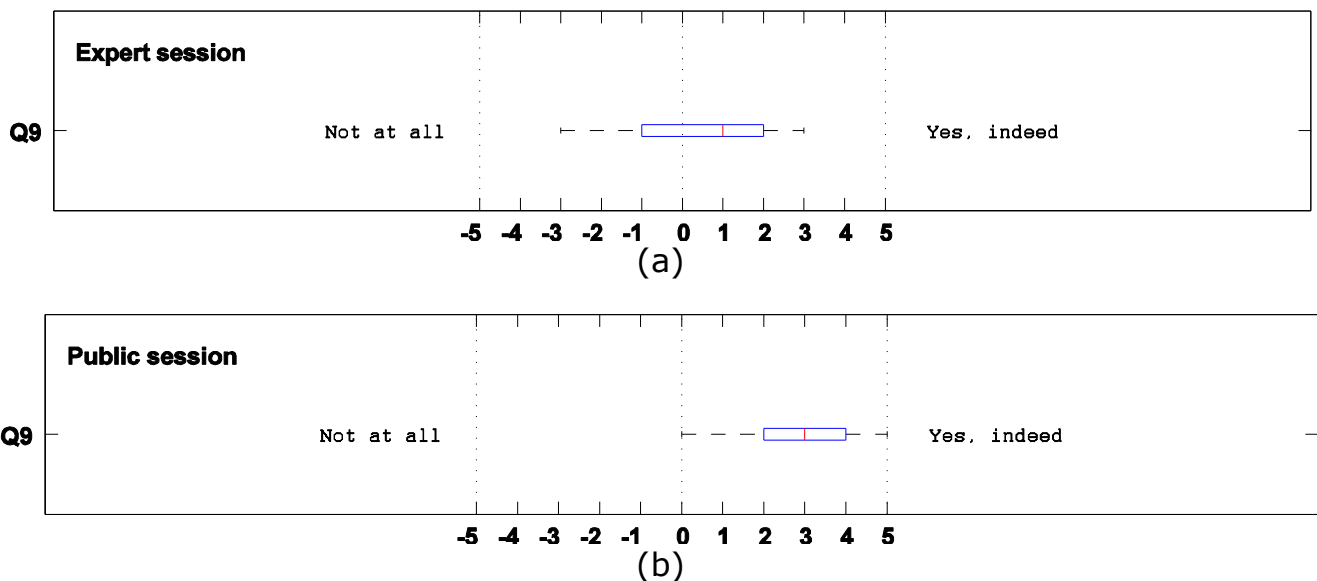
## 4.10 Overall feedback

In the overall feedback, the participants were asked to rate their experience of the demonstrations compared to their expectations. Both groups reported that the demonstrations gave what they were looking for. However, the feedback from the experts was quite neutrally balanced (ave=0.68).

The following is collected from the general comments and feedback. The demonstrations were found out to be nice and exciting. Visitors thought that all of the projects are using technology in new ways. The applications should be developed further and the graphical user interfaces should be improved. The gesture recognition and general purpose gesture interface on a standard mobile device would be appreciated among the visitors. In the future, users would like to see more networking-based features in these applications. The integration of the demonstration topics would also be interesting.

**Table 16.** The overall feedback of the expectations and experiences gathered from the demo sessions. The answers were collected using 11 point scale from -5 to 5. The number of answers, average values and standard deviations are presented for the both session types.

Question	Experts			Public		
	N	$\bar{x}$	$\sigma$	N	$\bar{x}$	$\sigma$
<b>Q9</b> Did the experience really do what I expected from it? Not at all Vs. Yes, indeed	12	0.67	2.02	18	2.83	1.62



**Figure 10.** Box plots of the answer distributions for the question described in Table 16, (a) for the expert session and (b) for the public session. The users evaluated these features using a 11 point discrete scale.

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## **5. CONCLUSION**

Based on the feedback, the visitors liked the applications and demonstrations. The feedback from both groups included valuable criticism, suggestions and proposals for improvements. The demonstrated applications have potential in the future, but more development work needs to be done. The feedback pointed out that the graphical user interfaces need to be developed further. It is typical that an application is reviewed based on the user interface. If the user interface is not inviting and finished there is a risk that the user loses the interest in the functionality of the application. The users were anxious to see social networking features implemented as a part of the applications. In general, the interaction between users and personal file sharing was appreciated. Merging of the applications or combining them into more versatile systems was also suggested.

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## 6. APPENDIX

### SAME Prototype experiments IRCAM – June 2009

Thank you for filling the following questionnaire, that will be taken into account for the project improvement.  
All questionnaires will be handled in an anonymous way.

DATE \_\_\_\_\_ TIME \_\_\_\_\_

#### Information about you:

Sex: M  F

Age (years): \_\_\_\_\_

Nationality: \_\_\_\_\_

Occupation: \_\_\_\_\_

Music instrument played: \_\_\_\_\_ for \_\_\_\_\_ years

I play my musical instrument(s) for about \_\_\_\_\_ hours/day

The music genre(s) that I prefer is(are): \_\_\_\_\_

I usually listen to music (check only one) :

Once a month  One a week  Everyday  Several hours a day  Other \_\_\_\_\_

I usually listen to music in the following situations (check all that apply) :  Radio  At home

Portable device  Car  Live concerts  Club, pub  Discotheque  Other \_\_\_\_\_

I usually listen to music with the following rendering systems (check all that apply) :  Headphones

Computer loudspeakers  Car audio system  Stereo Hifi  5.1 Home cinema  Multichannel system

Other \_\_\_\_\_

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### General questions (about all prototypes):

**Q1:** What did you expect from this experience (check all that apply) ?

- Have fun
- Learn
- New music experience
- Better communicate with peers

Other \_\_\_\_\_

**Q2:** What was your first impression?

Very negative  Very positive

**Q2:** The strength of your experience was:

Very weak  Very strong

**Q3:** Which of the following areas do you think could benefit from the project (check all that apply) ?

- New entertainment
- New technology
- New form of art
- Kinesthetic/motor abilities
- Ability to communicate
- For no good use at all

Other \_\_\_\_\_

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### Audio Explorer (Studio 4)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it

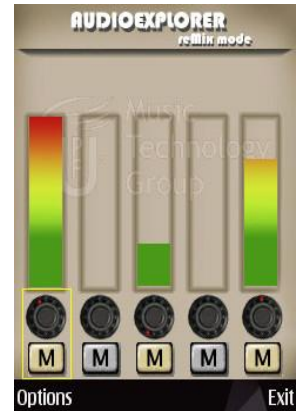
**Q5:** Do you believe a “normal” user (alien to the separation method / remixing principles) would lack of knowledge in order to enjoy the application?  Yes  No

**Q6:** What do you think of the possibility of sharing separation presets between users?

Good idea  No interest  Don't know

**Q7:** Do you prefer separation and remix control parameters to be driven :

By device rotation  By keypad button pressing  Don't know



Your spontaneous comments/ suggestions for improvements

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### Fishing Game (Studio 4)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it



Your spontaneous comments/ suggestions for improvements

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### Grain Stick (Studio 5)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it

**Q5:** How immersive/enveloping is your daily music or film listening experience?

No immersion  Full immersion

**Q6:** How immersive/enveloping would you consider your experience of GrainStick today?

No immersion  Full immersion

**Q7:** Please describe the sounds you were able to control, if any : \_\_\_\_\_

**Q8:** Please describe the sounds you were not able to control, if any: \_\_\_\_\_

**Q9:** Do you feel that you listened differently to the music of GrainStick because you were able to control it?  No

Yes How? : \_\_\_\_\_

**Q10:** Did you play the GrainStick

By yourself (both hands)  With another person  Both - Which did you prefer and why?: \_\_\_\_\_

Your spontaneous comments/ suggestions for improvements

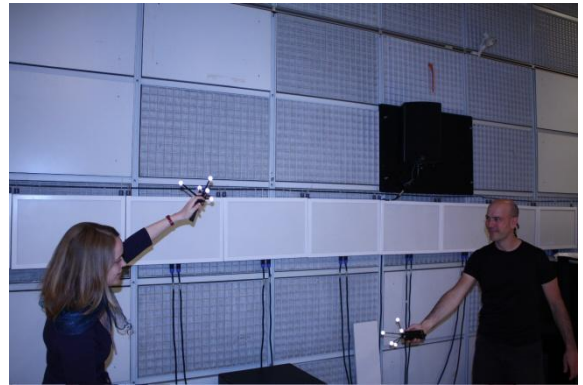
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### Orchestra Explorer (Studio 5)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it



Your spontaneous comments/ suggestions for improvements

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### Sync'n'Move (Studio 5)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it



Your spontaneous comments/ suggestions for improvements

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31 Aug. 2009

### pyDM : Contrôle expressif d'une interprétation au piano (Studio 5)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it

Your spontaneous comments/ suggestions for improvements

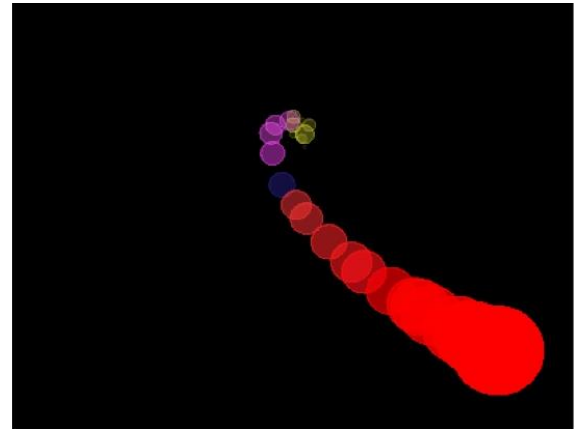
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Sound And Music for Everyone Everyday Everywhere  
Every way

S. Oksanen, J. Kleimola and V. Välimäki (Eds.)

31 Aug. 2009

**Interprétation expressive par mobile (Studio 5)**

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

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Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it

Your spontaneous comments/ suggestions for improvements

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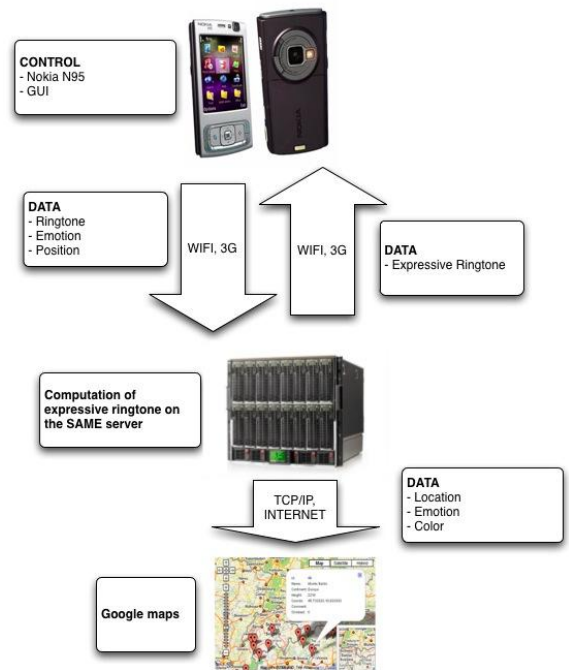
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## Sound And Music for Everyone Everyday Everywhere Every way

S. Oksanen, J. Kleimola and V. Välimäki (Eds.)

31 Aug. 2009

### Zagora (Studio 5)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it



Your spontaneous comments/ suggestions for improvements

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## Sound And Music for Everyone Everyday Everywhere Every way

S. Oksanen, J. Kleimola and V. Välimäki (Eds.)

31 Aug. 2009

### Terrain de jeu sonore (Studio 5)

User ID (if communicated by the demonstrators): \_\_\_\_\_

**Q1:** How easy is it to understand how the application works?

Very difficult  Very easy

**Q2:** How much do you feel in control of the application?

Very little  Very much

**Q3:** How do you find the level of interaction?

Low  High

**Q4:** What do you think about this application?

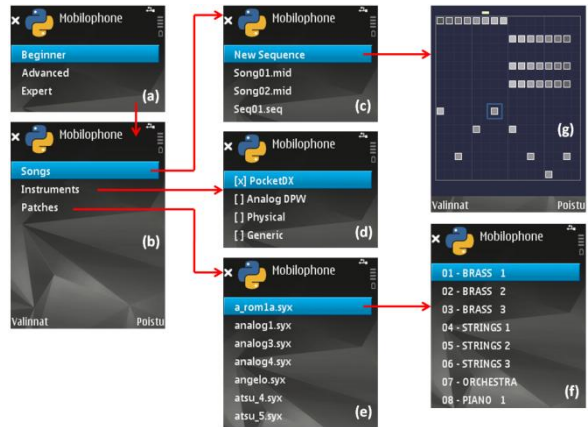
Boring  Funny

Uninteresting  Interesting

Nothing for the future  Something for the future

Not engaging  Engaging

I did not enjoy it  I enjoyed it



Your spontaneous comments/ suggestions for improvements

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