Appendix 01 – List of spatial attributes from ADAM test

The following list consists of short explanations of the attribute scales agreed upon by the panel members in the Audio Descriptive Analysis & Mapping of Spatial Sound Displays [65]:

Sense of direction Describes how easily the locations of events can be discriminated. This also measures whether several sound sources can be distinguished. A negative value of this attribute implies that the location of a sound event is ill-defined or enveloping.

Sense of depth Describes how strongly the sensation of distance is perceived, or how ambiguous the sensation of distance is. Once again this assesses whether several sound events can be discriminated in terms of distance. A negative value could mean that distances for all events are ambiguous except those originating from the transducer's position.

Sense of space This attribute scales how well the space where the recording was made is perceived. A positive value could mean a strong sensation of being in a certain kind of environment, e.g. in a room.

Sense of movement This describes whether a sound source is perceived to actually move in the sound space. A negative value could indicate a sound source simply disappearing from its original location and reappearing in another without moving through any intermediate position.

Penetration Describes the sensation often found in cross talk cancelled binaural reproduction. A positive value means that spatial information in the sample seems artificial. The sounds sometimes seem to originate very close to, or even inside, ones head.

Distance to events This attribute simply describes the actual distance from where the sound events appear to originate. A positive value implies that the sound sources are sensed to be far from the listening point.

Broadness This attribute describes how wide an area the perceived sound event seems to have. A strong positive value would mean that sounds are coming from all around the listener i.e. envelope the listener.

Naturalness describes how well the perceived events conform to what the subjects consider as realism. Perception of something that isn't possible in reality yields a negative value, e.g. a train rising straight up.

Richness This describes the homogeneity of the timbre of a sample. If a sound lacks some of its timbral aspects, it would be graded with a negative value.

Hardness This describes how aggressive the sound is perceived to be. A soft sound is mellow and doesn't offer any surprises.

Emphasis An emphasized sound is somehow, partly or in whole, too loud. Some part of the sample might be playing too loud and this would result in a positive value.

Tone colour Tone colour describes the spectral content of a sample. A dark sample lacking treble and having bass boost is graded as negative. A bright sample with more treble and/or less bass is graded as positive.

Appendix 02 – Pilot test Questionnaire

Preference Selection Test – Data sheet

1. Preference table:

TEST A

Excerpt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Preference																				

TEST B

Excerpt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Preference																				

2. Age   _____

3. Gender   _____

4. On average how many hours of music do you listen to daily?   _____

5. How was it to differentiate between the sound clips?

    A. very difficult **B**. difficult   **C.** moderate   **D**. easy   **E**. very easy

6. What differences made you choose a particular sound clip over the other?

    _____

    _____

7. Can you name anything unusual about the sounds clips? _____

    _____

    _____

8. After listening to the whole song, which version did you prefer?

    A. Version-01   **B**. version-02 **C.** no preference

9. Did you perceive any sounds as originating from beyond the headphones? If yes, approximately how far was the furthest sound? _____

10. Did you like the music?

    B. not at all   **B**. no   **C.** don't care   **D**. yes   **E**. very much

Appendix 03 – Results table for Pilot test

	Sound Clip	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Stereo	3D	X	Total
Repetitions		9	4	5	4	2	13	2	8	2	4	4	10	6	2	2	6	4	4	10	6				107
1	X	D	S	S	X	X	S		D	S	S	X	D	S	D		X	S	D	D	S	13	16	7	
2	3D	D	S	S	X	S	X		D	S	S	X	D	D	S		X	X	S	X	D	13	10	13	
3	ST	S	D	X	X	S	D	2	S	S	D	D	X	X	S		S	D	D	X	S	14	15	7	
4	3D	S	X	D	D	S	D	2	X	D	X	D	X	X	D	2	X	S	S	X	S	11	16	9	
5	X	D	X	S	X	S	X		X	D	S	X	X	X	X		X	D	X	X	X	7	8	21	
6	ST	S	D	D	S	D	X		S	D	S	S	X	X	D		D	S	S	D	S	12	11	13	
7	ST	S	S	S	D	X	X		D	X	X	S	X	X	D	1	X	D	X	X	S	7	12	17	
8	ST	S	S	X	S	X	D		S	X	S	D	S	X	X		X	D	S	S	S	16	5	15	
9	ST	S	S	X	X	X	S		X	D	D	X	X	X	X		X	X	X	S	S	9	8	19	
10	ST	D	S	S	X	D	S		D	D	D	X	X	S	S		S	S	X	X	S	16	13	7	
																						118	114	128	360
Stereo	6	1	4	6	2	4	4	0	2	4	2	1	1	2	2	0	1	4	3	0	5				
3D	2	8	5	1	2	2	2	0	5	4	5	2	1	2	6	0	0	4	2	2	4				
X	2	0	1	2	6	4	4	0	3	2	3	7	8	6	1	0	9	2	5	8	1				
Total																									
Stereo		7	11	12	4	8	9	0	4	9	8	5	1	5	8	0	2	8	5	2	10				
3D		12	7	3	6	6	6	0	12	7	8	4	3	5	9	0	1	7	7	3	8				
X		1	2	5	10	6	5	0	4	4	4	11	16	10	3	0	17	5	8	15	2				

Columns

A – Subject number
B – Choice of stereo (ST) or 3d Sound (3D) in full song test
C-V – Choice of stereo (S) or 3D sound (3) in Test A and B respectively
W – Total # of stereo clips for subject
X – Total # of 3D sound clips for subject
Y – Total # of Stereo pairs for subject
Z – Total # of 3D sound pairs for subject

Rows

1 – Sound Clip number
2 – Number of repetitions per sound clip in Test A and B respectively
3 – Total number of repetitions per sound clip
4-13 – Results for each subject
15-17 – # of stereo, 3D sound, X selected per clip in Test A and B respectively
19-21 – Total # of stereo, 3D sound, X selected per clip

Appendix 04 – Final test Questionnaire

Preference Selection Test – Data sheet

Subject number: _____

1. Preference table:

TEST A

Excerpt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Preference																				

TEST B

Excerpt	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Preference																				

2. Age   _____

3. Gender   _____

4. On average how many hours of music do you listen to daily? _____

5. How was it to differentiate between the sound clips?

   A. very difficult   **B.** difficult   **C.** moderate   **D**. easy   **E**. very easy

6. After listening to the whole song, which version did you prefer?

   A. Version-01 **B**. version-02 **C.** no preference

7. What differences made you choose a particular sound clip/version over the other?

   _____

   _____

8. Did you perceive any sounds as coming from beyond the headphones?

   A. not at all   **B**. no   **C.** don't know   **D**. yes   **E**. very much

9. Do you prefer live music recordings to studio recordings?

Appendix 05 – Preference Selection test Results

	A	B	C		D		E		F		G		H		I		J		K		L		M		N		O		P		Q		R		S		T		U		V		W	X	Y	Z
1	Sound Clip		1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18		19		20		Stereo	3D	Stereo	3D
2	Repetition		13	6	10	0	12	5	16	9	7	3	18	9	26	16	7	8	7	4	8	8	11	4	21	9	14	7	8	4	19	16	11	6	7	4	17	12	38	19	5	7			pairs	pairs
3	Total Rpt	431	19		10		17		25		10		27		42		15		11		16		15		30		21		12		35		17		11		29		57		12					
4	1	ST	S	D	S	S	S	S	S	S	D	S	S	D	2	2	S	S	S	S	D	S	D	S	S	S	S	S	D	S	1	2	D	D	S	D	S	S	S	D	S	S	26	10	9	1
5	2	ST	S	D	S	D	D	S	S	D	S	S	D	D	1	1	D	D	D	S	D	S	D	D	D	S	D	S	D	S	1	1	D	D	D	S	D	S	S	D	D	D	14	22	1	5
6	3	3D	D	D	D	S	D	S	S	D	D	D	D	D	2	2	D	D	S	D	S	D	D	D	D	D	D	D	S	D	2	2	S	D	S	D	S	D	S	S	D	D	11	25	1	8
7	4	3D	S	S	S	D	D	D	S	D	D	S	D	S	2	2	S	D	D	S	S	D	D	D	D	S	D	D	S	D	1	1	S	S	D	S	S	D	S	D	D	D	16	20	2	4
8	5	ST	S	D	S	S	S	D	D	D	D	D	S	D	1	1	S	D	S	D	D	S	D	S	D	S	D	D	D	D	1	1	D	S	D	D	D	S	S	D	D	D	13	23	1	6
9	6	ST	S	S	D	S	S	S	S	S	S	S	S	S	1	1	D	S	D	S	S	D	S	S	S	S	S	S	S	S	1	1	S	D	S	S	D	S	S	S	D	D	28	8	11	1
10	7	ST	S	S	S	D	S	S	S	S	S	S	S	D	1	1	S	S	S	S	D	S	D	S	S	S	S	D	S	S	1	1	D	S	S	S	S	S	S	D	S	S	29	7	11	0
11	8	ST	S	D	D	D	D	D	D	D	D	S	D	S	1	2	S	D	S	S	S	D	D	D	S	S	S	D	D	S	1	1	D	D	D	D	D	D	D	D	D	D	11	25	1	9
12	9	3D	S	S	S	S	D	S	D	S	D	D	S	S	1	1	S	S	S	D	S	D	D	S	S	D	S	S	S	D	2	1	D	S	S	D	D	S	D	D	S	S	22	14	6	2
13	10	ST	S	D	S	D	S	S	D	S	D	S	D	S	1	2	S	S	S	S	S	S	D	S	D	S	D	D	S	S	1	2	D	D	S	D	S	S	S	D	D	D	21	15	6	3
14	11	ST	S	D	S	D	D	D	S	S	S	D	S	S	1	1	D	D	S	S	D	S	D	S	D	S	D	S	S	S	1	1	D	S	D	D	S	D	S	S	D	D	19	17	5	4
15	12	ST	S	D	S	D	D	S	S	S	S	D	S	S	2	2	S	D	D	S	S	S	D	D	D	D	S	D	D	D	2	1	D	S	D	S	D	D	D	D	D	D	15	21	3	6
16	13	3D	S	S	D	D	S	D	D	D	S	D	D	S	1	1	D	D	S	D	S	D	S	D	S	S	D	S	D	S	2	2	S	D	D	S	S	D	D	S	D	D	16	20	2	4
17	14	ST	S	D	S	D	D	D	D	D	D	D	S	D	1	1	D	D	D	S	S	D	D	S	D	D	S	D	D	D	1	1	D	S	S	D	S	D	D	S	D	D	11	25	0	7
18	15	ST	S	D	D	D	S	S	S	S	S	S	S	S	1	1	D	D	D	S	S	S	D	S	D	S	S	S	D	S	1	1	S	S	S	S	D	S	S	D	D	S	24	12	8	2
19	16	ST	S	S	S	D	S	S	S	S	S	D	S	S	1	1	S	D	D	D	S	S	S	S	D	S	D	D	D	D	2	1	D	D	D	D	S	D	S	D	S	S	20	16	7	5
20	17	3D	S	S	D	D	S	D	S	S	S	D	S	D	1	1	D	S	D	D	D	D	D	D	D	D	D	D	D	D	2	2	S	S	D	D	S	S	D	D	S	D	13	23	4	9
21	18	ST	S	S	D	D	S	S	S	S	D	S	S	S	1	1	S	S	D	D	S	S	S	S	S	S	S	S	D	D	2	2	D	S	D	D	D	D	S	S	S	S	24	12	11	5
22	19	3D	D	D	D	D	D	D	D	D	D	D	D	D	1	1	D	D	D	D	D	D	S	D	D	D	D	D	D	D	1	1	D	D	D	D	S	D	S	D	D	D	3	33	0	15
23	20	ST	S	D	D	D	S	S	S	D	S	S	S	D	1	1	S	S	S	D	S	S	S	S	D	D	S	D	D	S	1	1	S	S	D	D	S	S	S	S	D	D	22	14	8	4
24	21	ST	S	D	D	D	S	S	S	S	S	S	D	S	1	2	D	S	D	S	S	S	D	S	S	S	S	S	S	D	1	2	D	S	D	S	S	S	S	D	S	S	25	11	8	1
25	22	3D	D	D	D	D	S	D	D	D	D	S	S	S	1	1	D	D	D	D	D	S	D	D	D	S	S	D	D	S	1	2	D	S	D	S	S	D	D	S	S	S	14	22	2	6
26	23	ST	D	D	D	D	S	D	D	D	D	D	D	S	2	1	S	D	S	S	S	D	S	D	S	D	D	D	D	S	1	2	D	D	D	D	S	D	D	S	D	S	12	24	1	7
27	24	ST	D	D	D	D	S	S	D	D	S	D	D	D	2	2	D	D	S	D	S	D	S	D	D	S	S	D	S	D	1	1	D	S	S	D	D	S	S	S	S	D	15	21	2	5
28	25	ST	S	D	D	D	S	S	S	D	D	D	D	S	2	2	S	D	S	S	D	S	S	D	D	S	S	S	S	S	1	2	D	D	S	S	D	S	S	D	S	S	21	15	6	3
29	26	ST	D	D	D	S	D	D	D	D	S	D	D	S	1	2	D	D	S	D	D	S	S	D	D	S	D	D	D	D	1	2	D	S	S	D	D	S	S	D	D	D	11	25	0	7
30	27	ST	S	S	D	D	D	S	S	S	S	S	S	S	1	2	S	S	S	S	D	S	D	D	D	S	S	D	D	S	2	2	D	S	D	S	S	S	D	S	S	D	23	13	7	2
31	28	ST	S	D	D	D	D	S	D	S	D	S	D	S	2	1	D	S	S	D	D	D	D	S	D	D	D	D	D	D	1	1	D	D	S	S	S	D	D	D	D	D	11	25	1	8
32	29	ST	S	D	S	S	D	S	D	S	S	D	D	S	1	1	D	S	S	D	D	D	S	S	D	D	D	S	S	D	1	1	S	S	S	D	S	D	S	D	S	D	19	17	3	2
33	30	ST	D	D	S	S	S	S	S	D	S	S	S	D	2	2	S	S	S	S	S	S	D	D	D	D	D	D	D	S	2	1	S	D	D	S	D	D	D	D	D	D	17	19	6	7
34	31	3D	D	D	D	D	S	S	D	S	S	D	D	S	1	1	D	D	D	D	D	D	D	D	S	D	D	S	D	D	1	1	S	S	S	D	D	D	D	D	D	D	10	26	2	10
35	32	3D	D	D	D	D	D	S	S	D	D	D	S	S	2	2	D	D	S	S	D	S	D	D	S	D	S	D	D	D	1	1	S	S	S	D	S	D	S	D	D	S	15	21	3	6
36	33	3D	S	D	D	D	S	S	S	D	D	S	S	D	1	1	S	D	D	D	S	D	D	S	D	S	S	D	S	S	1	1	D	S	D	S	D	S	S	D	D	D	17	19	2	3
37	34	ST	S	D	S	D	S	S	D	D	S	D	D	S	2	1	S	D	D	D	S	D	S	D	D	S	D	D	S	S	1	1	D	S	S	S	D	S	S	S	D	S	19	17	4	3
38	35	ST	D	D	D	D	S	S	S	D	D	D	S	D	1	2	D	D	S	D	D	S	D	S	D	S	D	S	D	S	2	1	D	S	D	D	S	D	D	S	D	D	13	23	1	6
39																																											600	660	145	176
40	Stereo	25	25	9	14	8	21	24	20	16	18	16	19	22	24	21	17	13	20	17	19	19	12	17	11	22	17	13	13	18	25	23	11	22	16	15	20	17	22	13	12	12				
41	3D	10	10	26	21	27	14	11	15	19	17	19	16	13	11	14	18	22	15	18	16	16	23	18	24	13	18	22	22	17	10	12	24	13	19	20	15	18	13	22	23	23				
42																																														
43	Stereo		34		22		45		36		34		41		45		30		37		38		29		33		30		31		48		33		31		37		35		24			600	321	279
44	3D		36		48		25		34		36		29		25		40		33		32		41		37		40		39		22		37		39		33		35		46			660	379	281

Columns

A – Subject number

B – Choice of stereo (ST) or 3d Sound (3D) in full song test

C-V – Choice of stereo (S) or 3D sound (3) in Test A and B respectively

W – Total # of stereo clips for subject

X – Total # of 3D sound clips for subject

Y – Total # of Stereo pairs for subject

Z – Total # of 3D sound pairs for subject

Rows

1 – Sound Clip number

2 – Number of repetitions per sound clip in Test A and B respectively

3 – Total number of repetitions per sound clip

4-38 – Results for each subject

40 -41 – # of stereo and 3D sound selected per clip in Test A and B respectively

43-44 – Total # of stereo and 3D sound selected per clip