High Power Audio Systems (HPAS) – GTK-XB7 launch

Sony Music Preference in Domestic Dogs Study

A scientific report investigating music preference in healthy adult dogs
Conducted by Dr Anna Wilkinson for Sony Benelux

Contents

Executive Summary

- This experiment investigated music preferences in pet dogs.
- Dogs were tested in a preference task in which they could choose between two Sony GTK-XB7 one-box high powered audio systems, one playing high-tempo chart hits and the other playing classical music.
- Dogs approach behaviour (towards each audio-system), as well as the time they spent next the speakers were coded and analysed.
- When first presented with a choice between popular or classical music, 62% of the subjects spontaneously chose chart hits versus classical concertos.
- Following this, they were given 10 choices between popular and classical music, dogs chose chart hits significantly more than classical.
- The results suggest that domestic family dogs have a preference for popular modern music over classical music.

Introduction to Experiment

Among non-human animals, dogs have an almost unique place in human society. They are integrated into our households and lifestyles and are thus exposed to humans (and the environment in which they live) in a way that no other species is. For many years, researchers have been fascinated by trying to understand how our canine friends experience the world. We are starting to gain a good understanding of how dogs use social information from humans, for example, dogs appear to be very good at using human communicative cues such as pointing and can even recognise our emotional expressions. However, we know less about how dogs perceive other stimuli which come hand in hand with living in a human dominated environment, one of these is music.

Previous research has found that dogs react differently to different types of music. The study conducted by Dr Deborah Wells at Queen's University in Belfast (2002) exposed dogs in an animal shelter to different types of music. The dogs' responses were observed as they listened to either pop, heavy-metal rock or classical music. Results showed that the dogs became agitated when listening to heavy-metal rock, showed signs of being content when listening to pop music and were visually relaxed when exposed to classical music. Although these are important findings, the study was conducted in a kennel situation and was based on passive behaviours only. Thus, a number of important questions remain: do domestic family dogs show preference towards specific music genres? What happens when the dogs have a choice between different types of music irrelevant of any other outcome? Do they have a preference for one over another?

To answer these questions and help launch the new Sony High Powered Audio System (GTK-XB7), Sony Europe commissioned Dr Anna Wilkinson, Senior Lecturer at University of Lincoln's School of Life Sciences and member of the pan-European Association for the Study of Animal Behaviour, to conduct a scientific study exploring music preferences in adult family dogs. This study made use of spontaneous choice behaviour, and examined which speaker the dogs approached when first presented with a choice of music. Popular and classical music were used as the music categories as they had been shown to have a positive impact on the dogs in the previous study. The spontaneous choice trial was followed by a preference test, where dogs had the opportunity to feed in front of both of the two Sony GTK-XB7 audio systems playing either chart hits or classical music. Initial choices, as well as the time they spent in proximity to the speakers were recorded and analysed.

Testing Measures

Subjects

Dr Anna Wilkinson and the research team tested 13 adult healthy family dogs of various breeds (Table 1) that were comfortable with being handled by unfamiliar people and tested in an unfamiliar experimental room in the absence of the owner. Dogs with auditory, visual or chronic problems or with a history of aggression were not used in this experiment. Subjects were recruited from the University of Lincoln's dog database. Four dogs had to be excluded due to a pronounced side bias (90% or more of choices towards the same side), therefore, for the testing measures, the team analysed the behaviour of nine dogs.

Table1. Subjects that took part in the experiment

Dog	Sex	Breed	Age (years)	Status
Freddie	Male	German Shorthaired Pointer	3	Entire
Lily	Female	Golden retriever	2	Entire
Ivo*	Male	Border Collie	10	Entire
Moya	Female	Labrador	2.5	Entire
Lexi*	Female	Staffy Cross	10.5	Neutered
Wren	Female	Golden Retriever	2	Entire
Millie	Female	Patterdale Cross	6.5	Neutered
Mia	Female	Labrador Cross	7	Neutered
Mya	Female	Working Cocker Spaniel	4.5	Neutered
Frodo	Male	Labradoodle	5.5	Entire
Pan*	Female	Siberian Husky	4.5	Neutered
Snowy*	Male	German Spitz	7.5	Neutered
Mimi	Female	Wirehaired Pointer	9	Neutered

*Dogs that did not have their responses during testing phase included in the analysis

Ethical approval was obtained by the University of Lincoln Ethics Committee, as well as signed informed consent from the owners. Any dogs which showed signs of stress would be removed from the study immediately. None did.

Apparatus

Data was collected in a purpose designed training room at University of Lincoln, United Kingdom. The experimental set up (Figure 1) consisted of two Sony XB7 one-box high powered audio systems positioned symmetrically in the centre of the room, two identical food bowls, one in front of each speaker and a barrier in the middle of the room, equidistant to both speakers. In front of it, there was a table with two laptops, each connected by one speaker via Bluetooth. During the test, there was

always music playing from both speakers, one song on each speaker. The entire experimental session was recorded by a digital video camera, positioned at the end of the room on a tripod.

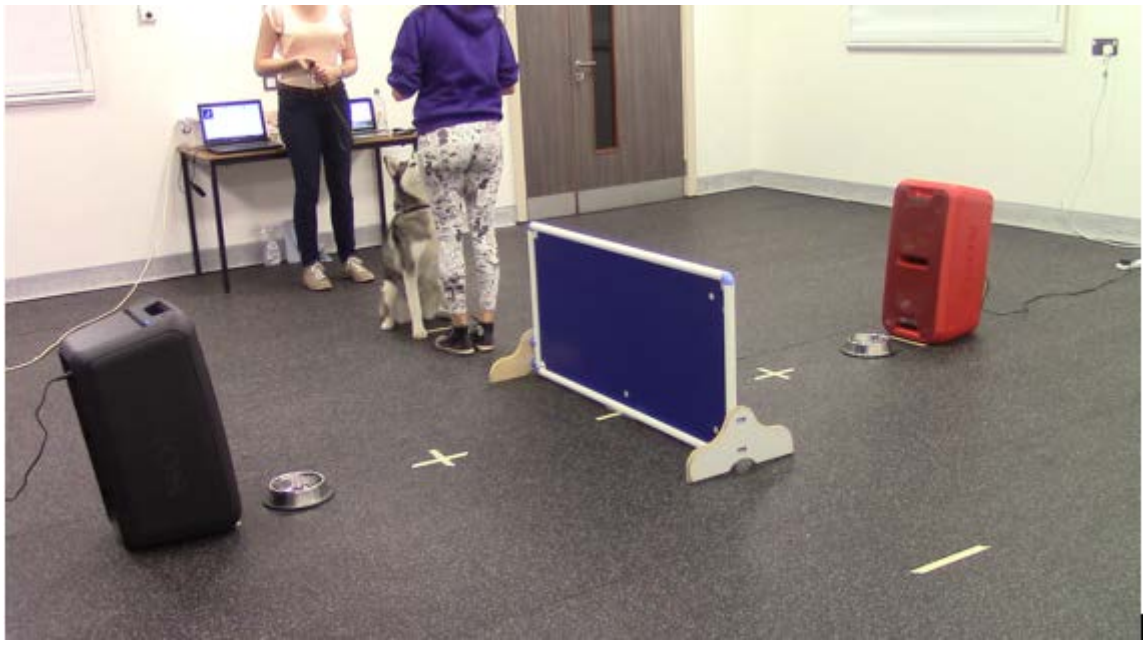

Figure 1. Experimental set up

Stimuli

Stimuli consisted of two musical categories: classical (C) and popular music (P). The team made use of five famous classical songs (C1: 7th Symphony – Beethoven; C2: Orchestral Suite No. 3 in D Major – Bach; C3: Eine Kleine Nachtmusik – Mozart; C4: Canon in D – Pachelbel; C5: Dance of the Sugar Plum Fairy– Tchaikovsky) and five high-temp popular songs (P1: Shake it off – Taylor Swift; P2: What do U Mean – Justin Bieber; P3: Single ladies - Beyoncé; P4: Animals – Martin Garrix; P5: Hound Dog – Elvis Presley). Songs were presented in pairs and the side of presentation for popular and classical music was randomised, as well as the order of stimulus (song combination) presentation. The songs were extracted from already available sources and were presented from identical make of speakers at the same volume. The dogs' behaviour was coded throughout 11 trials (initial trial for spontaneous behaviour + 10 test trials). All subjects were presented with all songs and pre-defined song combinations.

Procedure

Before the beginning of the experiment, the owner was informed about the general area of the study and gave informed consent for the use of their dog. Dogs received a five minute familiarisation phase in half the training room to allow them to habituate to the new environment and the experimenters. They did not have access to the speakers during this time.

The experimental session was divided in three parts: (i) first choice, spontaneous behaviour; (ii) pre-training (in which the dog learned that there was food in front of each speaker) and (iii) test. For first choice and test, music was playing before the animal entered the room; there was no music during pre-training.

During the first part, the dog was brought inside the room by the experimenter (E1), who had a piece of food in the dog's nose in order to keep his/her focus away from the speakers ergo the music until he/she was placed at the mark (in the middle of the room, in front of the barrier). As soon as the dog was in the middle, E1 released him/her and the subject was allowed to move freely in the room and investigate the speakers if wanted to. There was no food present (Figure 2).

Figure 2. First choice.

During pre-training, while the dog was outside the room with E1, a second experimenter (E2) placed a food bowl in front of each speaker, equidistant from the starting point and baited them with the same type and amount of treats. E1 then entered the room bringing the dog on the lead, placed themselves at the central mark and walked with the dog to one of the bowls, allowing the animal to eat the treats, returned to the mark and walked with the dog to the other bowl, again letting the dog eat the food (Figure 3). The dog was then handled by E2 (Figure 4) while E1 moved to the other end of the room and baited the bowls (one after the other) in front of the dog. After baiting, E2 set the subject free to eat from both bowls. This procedure was repeated twice for each dog. This was made in order to ensure that the dogs knew there will always be food in both bowls and that their choice during testing would not be based on differential food availability. The order of the side visited first

(left first or right first) was counterbalanced between dogs. After pre-training was completed, E1 and the dog left the room.

Figure 3. Pre-training (leading the dog to each bowl).

Figure 4. Pre-training (visible placement of the food in the bowls).

At the onset of testing, E2 set up the stimuli and ensured there was equal amounts of food available in both food bowls. The dog was then brought inside the room by E1, who had a piece of food in the dog's nose. After placing themselves at the central mark, E1 released the dog who was allowed to move freely in the room and to eat from the bowls (Figure 5). The team always allowed dogs to eat from both bowls in order to make sure that both sides would be equally reinforced in each trial and prevent discrimination learning. Dogs were free to explore the room, speakers and bowls as much as they wanted and the end of the trial was considered as soon as the dog had lost interest in exploring the environment (e.g. tried to leave the room, started to groom, started drinking water) or was in the same position (standing still or sitting down) for more than 10 seconds (Figure 6).

Figure 5. Testing.

Figure 6. On the left, dog sniffing the speaker; on the right, dog standing still next to one of the speakers.

Data Analysis

All the videos were blind coded by E1 with the software Solomon Coder Beta 15.11.19, with which it was possible to use normal speed and frame-by-frame analysis to better codes the behaviours. The target behaviours were choice, time eating from each bowl, number of inspections to each bowl and time spent in each side.

The team defined "choice" as the first speaker/bowl the dog moved towards once the trial had started; "time eating from each bowl" as the time the dog spent with his/her muzzle in contact with the bowl; "number of inspections to each bowl" as the number of events when dogs directed themselves to the bowl and looked inside it and "time spent in each side" as the time the dog spent inside the experimental zone of each speaker (which consisted of a rectangle that had as one side the barrier) and time the dog spent in one of the sides of the room (speaker 1 or speaker 2) without showing exploring behaviours (e.g. standing still; see figure 7).

Figure 7. Experimental zone delimited by the blue barrier in the middle (on the left hand side) and dog standing still on the black speaker side of the room (on the right hand side).

We calculated the absolute numbers, frequencies, proportions, averages and standard errors for all the measures throughout the population and to each individual. For the overall effect, we used a Wilcoxon signed-rank test to analyse the choices and the time spent for popular or classical musical.

Canine Results

Regarding subjects' spontaneous behaviour in the first phase of the experiment (initial contact with the speakers and the music), the team found that 62% of the dogs chose to visit first the popular music side/speaker and 38% moved towards the classical first (figure 8).

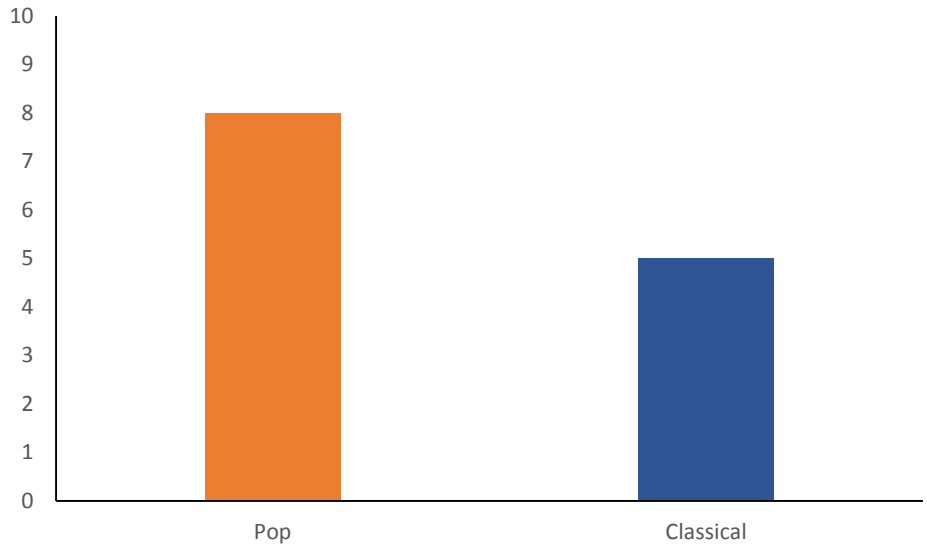

Figure 8. The number of first choices across population for Popular or Classical music

Moreover, we found that during testing dogs (as a population) chose the speaker that played chart hits more often than the classical speaker (popular: mean=6.22±0.52 and classical: mean=3.67±0.47; Figure 9), a difference that is statistically significant.

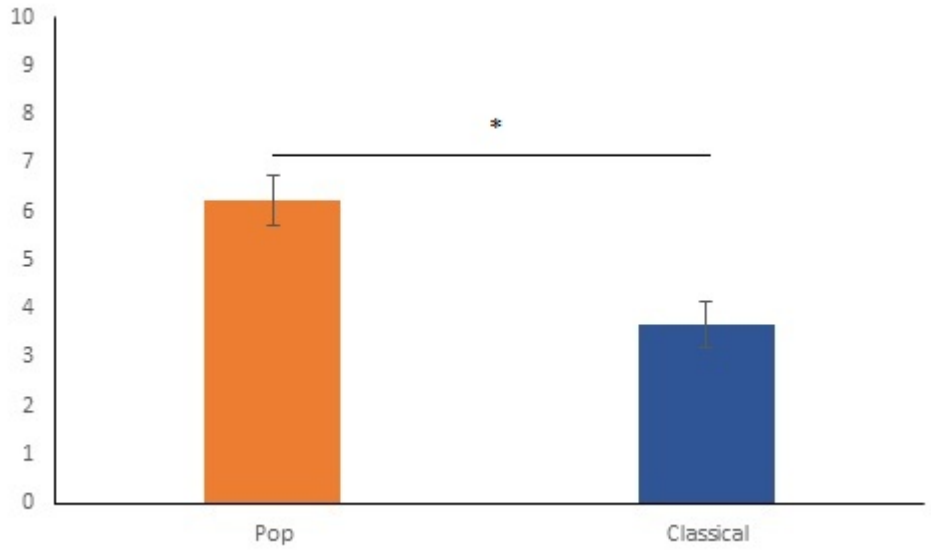

Figure 9. The average number and standard error of choices for Popular or Classical music

For the time spent in each experimental side (Figure 10), we found that dogs spent slightly more time next to the speaker that played high-tempo chart hits (mean: 5.22 ±0.57) in comparison to the classical speaker (mean: 4.33± 0.55), however this difference was not statistically significant.

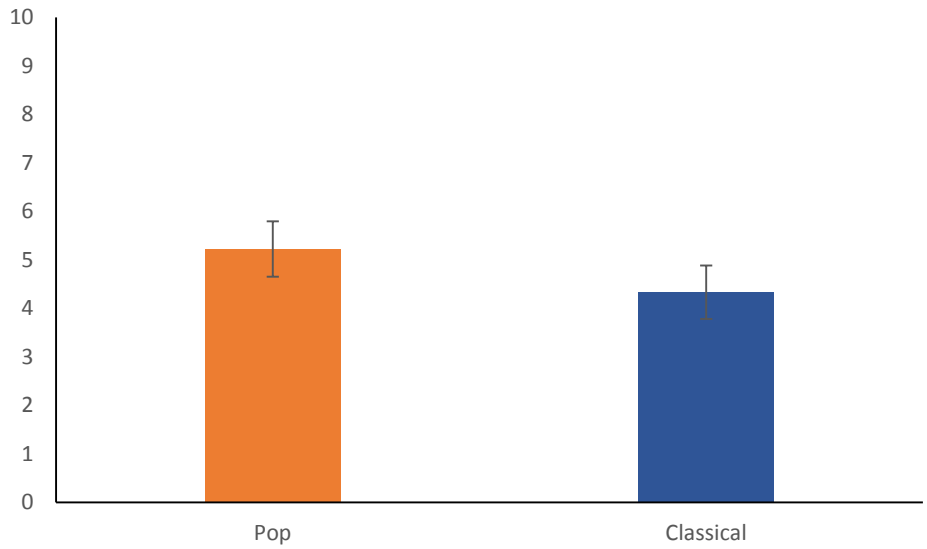

Figure 10. The average number and standard error of time spent on the Popular or Classical experimental side.

We found no effect of type of music on the food-related measures (time spent eating from each bowl: popular mean= 4.56 ±0.44 and classical mean= 4.33 ±0.52; number of inspections to each bowl: popular mean= 18.44 ±1.90; classical mean= 16.44 ±2.12).

Conclusion of Findings

The Sony study investigating Music Preferences in Domestic Dogs found a preference of popular music over classical music, with 62 per cent of dogs spontaneously choosing to listen to chart hits compared to only 38 per cent who chose classical when first presented a choice. Moreover, when given 10 testing choices in the preference task, dogs approached the speaker playing popular chart music significantly more than the one that played classical.

When discussing the findings, Dr Anna Wilkinson stated: “The research shows a strong musical preference of popular over classical music, when the dogs were given 10 choices they approached the Sony GTK-XB7 that played high-tempo chart hits significantly more than the one playing classical music. However, they had no specific favourite song.”

Appendices

Appendix One – EU Press Release

Press Release
DATE TBC

SUPER WOOFERS

It's official; Canines prefer Beyoncé to Beethoven

Sony and animal cognition expert Dr Anna Wilkinson measure the musical preferences of domestic dogs to reveal that canines go barking mad for chart hits…

- To celebrate the launch of the boombastic GTK-XB7 high power home audio system, Sony has worked with animal perception expert Dr Anna Wilkinson to conduct a study of music preference in canines
- Sony's Music Preference in Domestic Dogs study finds that tunes with a higher tempo and beat are more likely to get dogs' tails wagging than calming classical concertos, with 62% of canines choosing chart hits over classical symphonies
- Complimentary video visualises sound through animal reactions to the music of Martin Garrix's platinum EDM hit 'Animals', and features furry friends partying alongside the GTK-XB7 one-box high power audio system, which combines Sony's unique EXTRA BASS™ technology with vibrant speaker lights
- The 'Party Animals' video shows rabbit nose scrunches in time to the bassline and long-haired pooches partying to the power of the music to cats synchronised 'jumping' on the dancefloor
- The one-box high power audio system offers music-lovers soul-shaking sound and the biggest bass for the best house parties

To mark the launch of the party perfect GTK-XB7 one-box high power audio system, Sony has created the Music Preference in Domestic Dogs report – a scientific study exploring music preference in household dogs, which reveals canines rate high-tempo hits over classical concertos.

To sit alongside the study, Sony also conducted a video and sound experiment curated by innovative production company Unit 9. In the 'Party Animals' video, sound is visualised through animal reactions with the help of the new one-box high powered audio system GTK-XB7 to the beat of Martin Garrix's ground breaking electronic dance hit 'Animals'.

Sure to get anyone moving, the boombastic GTK-XB7 features Sony's unique EXTRA BASS technology, which uses DSP technology to ensure music sounds and feels even more powerful, with punchy and deep bass notes that define today's pulsing electronic dance tracks. Combined with 3-way multi-colour illumination - line lights, flashing strobes and speaker lights - that pulse in synch with the music, the GTK-XB7 brings a festival feeling to any house party.

The Study – Canines prefer Beyoncé to Beethoven

Knowing that music is best enjoyed with our nearest and dearest, Sony looked at what man's best friend would most prefer to tune into if given the choice - calming classical concertos or upbeat, high-tempo chart hits. Working with animal perception expert Dr Anna Wilkinson, who is a member of the Association for the Study of Animal Behaviour (ASAB), alongside PhD student Natalia Albuquerque, Sony conducted the Music Preference in Domestic Dogs study. ASAB is a European animal behavioural society dedicated to the study of animal behaviour.

The study found a strong fondness of chart hits over well-known classical concertos, with 62 per cent of dogs spontaneously choosing to listen to modern music compared to only 38 per cent who chose classical. When given 10 choices between the two genres in the preference task, dogs chose the chart hits significantly more than classical; with canines more likely to spend more time around the speaker that played upbeat chart hits than the speaker playing classical; suggesting they enjoyed listening to the high-tempo tunes with a beat more.

Two Sony GTK-XB7 audio systems were used during the experiment as means of playing popular or classical music to the canines, with their reactions documented and compared. Music was played from both speakers, one song on each speaker, and songs were presented in pairs and the placement of the speaker, as well as the order of song combinations was randomised, to ensure an unbiased result. Stimuli included five famous classical songs, featuring composers such as Mozart and Pachelbel, as well as five famed chart artists from Elvis Presley and Martin Garrix to Justin Bieber and Beyoncé.

When discussing the findings, Dr Anna Wilkinson stated: "The research shows an interesting difference in musical preference between popular and classical music. When given ten choices between the music types, dogs consistently chose the Sony GTK-XB7 that played popular music more than the one playing classical."

The video – 'Party Animals'

In 2015 the science of Cymatics was put to the test, this year, Sony takes scientific sound experiments to the next level, pairing the GTK-XB7 one-box high powered audio system with household animals' reactions to music.

To bring the study and the GTK-XB7 to life, Sony worked with Unit 9, as well as specialist animal handlers and an onsite vet, to create a video that represented the size and scope of a party with the GTK-XB7 through contrast with an array of household animals.

The video depicts cats, dogs and rabbits in glorious 1000 FPS (frames per second) super slow motion as they react to the music, with each product capability accentuated through a series of 'sets'. Air

blasts recreate the incredible sound pressure of the system, while the environmental lighting matches the speaker's multi-colour illumination LEDs and strobes. One of the highlights of the video is when the EXTRA BASS™ technology is emphasized through a Persian cat enjoying its repose, as it vibrates to the beat in an exposed sub-woofer.

The 'purr-fect' party potential of the speaker is also shown through wet and dry animals including Basset Hounds, Persian cats, Hungarian Pulis, Chouchous and rabbits dancing and shaking to the music.

Alberto Ayala, Director of Video and Sound at Sony Europe, said on the video: "The XB7 is all about fun; the portability, sound pressure, lights and EXTRA BASS™ means you can bring a top class party with you anywhere. To mark the launch of the new high powered speakers, we wanted to take the fun to the next level – and what better way than to invite our furriest friends to take part in the festivities!"

View the 'Party Animals' video here: <insert official YouTube link>

To read the full report, please refer to Sony's Music Preference in Domestic Dogs study.

For further details on the Sony GTK-XB7 one-box high powered audio system, please go to <insert link>

Notes to editors

- Ethical approval was obtained by the University of Lincoln Ethics Committee, UK, as well as signed informed consent from the owners
- Nine adult household dogs of various breeds took part in the study
- Stimuli (songs) that formed experiment -

Popular Music	**Classical Music**
What do U mean, Justin Bieber	Canon in D, Pachelbel
Shake it off, Taylor Swift	Dance of the sugar plum fairy, Tchaikovsky
Single Ladies, Beyonce	Eine Kleine Nachtmusik, Mozart
Animals, Martin Garrix	Orchestral Suite No. 3 in D Major, Bach
Hound Dog, Elvis Presley	7th Symphony, Beethoven

About Sony Corporation

Sony Corporation is a leading manufacturer of audio, video, game, communications, key device and information technology products for the consumer and professional markets. With its music, pictures, computer entertainment and online businesses, Sony is uniquely positioned to be the leading electronics and entertainment company in the world. Sony recorded consolidated annual sales of approximately $68 billion for the fiscal year ended March 31, 2015. Sony Global Web Site: http://www.sony.net/

Appendix Two – Biography of Dr Anna Wilkinson

Dr Anna Wilkinson is a member of the pan-European Association for the Study of Animal Behaviour and a Senior Lecturer at the School of Life Sciences, University of Lincoln, UK.

Dr Wilkinson joined the University of Lincoln in 2010. Prior to this, Dr Wilkinson completed a postdoctoral fellowship at the University of Vienna. Her research focuses on understanding animal perception and cognition.

Dr Wilkinson is interested in how animals perceive the world, how they learn about their environment and how they use and retain this information. This work is conducted within a comparative framework.

Qualifications

- PhD 2004 – 2007: Avian visual perception - Department of Psychology, University of York
- BSc 1999 – 2003: Department of Psychology, University of Stirling
- Professional Affiliations
- Association for the Study of Animal Behaviour
- Comparative Cognition Society
- The Psychonomics Society

Appendix Three – About the GTK-XB7

With fabulous sound, bags of power and massive low frequency response from two large 16cm woofers, the XB7 turns nights at home into a premium clubbing experience.

Sony's unique EXTRA BASS technology uses DSP technology that cleverly processes frequencies according to the source while maintaining excellent audio quality. Music sounds and feels even more powerful, with punchy and deep bass notes that define today's pulsing electronic dance tracks.

Exciting 3-way multi-colour illumination; line lights, flashing strobes and speaker lights pulse in synch with the music.

Multi Layout lets you position the XB7 vertically or on its side, enjoying sensational stereo sound in either orientation. There's also a handy Speaker Add function, allowing you to hook up a second XB7 unit via Bluetooth and instantly double your music power.

One-touch listening lets you stream your favourite tracks and playlists via Bluetooth with a single touch of your NFC smartphone or tablet.

You can charge your phone or tablet's battery over USB while you're playing music. There's also an audio input for connecting MP3 players or just about any other sound source.

Link to EU press centre: http://presscentre.sony.eu/pressreleases/with-great-power-comes-great-entertainment-1284990