MUS508 – Assignment One

WORKSHOP PORTFOLIO (WORD COUNT – 1062)

HARRIET DRURY

Portfolio

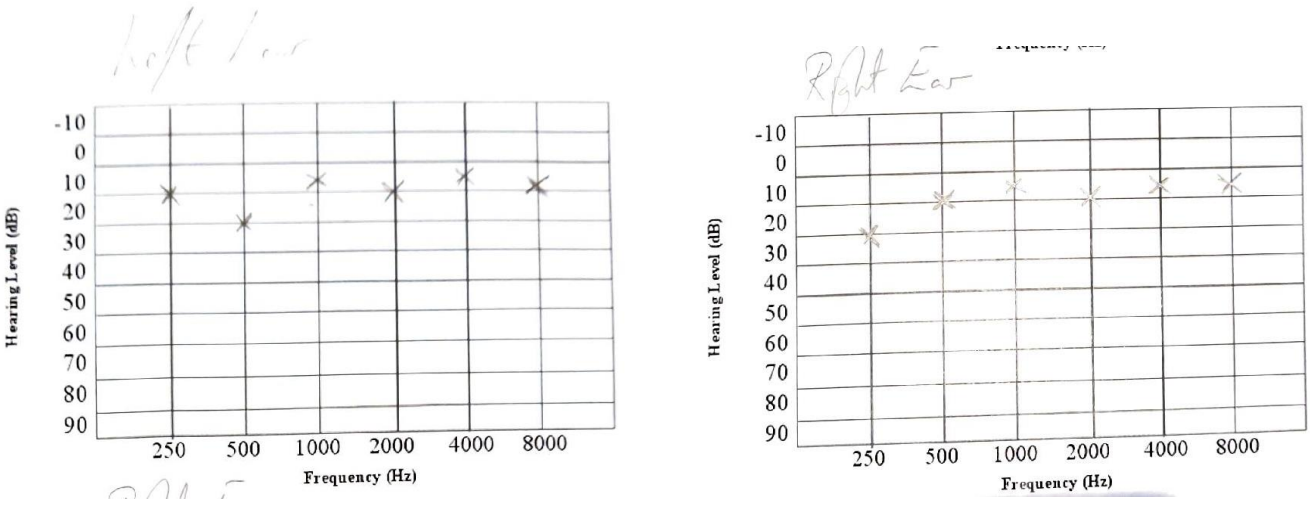
This portfolio examines the practical workshops undertaken in lectures. It includes the methodology and workspace analysis, issues within the workshops and the similar research with the application and usage in the real world explained.

A psychoacoustics practical untaken in class focuses around hearing tests; Specifically, the audiogram and the Weber and Rinne tests. The methodology for this was two separate tests; one focusing on pure tone audiometry and the other on subjective audiometry.

It is first worth outlining the experiment conditions and workspace. These stayed the same for both experiments. They were undertaken in the lecture room Rolle 14; no special audio booths were used, or any special testing spaces designed to isolate tones. Loud background noise of other students and subjects occurred at the same time as the readings measured. Further localised, the experiments occurred by a grand piano, a large resonant piece of equipment, worth highlighting.

For the audiogram, sound was played to a participant using a website that had been set up for usage of audiograms with headphones from a computer. Researching the website, it has been created by a professional audio engineer with all details of the calibration needed to provide accurate responses needed.

frequencies between 250 and 8000 Hertz were played, increasing in volume until the subject heard the tone. The left and right ears were tested separately. This was then written out into charts:

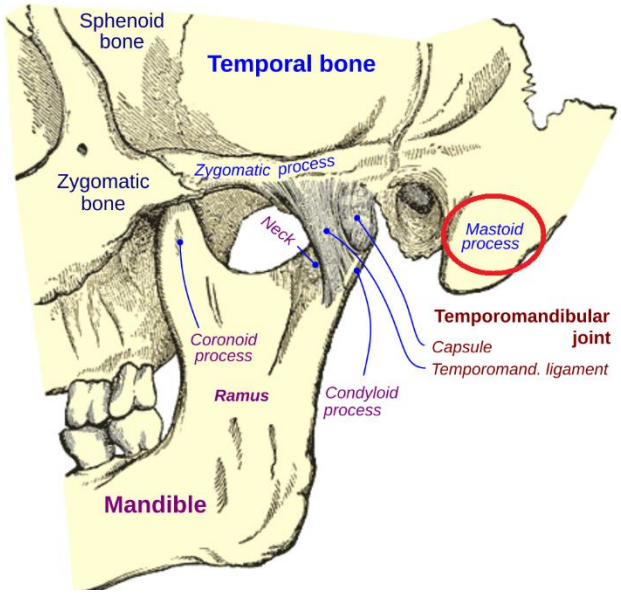


(Scans of the audio charts from the workshop)

Upon researching, these charts can be used as a therapeutic diagnostic tool to monitor the thresholds at which a specific frequency is heard (Kutz, 2019). If the participants responses are different to a standard average, then they have either impaired or better than average hearing.

For the second hearing test, the Weber and Rinne tests; a tuning fork is used either by the assistant or patient in various positions. For the Weber test, the tuning fork is struck and placed in the middle of the forehead, equidistance from the patient's ears. The lateralisation

of the tone heard is noted down. For the Rinne test, the tuning fork is again struck and placed on the mastoid process.



(Mastoid Process, Circled. Drake et al., 2015)

This occurs until the sound is no longer heard. The patient is asked to report this threshold; once it happens, without re striking the fork, it is placed outside the ear lobe and the patient is asked to report when it can be heard. If the sound is heard in the ear, then it is marked as positive on a chart. If the sound is not, it is a negative mark.

The results of the Weber and Rinne test are combined into a chart:

			Weber test				
			lateralizes to left		no lateralization	lateralizes to right	
	Condition of ears		left	right	both	left	right
Rinne test	⊕	⊕	Normal	Sensorineural loss	Normal Sensorineural loss	Sensorineural loss	Normal
	⊖	⊕	Conductive loss	Normal	(no such condition)	Combined loss	Normal
	⊕	⊖	Normal	Combined loss		Normal	Conductive loss
	⊖	⊖	Conductive loss	Combined loss	Conductive loss	Combined loss	Conductive loss
	left ear	right ear	Combined loss = conductive and sensorineural loss				

(Weber and Rinne chart from the workshop)

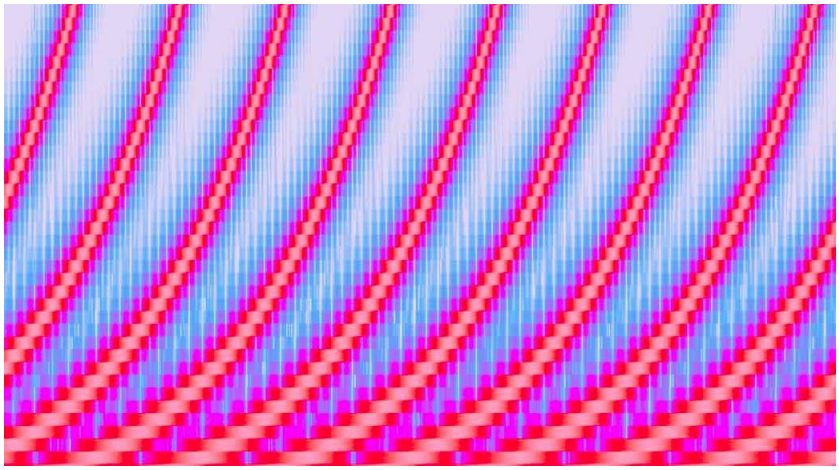
Further research into these tests, once again used as a therapeutic diagnostic tool, shows the monitoring of the bilateral condition of the ears can diagnose sensorineural loss and combined loss of hearing in the ears (Thompson, 1974). However, limitations become apparent. The tuning forks are not very accurate, and It has ‘limited utility in detecting mild conductive hearing losses or mixed hearing losses’ (Turton and Batty, 2016).

The issues of the workshop studies are mostly situational. With a lack of controlled equipment and sound booths it is hard to distinguish and measure the dependant variable. The sample size is very small and only consisting of trained musicians of a similar age range, decreasing the generalisation and reproduction of the tests.

Auditory illusions are a part of the psychology of music. During the workshop, the Shepard scale and Scale illusion were observed. Further research into this area also shows the usage of the Mcgurk effect and Risset Tone.

Again, outlining the conditions and workspace of this workshop is important. It was once again undertaken in Rolle 14. Using the speakers in the room to fill the room with sound and not individual headphones. Experiments were undertaken as a group project meaning that ideas were shared, even compared. This might have left for results to be very similar and providing a bias in the experiment. Controlling variables were very limited while measuring the dependant variable, which was the pitches and interpretation of them.

To begin this workshop, an audio clip of the Shepard scale is played. First thoughts suggest it is a continuous rising glissando, increasing in tension. However, being shown a spectrogram of the Shepard scale allows for the analysis of the harmonic component:



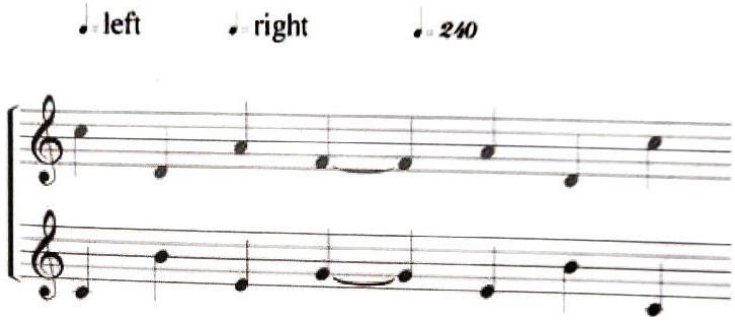
(Shepard Tone Spectrogram - Science Everyday, 2014)

Initial reflection shows a rising tone of which peaks and cuts while another tone, starting at the original pitch takes prescience in perception. While they fade together it blends creating a feeling of a continually rising scale.

Further research into the Shepard Tone shows the research of intransitivity, the idea that A>B and B>C so therefore A>C. This intransitivity does not always occur in the universe as there is always a limiting factor (Huron, 2012). Researchers take the view that pitch judgement is not always one thing, it in fact changes perception due to the auditory cortex of each person being slightly different (Beament, 2005, p.93).

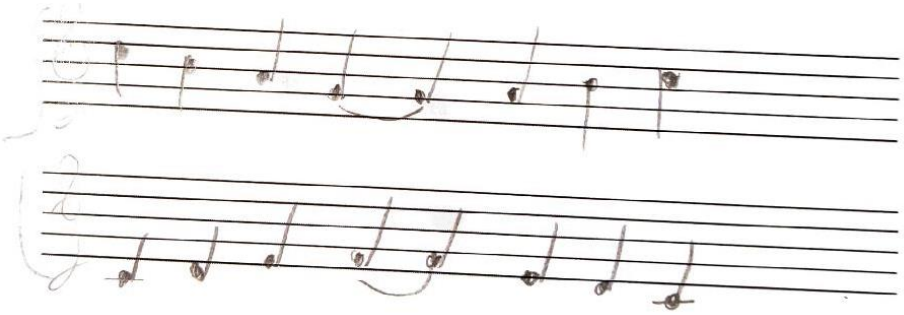
A similar rhythm-based illusion exists, named the ‘Risset Tone’ (Owen, 2019). These auditory illusions focus on confusing the brain’s auditory cortex so that the perception is changed within the context of usage.

The second part of this workshop was based around the Scale Illusion. This started as a practical where we chose two similar instruments to play each line:



(The Separate Lines, from the worksheet)

The same conditions of the previous Shepard Tone illusion are observed. Two saxophones were chosen from the group to play. Upon playing, the observation of what is heard is written down and compared between colleagues:



(The Interpretation of What is Actually Heard, From the Worksheet)

This demonstrates the ‘Scale Illusion’. The auditory cortex analyses and arranges the notes heard to make two separate scales (Deutsch, 2010). However, there is no simple explanation as to why this occurs. The perception of the scales in the brain have no common localisation to account for the perception (Deutsch, 1975, pp.2–4).

Both illusions have usage in sound design, music and even video games. Key examples of the Shepard Tone are the Mario 64 endless staircase, the ending of the song ‘Echoes’ by Pink Floyd (audible at 22:10 minutes in) and in the film ‘Dunkirk’ (The Mole, by Hans Zimmer). With the Scale Illusion, Music might be mixed to pan between the left and right headphones to create a sense of space while still creating the intended scale.

The same limitations from the previous workshop exist within this workshop, with the discussions affecting the individual outcomes of each test.

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