Title: Pitch Perception and Expectancies

Description: There are a number of patterns and rules for constructing musical sequences. These rules form a structure of melodic and rhythmic factors that enable listeners to recognise and understand music. Music cognition research has examined the effect of breaking these rules on music perception, particularly with regard to whether the rules work separately or can affect one another. This study followed in this literature by investigating how following or breaking musical rules affects the ability to process individual pitches heard at the end of a sequence.

Ethics approval number: 2015/066

Month/Year available: June 2016

This study into temporal expectancies and the metric hierarchy was conducted with the aim of examining how the combination of three different theories of music cognition would affect the performance of participants in a pitch identification task. These three theories are dynamic attending theory, metric hierarchy and temporal expectancies. Dynamic attending theory is the idea that people's brains adapt to changes in something that they are paying attention to as the changes occur, metric hierarchy is the idea that different beats in a bar of music are more cognitively preferred (meaning that we expect them to occur more often) than others, and temporal expectancies is the idea that when a person is listening to something involving rhythm they use the structure that has already occurred to form predictions as to how the rhythm will continue. Particularly, this study sought to extend the research base of dynamic attending theory, by incorporating the idea that some beats are more preferred than others, as well as provide additional evidence for metric hierarchy itself.

Methodology and Results

Considering this aim, the first experiment was constructed to replicate the idea of a previous study that was important in establishing dynamic attending theory, with a number of changes to incorporate the idea of metric hierarchy. These changes were made to the amount of beats within a sequence of music that were used as the location of the final tone in the sequences which participants listened to that they would then have to compare to the first tone of the sequence to answer whether or not it was higher or lower in pitch. The location used in this experiment were the second, third and fourth beats of a bar of music, as well as locations between these beats (beats 2.25, 2.5, 2.75, 3.25, 3.5 and 3.75. The task of this experiment involved participants listening to a number of atonal musical sequences (meaning that the pitches were random), in which the final tone of each sequence was moved to different metric positions as the experiment progressed. Participants of this experiment were asked once they had complete the experiment whether or not they had noticed that the pitch of the first note of the sequence was repeated at the second last point of the sequence. This was asked due to concerns that this feature would allow participants to essentially cheat the task, as they wouldn't need to listen to the whole sequence in order to complete the pitch identification task. It was predicted that this experiment

would achieve results that reflected the rank of the beats measured within the metric hierarchy. Namely, that performance in the task would be best on beats 2, 3, and 4, would be lower on beats 2.5 and 3.5 and then would be lower again on beats 2.25, 2.75, 3.25 and 3.75. It was also predicted that the central three beats measured in this experiment (2.75, 3 and 3.25) would achieve a similar graphic shape of results to the original study in an expectancy profile (which is a display of how temporal expectancies influence performance in the task). The predicted shape for this expectancy profile is the shape of an inverted letter U. However this did not prove to be the case in the results of this first experiment, as the expectancy profile was flat (meaning that performance in all metric positions were relatively similar).

A possible reason identified for this result was the presence of a potential method of cheating the task in the original experimental format. This was removed for the second experiment of this study. This experiment was structured in almost the same way as experiment one, except for the removal of the repeated tone at the second last point of the sequence. It was also changed to lengthen the sequence that preceded the final comparison tone so that it would finish later than it did in the first experiment, which was done to make sure that participants had the best possible opportunity to remember the first tone of the sequence. It was predicted that removing this aspect of the original method would allow for the original hypothesis (that the expectancy profile of participants' performance would be consistent with both dynamic attending theory and metric hierarchy) to be supported. This was not the case, as again the result of this experiment showed a flat expectancy profile.

Future Implications

The results of these two experiments have a variety of implications for future research, most notably for the idea of dynamic attending theory. Up until more recent research in the field of music cognition, it had been assumed that this theory was powerful in the musical structures of both rhythm and pitch. This study contributes to a growing uncertainty of the power of dynamic attending theory in relation to pitch, which in turn casts doubt into the generalizability of the theory as a whole.