**Expectations in post-tonal music – Outline**

*Aims:*

* Assess the impact of formal knowledge and exposure on perceived expectation and uncertainty in post-tonal music; can listeners actually perceive the tone rows used to organize this music?
* Evaluate computational model IDyOM’s success at modelling expectation and uncertainty for post-tonal music

*Approach:*

Can statistical learning explain the perception of atonal music?

Approach as an alternative to the salience theories (Dibben, Lerdahl, Imberty) or as an extension of statistical learning in music?

*Participants:*

15-20 MUN School of Music students taking the post-tonal theory course as part of their regular curriculum

*Study Design:*

All participants will take part in both the pre- and post-tests; they will rate expectancy (how surprising was the last note?) and closure (how well did it end the phrase?), and certainty (how sure are you about what’s coming next?)

Pre-test

* Demographics
  + Age
  + Musical training (Gold-MSI)
  + Experience/exposure to post-tonal music
* Rating expectancy/closure and certainty to each note in an atonal phrase, where the phrase is presented one note at a time (first presentation = 1 note, second presentation = 2 notes, third = 3 notes, etc.)
  + 2 phrases from piece by Dallapicola (Quaderno musicale di Annalibera; piano versions)
  + 4 phrases from Webern works, 2x string quartets and 2x vocal

Post-test

* Experience/exposure to post-tonal music
* Rating expectancy/closure and certainty to each note in an atonal phrase, where the phrase is presented one note at a time (first presentation = 1 note, second presentation = 2 notes, third = 3 notes, etc.)
  + 2 other phrases from the same Dallapicola suite, piano versions
  + 4 more Webern phrases from string quartets and vocal work
* Short interview
  + How has your listening changed from September to now, if at all?

*Computational modelling*

Pre-test

IDyOM will be trained on the prototypical training corpus of NS Folk Songs, Bach melodies and German folk songs.

Models of pitch, interval, scale degree, and combinations of the above will be tested; predict interval will perform best based on the structure of the music we’re looking at.

Post-test

IDyOM will be trained on two types of LTMs:

1. the prototypical training corpus (tonal) PLUS the pre-test phrases and other atonal phrases from pieces studied in the course curriculum (atonal)
2. pre-test phrases and other atonal phrases from the curriculum (atonal only)

Once again, models of pitch, interval, scale degree, and combinations of the above will be tested; predict interval will perform best. These two types of LTMs may be able to tell us something about compartmentalization in music perception. It is known that listeners are able to adjust their expectations based on the style of music they are listening to; how well can IDyOM simulate this? If the atonal only LTM is closer to human ratings then we have good evidence for strong compartmentalization.

*Hypotheses:*

* Exposure and study of post-tonal music will lead to ‘expected uncertainty’ (Koelsch, Vuust, & Friston, 2018), leading in a reduction in perceived surprise (i.e. higher predictability ratings) but similar entropy from pre- to post-test
* IDyOM (information dynamics of music; a statistical model of music; Pearce, 2005, 2018) will detect 12-tone rows more efficiently than human listeners in both pre- and post-tests but substantially more with post-test training; mean IC will be relatively lower than mean predictability ratings in post-test than in pre-test

*Analysis:*

IDyOM’s output for each viewpoint and LTM type for IC and entropy will be compared to human ratings using Pearson correlation tests. A linear model will evaluate the influence of test time (pre/post), rating origin (IDyOM, human) and closure ratings on measurements of predictability and uncertainty. A significant role of closure would mean that closure ratings differ from predictability and uncertainty ratings, which we want. The correlation between predictability and closure ratings will also be measured in order to have an idea of the magnitude of the confounding effect of closure.

*Timeline:*

Ethics submission: Feb Ethics approval: March

Recruitment: September Pre-test: September (first two-three weeks of class)

Post-test: December (last week or two of class and into pre-exam period; must be before holiday break)

*Funding:*

Participants will be paid $10/h.

*References*

Koelsch, S., Vuust, P., & Friston, K. (2018). Predictive Processes and the Peculiar Case of Music. *Trends in Cognitive Sciences*.

Pearce, M. T. (2005). *The construction and evaluation of statistical models of melodic structure in music perception and composition* (doctoral). City University London, London, UK. Retrieved from http://openaccess.city.ac.uk/8459/

Pearce, M. T. (2018). Statistical learning and probabilistic prediction in music cognition: mechanisms of stylistic enculturation. *Annals of the New York Academy of Sciences*, *1423*(1), 378–395. https://doi.org/10.1111/nyas.13654