Rhythm MVPA Stimuli

Designing Stimuli: What to control

- Number of beats per stimuli (4 or 5?)
  - If scan protocol provides 4s silent window, 80 bpm tempo gives 4.25s duration at 5 beats
  - After listening for the stimuli for an hour, I prefer 4 beats
- Number of onsets/intervals in each rhythm
- Duple or triple subdivision
- Accents (intensity) of each onset
- Synchronizing first and last onset
  - Requires participant to assess entire phrase
- Amount of similarity? (non-significant difference between similarity scores of stimuli pairs)

Designing Stimuli: What to vary

- Tempo (aka duration) – 80, 112, 144 bpm
- Rhythm complexity (prevalence of pulse)
- Actual rhythmic content (rhythmic gestalt)

Designing Stimuli: Avoiding metric perception

- A sense of pulse or tempo can be induced with as few as two clicks from a metronome in musicians (personal experience)
- Can a sense of meter be induced by a similar “minimal pair”?
  - E.g. 2/4 meter would require 3 beats…
  - E.g. 3/4 meter would require 4 beats…
- Rhythms must be designed in a way to avoid this superordinate category of meter?
- Should we go with 4 or 5 beats?

Designing Stimuli: Analysis of data

- fMRI study analyzed using representational similarity analysis (RSA)
- If we design 3 stimuli per category (A, B, and C)
  - If A and B are behaviorally rated as more similar to each other than to C…
  - RSA comparing A – B and A – C or B – C would show how brain represents rhythmic similarity and dissimilarity?
  - RSA results can be compared within each category
- Classification/decoder analysis
  - If stimuli are designed as above (A, B, and C)…
  - Would classifier have higher accuracy labeling C than A and B?

Stimuli: Simple

4 beats

1 

2 

3 

5 beats

1 

2 

3 

Hypothesis: 1 similar to 2, 2 similar to 3

1 not similar to 3?

Stimuli: Complex

4 beats

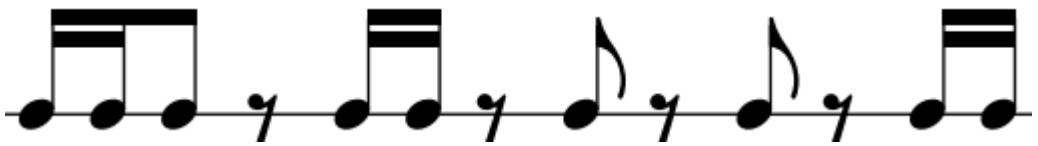
1 

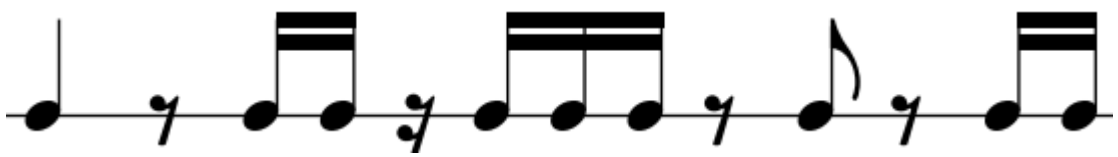
2 

3 

5 beats

1 

2 

3 

Hypothesis: 1 similar to 2, 2 similar to 3

1 not similar to 3?