June 4, 2019 Committee Meeting Summary

1. Explanation of the questions being asked and what is new about what I am doing
2. Overview of the young and older adult datasets and how they relate to the questions asked
3. Demographic summary of the young adult data and the current set of older adult data
4. Young Adult Data
   1. Overview of the testing paradigm (hidden slides for info on details of behavioural tests)
   2. Behavioural data to show learning occurred between scan 1 and 2
   3. BOLD data summary
      1. No session x stim type interaction (F test)
      2. No effect of session (F test or T tests: S1>S2 or S2>S1)
      3. No effect of familiarity (F test or T tests: learned > unlearned or unlearned > learned)
      4. Effect of stimulus type (F test): sig clusters at corr p<0.05 in auditory, premotor, PFC and inferior parietal (slide 12)
      5. Pairwise stimulus comparisons show significant clusters in auditory and other areas(slide 14 & 15)
         1. A capella involves premotor more than other stim types
         2. Spoken involves inferior frontal more than instrumental
         3. Instrumental involves parietal cortices more than spoken
   4. Synchrony data summary
      1. Session x stimulus (2x4 ANOVA)
         1. Main effect of session in some ROIs
         2. No interaction
         3. No main effect of stimulus
      2. Stimulus (1x4 ANOVA) within session 1 or 2
         1. Strong stimulus effects in some ROIs in frontal, cingulate, auditory, cerebellar areas
      3. No difference in synchrony between familiar and unfamiliar stimuli with Session 2
      4. Pairwise comparisons show: S > A > W > I
      5. Show the timecourse plots with the stim envelope overlay on the timecourses from Heschel’s gyrus.
         1. Synchrony in auditory areas may well be driven by stim envelope, but synchrony in other areas is not
      6. Lyric Orientation scores do not covary with any of the synchrony results
   5. Other ideas for Young Adult analyses
      1. Pattern analyses using RSA
      2. Relationship between cognition and synchrony
5. Older Adult Data (14 participants) \* VERY PRELIMINARY RESULTS\*
   1. Overview of the testing paradigm – to shorten the scan session we dropped a capella stimuli because there was little to no difference between a capella and spoken stimuli in the synchrony data; added 2 long known stimuli (one spoken, one whole)
   2. BOLD data summary
      1. All stimuli activate auditory cortices
      2. Spoken stimuli activates areas in inferior frontal (triangularis) more than other stimuli
   3. Synchrony data summary
      1. Unknown stimuli (1x3 ANOVA)
         1. Frontal, Auditory, and Cerebellar areas differentiate between these stim types
      2. Unknown and known stimuli (1x5 ANOVA)
         1. Frontal, Auditory, and Cerebellar areas differentiate between these stim types
      3. pairwise comparisons show: S > W > I
         1. follows same pattern as in young adults
      4. Unfamiliar spoken > familiar spoken
         1. These are different stimuli, but we still see that when there is a familiarity difference, unfamiliar stimuli show more synchrony than familiar
      5. Lyric Orientation scores covary with auditory ROIs only – mostly on the R side
   4. Other analyses
      1. Potentially pattern analysis if the young adult data shows anything of interest
      2. Relationship between cognition and synchrony (compared to young adults)
6. Summarize what is currently the same/different between young and older adults

Young Adults

ROIs that differentiate between 4 stimuli in **Session 1**

* Frontal
  + Superior frontal gyrus
  + Inferior frontal gyrus – pars triangularis
  + Frontal operculum cortex
* Cingulate
  + Paracingulate gyrus
  + Anterior cingulate gyrus
* Auditory
  + Heschel’s gyrus
  + Anterior superior temporal gyrus
  + Posterior superior temporal gyrus
  + Planum temporale
* Cerebellum
  + 6\_L
  + Vermis\_9
  + Vermis\_6

ROIs that differentiate between 4 stimuli in **Session 2**

* Frontal
  + Frontal medial cortex
* Cerebellum
  + 7b\_R

Session 2 Familiar vs Session 1 ‘Familiar’ (to be learned)

* Frontal
  + IFG – S1 > S2
  + Frontal Operculum – S1 > S2; W1 < W2
* Auditory
  + Heschel’s gyrus – W1 > W2
  + Superior Temporal Gyrus – S1 > S2; W1 > W2
  + Planum polare – I1 > I2
  + Planum temporale – I1 > I2; S1 > S2; W1 > W2
  + STG, posterior – A1 > A2; I1 > I2; S1 > S2; W1 > W2
* Cerebellum
  + Vermis\_9 – A1 < A2
  + Vermis\_6 – I1 < I2
  + Vermis\_4\_5 – I1 < I2

**Familiar – within Session 2**

ANOVA in Session 2 – differentiating 4 stim types with familiar stim only

Cerebellum – 7b\_R F(3,72)=6.85, p=.008 (FDR)

**Unfamiliar – within session 2**

ANOVA in Session 2 – differentiating 4 stim types with unfamiliar stim only

Frontal Operculum cortex F(3,72)=4.14, p=0.046 (FDR)

**T-tests**

Session 2 Familiar vs Session 2 Unfamiliar

* NONE

Older Adults

I = instrumental, S = spoken, W= whole,

SF = spoken familiar (Twas the night..), WF = Whole familiar (Hey Jude)

ROIs that differentiate between **unknown stimuli (I,S,W)**

*Compare to Young Adult Session 1 ANOVA above*

* Frontal
  + Pole (L/R)
  + Inferior frontal gyrus – pars triangularis (R)
  + Inferior frontal gyrus – pars opercularis (L/R)
* Auditory
  + Heschel’s gyrus (L/R)
  + Anterior superior temporal gyrus (L/R)
  + Posterior superior temporal gyrus (L/R)
  + Planum polare (L/R)
  + Planum temporale (L/R)
* Cerebellum
  + 4\_5\_L
  + 4\_5\_R
  + Vermis\_4\_5
  + Vermis\_3

ROIs that differentiate between **unknown and** **known stimuli (I,S,W,SF,WF)**

* Frontal
  + Pole (R)
  + Superior Frontal Gyrus (R)
  + Inferior frontal gyrus – pars triangularis (R)
  + Inferior frontal gyrus – pars opercularis (L/R)
  + Frontal Medial Cortex (R)
* Auditory
  + Heschel’s gyrus (L/R)
  + Anterior superior temporal gyrus (L/R)
  + Posterior superior temporal gyrus (L/R)
  + Planum polare (L)
  + Planum temporale (L/R)
* Cerebellum
  + 4\_5\_L
  + 4\_5\_R
  + 6\_R
  + 8\_L
  + 8\_R
  + 9\_R
  + Vermis\_4\_5
  + Vermis\_3