*6 h 40 min*

**Free Recall Test 1**

*lyric-only, instrumental-only, whole songs = 6 songs total, 10 min per song, 60 min*

* tests for memory of the melody, pitch, and tempo
* using humming or “la” or “da” or whatever syllable is preferred, sing the melody only (no lyrics, if known) of the song
* for each song, start with just title cue
  + Then reproduce with first-line cue
* ask them if they are satisfied with the production

Background:

* Bartlett & Snelus 1980: title cue not as good as first line cue
* Levitin 1989: Absolute pitch memory – hum first few notes of melody multiple times (of LTM song) – 72% of people came within 8% of actual tempo
* Halpern 1989– produce opening pitch of song – first few notes – try until satisfaction is excellent – just looked at variability between productions being less than variability across different songs – so we could get them to repeat a few times
* Trial sequence:
  + View song title
  + Click to proceed
  + Sing the melody for the length of the song, as much as you can remember
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy
  + Hear first line of song (*lyric-only, instrumental-only, or whole*)
  + Click to proceed
  + Sing the melody following from the first line of the song, as much as can remember
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy
  + Hear first line of later song verse
  + Click to proceed
  + Finish the verse
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy
  + Hear first line of an additional song verse, mid-way through song
  + Click to proceed
  + Finish the verse
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy
* Scoring:
  + Pitch – analyze pitch of first note against first note of the song
    - compare overall average pitch to correlate between the real and sung version
  + Tempo: analyze tempo of production against tempo of song
    - And tempo variability
    - And tempo of different parts of song
  + Melody:
    - Score the contour of notes – notate what the notes themselves are, then see if transcribe to song notes (even if not exact notes)
* Can compare memory at different points in the song
* And differences in memory of melody for lyrics vs. instrumental music vs. both

**Free Recall Test 2**

*spoken, lyric-only, whole songs = 6 clips, 10 min per song, = 60 min*

Lyrics: Singing or speaking with original

Background:

* Bartlett & Snelus 1980: title cue not as good as first line cue
* Rubin 1977 – remember more text when given melody during recall (so first line cue might trigger)
* Rubin 1977, Calvert & Tart, 1993 – count up all the words recalled to score – sing or speak during learning and retrieval, singing better at longer term
* for each song, start with just title cue
  + Then reproduce with first-line cue
* ask them if they are satisfied with the production
* Trial sequence:
  + View song title
  + Click to proceed
  + Sing the lyrics for the length of the song, as much as you can remember
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy
  + Hear first line of song (*spoken, lyric-only, or whole*)
  + Click to proceed
  + Sing the lyrics following from the first line of the song, as much as can remember
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy
  + Hear first line of later song verse
  + Click to proceed
  + Finish the lyrics of the verse
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy
  + Hear first line of an additional song verse, mid-way through song
  + Click to proceed
  + Finish the lyrics of the verse
  + If satisfied, continue, can listen to playback, can re-record as desired
  + End – rate confidence in accuracy

**Free Recall Test 3**

*spoken, lyric-only, whole songs = 6 songs, 10 min per song = 60 minutes*

Lyrics: Written

Background: Most lyric recall tasks have allowed written, could be interesting to see whether spoken/written differ, allows the respondent to review work and make sure has been thorough rather than having to recall serially, can recall more in parallel

- eg. calvert and tart, 1993; Rubin, 1977;

* for each song, start with just title cue
  + Then reproduce with first-line cue
* ask them about confidence in submitted written lines
* Trial sequence:
  + View song title
  + Click to proceed
  + Type the lyrics for the length of the song, as much as you can remember
  + End – rate confidence in accuracy
  + See written first line of song (*spoken, lyric-only, or whole*)
  + Click to proceed
  + Type the lyrics following from the first line of the song, as much as can remember
  + End – rate confidence in accuracy
  + Hear first line of later song verse
  + Click to proceed
  + Type the lyrics of the verse
  + End – rate confidence in accuracy
  + Hear first line of an additional song verse, mid-way through song
  + Click to proceed
  + Type the lyrics of the verse
  + End – rate confidence in accuracy

**Free Recall Test 4**

Lyrics: with background music

Background:

* Smith, 1985 – presence of background music vs. no music improves memory for words, if background music matches at study and test – context matching at encoding and retrieval
* Rubin 1977 – remember more text when given melody during recall
* Wallace 1994 – only had recall differences after 2 reps – after 5 reps recall already at ceiling for verses – so we may have ceiling effects. Counted percentage of errors.
* Purnel-Webb & Speelman – scored explicit recall - # words remembered
  + Rhythm supported memory for words

*Lyrics-only and Whole songs = 4 songs, 10 min per song, 40 minutes*

* Give title of song
* Give background music for whole song, ask participant to sing words
* Show that background music supports lyrics more when present to begin with vs. just at retrieval
* Show that better than with silence in background (which is tested above)
* Trial sequence:
  + View song title
  + Click to proceed
  + Sing the lyrics for the length of the song, as much as you can remember
  + End – rate confidence in accuracy
  + Hear first line
  + Click to proceed
  + Sing the lyrics for the length of the song, as much as you can remember
  + End – rate confidence in accuracy

**Free Recall Test 5**

Remove tempo/pitch cues

*Lyrics-Only, Whole, and Spoken stimuli = 6 songs, 10 min per song, 60 min*

* Can also get them to speak the sung words to see if they can remember them when have to speak them instead of sing – without pitch cues, and without temporal cues – speak the words along with this metronome and don’t vary pitch
* Purnel-Webb & Speelman – scored explicit recall - # words remembered
  + Presence of rhythm at encoding supports memory for words (Purnel-Webb & Speelman, 2008)
  + What about taking away the rhythm at retrieval?
* Trial sequence:
  + View song title
  + Click to proceed
  + Metronome click & visual cue for timing
    - Instructions: keep tone neutral, and speak the words along with this metronome, with one word per tick
    - Could play at relatively slow pace so the participant could keep up – maybe 1 tick every 500 ms?
  + End – rate confidence in accuracy
  + Hear first line
  + Click to proceed
  + Metronome click & visual cue for timing
    - Instructions: keep tone neutral, and speak the words along with this metronome, with one word per tick
  + End – rate confidence in accuracy

**Free Recall test 6: Title memory**

*Spoken, Sung, Whole, instrumental – 8 songs \* 5 min per song = 40 min*

Background:

* Schulkind 2009 – 20s excerpts of old recordings of popular songs – either old or recent ones – recall artist and title of each tune – they found title memory similar to overall recall
* If a line has a word in common with the title, more likely to recall title (Hyman & Ruban 1990)
* name that tune – play a short clip and see if they can name the title
* have them press a button as soon as they can identify the song
* then the type in the title
* then we can measure how long it takes to identify the song
* whether this is different for lyrics vs. instrumental vs. intact vs. speech
* we could “title” each song as a phrase that happens early or later in song to see if that effects when they learn the title

**Recognition Task 1: Old vs. new song clips**

*Spoken, Sung, Whole, Instrumental – 8 old and 8 new, multiple clips from each song = 40 min*

Play clips of all original songs and get “remember” “know” “new” responses

Background:

* Eschrich et al., 2008 – recognition task with 1-day retention interval lead to significant differences between their conditions
* also play lyrics-only as intact, instrumental, etc. to get all 3 in there
* maybe will just “know” when it’s the corresponding music they never heard
* and maybe more “remember” responses with the full song
* and see whether more “remember” responses with instrumental or with lyrics
* see what they say to sung versions of spoken pieces
* and put spoken versions in of foil songs (we have these)
  + 10 sec clips of each song
  + could have them press a button as soon as they know – R,K,N
  + then “press when ready for next clip”

**Recognition Task 2:**

Pitch & Tempo (& maybe melody) Detection Task

*Lyrics-only, Instrumental, & Whole clips, + added instrumental, added lyrics, + new whole, lyrics-only, and instrumental-only clips*

*40 min*

* correct, pitch, or tempo task
* correct clips, pitch altered clips, and tempo altered clips
* maybe melody altered clips (one note off)

Pitch foils

- all song clips raised or lowered by 1 semitone (or pick some interval)

Tempo foils

- song clips changed in tempo by 10% up or down

Measure: Whether tempo or pitch deviations are better detected when hear whole song, lyrics only, or instrumental only

And when have accompanying background music or lyrics for song that didn’t before

General predictions:

- whole will be better remembered than instrumental (Weiss, Trehub & Schellenberg 2012 – songs with lyrics remembered better than those without)