

# MEMORY & TIMBRE

MEMT 463

Purpose: Effect of three parameters on segregating 4-note melody among “distraction notes”.

Target melody and distractor melody utilized.

- Experiment 1: only one parameter altered at a time
- Experiment 2: multiple parameters altered at a time

Results:

- Experiment 1: musicians require less change in parameters to perceive melody with distraction notes.
- Experiment 2: loudness level most effective for musicians, timbre with temporal cues least effective for non-musicians: Higher difference between timbral cues is easier to perceive

## Pitch vs. Timbre in Auditory Short-Term Memory

Purpose: Do we process pitch and timbre in the same or different areas of the brain?

Experiment: 8 participants, 2 test tones (*S1 and S2*) separated *I tones* which were:

- Pure tones of the same timbre but not the same pitch class (one octave higher, one octave lower).
- Pure tones of the same pitch class but not the same timbre
- Pure tones of the same pitch class and timbre.

Question: Were the 2 test tones the same or different from each other?

Results: Performance was affected by pitches of *I tones*, not by their timbres. Suggests that pitch is processed independently of timbre in auditory short term memory.

Purpose: The present study sought to compare performance of auditory working memory on recall of words, tone and timbres.

## Experiment 1: Forward Recognition Task

- Participants presented with auditory sequence consisting of 5 or 6 auditory items
  - 6 timbres: guitar, cello, flute, trumpet, vibes, and piano
  - 1st sequence was presented and after 3 secs of silence a 2nd sequence was presented with all items being either in the same order or not

## Experiment 2: Backward Recognition Task

- Participants presented with auditory sequence consisting of 3 or 5 auditory items
  - 1st sequence was presented and after 3 secs of silence a 2nd sequence was presented that was either backward or had changed order

## Experiment 3: Backward Recognition Task with Articulatory Suppression Task

- Used backward recognition task but used articulatory suppression task during the delay
- Participants were required to count aloud from 1-5 during 3 sec of silence

Results: Results indicate that human auditory working memory is not a unitary system. Working memory processes for timbres differed from tones and words. It is suggested that timbre may be stored as acetegorical info using sensory memory traces versus verbal and tonal material as rehearsal or categorical information.

# Attentional interference in Judgements of Musical Timbre: Individual Differences in Working Memory

- Purpose: To determine how timbre combined with a strong or weak working memory affects attention
- Participants: 57 undergraduate students, with no hearing impairments, and a variety of musical backgrounds. Their average age was 19.87 years old, with 60% of participants being male.
- Method:
  - All participants took a preliminary memory test and answered a questionnaire to determine the participant's musical background and experience
  - The participants were played four electronically produced musical tones: A violin with vibrato playing C4 and F#4, and an Eb clarinet playing C4 and F#4
  - The same pitch would be played in each ear with the clarinet playing in one ear and the violin playing in the other.
  - The participants were asked to identify, as fast and accurately as possible, the instrument that was played in a certain ear (solely based on timbre, requiring the ability to ignore the timbre being perceived in the opposite ear)
- Results:
  - Based on the preliminary test, listeners with high working memory spans were more successful at inhibiting timbre information stemming from the ear that was to be ignored

- The larger the timbral difference, the easier it is to differentiate between the two.
  - Ex. Instrument Guessing Game
- Pitch and timbre are processed in different areas of the auditory short-term memory
  - Working memory for timbre relies on a sensory trace during working memory maintenance.
  - Working memory for verbal and tonal material rely on internal rehearsal.
- We need to take into consideration the client's current level of working memory/cognitive abilities to inform how we arrange interventions musically based on the music's level of complexity