

Interfering Effects of Musical and Non-Musical Stimuli in a Short-term Memory Task

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ABSTRACT

Background

In a previous study, we found that performance in a short-term verbal memory task was reduced by presentation of familiar instrumental songs during the retention interval. However, the question remains as to what factors underlie that interference. Other researchers have shown that auditory sequences comprised of discrete elements can disrupt serial information if the elements vary over time. This *changing-state effect* has been demonstrated with spoken and sung syllables as well as with tones, and could account for the interference found with instrumental music. On the other hand, it is also possible that some quality of the songs – e.g. note congruence within key, rhythmic patterns, or relative familiarity – is responsible. For instance, there is evidence to suggest that staccato music is more distracting than legato music. While both changing-state and musical qualities have been shown to interfere with serial recall, the two conditions have not been directly compared experimentally. Thus, in the present project, we examine these two alternative explanations.

Aims

If recall performance is equivalent between the instrumental and random note sequence conditions, it would suggest that the changing-state effect can account for the disruption to serial information, independent of musical qualities. Conversely, poorer performance in the instrumental condition would support the idea that qualities associated with music contribute to recall interference, independent of the influence of the changing-state effect.

Method

Twenty-eight undergraduate students volunteered for this project in return for class credit. Participants heard a spoken 9-digit sequence and were asked to remember it. During a 10 second retention interval, they heard one of five types of auditory distractor: Familiar instrumental music, instrumental versions of familiar vocal songs (IFVS), random note sequences (diatonic or chromatic sequences between C4-C5, matched with the instrumental and IFVS songs for timbre and average number of notes per sequence), or white noise. Both musical selections and random note sequences were recorded as simple piano melodies. Participants then attempted to recall the digit sequences in correct order. There were 60 trials, and distractors were counter-balanced across five presentation lists so that each digit sequence would be followed by a different distractor type in each list. Each participant heard only one presentation list. Responses were scored for correct digit in correct order. Percentages of correct responses were averaged across distractor categories and across participants.

Results

A repeated-measures ANOVA revealed a main effect for distractor category, $F(1,108) = 9.50$, $p < .001$. Pairwise

comparisons showed recall performance in both musical and non-musical conditions to be significantly lower than in the white noise condition. Results further demonstrated significantly poorer recall performance in the instrumental condition than in either random note condition. Recall performance associated with IFVS songs was not reliably different from instrumental music or either random sequence.

Conclusions

Results confirmed significantly greater interference to recall performance associated with hearing instrumental songs compared to either the diatonic or chromatic condition, which supports the idea that qualities associated with music contribute to recall interference, independent of the influence of the changing-state effect. Recall performance in the IFVS condition was not reliably different from any of the other conditions, but was numerically lower than the equally familiar instrumental music and numerically higher than the diatonic and chromatic distractors. Average notes-per-sequence was greater for the instrumental songs than for the IFVS, while the diatonic and chromatic distractors were isochronal (equal onset and duration with no rhythmic information). Thus, we conclude that the greater interference associated with instrumental music may result from the greater rhythmic complexity of the instrumental selections rather than from familiarity or other musical qualities.

Keywords

Memory, serial recall, interference