

# Effect of Aging on Music-Evoked Autobiographical Memory

Meghan Collett  
Queen's University  
Kingston, Ontario  
Canada, K7L 3N6  
(613) 533-2490

m.collett@queensu.ca

Janice Lee  
Queen's University  
Kingston, Ontario  
Canada, K7L 3N6  
(613) 533-2490

janice.lee@queensu.ca

Kevin Shabahang  
Queen's University  
Kingston, Ontario  
Canada, K7L 3N6  
(613) 533-2490

k.shabahang@gmail.com

Ashley D. Vanstone  
Queen's University  
Kingston, Ontario  
Canada, K7L 3N6  
(613) 533-2490

a.vanstonet@queensu.ca

Lola L. Cuddy  
Queen's University  
Kingston, Ontario  
Canada, K7L 3N6  
(613) 533-2490

lola.cuddy@queensu.ca

## ABSTRACT

We examined the role of aging in the retrieval of music-evoked autobiographical memories (MEAMs), following Janata, Tomic, & Rakowski [1]. Younger ( $n = 21$ ; 17-21 years) and older ( $n = 18$ ; 66-79 years) adults listened to 32 30-s familiar instrumental excerpts and then provided MEAMs. Unlike previous results obtained without music, where episodic memories are found disrupted for older adults (Levine et al. [2]), the ratio of episodic details to total content of MEAMs was similar on average for younger (.69) and older (.64) adults. Results suggest a strong effect of music on effortless memory retrieval in an aging population.

## Keywords

Autobiographical Memory, Music, Aging

## 1. INTRODUCTION

Autobiographical memories are recollections of the past that specifically pertain to the self. Music-evoked autobiographical memories (MEAMs) have been described both in anecdotal accounts of daily life and in a controlled research setting by Janata, Tomic, & Rakowski [1]. However, empirical research to date on the characteristics of MEAMs is sparse and there is no research on the effects of aging on MEAMs.

Although our present understanding of MEAMs is limited, a considerable amount of research on autobiographical memories has been undertaken. For example, in their study of autobiographical memory, Levine et al. [2] followed Tulving [e.g., 3] in distinguishing episodic from semantic memory. Episodic memories have defined spatio-temporal characteristics, including specific sensory details from a particular event. During recall of episodic memories, the rememberer often re-experiences the event in mind. In contrast, semantic memory refers to knowledge about the world and self not associated to any particular event.

Levine et al. [2] demonstrated the vulnerability of episodic memory to the effects of aging. They found that older participants produced fewer episodic details compared to younger participants in their descriptions of autobiographical memory. However, the older group showed similar or enhanced recall of semantic details compared to younger participants. Levine et al. suggested that age has a disrupting effect on the recall of episodic details. Conversely, semantic knowledge of

autobiographical significance is preserved in older adults; older individuals have established stable, more mature self-concepts that are not as susceptible to decay.

Is music effective in eliciting autobiographical memories? Moreover, can music facilitate episodic memories in older adults? Addressing the first question, Janata et al. [1] reported MEAMs in an undergraduate student sample. The study described the content of the MEAMs but did not analyze the content in terms of semantic and episodic details. However, it developed an extensive protocol that has been adopted in the present study.

Addressing the second question, we used Janata's protocol to collect MEAMs and compared a younger group to an older group for the number of MEAMs elicited, the total length of their descriptions, and the number of episodic and semantic details. The objectives were to test the following hypotheses:

1. Because of greater life experiences, and more stable and mature-self concepts, older adults will provide more MEAMs and more semantic memories than young adults.

2. However, older adults will provide more episodic memories relative to semantic memories than has been reported for autobiographical memories. Music attached to specific events will bring to consciousness other episodic sensory-perceptual details associated with that event—details that would otherwise remain buried in long-term memory. This result would reveal a unique effect of music to retrieve memories.

3. The strength of emotional response elicited by the musical excerpts presented will be correlated with the likelihood of MEAMs. This hypothesis is exploratory but derived from current proposals regarding associated networks for music, memory and emotion.

## 2. METHODS

### 2.1 Participants

Twenty-one younger female adults ( $M_{age} = 18.4$  years, range: 17-21 years) and 18 older female adults ( $M_{age} = 71.5$  years, range: 66-79 years) were recruited. The younger group was compensated with 1.5 course credits, while the older group was compensated with \$15. All participants were required to have normal or corrected hearing, and all had English as a first language. The older group was matched for formal education to

the younger group; older adults were required to have at least completed high school.

## 2.2 Materials

Participants were each presented with 32 instrumental musical excerpts of 30 s duration. Previous work in our laboratory has confirmed familiarity for these excerpts with both young and old participants. Some examples of pieces excerpted are Pachelbel's *Canon in D*, the Starwars theme song, and Tchaikovsky's *Swan Lake*. Excerpts were presented in random order from loudspeakers (FOSTER6301B). Following each musical excerpt, participants completed specific questionnaires from Janata et al. [1] designed to measure familiarity with the musical stimulus, autobiographical saliency, and emotional responses to the music.

## 2.3 Procedure

Participants completed the study alone in a sound-attenuated room. The experiment was programmed using MediaLab v2010.2.19, and DirectRT v2010.2.103.1115. Participants were guided through the experiment with programmed instructions. All data were collected on the computer. The computer screen prompted the participant to select a key to begin the experiment. The screen prepared the participant for the presentation of the musical excerpt and instructed the participant to press a key the moment a memory entered consciousness. Whether or not the participant pressed the key to indicate a memory had been elicited, the music continued for the full 30 s. Following the music, the screen asked the participant to indicate the extent to which the music was autobiographically salient. If the participant chose "somewhat" or "strongly" autobiographical, the participant was provided with a textbox to describe the memory/memories evoked with as great detail as possible. Following the description of the memories, or if the participant chose "weak or no salient association", all participants rated their familiarity with the musical excerpt, image vividness, and emotional response to it.

After listening to all 32 musical excerpts, participants completed a final quasi-control task in which they were asked to describe a holiday memory. Participants were not provided with any musical stimulus and described their memory in a textbox just like the textbox following the musical excerpts in the previous section. This control is a check that, should hypothesis 1 be supported, it is not simply due to the fact that older adults produce longer memories irrespective of stimulus conditions.

## 3. RESULTS AND IMPLICATIONS

### I. Number and length of MEAMs

The total number of MEAMs available for analysis was 378 for young adults and 375 for older adults. The median number of MEAMs provided by young adults was 17 (range 9 to 30),

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.  
*SysMus12, Montreal, Canada, May 24-26, 2012*  
Copyright remains with the author(s).

representing 53% of the 32 musical excerpts. The median provided by older adults was 24 (range 6 to 32), representing 75% of the excerpts. A Mann-Whitney  $U$  test revealed that the difference between the younger and the older adults did not reach significance,  $U = 128.00$ ,  $p = .09$ . The difference in length of MEAMs between the younger adults ( $M = 28.8$  words,  $SD = 13.9$ ) and the older adults ( $M = 20.2$  words,  $SD = 15.72$ ), did not reach significance,  $t(37) = 1.82$ ,  $p = .08$ . The first hypothesis was not supported.

### II. Semantic and Episodic Details

The second hypothesis received partial support. The ratio of episodic details to total content was .69 for younger adults and .64 for older adults, and the difference between the two groups was not significant,  $t(37) = .65$ ,  $p = .52$ . Both groups revealed a greater proportion of episodic content than semantic content relative to total content.

### III. Saliency Prediction

The third hypothesis was supported. For both the young and old adults, familiarity (young:  $\beta = .28$ ,  $p < .05$ ; older:  $\beta = .20$ ,  $p < .05$ ) and emotion ratings (young:  $\beta = .80$ ,  $p < .001$ ; older:  $\beta = .83$ ,  $p < .05$ ) were significant contributors to the saliency of the MEAM.

### IV. Quasi-Experimental Control Condition

The younger group ( $M = 93.38$  words,  $SD = 39.88$ ) provided significantly longer descriptions than the older group ( $M = 56.39$ ,  $SD = 42.80$ ),  $t(37) = 2.79$ ,  $p < .05$ .

### V. Conclusions

The study was successful in demonstrating that older adults are able to report music-evoked autobiographical memories. Moreover, they produced as many episodic memories relative to total content as did younger adults, a finding that contrasts with those of Levine et al obtained without music. These results are particularly intriguing when considering memory loss in older adults: music may be a useful tool for eliciting memories in patients with cognitive impairment. However, further research is needed to confirm this hypothesis.

## 4. ACKNOWLEDGMENTS

Research supported by grants from the Natural Sciences and Engineering Council of Canada (L.L. Cuddy) and the GRAMMY foundation® (L.L. Cuddy and J.M. Duffin).

## 5. REFERENCES

- [1] Janata, P., Tomic, S.T., & Rakowski, S.K. (2007). Characterisation of music-evoked autobiographical memories. *Memory*, 15, 845-860.
- [2] Levine, B., Svoboda, E., Hay, J. F., Winocur, G., & Moscovitch, M. (2002) Aging and autobiographical memory: Dissociating episodic from semantic retrieval. *Psychology and Aging*, 17, 677-689.
- [3] Tulving, E. (1972). Episodic and semantic memory. In E. Tulving & W. Donaldson, *Organization of Memory* (381-402). New York, NY: Academic Press.

