

Song Versus Verbal Forms for Very-Long-Term, Long-Term, and Short-Term Verbatim Recall

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Very-long-term, long-term, and short-term verbatim recall of the Preamble to the Constitution were assessed in both naturalistic and experimental television studies. In the naturalistic study of very-long-term memory, young adults who as children were frequent viewers of an educational televised song about the Preamble recalled the words of the text better than did infrequent viewers. In the experimental study, young adults who were repeatedly exposed to this televised song demonstrated better short- and long-term recall of the Preamble text than did those who saw a verbal presentation of the same televised vignette, but recall was comparable for students who saw either the verbal or the song vignette only once. Songs are discussed as a presentational form that students can use to represent, rehearse, and retrieve verbal content over extended periods of time.

Before written language was easily available to the public, bards sang tales of their culture as they traveled from place to place. Preiterate societies relied on songs and poems to convey information, perhaps because the rhythmic structure that characterizes these forms of communication are easier to remember than is the verbal form that characterizes written speech (Sloboda, 1985). Remnants of oral traditions still remain, and those who have mastered such oratory skills can recount long intact narratives to their listeners through songs (Lord, 1982). These retellings are virtually verbatim, retaining a rhythm that assists the organization of the passages. Although details are sometimes changed in these retellings, the song preserves the essential point of the story (Hyman & Rubin, 1990; Lord, 1982).

Although verbal information has been transmitted through songs for centuries, we know relatively little about how songs are actually remembered. What makes the lyrics of a song memorable? How do we recall the words of a song

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over long periods of time? Are memories of songs better than those that involve a verbal presentation of that same information?

The purpose of the studies presented here is to compare the short-term, long-term, and very-long-term memorability of a verbal passage, the Preamble to the Constitution, when it is presented in a song versus a verbal form. Our central thesis is that the form of a song provides a representational structure that can increase students' verbatim recall of verbal content.

SONG VERSUS VERBAL PRESENTATIONS

Linguistic information is rarely remembered verbatim (Sloboda, 1985). Instead, the semantic meaning of language is recalled. In general, adults remember essential information and forget the details when short-term recall is tapped immediately after exposure to content, when long-term recall is measured after a delay of a few hours or weeks, and when very-long-term recall is measured after a delay of several months or years. As time passes, people increasingly retain only the gist of a passage, forgetting almost all other content (Bartlett, 1932). There is at least one important exception to poor recall of a linguistic passage over time: It is recall of verbal information that is presented by a song.

Songs present content in a form that may be easily stored, rehearsed, and retrieved from memory. The *content* of a song involves the lyrics and, at an abstract level, the message or point of those lyrics. The *form* of a song involves the rhythm, the repetition of a verse, the rhyme of the words, and the melody of the tune. This musical structure creates a schematic organization from which a person can retrieve lyric information (Sloboda, 1985). For instance, the rhythm of a song tells the listener that there is a certain number of beats to a line of the song. If a person cannot remember a few words, the rhythm reminds them that the beat continues in a certain pattern. Memory is constrained in a particular manner, perhaps increasing the probability that verbatim recall will be accurate.

Because vocal music places multiple constraints on memory, songs may assist verbatim recall more than does a verbal presentation (Hyman & Rubin, 1990). These constraints include a tune, rhythm, rhyme, and meaning. By contrast, recall of verbal passages is constrained only by meaning. Thus, listeners who only hear words must later recall verbal information with fewer retrieval cues than when they hear a song.

Passages with strong rhythmic structure are easier to recall than are those with weak rhythmic structure. For example, undergraduates recalled only 14 of the 52 words from the Preamble to the Constitution, a passage with weak rhythmic structure, but recalled 42 of the 117 words from the "23rd Psalm," a passage with strong rhythmic structure (Rubin, 1977). Although the Preamble to the Constitution does not have a strong rhythmic structure, adding a song to the Preamble text may increase the rhythmic structure and memorability of that content.

A tune may also provide an automatic rehearsal device that makes words that are sung more memorable than words that are only spoken. More specifically, tunes can play repeatedly in one's thoughts, thereby facilitating automatic rehearsal of the lyrics. Involuntary rehearsal means that a person does not have to invoke a memory strategy. Thus, songs should be memorable at young ages when recall strategies are not well developed and in situations where remembering information is not an explicit goal of the learner, such as viewing television content.

SINGLE VERSUS REPEATED EXPOSURE

Repetition of lyrics or of verbal material is associated with memory of that content. For example, a verse or chorus that is repeated within a song is better remembered than other parts of that song (Hyman & Rubin, 1990). Repetition of themes and lyrics also characterizes the songs of cultures that rely on oral transmission of information (Lord, 1982).

Such naturalistic findings contradict experimental studies of nursery rhymes when verses are heard only once. In particular, children reportedly pay attention to the phonetic sounds of nursery rhymes at the expense of comprehending the deeper semantic meaning of the passage (Hayes, Chemelski, & Palmer, 1982). When verbatim recall is examined, however, rhyme increases memory more so than prose (Johnson & Hayes, 1987). Apparently, the type of recall task influences the degree to which the learner appears to have processed the content. Moreover, repeated exposure to a passage may be necessary for memory to show beneficial effects of rhyme on comprehension.

Although repetition is a key element in musical structure (Sloboda, 1985), little attention has been paid to the role of repetition in the acquisition of a song. When listeners hear a song, they encode both the tune and the lyrics. Adults encode the lyrics and tune of a song in an integrative or associative manner (Morrongiello & Roes, 1990; Serafine, Crowder, & Repp, 1984). Since the internal structure of a musical piece becomes better known as the listener repeatedly hears it (Sloboda, 1985), repetition may enhance integration of the lyrics with the tune. Put another way, songs should be better remembered than are verbal passages only after repeated exposure to the musical and linguistic components of oral music that constrain recall.

One problem in experimental comparisons of prose and verse is the use of different content. Although the meaning of a passage has been retained, the exact words have been altered. In both studies presented here, only one verbal passage, the Preamble to the Constitution, was used. A televised vignette allowed us to keep the words and rhythm constant. The only change was the use of song versus verbal presentational forms.

NATURALISTIC VERSUS EXPERIMENTAL STUDIES OF LEARNING

A key methodological debate within psychology has centered on whether people should be studied in their natural environments or in laboratory settings. Naturalistic studies provide rich information about how people learn in the settings that comprise their daily lives, whereas laboratory studies allow experimenters to pinpoint causality. Naturalistic and experimental approaches can be complementary, for studies of naturally occurring memories can increase the generalizability of findings from laboratory studies (Neisser, 1982). The research strategy employed here combines naturalistic and experimental approaches.

One naturalistic setting that most American children experience is viewing television programs within their homes. Fifteen years ago, an educational television series titled "School House Rock" was shown between Saturday morning cartoons. School House Rock presented history, math, science, and English lessons in 2-3-min animated stories and songs. These televised vignettes, which were aired from 1976 to 1979, are currently available on videotape but are no longer broadcast.¹

Although singing is often used in children's educational television programs like School House Rock (Wright & Huston, 1983), we know little about the impact of these songs on children's learning (Liebert & Sprafkin, 1988). The memories of young adults who viewed these vignettes as children would yield useful information about the long-term benefits of educational television as well as the effectiveness of songs as a memory aid. One of these vignettes, the Preamble to the Constitution, was the target of our investigation. In Study 1, a naturalistic study examined students' very-long-term verbatim recall of the Preamble text 10 years after exposure to the televised song.

If students who were frequent viewers of School House Rock remember the Preamble better than those who were less frequent viewers, the relation could be attributed to the overall amount of exposure to the Preamble rather than to the song. Therefore, in Study 2, we conducted an experimental, laboratory study to examine students' short- and long-term verbatim recall of the Preamble when they were exposed to a televised vignette with a verbal or a song format either once or repeatedly.

STUDY 1

The purpose of Study 1 was to examine students' very-long-term verbatim recall of the Preamble to the Constitution based on their self-reports of exposure to the Preamble song from School House Rock. The hypotheses were as follow: (a)

¹"School House Rock" is widely available for purchase at various retail stores. This past year, ABC also began to rebroadcast School House Rock on Saturday mornings.

students who frequently saw the School House Rock vignette about the Preamble to the Constitution would be more likely to select singing as a retrieval strategy than would those who saw the vignette less often; (b) exposure to the Preamble to the Constitution through school would be comparable for those who used singing versus saying the words as a retrieval strategy; and (c) those who used singing as a retrieval strategy would remember more of the text from the Preamble to the Constitution than would those who said the words as a retrieval strategy.

METHOD

Subjects

Nineteen students who attended an undergraduate class in a large metropolitan university participated in the study. Two students were dropped from the study because they did not specify singing or saying the words as their retrieval strategy; a third student was dropped because she was from another country. Of the remaining 16 students ($M = 20$ years, 7 months), 8 were men and 8 were women; men and women equally selected the two retrieval strategies of singing versus saying the words.

School House Rock: The Preamble to the Constitution

School House Rock was a series of educational vignettes about different academic topics. *School house* refers to the academic content, and *rock* refers to the musical form of the lesson. That is, all content was presented with music to support linguistic processing.

The 3 min animated vignette selected for study here was the Preamble to the Constitution. This vignette consisted of an introduction, the presentation of the Preamble, a further description of the topic, and a second presentation of the Preamble. Scenes from the 1770s were depicted during the first presentation of the Preamble followed by scenes from the 1970s during the second presentation. For example, during the first presentation, animated people in colonial garb voted by placing a piece of paper in a box; during the second presentation, animated people in contemporary dress voted in a booth.

The original Preamble is 52 words long, but the School House Rock version deleted “of the United States” in the first line (as indicated by the parentheses in the following text). Thus, the School House Rock version of the preamble is 48 words long. The presentation of the Preamble, which is boldfaced below, lasts 38 s for each of the two verses; the remaining 104 s is devoted to the rest of the song. The verbal script is as follows:

Hey, do you know about the USA?
Do you know about the government?
Can you tell me about the Constitution?
Hey, learn about the USA.

In 1787 I'm told
 Our founding Fathers did agree
 To write a list of principles for keeping
 people free.

The USA was just starting out.
 A whole brand-new country.
 And so our people spelled out
 The things that we should be.

And they put those principles down on paper
 and called it the Constitution
 And it's been helping us run our country ever
 since then.

The first part of the Constitution is called
 the Preamble.
 And tells what those Founding Fathers set out
 to do.

**We, the People (of the United States)
 In order to form a more perfect Union,
 Establish justice, insure domestic
 tranquility,
 Provide for the common defense,
 Promote the general welfare,
 And secure the Blessings of Liberty
 To ourselves and our Posterity,
 Do ordain and establish
 This Constitution for the United States of
 America.**

In 1787 I'm told
 Our Founding Fathers all sat down.
 And wrote a list of principles
 That's known the world around.

The USA was just starting out
 A whole brand-new country.
 And so our people spelled it out.
 They wanted a land of liberty.
 And the Preamble goes like this.

**We, the People (of the United States)
 In order to form a more perfect Union,
 Establish justice, insure domestic
 tranquility,
 Provide for the common defense,
 Promote the general welfare,
 And secure the Blessings of Liberty
 To ourselves and our Posterity,**

Do ordain and establish**This Constitution for the United States of America.**

For the United States of America.

Procedure

Because the goal of Study 1 was to examine very-long-term recall of an educational televised song, students were not shown the vignette or text of the Preamble. Instead, students were given a sheet of paper and asked to write the Preamble to the Constitution. After they completed this task, they turned the sheet over and answered multiple-choice questions that assessed their prior exposure to the Preamble through School House Rock and through classes in school.

A key question asked if they sang or said the words to recall the Preamble. This question was used to divide the students into two strategy groups: those who chose to sing and those who chose to say the words. Students were also asked how frequently they had viewed the "School House Rock" vignette about the Preamble, if they had used the song to help them remember the text of the Preamble when they were in school, how long it had been since they had seen the School House Rock vignette at home or had been tested on the Preamble in school, and how effective they thought singing was as a retrieval strategy.

RESULTS

Two groups were formed based on students' selection of singing versus saying the words as their retrieval strategy. These two strategy groups were used to organize all analyses.

The first hypothesis was that those who frequently saw the School House Rock vignette about the Preamble to the Constitution would be more likely to use singing as a retrieval strategy than would those who saw the vignette less frequently. As seen in Table 1, a chi-square analysis on the frequency of students' exposure to the Preamble revealed that those who chose singing as a retrieval strategy had seen the televised vignette on the Preamble more often than those

TABLE 1
Retrieval Strategy as a Function
of Reported Frequency of Viewing
the Preamble Vignette

	Retrieval Strategy	
	Sings	Speaks
Exposure		
Infrequent	2	8
Frequent	6	0

who chose saying the words as a retrieval strategy, $\chi^2(1, N = 16) = 9.60, p < .005$.

The second hypothesis was that exposure to the Preamble to the Constitution in school would be equal regardless of students' choices to sing or to say the words as a retrieval strategy. As expected, there were no differences between the groups' choice of strategy and their prior exposure to the Preamble in school. Interestingly, however, adults who used singing as a retrieval strategy had also used the School House Rock song as a retrieval strategy when learning the Preamble in school several years earlier. This pattern suggests that students who chose singing as a retrieval strategy realized the value of singing for memory and had purposely represented the Preamble in this manner.

The third hypothesis was that students who chose singing as a retrieval strategy would recall more of the text from the Preamble to the Constitution than those who chose saying the text. Following procedures developed by Rubin (1977), recall was scored on a word-by-word basis for the entire 52 words. Verbatim recall was required but misspellings were allowed. As expected, students who used singing as a strategy recalled significantly more words from the Preamble than those who simply said the words ($M = 37.88$ vs. 8.63), $t_{(14)} = 4.50, p < .001$.

Regardless of the retrieval strategy chosen, both groups recognized the value of singing for recall. Eighty-eight percent of the students, equally represented by both strategy groups, thought singing was a very effective strategy for remembering the Preamble. One student wrote that his recall might have been better had he heard the Preamble song more often.

STUDY 2

Study 1 demonstrated very-long-term favorable effects of exposure to the Preamble song from School House Rock for students' verbatim recall of the Preamble to the Constitution. Although ecologically valid, questions remain about why frequent viewers remembered the Preamble better than did infrequent viewers. Although we believed that repeated exposure to the song would lead to enhanced recall of the Preamble text, the amount of exposure could not be controlled in the naturalistic study.

The purpose of Study 2 was to examine the impact of the type of presentation form (song vs. verbal) and the amount of repetition (single vs. repeated exposure) on students' short- and long-term verbatim recall of the Preamble. We expected that: (a) repeated exposure would lead to superior recall over single exposure; (b) the song would lead to superior recall over the verbal presentation, but only in repetition conditions; (c) students in the repeated song condition would rehearse the Preamble text in a lyrical form (i.e., sing to themselves or out loud) more often than would other conditions; and (d) students repeatedly ex-

posed to the song would sing as a retrieval strategy more often than would those exposed to the verbal presentation.

METHOD

Subjects

Subjects were 28 college students (M age = 19 years, 6 months) who attended the same university as those in Study 1. Subjects were selected according to two criteria: they had little or no exposure to School House Rock, and they were of American nationality. There were 16 women and 12 men.

Treatment Conditions

Students viewed one of four programs: singing with repetition, verbal with repetition, singing without repetition, and verbal without repetition. Treatment conditions were created in the following manner. The original version of the Preamble from "School House Rock" was used as the singing treatment condition. The verbal control version was created by having a narrator wear a set of headphones and listen to the musical track as she spoke and dubbed the same verbal track in synch with, but over, the original song version. This verbal track preserved the sung oral track exactly in terms of language, rhythm, and pacing. This procedure resulted in two types of Preamble formats: an audiovisual song presentation and an audiovisual verbal presentation. Each of these vignettes was 3 min long and had the same visual track and words. Students in the repetition conditions saw either the song or verbal presentation repeatedly. Students in the single exposure conditions saw either the song or verbal presentation one time.

Procedure

Subjects selected one of four time slots when they were available, and the song and verbal conditions were randomly assigned to those time slots. Students came in small groups to view their assigned videotape.

In repetition conditions, students viewed the vignette twice a week over a period of 4 weeks, resulting in eight exposures to the same vignette. If students missed a session, they viewed the vignette in a makeup session later in that same week. In single-exposure conditions, students viewed either the song or verbal version one time only on the last day that the repetition condition groups saw the vignette.

Short- and Long-Term Verbatim Recall

After completion of the respective conditions, students were asked to write the Preamble. This short-term recall task also asked questions about the strategies that students used to remember the Preamble. Five weeks later, students were

phoned and asked to return one more time. The same recall task was given to assess long-term recall.

Following the same procedures used in Study 1, protocols were scored as correct only if words were in the same order as in the Preamble. Reliability, assessed as two times the number of agreements divided by the total number of scores for Observer 1 and Observer 2, was performed on 12 randomly selected protocols from the short- and long-term tests. Reliability was .96 for short-term recall and .98 for long-term recall.

RESULTS

Short-Term Recall

A 2 (Repetition) \times 2 (Presentation Form) between-subjects analysis of variance (ANOVA) was run on short-term verbatim recall scores. As predicted, the two-factor ANOVA yielded a main effect of repetition, $F(1, 24) = 89.44, p < .0001$; a main effect of presentation form, $F(1, 24) = 8.84, p < .01$; and a repetition by presentation form interaction, $F(1, 24) = 4.58, p < .05$. As seen in Table 2, single exposures to a song or verbal presentation of the Preamble yielded similar patterns of recall, but repeated exposure to musical formats was superior to repeated exposure to verbal formats.

A 2 (Repetition) \times 2 (Presentation Form) ANOVA was also run on the four words "of the United States" because these words are part of the Preamble, but are not included in the Preamble vignette. As expected, the two-factor ANOVA on these four words yielded a main effect of repetition, $F(1, 24) = 6.82, p < .02$. Students who were exposed repeatedly to the Preamble vignette deleted these words more often than did students who saw the vignette only once. That

TABLE 2
Mean Number of Words Recalled on the Short- and Long-Term Tests as a Function of Repetition and Presentation Form

	Short-Term Recall		Long-Term Recall	
	Repetition		Repetition	
	Absent	Present	Absent	Present
Form				
Verbal	14.14 ^c (4.14)	31.71 ^b (9.20)	9.57 ^c (4.43)	25.43 ^b (11.24)
Song	16.14 ^c (5.58)	44.00 ^a (5.35)	9.14 ^c (7.10)	40.29 ^a (6.26)

Means with different level superscripts are significantly different at $p < .05$ or greater. Duncan's test was run on post-hoc comparisons. Standard deviations appear in parentheses. Cell means are based on 7 subjects.

is, students in repetition conditions ($M = .00$; $SD = 0$) were less likely to recall these four words than were students in single-exposure conditions ($M = 1.43$; $SD = 1.99$). The latter finding suggests that those who were repeatedly exposed to the Preamble vignette did not recall those four words because of the experimental treatment.

Long-Term Recall

A 2 (Repetition) \times 2 (Presentation Form) between-subjects ANOVA was run on long-term verbatim recall scores. As predicted, the two-factor ANOVA yielded a main effect of repetition, $F(1, 24) = 65.63$, $p < .0001$; a main effect of presentation form, $F(1, 24) = 6.18$, $p < .02$; and a repetition by presentation form interaction, $F(1, 24) = 6.94$, $p < .01$. Song and verbal presentations of the Preamble continued to show comparable effects when there was only a single exposure. More importantly, the song presentation continued to be superior to the verbal presentation in the repetition conditions after 5 weeks. In fact, the level of significance between those exposed to the song versus the verbal formats became more pronounced over time in repetition conditions. See Table 2.

A 2 (Repetition) \times 2 (Presentation Form) ANOVA on the four deleted words in the long-term recall test yielded no significant effects. Mean scores were .86 in repetition conditions and 1.14 in single exposure conditions.

Rehearsal Activities

Students answered four questions on a 5-point Likert scale that assessed their covert and overt rehearsal of the Preamble text through the use of lyrics and words. For each question, responses ranged from scores of (1) *never*, to (5) *very often*. Covert rehearsal was defined as singing in one's thoughts (lyric rehearsal) or saying the words in one's thoughts (verbal rehearsal). Overt rehearsal was defined as singing aloud (lyric rehearsal) or saying words aloud (verbal rehearsal).

Covert and overt rehearsal scores are analyzed below as a within-subjects variable called *rehearsal style*. Lyric and verbal rehearsal are analyzed as a within-subjects factor called *rehearsal mode*. Because there was no opportunity for students in no repetition conditions to rehearse before the short-term recall task, their rehearsal data are analyzed only for the long-term recall task.

Short-Term Rehearsal. Covert/overt and lyric/verbal scores were submitted to a 2 (Presentation Form) \times 2 (Rehearsal Style) \times 2 (Rehearsal Mode) multivariate analysis of variance (MANOVA). A significant multivariate effect (Wilks' Lambda) was obtained for rehearsal style, $F(1, 12) = 21.15$, $p < .001$. Students rehearsed in their thoughts more often than they rehearsed out loud ($M = 3.15$ vs. 1.93).

The MANOVA (Wilks' Lambda) also yielded a presentation form by rehearsal mode interaction, $F(1, 12) = 16.30$, $p < .002$. As seen in Table 3, students in

TABLE 3
Mean Short-Term Rehearsal Scores
as a Function of Presentation Form
and Rehearsal Mode

	Rehearsal Mode	
	Verbal	Lyric
Form		
Verbal	2.65	2.00 ^b
Song	2.22 ^b	3.29 ^a

Means with different level superscripts are significantly different at $p < .05$. Duncan's test was run on post-hoc comparisons. Cell means are based on 7 subjects.

the repeated song condition reported more lyric than verbal rehearsal; students in the repeated song condition also reported more lyric rehearsal than did students in the repeated verbal condition.

Long-Term Rehearsal. Covert/overt and lyric/verbal scores were submitted to a 2 (Presentation Form) \times 2 (Repetition) \times 2 (Rehearsal Style) \times 2 (Rehearsal Mode) MANOVA. A significant multivariate effect (Wilks' Lambda) was again obtained for rehearsal style, $F(1, 24) = 19.10$, $p < .001$. Students were still more likely to rehearse in their thoughts than out loud ($M = 2.11$ vs. 1.36).

The MANOVA (Wilks' Lambda) also yielded a repetition by rehearsal mode interaction, $F(1, 24) = 4.17$, $p < .05$, which was qualified by a Repetition \times Rehearsal Mode \times Presentation Form interaction (Wilks' Lambda), $F(1, 24) = 5.15$, $p < .05$. As seen in Table 4, lyric rehearsal in the repeated song condition was greater than lyric rehearsal in the repeated verbal condition.

TABLE 4
Mean Long-Term Rehearsal Scores as a Function
of Presentation Form, Repetition, and Rehearsal Mode

	No Repetition Rehearsal Mode		Repetition Rehearsal Mode	
	Verbal	Lyric	Verbal	Lyric
Form				
Verbal	1.93	1.72	1.50	1.22 ^b
Song	2.15	1.43	1.65	2.29 ^a

Means with different level superscripts are significantly different at $p < .05$. Duncan's test was run on post-hoc comparisons. Cell means are based on 7 subjects.

Retrieval Strategy

The final analysis examined students' selection of strategies in their efforts to recall the Preamble. We expected singing to be the predominant strategy of students who were exposed to the song vignette for both the short- and long-term recall task. As seen in Table 5, students who were repeatedly exposed to the song presentation used singing as a retrieval strategy more often than did other students for both short-term recall, $\chi^2(3, N = 28) = 21.46, p < .001$, and long-term recall, $\chi^2(3, N = 28) = 22.91, p < .001$.

DISCUSSION

The purpose of these studies was to examine the role of singing for students' very-long-term, long-term, and short-term verbatim recall of the Preamble to the Constitution. College students were examined in both naturalistic and experimental television studies.

The naturalistic data, complemented by experimental data, demonstrate the beneficial effects of songs as a mnemonic memory aid for verbal material. Moreover, repeated exposure to the song was clearly associated with increased verbatim recall in both data sets. In the naturalistic study, adults who as children had been frequent viewers of the School House Rock Preamble vignette recalled 73% of the words verbatim, whereas infrequent viewers recalled only 17% of those words. Infrequent viewers remembered about the same number of words from the Preamble as did Rubin's (1977) students ($M = 27\%$ recall), which provides additional support for the typically low recall pattern of this verbal passage after a very long period of time.

To control for the overall amount of exposure to the Preamble vignette, an experimental study manipulated how frequently young adults saw the vignette in either a verbal or a song format. As in the naturalistic study, students who viewed the song format recalled the words of the Preamble better than those who heard a verbal format, but these effects occurred only in the repeated exposure condition.

TABLE 5
Frequency of Students Reporting Singing Versus Nonsinging
Retrieval Strategies During Short- and Long-Term Recall Tasks
as a Function of Presentation Mode and Repetition

	Short-Term Recall		Long-Term Recall	
	Singing	No Singing	Singing	No Singing
Verbal, No Repetition	0	7	0	7
Sing, No Repetition	2	5	0	7
Verbal, Repetition	0	7	0	7
Song, Repetition	7	0	6	1

Single exposures to the song or verbal versions yielded comparable patterns of recall. These results have implications for the study of nursery rhymes as well as for the study of songs. Specifically, much of the information about beneficial effects of prose over rhyme occurs when children are exposed to verses of nursery rhymes one time (Hayes et al., 1982). Repeated exposure may tell a truer tale about benefits or liabilities of rhyme versus verbal formats for memory.

Although repetition of lines within a song is associated with recall of those lyrics (Hyman & Rubin, 1990), the present study demonstrates the importance of repeated exposure to a song for successful recall of any lyrics. Specifically, words repeatedly presented by song over a period of time were better remembered and less forgotten than were words presented without song. Moreover, this relation becomes stronger over time. In repetition conditions, the song was better recalled than was the verbal passage immediately after exposure, and this effect became even more pronounced after a delay of 5 weeks. These findings suggest that songs are rather durable memories that can remain with us for very long periods of time.

Why are songs better recalled over time than are verbal passages of the same information? Students in both the naturalistic and experimental studies who heard the song repeatedly reported singing the words to themselves during the retrieval task. Repetition, a key structural component of music, probably allowed accurate representation of the Preamble text, particularly when presented by the song. Repetition may allow a listener to chunk the tune and words together as information is organized and represented in memory. Dual encoding, in turn, may assist later retrieval efforts if chunks of words are packed with the repeating, structural patterns of the music. The structural pattern of the music may also provide clues if particular words are forgotten (Hyman & Rubin, 1990). For instance, a person can use formal cues such as rhythm and beat to figure out details such as the number of syllables in a forgotten word or chunk of words.

We also wish to advance the hypothesis that songs provide an automatic rehearsal mechanism for thinking about words. Most of us have had the experience of having a tune get "stuck in our head." As the tune replays in one's mind, the person automatically rehearses the lyrics in an effortless manner. Mozart, for example, may have replayed intricate musical compositions in his thoughts at will (Sloboda, 1985). This hypothesis is supported by students' reports of their mental activities. All students reported more covert than overt rehearsal. Moreover, students in the repeated song condition reported lyric rehearsal of the Preamble text prior to both the short- and long-term recall tasks. These findings suggest that repeated exposure to songs can lead to automatic rehearsal of those lyrics, an activity that may partly explain the superior recall patterns of these students.

Although past methodological debates have centered on experimental versus naturalistic studies of memory (e.g., Banaji & Crowder, 1989), the present study demonstrates their complementary nature (e.g., Neisser, 1988). Specifically, a

naturalistic study demonstrated the utility of a song for very-long-term memory, and an experimental study clarified underlying processes that explain why songs are memorable. Future research could use both experimental and naturalistic approaches to address issues of internal and external validity.

This study is limited by the use of only one passage, the Preamble, and one type of comprehension measure, verbatim recall. Television depictions, such as the one used here, also involve a visual track that affects memory in conjunction with the audio track (Calvert, Huston, & Wright, 1987). Another limitation is that gist recall for comprehension of meaning was not assessed. Future research should extend the current findings to other verbal passages, to other media, and to other measures of comprehension, particularly those directed at understanding the meaning or point of the passage.

Even so, these findings are encouraging. Songs present content in a form that is memorable to children as well as adults. Repeated exposure to songs leads to recall benefits over verbal formats both immediately and after extended periods of time. Because television songs are easily repeated, educational content can be delivered effectively in home and school settings.

In conclusion, songs present content in a musical form that can be memorable for years to come. Songs provide students with an encoding, a rehearsal, and a retrieval strategy that can assist their verbatim recall. People have a capacity to utilize songs as a mnemonic device that remains largely untapped, particularly by literate societies who rely on written words as their primary form of communication.

REFERENCES

- Banaji, M., & Crowder, R. (1989). The bankruptcy of everyday memory. *American Psychologist*, *44*, 1185–1193.
- Bartlett, F.C. (1932). *Remembering: A study in experimental psychology*. Cambridge: Cambridge University Press.
- Calvert, S.L., Huston, A.C., & Wright, J.C. (1987). Effects of television preplay formats on children's attention and story comprehension. *Journal of Applied Developmental Psychology*, *8*, 329–342.
- Hayes, D., Chemelski, B., & Palmer, M. (1982). Nursery rhymes and prose passages: Preschoolers' liking and short-term retention of story events. *Developmental Psychology*, *18*, 49–56.
- Hyman, I.E., & Rubin, D.C. (1990). Memorability: A naturalistic study of long-term memory. *Memory & Cognition*, *18*, 205–214.
- Johnson, J.L., & Hayes, D.S. (1987). Preschool children's retention of rhyming and nonrhyming text: Paraphrase and rote recitation measures. *Journal of Applied Developmental Psychology*, *8*, 317–327.
- Liebert, R., & Sprafkin, J. (1988). *The early window: Effects of television on children and youth*. New York: Pergamon.
- Lord, A.B. (1982). Oral poetry in Yugoslavia. In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts* (pp. 243–257). San Francisco: W.H. Freeman.
- Morrongiello, B., & Roes, C. (1990). Children's memory for new songs: Integration or independent storage of words and tunes? *Journal of Experimental Child Psychology*, *50*, 25–38.

- Neisser, U. (1982). Memory: What are the important questions? In U. Neisser (Ed.), *Memory observed: Remembering in natural contexts* (pp. 3–18). San Francisco: W.H. Freeman.
- Neisser, U. (1988). New vistas in the study of memory. In U. Neisser & E. Winograd (Eds.), *Remembering reconsidered: Ecological and traditional approaches to the study of memory* (pp. 1–10). Cambridge: Cambridge University Press.
- Rubin, D. (1977). Very long-term memory for prose and verse. *Journal of Verbal Learning and Verbal Behavior*, 16, 611–621.
- Serafine, M.L., Crowder, R.C., & Repp, B.H. (1984). Integration of melody and text in memory for songs. *Cognition*, 16, 285–303.
- Sloboda, J. (1985). *The musical mind: The cognitive psychology of music*. Oxford: Oxford University Press.
- Wright, J., & Huston, A. (1983). A matter of form: Potentials of television for young viewers. *American Psychologist*, 38, 835–843.