MEMORY FOR POETRY: MORE THAN MEANING?

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ABSTRACT

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Is there more to memory for poetry than memory for meaning? The assumption has become that memory for form, or the sound patterns of words, is rapidly lost in comparison to memory for content. Memory for form is also assumed to be verbatim rather than schematic. The present experiment investigated if form is remembered in contexts where it is important, such as poetry, and if it remembered schematically. I also explored if sleep could help preserve memory for form, so participants were divided into sleep and no-sleep groups. I specifically tested whether alliterative sound patterns could cue memory for poetry lines both immediately and after a delay of 12 hours. Twelve alliterative poetry lines were modified to have same alliteration, different alliteration, and no alliteration paraphrases. Overall, I hypothesized that original lines would be remembered less well after 12 hours. Same alliteration paraphrases were predicted to be falsely remembered at a higher rate over time, as the sound patterns were schematically similar to original lines. The different alliteration and no alliteration lines were not expected to share this effect given that their sound patterns differed from original lines. All of these hypotheses were supported. Furthermore, the no-sleep group’s recognition of original lines was significantly worse than the sleep group’s over time. The no-sleep group also made more false recognition errors for same alliteration paraphrases after 12 hours. These results provide evidence of long-term memory for form in poetry and schema-based learning for form, as false recognition rates favored lines that schematically resembled original material. Thus, memory for form persists when it is important, as in poetry, schematic learning applies to sound patterns, and sleep may help preserve memory for form.
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TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Schematic Memory</td>
<td>3</td>
</tr>
<tr>
<td>Memory for Form</td>
<td>6</td>
</tr>
<tr>
<td>The Role of Sleep</td>
<td>10</td>
</tr>
<tr>
<td>More than Meaning</td>
<td>12</td>
</tr>
<tr>
<td>METHODS</td>
<td>14</td>
</tr>
<tr>
<td>Norming</td>
<td>14</td>
</tr>
<tr>
<td>Participants</td>
<td>15</td>
</tr>
<tr>
<td>Materials</td>
<td>15</td>
</tr>
<tr>
<td>Procedure</td>
<td>17</td>
</tr>
<tr>
<td>RESULTS</td>
<td>19</td>
</tr>
<tr>
<td>Reading Ability</td>
<td>27</td>
</tr>
<tr>
<td>DISCUSSION</td>
<td>28</td>
</tr>
<tr>
<td>Limitations and Future Directions</td>
<td>31</td>
</tr>
<tr>
<td>REFERENCES</td>
<td>36</td>
</tr>
<tr>
<td>APPENDIX A. SYNOPSIS</td>
<td>39</td>
</tr>
<tr>
<td>APPENDIX B. STIMULI</td>
<td>40</td>
</tr>
<tr>
<td>APPENDIX C. GENERAL QUESTIONNAIRE</td>
<td>46</td>
</tr>
<tr>
<td>APPENDIX D. COMPREHENSION QUESTIONNAIRE</td>
<td>47</td>
</tr>
<tr>
<td>APPENDIX E. READING HABITS QUESTIONNAIRE</td>
<td>48</td>
</tr>
<tr>
<td>APPENDIX F. AUTHOR RECOGNITION QUESTIONNAIRE</td>
<td>49</td>
</tr>
<tr>
<td>APPENDIX G. CONSENT FORM</td>
<td>52</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES AND TABLES

<table>
<thead>
<tr>
<th>Figure/Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Proportions of Hits (Original Lines) and False Alarms (Alliteration Paraphrases)</td>
<td>20</td>
</tr>
<tr>
<td>2. Original Phrase Hit Rates</td>
<td>22</td>
</tr>
<tr>
<td>3. Same Alliteration False Alarm Rates</td>
<td>22</td>
</tr>
<tr>
<td>4. Different Alliteration False Alarm Rates</td>
<td>22</td>
</tr>
<tr>
<td>5. No Alliteration False Alarm Rates</td>
<td>22</td>
</tr>
<tr>
<td>6. Original Phrase Hit Rates by Group</td>
<td>24</td>
</tr>
<tr>
<td>7. Same Alliteration False Alarm Rates by Group</td>
<td>24</td>
</tr>
<tr>
<td>8. Different Alliteration False Alarm Rates by Group</td>
<td>24</td>
</tr>
<tr>
<td>9. No Alliteration False Alarm Rates by Group</td>
<td>24</td>
</tr>
<tr>
<td>10. Hit and False Alarm Rates Overall</td>
<td>26</td>
</tr>
<tr>
<td>11. Hit and False Alarm Rates by Group</td>
<td>26</td>
</tr>
</tbody>
</table>
INTRODUCTION

Poems and songs often emphasize the sound patterns, or form, of words. For centuries, people from various cultures have been able to memorize lengthy poems and songs without the aid of written references. Rubin (1995) has provided the following explanation for this phenomenon: “People take advantage of whatever forms of organization they can find when performing tasks, and in oral traditions patterns of sound are often the clearest form of organization” (p. 303). Thus, form may provide an organizational framework for poetic and lyric material, and when portions of a piece are forgotten, form can serve as a reference point to help fill in memory gaps for wording. Anecdotally, children’s stories that use poetic devices, such as *Eenie meenie miney mo*, are often the easiest ones to recall even decades later.

Poetic devices may provide even more than aesthetics and organization, however. For example, alliteration (the repetition of initial consonants) serves as a type of sound-based play during learning language (Dowker, 1989). Dowker noted that children learning English as a second language used alliteration more frequently than their English speaking peers – perhaps as a form of practice. Furthermore, Hayes & Slater (2007) found that young infants attended to alliterative syllables significantly longer than non-alliterative syllables, as measured by looks toward a light associated with the stimuli. These results suggest that sound patterns are recognized at a very early age and may affect language development. This implies that form may be influential in other areas, such as memory for poetry and song.

Memory for the meaning of words is central to language, but it can be hindered by interference from synonyms and alternate meanings nonetheless (Rubin, 1995). Meaning derived from ordinary sentences can only cue memory, or prompt recall, to a certain extent. In
contrast, form-based memory cues are straightforward and consistent because they are comprised of sound patterns. However, there is a stipulation: form-based cues may only work in certain contexts, such as poetry or song, in which sound patterns are important. Meaning is likely to wield heavier influence on memory for material that does not use rhyme or alliteration schemes, assonance, or a controlled number of syllables.

Rubin (1995) proposed the serial recall theory as an explanation for how form could cue memory in oral traditions such as poetry and song. His theory states that initial rhythmic sound patterns trigger the recall of subsequent rhythmic sound patterns. Thus, memory for form makes use of existing activation to restrict appropriate choices and streamline recall. However, sound cues can activate an abundance of alternatives if an original item is forgotten, whereas meaning cues are much more constrained (Rubin, 1995). Consider the tip of the tongue phenomenon: when a known word is forgotten, people often try to remember it by sounding it out. Form certainly aids recall in this way.

But what is the evidence of form’s effects on memory? Early experiments suggest form is unimportant and quickly forgotten (Bransford & Franks, 1971; Brewer & Hay, 1984). Conversely, more recent work (Lea, Rapp, Elfenbein, Mitchel, & Romine, 2008; Rapp & Samuel, 2002; Tillman & Dowling, 2007) aligns with Rubin (1995) in suggesting that form is remembered in contexts like poetry. However, in order to understand memory for form, it is necessary to explore the constructive aspects of memory that enable it, such as schemas.
If form is remembered, it is likely that schemas play a role. Schemas are summaries of knowledge and experience. Functionally, schemas provide organization for memory and aid in the processing of information (Rubin, 1995). Information that matches the memory theme, or schema, will be remembered better than information that does not. Thus, schemas allow one to make inferences about information that is forgotten or missing. In oral traditions, details that are forgotten can be filled in using form-based schemas as guidelines (Rubin). These substitutions tend to adhere to the schema in regard to what fits the theme of the memory best.

Evidence suggests that form is remembered schematically, as schematic memory involves “imaginative reconstruction, or construction, built out of the relation to our attitude towards a whole active mass of organized past reactions or experience” (Bartlett, 1932, p. 213). Thus, the sound patterns of poems and songs provide structures for memory that are remembered as form-based schemas (Rubin, 1995). Within these schemas, initial sound repetitions aid memory by cuing the sounds that come after them. When schematic memory for form is utilized, sound repetitions constrain and cue appropriate choices during recall while schemas provide a sound-based thematic outline.

Rubin (1995) also suggests that an active schema can cue memory for material that is related to it; however, he describes the schema itself as “an abstraction of many individual variants and therefore not greatly affected by any one variant” (p. 22). Thus, schemas make memories easier to reconstruct because they allow connections to form between what would otherwise be random, redundant bits of information. This process makes the combined information (the schema) easier to access and apply overall. This streamlines the processing of
everyday objects and events by relating novel experiences to prototypical experiences and existing knowledge.

Although schemas represent average experiences, such as what one typically does in a restaurant, this does not mean they are rigid. Schemas can adapt as situations unfold and incorporate information as contexts change, a concept that Anderson & Pichert (1978) illustrated in memory for events. Their participants were assigned the imaginary role of a home buyer or burglar and read descriptions of houses. They were later asked to recall items from these descriptions, and interestingly, participants tended to remember objects relevant to their assigned buyer or burglar schemas (e.g., big yard versus big screen TV).

Unfortunately, schemas can also lead to memory errors – after all, what is most likely to occur may not be what actually occurs. An example of this is Brewer & Treyens’ (1981) study in which participants waited in a room, identified as a graduate student’s office, and later recalled objects from the room. The authors expected that schemas would provide a framework for memory and facilitate recall for episodic information. They found that participants did tend to recall objects that fit their schemas of a graduate student’s office regardless of what was actually in front of them. For example, participants often inferred that there were books in the office when in fact there were none.

Since schemas are important in memory for events, might they also be important in memory for text? This question is complicated by the fact that memory for text involves both meaning and surface form. Indeed, Rubin (1995) argued that there are schemas for meaning and schemas for form, both of which can facilitate recall for material.
In support of this idea, early work on memory for text suggests that meaning and form are remembered differently. For example, Bransford & Franks (1971) presented participants with sentences such as the following: “The rock crushed the tiny hut,” and “The hut was at the edge of the woods.” Later, on a recognition test, participants would also see sentences like this: “The rock which rolled down the mountain crushed the tiny hut at the edge of the woods.” Participants tended to falsely remember the combined sentences even though they were not presented originally. Bransford & Franks suggested that this was because the longer sentences could be inferred from the shorter ones. They interpreted their results as an illustration of the importance of memory for meaning since memory for form was lost.

In order to look more closely at this relationship, Brewer & Hay (1984) investigated memory for the stylistic aspects of prose (e.g., a business writing style) in comparison to memory for meaning. They found that participants recalled sentences’ content but not stylistic form, which again suggests that memory for form is poor relative to memory for meaning. In combination with the results of Bransford & Franks (1971), this implies that meaning is all that matters in memory for sentences. The assumption became that memory for text was essentially memory for meaning, whereas memory for form was quickly forgotten.

However, this assumption is not without fault. For instance, form was not an important aspect of Bransford & Franks’ (1971) study. Their experiment measured recall for ordinary sentences, whereas poetic or lyrical lines would have emphasized sound patterns and allowed form to stand out. Brewer & Hay (1984) also assumed that meaning and form are mutually exclusive in memory. More recent work on memory for form addressed these issues by exploring the role of context and the possibility of interaction between meaning and form in memory.
Rapp & Samuel (2002) brilliantly illustrated form’s potential effects on memory by investigating whether form and meaning could work together in language production. Participants were asked to fill in blanks at the ends of spoken sentences such as this one: “Joe opened the present and hoped he wouldn’t get any clothes. He looked in the box and found some _____.” The sentences semantically restricted potential word choices (a small gift) and primed a potential rhyming answer (“socks” after “box”). Rapp & Samuel found that spontaneous completions were influenced by sentences’ form, and in tandem with restricted semantic choices, this implied that form had an effect on lexical selection. Rapp & Samuel’s experiment is evidence that form and meaning can interact during word production. Thus, they are not mutually exclusive processes.

If form influences production then it may influence recall as well, as production itself involves memory retrieval. Still, why would form be remembered? Rubin (1995) argued that form is only remembered in contexts in which it is important, such as poetry and song. As evidence, he pointed out that errors in songs and poems tend to preserve form at the expense of meaning. An example of this is the human tendency to spontaneously use nonsense words while reciting songs. The improvised lyrics may not be meaningful, but they do tend to match original songs’ sound patterns. The errors favor form over meaning, and in this way, the sound pattern of a song is being used as a memory framework. This is a reversal of Bransford & Frank’s (1971) and Brewer & Hay’s (1984) argument that meaning is remembered over form.

Indeed, the results of the Brewer & Hay (1984) study may have been drastically different if participants were asked to match writing styles rather than recall content. It is likely that their
subsequent errors would have reflected a bias toward form in this scenario. However, Brewer & Hay argued that form was reconstructed in memory and not remembered verbatim. Although Rubin’s (1995) work does not specifically involve writing styles, he would agree that poor verbatim recall does not mean that form is forgotten. He posits instead that poetic structures provide “an organized set of rules or constraints” that can aid recall for form in general (p. 7).

Nonetheless, people tend to focus on meaning over form in most contexts. Dowker (1989) found that even very young children (aged 2-5) were able to write coherent stories; this was likely because the children were accustomed to attending to meaning. Even so, these same children also wrote poems containing strings of nonsense words that rhymed and alliterated. This suggests that the children understood that form can be more important than meaning when it comes to poetry.

However, memory for form may depend on circumstances other than context. Rummer & Engelkamp (2001) found that auditory presentation improved verbatim short-term recall of sentences whereas visual presentation did not. Although their sentences were not poetic or lyrical, these findings still imply that auditory presentation can help facilitate memory for form. In other words, hearing sentences rather than silently reading them may be essential for form to be remembered. Earlier work (Rogers, 1970) also found that alliteration had no effect on sentence retention unless the sound pattern was emphasized through capitalization or pointed out in instructions. Despite Rogers’ use of visual presentation rather than auditory presentation, her findings suggest that alliterative patterns have to be explicitly attended to in order to have an effect on memory. Thus, memory for form is unique in that it is dependent on context, auditory presentation, and salience.
This evidence supports the idea that form is remembered, but it also introduces several caveats. The most central of these is that form may only be remembered in poetry or song – why would this be? Humanity’s oral traditions provide a logical explanation. Consider how people went about memorizing and passing on information before written word. Long stories tended to take the form of rhythmic poems or songs that were passed down for generations. For example, the epic poem *Beowulf* employed line-by-line alliteration in the original Old English. As Rubin (1995) argued, the repetitive sounds of poetic form can provide organization and structure for memory in the absence of written references.

Rubin’s theory of serial recall helps to further explain this phenomenon. His theory states that poetic recall is serial, meaning earlier lines cue later lines. The constraints imposed by a poem’s sound pattern can help distinguish upcoming items in memory. Serial recall theory also suggests that form isn’t remembered precisely; instead, a form-based schema for general sound patterns is remembered. Items that match the form-based schema should be recalled better than items that do not. Since schema-based learning for events is supported by empirical evidence (Anderson & Pichert, 1978; Brewer & Treyens, 1981), it is not a far leap to predict that schema-based learning for form also takes place.

Experimental evidence supports this idea. Lea, Rapp, Elfenbein, Mitchel, & Romine (2008) examined the potential effects of form on memory for poetry. Participants read alliterative poems aloud and cue lines were scattered in the blocks of text. The cue lines ended in target words that were followed by recognition probes for these targets. In the recognition probes, the cue lines were altered to fit same alliteration (e.g., *w-* throughout), different alliteration (e.g., *w-* for half the line and *r-* for the other half), or no alliteration formats. They found that participants were significantly faster at remembering target words in the same
alliteration condition, making it the most successful memory cue. There was no difference between the different alliteration and no alliteration conditions, which were approximately 85 milliseconds slower than the same alliteration condition on average. This strongly implies that form can aid memory, as phonologically similar sound patterns acted as memory cues and facilitated retrieval.

Tillman & Dowling (2007) also investigated memory for form by comparing recall for short stories and rhyming poems. Their participants listened to the pieces then took recognition tests after delays ranging from approximately 9 seconds (short delay) to 20-30 seconds (long delay). Participants were instructed to identify original lines (targets) on these tests, but paraphrases (which changed word order but preserved rhyme) and meaning-changed lines were also presented as decoys. Tillman & Dowling expected rhythmic sound patterns to aid memory for poetry over time, and memory for prose was expected to be poorer, as it did not have this advantage.

Indeed, participants were better at correctly distinguishing original lines from paraphrases and meaning-changed lines in the poetry condition over time. However, memory for poetry was poor in the short delay condition compared to memory for prose, which started out strong and then decayed. Unfortunately, this aspect of the data was not discussed, but overall these findings suggest that memory for poetry can be stable over time, even if it is not remembered as well as prose from the outset. The results of the longer delay can be taken as evidence that form was being used as a memory aid in the poetry condition. Interestingly as well, Tillman & Dowling’s (2007) findings mirror Bransford & Franks’ (1971) insofar as memory for poetry was initially poor in comparison to memory for prose. However, memory for poetry did not decay as sharply as memory for prose over time.
The experiments I’ve discussed raise several important issues in the study of memory for form. Firstly, the development of memory for form in poetry has not been examined over the long-term, as measured in hours. Previous long delays typically lasted under a minute, and they may not have provided a sufficient assessment of long-term memory for form (Lea et al., 2008; Tillman & Dowling, 2007). Another issue is that the broader study of memory for text has typically involved scenarios in which form is incidental to the material rather than central to it (Bransford & Franks, 1971). This raises even more questions: How might memory for form fare in a context like poetry, in which sound patterns are important? What would be the result of a delay measured in hours rather than seconds? And finally, is it possible that sleep could influence memory for form as it influences memory for other types of information?

*The Role of Sleep*

Increasing experimental evidence supports the theory that sleep is essential to the long-term retention of perceptual and linguistic information. For example, Karni, Tanne, Rubinstein, Askenasy, & Sagi (1994) investigated performance on a visual task before and after sleep. Participants were taught to pick out target textures from background textures, and their performance on this task failed to improve if they did not enter REM sleep 8 to 10 hours later. In contrast, performance significantly improved in participants who did enter REM sleep 8 to 10 hours after learning the task. Since sleep apparently improved performance, the authors theorized that deprivation of REM sleep interfered with successful learning of the task, which in turn prevented improvement on the task. Although Karni and colleagues’ stimuli were visual, their results are still generalizable, as they indicate that sleep can aid in the retention of novel perceptual material.
These findings may extend to memory for auditory information as well. Consider how new spoken words are learned and incorporated into existing vocabularies – a phenomenon known as lexicalization. When a new word has been lexicalized, it will compete with and inhibit similar words during recall (Dumay & Gaskell, 2005). Lexicalization can be tested by asking participants to decide if silent pauses have been inserted into newly learned words. This task takes longer when a new word has been lexicalized because it is competing with other words during recall. Using this pause detection method, Dumay & Gaskell (2005) investigated the time course of lexicalization. Participants learned novel spoken words and were tested to see if the novel words inhibited similar words immediately, 24 hours later, and one week later. There was no evidence of lexicalization in the immediate condition, but the novel words did inhibit similar words in the 24 hour and one week conditions – presumably after sleep had taken place. Consequently, Dumay & Gaskell suspected that sleep played a role in the process of lexicalization.

In order to explore this issue further, Dumay & Gaskell (2007) conducted another experiment in which participants learned novel spoken words. This time they were tested for lexicalization effects immediately, 12 hours later with or without sleep, and 24 hours later. As before, the authors found that novel spoken words did not immediately inhibit similar words, which indicated that the information had not yet been lexicalized. The same pattern was found after 12 hours without sleep. Interestingly, however, novel words did inhibit similar words after 12 hour or 24 hour periods that included sleep. Thus, novel spoken words were lexicalized only after a considerable amount of time had passed, and only if sleep had taken place in the interim. An equivalent amount of time without sleep was not enough.
Maquet (2001) offers an explanation for these findings in his overview of sleep’s effects on learning and memory. Maquet argues that REM sleep is essential to maintaining plasticity in the brain. Plasticity allows newly formed neural connections to strengthen, which explains why sleep facilitates processes like lexicalization and visual learning (Dumay & Gaskell, 2007; Karni et al., 1994). In other words, plasticity enables learning and memory for linguistic and perceptual information. Since sleep plays a key role in long-term memory for these types of material, it follows that sleep could also influence memory for auditory information, such as memory for form.

More than Meaning?
Memory for text has been assumed to be memory for meaning. Memory for form is different than memory for meaning, but this does not mean it is unimportant. Previous work has argued that memory for form decays rapidly (Bransford & Franks, 1971; Brewer & Hay, 1984). However, much of this work did not use form in a way that made it relevant, and memory for irrelevant information could naturally be expected to decay. Rubin (1995) argued that form is remembered when it is important, as in poetry. He posited that memory makes use of any organization it can find, and that the sound patterns of form provide structure in poetry.

Another common misconception seems to be that memory for form is word-for-word memory (Bransford & Franks, 1971), but this is not the case (Rubin, 1995). Experimental evidence suggests that form-based schemas, not verbatim wording, are remembered (Lea et al., 2008; Tillman & Dowling, 2007). Memory for form may not be perfect, but it is also not completely forgotten. Furthermore, memory for form has rarely been explored over the long term, as in more than a minute or so. Despite findings that imply sleep is essential to memory for linguistic and perceptual information (Dumay & Gaskell, 2005; Dumay & Gaskell 2007;
Karni et al., 1994; Maquet 2001), memory for form has not been investigated in this regard either.

The present experiment was an attempt to fill in several gaps in our understanding of memory for form: 1. Is form remembered immediately and over the long-term when it is an important part of the material? 2. Is memory for form stable after a delay that includes sleep in comparison to an equivalent delay without sleep? 3. Is there evidence of form-based schematic learning, i.e., will error patterns favor sound patterns that are similar to originals over those that are not?

I investigated these questions by comparing immediate and long-term (12 hour delay) memory for alliterative poetry lines in sleep and no-sleep conditions. Given previous evidence, I hypothesized the following: 1. Immediate memory will be better than delayed memory for original lines. 2. Delayed memory for original lines will be better in the sleep group. 3. False alarm rates will increase over time for same alliteration paraphrases, which have sound patterns similar to originals, and this will suggest schema-based learning for form. 4. The no-sleep group will make more form-based schematic errors over time. Overall, I predicted that alliterative poetry lines would be remembered as form-based schemas, that form-based schemas would aid memory for poetic material, and that sleep would help preserve these effects.
METHODS

The overarching goal of the experiment was to explore whether form is remembered when it matters, as in poetry, and if it is schematic. I tested this by measuring recognition for alliterative poetry lines as well as paraphrases with similar, dissimilar, and non-alliterative sound patterns over time.

Norming

I conducted a stimuli norming survey prior to the experiment. Forty-two Bowling Green State University undergraduates participated in an online questionnaire presented via Survey Gizmo 3.0. They signed up for the experiment through the university’s online system and were awarded course credit for participation. Participants were required to be at least 18 years old and native English speakers. The sample was 76.2% female and 88.1% white, and the average age was 19.1 years. Four people were excluded for incorrectly answering a question that assessed if they were paying attention, and one person was excluded for offering an unprompted admission of substance use during the survey.

Participants rated 36 poetry line pairs for clarity and poetics using Likert scales ranging from 0 to 5. Clarity was defined as how easy the lines were to understand, and poetics was defined as how well the lines resembled poetry as opposed to ordinary sentences. A score of 0 on the Likert scales was labeled as Not Clear or Not Poetic, whereas a score of 5 was labeled as Very Clear or Very Poetic. All line pairs were rated for both qualities, and participants were also provided with a comment box in which to type any words they did not understand. The 12 line pairs with the highest average ratings were selected for use in the experiment (Clarity $M = 4.2$, $SD = .17$; Poetics $M = 3.4$, $SD = .33$). None of the 12 selected lines had any reported instances
of unrecognized words. The line pairs contained a wide variation of alliterative consonants and semantic topics as well in order to minimize potential confusion amongst the lines.

Participants

Fifty-one Bowling Green State University graduate and undergraduate students participated in the experiment for either course credit or $10. They were recruited through the university’s online system, email advertisements, and flyers. Again, participants were required to be 18 or older and native English speakers. The sample was 43.1% female, 75.1% white, and the average age was 21.0 years. Eleven participants were disqualified in total: three did not attend the second session, three no-sleep participants napped, three guessed repeatedly on the author recognition questionnaire, and two had a comprehension score at or below the cut-off point of 60%. Participants excluded due to questionnaire performance presumably did not pay sufficient attention to experimental instructions.

Materials

The poetry lines I used were adapted from Seamus Heaney’s modern English translation of Beowulf (2001). I chose to use alliterative poetry lines because Rubin (1995) suggested that words’ initial letters provided stronger memory cues than ending letters: “the first occurrence of the sound limits the choices for the second occurrence and provides a strong cue” (p. 75). The poetry lines occasionally required minor changes in order to fit experimental conditions: all lines were transformed into two-line pairs, and archaic terms were replaced with modern terms as needed. Three types of paraphrases were created from each original line pair as well: same alliteration paraphrases, different alliteration paraphrases, and no alliteration paraphrases. Below are examples of each:
Alliterative original line pair, adapted from Heaney (p. 213):

“They let the ground keep the gold
under the gravel, gone to the earth.”

Same alliteration paraphrase that keeps the original consonants intact:

“They let the grasses keep the gems
under the grime, given to the earth.”

Different alliteration paraphrase that changes the alliterative consonants:

“They let the dirt keep the diamonds
under the dust, dropped to the earth.”

No alliteration paraphrase that removes alliteration:

“They let the soil keep the riches
under the mud, lost to the earth.”

Thus, there were 48 total poetry line pairs with paraphrases included. These were divided into four lists (A, B, C, and D), each of which had three original line pairs and three of every paraphrase type included. No line pair was presented twice in any version on the same list. Participants saw different lists on their first and second sessions and list order was counterbalanced.

It is important to note that meaning was held constant across phrase types; only the surface form differed across line pairs. Alliterative synonyms were matched as closely as possible to original words for familiarity, frequency of use, and number of syllables using Coltheart’s (1981) psycholinguistic database. See Appendix B for a complete list of line pairs.

Participants completed several questionnaires once the recognition tests were complete. The general questionnaire asked for the following information: age, gender, ethnic background, class year, fluency in languages other than English, and hours slept the night before. Participants
were also asked if they had slept between the first and second sessions. They were excluded if they did so in the no-sleep group. The questionnaire also asked if participants were familiar with the poem *Beowulf*, if they dreamt (an erratic possible indicator of REM sleep), and if they liked poetry in general, as these factors could be expected to influence performance. However, these factors did not have meaningful significant effects and will not be discussed further. See Appendix C to view the general questionnaire.

Additionally, participants completed a comprehension questionnaire consisting of True or False items that pertained to basic themes in the poetry lines. The comprehension questionnaire was not intended to be challenging; rather, it was an indirect measure of whether participants were paying attention during the experiment. Participants also reported their reading ability using a reading habits questionnaire adapted from Acheson Wells, & MacDonald (2008). Participants reported how often they came across words they didn’t recognize in the poetry lines as well. Finally, participants took Acheson and colleagues’ author recognition questionnaire as an objective measure of print exposure and reading experience. These questionnaires can be viewed in Appendices D, E, and F.

*Procedure*

The experiment was presented in two sessions, and participants were assigned to one of two groups: sleep or no-sleep. Participants in the sleep group came in for the first session in the evening and the second session the following morning. Participants in the no-sleep group completed testing in the same day with the first session in the morning and the second session in the evening. Testing sessions were always 12 hours apart, at 9, 10, or 11am/pm time slots. All participants were tested individually.
At the beginning of the first session, participants silently read a short synopsis of events in *Beowulf* (see Appendix A). The synopsis was intended to alleviate confusion since the 12 original poetry lines were later presented in a random order. After the synopsis, participants completed a learning phase in which they read the 12 original line pairs aloud from a computer screen. This process was repeated three times in total, and an experimenter was always in the room to ensure that participants were reading aloud.

The learning phase was followed by an immediate recognition test. This test used one of four different lists containing an equal mixture of randomly ordered original line pairs, same alliteration paraphrases, different alliteration paraphrases, and no alliteration paraphrases. Participants used Likert scales to rate line pairs for whether or not they matched original line pairs from the learning phase. The Likert scales ranged from 0 to 5; 0 was labeled as *Definitely Not* an original line pair while 5 was labeled as *Definitely Yes* an original line pair. As with the learning phase, the recognition items were read aloud in order to make the sound pattern as salient as possible. The first session ended once the immediate recognition test was complete.

Participants returned to the lab 12 hours later for the second session. They were given a delayed recognition test right away. They did not repeat the learning phase, and the delayed recognition test list always differed from the immediate recognition test list. The rating system and procedure were otherwise identical to those in the first session. After the delayed recognition test was complete, participants filled out the general questionnaire, comprehension questionnaire, reading habits questionnaire, and author recognition questionnaire in that order.
RESULTS

The poetry lines’ Likert scale ratings were transformed into hit rates for original lines and false alarm rates for paraphrased lines. The scales were divided into Yes (3-5) or No (0-2) responses in order to calculate these proportions. Responses to original line pairs were classified as hits (Yes) or misses (No), whereas paraphrase responses were classified as false alarms (Yes) or correct rejections (No). To avoid redundancy, only hit rates and false alarm rates are reported, as miss rates and correct rejection rates are simply the remaining amount out of 100%. Hits and false alarms are related in that they both indicate that an item is remembered, although only hits involve correct recognition.

Item reliability analyses were conducted to ensure that no individual items(s) were carrying effects. All 48 items were within 2.3 standard deviations from the raw score rating grand mean of 1.4. Error rates were comparable across conditions and lists (\(M = 15\%\)). Four items had error rates between 40-50% and accounted for 9% of the data; three were original line pairs and one was a no alliteration line pair. It is to be expected that some items would be remembered less well than others on average, and importantly, participants never saw the same line pair twice on either of the two recognition tests. Thus, all 48 items were included in further analyses, and the data were normalized using an arcsine transformation. The analyses described hereafter reference the transformed data, although ultimately these had the same significance patterns as the original data. Table 1 provides recognition proportions for original line pairs (hit rates) and same, different, and no alliteration paraphrases (false alarms) by group and delay type.
### Table 1.

**Proportions of Hits (Original Lines) and False Alarms (Alliteration Paraphrases)**

<table>
<thead>
<tr>
<th>Line Types</th>
<th>Overall Immediate</th>
<th>Overall Delayed</th>
<th>Sleep Immediate</th>
<th>Sleep Delayed</th>
<th>No-Sleep Immediate</th>
<th>No-Sleep Delayed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>M (SD)</em></td>
<td><em>M (SD)</em></td>
<td><em>M (SD)</em></td>
<td><em>M (SD)</em></td>
<td><em>M (SD)</em></td>
<td><em>M (SD)</em></td>
</tr>
<tr>
<td>Original</td>
<td>.84 (.24)</td>
<td>.63 (.36)</td>
<td>.80 (.27)</td>
<td>.72 (.38)</td>
<td>.87 (.20)</td>
<td>.53 (.31)</td>
</tr>
<tr>
<td>Same Alliteration</td>
<td>.04 (.12)</td>
<td>.12 (.21)</td>
<td>.05 (.12)</td>
<td>.08 (.15)</td>
<td>.03 (.10)</td>
<td>.15 (.25)</td>
</tr>
<tr>
<td>Different Alliteration</td>
<td>.10 (.19)</td>
<td>.11 (.23)</td>
<td>.12 (.20)</td>
<td>.07 (.14)</td>
<td>.08 (.18)</td>
<td>.15 (.30)</td>
</tr>
<tr>
<td>No Alliteration</td>
<td>.12 (.18)</td>
<td>.15 (.25)</td>
<td>.13 (.20)</td>
<td>.10 (.19)</td>
<td>.10 (.16)</td>
<td>.20 (.29)</td>
</tr>
</tbody>
</table>
Hit rates and false alarm rates were analyzed using 2 X 4 X 2 mixed-design analyses of variance (ANOVAs). The independent variables were delay type (within subjects: immediate or 12 hour), phrase type (within subjects: original, same alliteration, different alliteration, or no alliteration), and group type (between subjects: sleep or no sleep).

Initial analyses combined the two groups and explored overall effects. I hypothesized that original line pairs would be remembered less well over time, and there was a significant effect of delay type on hit rates for original lines \((F(1, 38) = 17.40, p < .0001)\). This means that original lines were correctly remembered significantly more often on the immediate recognition tests (hit rate = 84%) than the 12 hour delay recognition tests (hit rate = 63%; see Figure 1). I also predicted that same alliteration paraphrases would be mistaken for originals more often over time because the sound patterns were similar, and there was a significant effect of delay type on false alarm rates for same alliteration paraphrases \((F(1, 38) = 5.71, p = .022)\). Thus, the same alliteration paraphrases were rarely mistaken for originals immediately (false alarm rate = 4%), but they were mistaken for originals significantly more often after a 12 hour delay (false alarm rate = 12%; see Figure 2). The different alliteration and no alliteration paraphrases were not expected to have memory effects since they should have been easy to distinguish from original lines, since the alliterative sound patterns were altered or removed. This appeared to be the case, as overall there were no significant effects for different alliteration \((F(1, 38) = .014, p = .91; \text{see Figure 3})\) or no alliteration paraphrases \((F(1, 38) = .28, p = .60; \text{see Figure 4})\) over time.
Figure 1. Original Phrase Hit Rates

Figure 2. Same Alliteration False Alarm Rates

Figure 3. Different Alliteration False Alarm Rates

Figure 4. No Alliteration False Alarm Rates

Note. * Indicates significance at a $p = .05$ level or less.
I also hypothesized that the sleep group would remember original lines better than the no-sleep group at after a 12 hour delay. There was a significant interaction between delay type and group for recognition of original lines \((F(1, 38) = 6.10, p = .018)\). The groups correctly identified original lines equally well on the immediate recognition test (sleep hit rate = 80%; no-sleep hit rate = 87%). However, as predicted, the sleep group’s performance was stable 12 hours later whereas the no-sleep group’s performance deteriorated (sleep hit rate = 72%; no-sleep hit rate = 53%). Additional analyses revealed that correct recognition rates for original lines significantly dropped over time in the no-sleep group \((F(1, 19) = 30.0, p < .0001)\) but not in the sleep group \((F(1, 19) = 1.15, p = .30)\). Thus, memory for the poetry lines was better 12 hours later if sleep had occurred compared to if it had not (see Figure 5).

Further analyses separated the groups in order to examine the potential effects of sleep in more depth. I hypothesized that the no-sleep group would make more form-based schematic errors over time, which is to say that they would falsely recognize same alliteration paraphrases as originals more often after 12 hours. This is exactly what was found; the no-sleep group had a higher rate of same alliteration false alarms over time \((F(1, 19) = 4.87, p = .040)\), while interestingly, the sleep group did not \((F(1, 19) = 1.00, p = .33\); see Figure 6). Memory for the lines was more accurate in the sleep group over time. Furthermore, as with the combined results, the false alarm rates for different alliteration and no alliteration paraphrases weren’t expected to differ over time. There were no significant effects for different alliteration paraphrases in the no-sleep group \((F(1, 19) = .82, p = .38)\) or the sleep group \((F(1, 19) = .68, p = .42\); see Figure 7). Similarly, there were no significant effects for no alliteration paraphrases in the no-sleep group \((F(1, 19) = 1.70, p = .21)\) or the sleep group \((F(1, 19) = .33, p = .57\); see Figure 8).
Figure 5.
Original Phrase Hit Rates by Group

Figure 6.
Same Alliteration False Alarm Rates by Group

Figure 7.
Different Alliteration False Alarm Rates by Group

Figure 8.
No Alliteration False Alarm Rates by Group

Note. * Indicates significance at a $p = .05$ level or less.
In the interest of simplification, Figure 9 and Figure 10 provide summaries of original line recognition and combined paraphrase false recognition for the entire sample and separated groups, respectively. Memory for original lines universally decayed over time but was worse in the no-sleep group. False recognition for same alliteration lines significantly increased over time across groups. However, with the groups separated, this was only significantly true of the no-sleep group. False recognition of the different alliteration and no alliteration paraphrases did not differ over time or by group. Presumably this was because their sound patterns were very different from originals and easy to distinguish. The increase in same alliteration false alarm rates over time suggests that there was form-based schematic learning for the poetry lines. Additionally, the sleep group demonstrated better memory for original lines and fewer false alarm errors than the no-sleep group after 12 hours. There were no significant effects over time when all paraphrases were considered together.
Figure 9.
Hit and False Alarm Rates Overall

Figure 10.
Hit and False Alarm Rates by Group

Note. * Indicates significance at a $p = .05$ level or less.
Reading ability was not expected to affect recognition of original lines since the task involved memory for sound patterns rather than content. Meaning was consistent across line types as well. Nonetheless, reading ability was included in the analyses in order to assess this possibility. Participants’ performance on the recognition tests, as measured by proportions of original line hit rates and paraphrase false alarm rates, did not significantly correlate with reading ability, as assessed by the reading habits and author recognition questionnaires. The reading ability measures were significantly correlated with each other ($r = .46, p = .003$), and lower self-reported reading ability was also correlated with lower comprehension scores ($r = -.50, p = .001$) and more trouble recognizing words ($r = -.60, p < .0001$). However, these results indicate that reading ability did not affect performance on the recognition tests.
DISCUSSION

My main experimental question was if form is remembered when it matters, and if so, is form remembered schematically? I tested this by comparing correct recognition of alliterative poetry lines to false recognition of same alliteration, different alliteration, and no alliteration paraphrases of the lines. Error patterns were found to be schematic: same alliteration paraphrases sounded similar to originals and were falsely remembered significantly more often over time. This effect was found in the overall sample and in the no-sleep group, and it provides evidence of schema-based learning for form. This evidence is strengthened by the fact that the different alliteration and no alliteration paraphrases had no significant effects by delay or group. These paraphrase types changed the original sound patterns and did not seem to fool anyone.

I also wanted to explore how long memory for form might last and if sleep could help preserve it. Thus, participants were tested immediately and after a 12 hour delay in either a sleep or no-sleep group. I found that memory for form can endure for up to 12 hours if sleep has taken place, which offers counter-evidence to the assumption that memory for form decays rapidly (Bransford & Franks, 1971; Brewer & Hay, 1984). Sleep did apparently help preserve memory for form, as recognition for original lines did not significantly decay over time in the sleep group. However, combined group effects show that form-based schematic errors occurred more often over time regardless of whether sleep had taken place. The evidence of schema-based learning for form therefore still stands, even with the sleep aspect of the study removed, as does the finding that memory for form can persist for at least 12 hours.

Several differences between the sleep and no-sleep groups are significant as well. The sleep group’s pattern of false alarms errors did not significantly change over time. They
remembered original lines only slightly (and non-significantly) less well at the 12 hour mark, whereas the no-sleep group was significantly worse at recognition after a 12 hour delay. The no-sleep group also falsely recognized same alliteration paraphrases significantly more often over time. No other paraphrase types were falsely remembered at significant rates in any condition.

These results are of interest because they imply that participants did not simply make more false alarm errors after 12 hours. The sleep group actually displayed a non-significant decrease in different alliteration and no alliteration false alarms over time. This suggests that participants were attending to the poetry lines’ sound patterns and using form-based schemas to help remember them. Participants were not simply attending to meaning; they were able to discard sound patterns that clashed with the original form-based schemas they had learned. In other words, participants were able to identify sound patterns that did not match the originals, and they were able to make this distinction both immediately and at the 12 hour delay regardless of whether or not they had slept. However, same alliteration lines presented a challenge since they were schematically similar to original sound patterns. Participants made form-based schematic errors by mistaking these same alliteration paraphrases for originals. This happened more often over time in general, and especially if participants had not slept in the interim.

Other group differences are also worthy of note. At a non-significant level, the sleep group did not remember originals as well as the no-sleep group at immediate testing. They also displayed a non-significantly higher false alarm rate than the no-sleep group at first; yet, despite this initial poorer performance, the sleep group rebounded and outperformed the no-sleep group in terms of correctly recognizing original lines and making fewer false alarm errors in all paraphrase conditions after the delay. The only condition in which the sleep group’s false alarm rate went up over time was the same alliteration condition, although this was not significant on
its own. The uniformity of these trends tentatively implies that sleep plays a stabilizing role in schematic memory for poetic material.

My findings also support Lea and colleagues’ (2008) work, as participants remembered material better when sound patterns were consistent. This provides more evidence that alliteration can serve as a memory cue. Overall, participants were significantly worse at recognizing original lines over time, yet false alarm rates for same alliteration paraphrases spiked after the 12 hour delay: there was a significant threefold increase in the entire sample (4% to 12%) and a significant fivefold increase in the no-sleep group (3% to 15%).

Furthermore, the sleep group’s steady recognition of originals and lower error rates over time support Tillman & Dowling’s (2007) findings on the stability of memory for poetry. However, the no-sleep group did not display stable memory for the lines over time, and immediate memory for poetry lines was not poor from the outset in this experiment. One explanation for these results is that the form of the poetry lines provided a structure, or schema, that aided recall of the material (Rubin 1995), and sleep may have helped preserve this structure over the long-term, as it does with other types of perceptual material (Maquet, 2001). My findings also offer an example of how form-based schemas can be double-edged swords, as Brewer & Treyens’ (1981) illustrated in schematic memory for events. Overall, false alarm rates for paraphrases that were similar to originals increased over time. Thus, the poetry lines were not remembered verbatim, but as schemas, which resulted in errors – just as with memory for events. Perhaps the strongest evidence of this is the fact that false recognition of similar-sounding lines went up over time as correct recognition of original lines went down.
The overall results of the experiment are in support of my hypotheses. Participants made errors that preserved form – they had a harder time distinguishing schematically similar paraphrases from original lines over time. Thus, form would appear to be remembered in the context of poetry, in which it is relevant. Additionally, memory for form is not always lost, as the sleep group’s recognition of alliterative poetry lines did not significantly decrease after 12 hours. These results suggest that sound patterns act as memory cues, that form-based schematic learning takes place for poetic material, and that form-based schemas can endure over time.

Limitations and Future Directions

Inevitably, unintended influences may have affected this study. All participants were native speakers of English, but accents were not taken into account. Presumably this is acceptable, since participants read the lines aloud and consequently remembered their own sound pattern recitations. Participants’ hearing and speaking abilities were also not formally assessed, although no participants displayed noticeable difficulties in these areas.

Another potential limitation is that participants selected their own time slots, which ranged from 9 to 11am and 9 to 11pm. It is possible that these slight differences in testing time affected performance. However, this setup was intended to open experimental participation to a wider population, since coming in for two time-sensitive sessions was sometimes difficult to arrange. As such, group assignment can be called pseudorandom, but nonetheless, variables such as age, reading ability, and gender ratios did not significantly differ between groups.

Unexpectedly, the sleep group did not immediately remember originals as well as the no-sleep group. They also had a higher error rate than no-sleep participants from the outset. These differences were non-significant, but they may have been due to testing times. Sleep group
participants may have initially been more tired during the evening sessions, although feasibly the same thing could be said of no-sleep participants in the morning sessions. It is difficult to say if there were fatigue effects in the no-sleep group, as they generally made more errors in their second sessions whereas the sleep group did relatively well in early morning second sessions. Overall results indicate that participants generally did worse when tested in the evening regardless of group; however, testing in the evening could not have been avoided due to the 12 hour delay.

It should also be pointed out that standard deviations tended to be higher in the delayed condition than the immediate condition across groups and phrase types. This likely reflects variance in individual ability on the recognition tests, which became more apparent as time passed. Also, the no-sleep group was more likely to answer that they recognized lines overall after 12 hours, which could indicate a change in response bias over time rather than memory for the material. Unfortunately, there were not enough trials per person in this experiment to formally assess the possibility.

Interestingly, the different alliteration and no alliteration paraphrases were falsely remembered at higher rates than the same alliteration paraphrases at immediate testing. Recognition rates for different and no alliteration paraphrases did not significantly change over time, but the slight increase for no alliteration paraphrases over time could be explained as prose creating a false sense of familiarity. After all, ordinary sentences are heard and read much more often than poetry lines. False alarms for no alliteration paraphrases may have also been higher from the outset because the lines resembled regular sentences, which may have made them easier to read. Thus, because meaning was held constant across all line types, participants may have
attended to meaning rather than form at immediate testing – although this is a non-significant trend. Perhaps schema-based learning for form, as with lexicalization, takes time.

Furthermore, there may have been unintended differences between line types, although every attempt was made to keep meaning as consistent as possible across originals and paraphrases. However, this proved to be a challenging task at times. For example, one excerpt required coming up with three different ways to say “wound” – one synonym had to begin with w-, two more synonyms had to start with different letters, all had to fit the style of *Beowulf* yet be words in modern use, and all had to be roughly the same length. Thus, some synonyms were imperfect matches, e.g., the reflection of a “maze” in the trees versus the reflection of a “cobweb” in the trees. This may have caused some paraphrases to be more easily rejected or falsely remembered than others; however, hit and false alarm rates within phrase types contained no notable outliers in this regard. I did not conduct a norming survey for meaning consistency, but the idea was to get the gist of the lines across while altering only the surface features. Memory for meaning was not seen as vital, e.g., slight semantic variations between words such as “wisdom” and “insight” were not considered cause for concern.

My explanation for the role of sleep in memory for form is also open to interpretation. It’s possible that the no-sleep group had to deal with more information during the day, which may have disrupted memory for the poetry lines. The sleep group may not have had to contend with the same amount of interference. However, participants in the sleep group slept for an average of 6.8 hours, which left approximately 5.2 hours for other information to intrude. In the interest of a naturalistic learning setting, participants were not deprived of sleep nor kept under supervision in the lab for 12 hours. Even if that had been the case, it would have been
impossible to prevent participants from encountering or thinking about information other than the poetry lines.

I also interpreted my results as sleep exerting a stabilizing influence on schematic memory for form. The sleep group had no significant decreases in correct recognition or increases in false alarm rates over time. In comparison, the no-sleep group’s correct recognition of original lines significantly decreased while same alliteration false alarms increased after 12 hours. Since the no-sleep group was more prone to make schematic errors, this indicates that they did not learn form-based schemas as accurately as the sleep group and thus had to generalize the information more widely.

However, the sources of these differences cannot be known with absolute certainty. Again, participants were not kept in the lab for 12 hours of supervision, and sleep (or lack thereof) was self-reported. Even so, schema-based false recognition increased over time across groups, as overall false alarm rates were higher for same alliteration paraphrases after 12 hours. The separated effects of the sleep and no-sleep groups were significant, but they became more significant when considered together. This implies that the results are not simply a reflection of fatigue in the no-sleep group. However, this would be a worthwhile question to pursue in future studies in which fatigue effects can be more stringently controlled. Another important question raised by this study is whether schematic memory could also apply to music.

The results of this experiment offer strong evidence of schema-based learning for form in poetry, and that memory for form can persist for at least 12 hours. The results also suggest that sleep may stabilize memory for form. Memory for form in poetry is analogous to the erosion of a stone – details are lost over time, but a basic structure endures. Form-based schemas make up
this structure: they enable sound patterns to be anticipated, and they provide cohesion for the material through rhythmic constraints.

Humanity’s oral traditions have often emphasized form in the past. This long-standing practice implies that form may lend an advantage to memory for spoken words. However, the sound patterns of form have to be heard to be remembered, and they must also be relevant to the material in order to be retained. The findings of my experiment indicate that there is enduring memory for form in the context of poetry, that poetic sound structures are learned schematically, and that sleep may aid these processes. Thus, in the case of poetry, memory for form is not unimportant or forgotten. There is more to memory for poetry than meaning.
REFERENCES


APPENDIX A

SYNOPSIS

You will be reading several lines from the poem Beowulf. The source of the lines is Seamus Heaney’s 2001 translation. To help you understand what you read, here is a summary of events in the poem:

Beowulf is described as a famous warrior from Geatland (modern-day Scandinavia). He leaves his home to help Hrothgar, the king of Danes, whose warriors were eaten by a monster called Grendel. Beowulf and his men lure Grendel to them by sleeping in the hall where the monster had killed the other warriors. When Grendel attacks, Beowulf fights and injures him. Grendel runs away and dies.

Believing the danger is over, Hrothgar and his men return to their hall to celebrate Beowulf's victory. However, Grendel's mother comes for revenge late in the night and kills Hrothgar's best warrior. Beowulf follows Grendel's mother back to her home underneath a lake and slays her so that the Danes can live in peace.

Beowulf returns to Geatland and eventually becomes king. He rules the Geats for over 50 years. However, one day a villager steals a golden cup from the lair of a nearby dragon. This act provokes the dragon to attack the village. Although he is now an old man, Beowulf hunts down and fights the dragon in order to protect his people. The dragon is eventually defeated, but Beowulf dies from the wounds he received in the battle. The Geats mourn Beowulf and praise him as a hero. He is buried near the sea.
APPENDIX B
STIMULI

1

Original Line:
The frost-bitten woods wait and keep watch,
like a maze mirrored in the lake’s surface.

Same Alliteration Paraphrase:
The frost-bitten wilds withstand and keep wary,
like a mist mimicked in the lake’s surface.

Different Alliteration Paraphrase:
The frost-bitten groves grow and keep guard,
like a cobweb copied in the lake’s surface.

No Alliteration Paraphrase:
The frost-bitten forests sway and keep alert,
like a net reflected in the lake’s surface.

2

Original Line:
And so Grendel waged his lonely war,
inflicting constant cruelties on the people.

Same Alliteration Paraphrase:
And so Grendel worked his lonely wickedness,
inflicting continuous conflict on the people.

Different Alliteration Paraphrase:
And so Grendel conducted his lonely crusade,
inflicting steady suffering on the people

No Alliteration Paraphrase:
And so Grendel fought his lonely battle,
inflicting unending torture on the people.
Original Line:
In his wisdom, the king wondered
if the tide of misfortunes would ever turn.

Same Alliteration Paraphrase:
In his worthiness, the king worried
if the trend of misfortunes would ever tire.

Different Alliteration Paraphrase:
In his practicality, the king pondered
if the course of misfortunes would ever change.

No Alliteration Paraphrase:
In his insight, the king questioned
if the wave of misfortunes would ever end.

Original Line:
Beowulf had survived every extreme, excelling himself
in daring and danger, until the day arrived.

Same Alliteration Paraphrase:
Beowulf had survived each excess, exceeding himself
in dilemma and difficulty, until the dawn arrived.

Different Alliteration Paraphrase:
Beowulf had survived all adventures, advancing himself
in hardship and hazard, until the hour arrived.

No Alliteration Paraphrase:
Beowulf had survived many trials, outdoing himself
in bravery and risk, until the time arrived.
5

*Original Line:*

Friends and young followers flocked to his ranks,
a force that grew to fight an army.

*SAME ALLITERATION PARAPHRASE:*

Family and young fellows flew to his ranks,
a formation that grew to face an army.

*DIFFERENT ALLITERATION PARAPHRASE:*

Allies and young admirers amassed to his ranks,
an assembly that grew to assault an army.

*NO ALLITERATION PARAPHRASE:*

Companions and young supporters rallied to his ranks,
a power that grew to battle an army.

6

*Original Line:*

All were hunted by the dark death-shadow
who swooped and lurked in the long nights.

*SAME ALLITERATION PARAPHRASE:*

All were hunted by the demonic doom-shadow
who swooped and lay in the lingering nights.

*DIFFERENT ALLITERATION PARAPHRASE:*

All were hunted by the gloomy grim-shadow
who swooped and crawled in the creeping nights.

*NO ALLITERATION PARAPHRASE:*

All were hunted by the evil ruin-shadow
who swooped and dragged in the boundless nights.
In a fury, Beowulf flung his sword away; so must a man do to gain enduring glory.

Same Alliteration Paraphrase:
In a frenzy, Beowulf flicked his sword away; so must a man do to get enduring greatness.

Different Alliteration Paraphrase:
In turmoil, Beowulf tossed his sword away; so must a man do to attain enduring adoration.

No Alliteration Paraphrase:
In a rage, Beowulf hurled his sword away; so must a man do to win enduring fame.

And now Grendel won’t be long for this world; he has done his worst but the wound will end him.

Same Alliteration Paraphrase:
And now Grendel will not be long for this way; he has done his wickedness but the whack will end him.

Different Alliteration Paraphrase:
And now Grendel shall not be long for this sphere; he has done his slaughter but the slash will end him.

No Alliteration Paraphrase:
And now Grendel cannot be long for this earth; he has done his ravaging but the gash will end him.
Original Line:
Beowulf got lavish rewards from the lord
for his part in the battle: beaten gold and much else.

Same Alliteration Paraphrase:
Beowulf got luxurious rewards from the leader
for his part in the brawl: bountiful gold and much else.

Different Alliteration Paraphrase:
Beowulf got numerous rewards from the noble
for his part in the fighting: fine gold and much else.

No Alliteration Paraphrase:
Beowulf got plentiful rewards from the king
for his part in the combat: pure gold and much else.

Original Line:
With high hearts they went away
along trails and footpaths through the fields.

Same Alliteration Paraphrase:
With happy hopes they went away
along trails and furrows through the farms.

Different Alliteration Paraphrase:
With thrilled thoughts they went away
along trails and grasses through the gardens.

No Alliteration Paraphrase:
With cheery moods they went away
along trails and streams through the pastures.
11

*Original Line:*

His piercing eyes dim and darken;
the dear warrior’s death sweeps him away.

*Same Alliteration Paraphrase:*

His piercing eyes dull and deaden;
the daring warrior’s doom sweeps him away.

*Different Alliteration Paraphrase:*

His piercing eyes fog and fade;
the favored warrior’s fall sweeps him away.

*No Alliteration Paraphrase:*

His piercing eyes haze and cloud;
the esteemed warrior’s passing sweeps him away.

12

*Original Line:*

They let the ground keep the gold
under the gravel, gone to the earth.

*Same Alliteration Paraphrase:*

They let the grasses keep the gems
under the grime, given to the earth.

*Different Alliteration Paraphrase:*

They let the dirt keep the diamonds
under the dust, dropped to the earth.

*No Alliteration Paraphrase:*

They let the soil keep the riches
under the mud, lost to the earth.
APPENDIX C

GENERAL QUESTIONNAIRE

1. What is your age? _____
2. What is your gender?
   a. Male
   b. Female
3. What is your ethnic background? You may choose more than one if applicable.
   a. Asian
   b. Black or African American
   c. White
   d. Hispanic or Latino
   e. American Indian or Alaska Native
   f. Native Hawaiian or Pacific Islander
   g. Other
4. What is your year of study?
   a. Freshman
   b. Sophomore
   c. Junior
   d. Senior
   e. Graduate Student
5. Are you fluent in any language(s) other than English?
   a. Yes
      i. What language(s)? __________
   b. No
6. How many hours did you sleep last night? _____
7. Did you experience dreams last night?
   a. Yes
   b. No
8. Did you sleep between your first and second sessions in this experiment?
   a. Yes
   b. No
9. Have you read the poem Beowulf or seen a movie based on the poem?
   a. Yes
   b. No
10. Do you like poetry?
    a. Yes
    b. No
APPENDIX D

COMPREHENSION QUESTIONNAIRE

The True/False questions below concern the Beowulf lines you read earlier.

1. The lines described modern events.
   a. True
   b. False
2. Beowulf fought a pack of wolves.
   a. True
   b. False
3. Beowulf was well-liked by his people.
   a. True
   b. False
4. Beowulf fought to protect others.
   a. True
   b. False
5. Grendel was Beowulf’s enemy.
   a. True
   b. False
6. One of the themes was love.
   a. True
   b. False
7. There was a king in the story.
   a. True
   b. False
8. Beowulf did not use violence.
   a. True
   b. False
9. Beowulf was described as a great hero.
   a. True
   b. False
10. The story took place in a desert.
    a. True
    b. False
APPENDIX E

READING HABITS QUESTIONNAIRE

(Acheson, Wells, & MacDonald, 2008)

Instructions: Circle a number on the scale to indicate your answer.

1. Compared to other college students, how much time do you spend reading all types of materials?

   \[1\] \[2\] \[3\] \[4\] \[5\] \[6\] \[7\]
   very little time \hspace{2cm} very much time

2. Compared to the reading material of other college students, how complex do you think you reading material is?

   \[1\] \[2\] \[3\] \[4\] \[5\] \[6\] \[7\]
   not complex \hspace{2cm} very complex

3. Compared to other college students, how much do you enjoy reading?

   \[1\] \[2\] \[3\] \[4\] \[5\] \[6\] \[7\]
   very little \hspace{2cm} very much

4. Compared to other college students, how fast do you normally read?

   \[1\] \[2\] \[3\] \[4\] \[5\] \[6\] \[7\]
   very slowly \hspace{2cm} very quickly

5. Compared to other college students, when reading at your normal pace, how well do you understand the reading material?

   \[1\] \[2\] \[3\] \[4\] \[5\] \[6\] \[7\]
   not well \hspace{2cm} very well
APPENDIX F

AUTHOR RECOGNITION QUESTIONNAIRE

(Acheson, Wells, & MacDonald, 2008)

Below is a list of names. Some of them are authors of books, and some of them are not. Please put check marks next to the ones that you know for sure are authors. There is a penalty for guessing, so you should check only those names about which you are absolutely certain. Thank you.

___Patrick Banville  ___James Patterson
___Kristen Steinke  ___Martha Farah
___Ernest Hemingway  ___Craig DeLord
___Clive Cussler  ___Nora Ephron
___Hiroyuki Oshita  ___Ann Beattie
___Kurt Vonnegut  ___Stewart Simon
___Anne McCaffrey  ___Danielle Steel
___Elinor Harring  ___Dick Francis
___Sue Grafton  ___Ted Mantel
___Lisa Woodward  ___I.K. Nachbar
___David Harper Townsend  ___Judith Krantz
___Anna Tsing  ___Thomas Pynchon
___T.C. Boyle  ___Wayne Fillback
___Jonathan Kellerman  ___Harry Colheart
___Cameron McGrath  ___Gary Curwen
___F. Scott Fitzgerald  ___Herman Wouk
___A.C. Kelly  ___Geoffrey Pritchett
___Peter Flaegerty  ___Ray Bradbury
___Kazuo Ishiguro  ___Jay Peter Holmes
___Jane Smiley  ___Christina Johnson
<table>
<thead>
<tr>
<th>Author</th>
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<tbody>
<tr>
<td>Elizabeth Engle</td>
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<td>Brian Herbert</td>
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<td>T.S. Elliot</td>
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<td>Sue Hammond</td>
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<td>Marvin Benoit</td>
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<td>Jared Gibbons</td>
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<td>Joyce Carol Oates</td>
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<td>Michael Ondaatje</td>
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<td>Jessica Ann Lewis</td>
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<td>Thomas Wolfe</td>
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<td>Nelson Demille</td>
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<td>Jeremy Weissman</td>
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<td>Arturo Garcia Perez</td>
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<td>Willa Cather</td>
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<td>S.L. Holloway</td>
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<td>J.D. Salinger</td>
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<td>John Irving</td>
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<td>Antonia Cialdini</td>
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<td>Stephen Houston</td>
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<td>Lisa Hong Chan</td>
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<td>Marcus Lecherou</td>
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<td>Samuel Beckett</td>
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<td>Valerie Cooper</td>
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<td>Beatrice Dobkin</td>
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<td>Tom Clancy</td>
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<td>Wally Lamb</td>
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<td>Vladimir Nabokov</td>
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<td>Katherine Kreutz</td>
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<td>Pamela Lovejoy</td>
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<td>James Michener</td>
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<td>Vikram Roy</td>
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<td>William Faulkner</td>
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<td>Saul Bellow</td>
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<td>Isaac Asimov</td>
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<td>Stephen King</td>
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<td>Lindsay Carter</td>
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<td>Elizabeth May Kenyon</td>
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<td>Paul Theroux</td>
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<td>Frederick Mundow</td>
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<td>Francine Preston</td>
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APPENDIX G
CONSENT FORM

Title of experiment: Poetry Perception
Principal investigator: Rachel Atchley, Graduate Student
Dept. of Psychology, Bowling Green State University
Email: atchley@bgsu.edu
Office phone: (419) 372-4375

We are conducting a research study to learn more about how we understand poetry. If you agree to participate, you will listen to several individual lines of poetry through headphones. You will hear additional poetry lines either immediately afterward or 12 hours later. You will be asked to decide if the new lines match previous lines, and you will indicate your certainty in your answers with pen and paper scales ranging from 1 to 6. Next, you will be given a short questionnaire on the content of the lines. You will also be given a list of names and asked to circle any authors you recognize. Finally, you will be given short questionnaires on your reading habits and your general information such as age, gender, ethnicity, and sleep habits. In total, the experiment will take approximately 45 minutes to complete.

For your participation on this project, we will award you compensation in the form of either experimental course credit or monetary compensation. Note that if you are to come back 12 hours later, your course credit or payment will be divided between the two visits. Please indicate your preferred form of compensation below.

___ The amount of experimental course credit you receive is based on the duration of the experiment. You will receive one half point of experimental course credit for every half hour of participation.

___ You will receive monetary compensation for your participation. The compensation rate is $10/hour. Note that experiment durations are tallied in 15 minute increments for purposes of compensation.

Information about your performance will be held in the strictest confidence. Only the researchers will have access to any records with your name on them. If we publish the results of this study we will report only averaged data, not that of individuals.

Participation in this research is entirely voluntary. You may refuse to participate or withdraw at any time without penalty. Your grades, class standing, and relationship to BGSU will not be affected should you choose to participate, refuse to participate, or withdraw from the experiment. We will end the experiment early without your consent only if there is an equipment failure or unforeseen technical problem. If we have to end the experiment, you will receive compensation based on the amount of time you have participated. There are no known risks associated with these procedures. There will also be no direct benefit to you, although after the study is finished the experimenter can talk with you about experimental procedures if you would like. We hope that the study will have the more general benefit of telling us more about how we understand poetry.
If you have any questions, please ask them before signing this form. If you have additional questions in the future or would like more information, please contact Rachel Atchley at the phone number or email address at the top of this letter. You may also contact the project advisor, Dr. Mary Hare, at (419) 372-2526 or mlhare@bgsu.edu. If you have questions regarding the conduct of the study or concerns regarding your rights as a research participant, you may contact the Chair of the Human Subjects Review Board at Bowling Green State University at (419) 372-7716 or hsrb@bgsu.edu. Please keep this letter for your records.
Title of Experiment: Poetry Perception

I have had the study explained to me, and my questions have been answered to my satisfaction. Based on the information I have been given, I agree to participate in this study.

__________________________
Signature

__________________________
Date