

Aesthetic Appeal, Rhyme, and their influence on Memorability

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Abstract EN:

Aesthetics, despite its implications for the fields of language processing and communication, has remained largely understudied within linguistic research. This paper investigates the aesthetic appeal of rhyme and its potential influence on memory. Since existing literature suggests a correlation between aesthetic appeal and memorability, this study predicts that rhyming sequences would be rated higher in terms of aesthetic appeal and, consequently, be more memorable compared to non-rhyming sequences. To test this hypothesis, I employed a dual-task design consisting of a rating and a memory task. Participants (N=26) were presented with auditory stimuli, rhyming and non-rhyming stanzas, which they evaluated in terms of their aesthetic appeal and had to recognise in a subsequent memory test. The aesthetic rating task required participants to assess the appeal of each sequence on a Likert scale, while the memory task was designed as an item recognition task and tested their ability to recognise the stimuli rather than actively recall them. The analysis focused on recognition accuracy and the correlation between aesthetic ratings and memory performance. Contrary to the original hypothesis, the results did not demonstrate a significant difference in ratings between rhyming and non-rhyming sequences. A slight tendency to recognize rhyming schemes was observed, however, without statistical significance. These findings suggest a need for further investigation into the relationship between aesthetic appeal, rhyme and memorability.

Keywords: Aesthetic Linguistics, Rhyme, Memorability, Item Recognition Task, Phonetics

Abstract DE:

Ästhetik ist, trotz ihrer Relevanz für Sprachverarbeitung und Kommunikation, bisher in der linguistischen Forschung weitgehend unbeachtet geblieben. Die vorliegende Arbeit untersucht daher die ästhetische Wirkung von Reimstrukturen und deren möglichen Einfluss auf das

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Gedächtnis. Bestehende Literatur deutet auf einen Zusammenhang zwischen ästhetischem Reiz und Erinnerungsleistung hin. Entsprechend wird in dieser Studie angenommen, dass Reimsequenzen als ästhetisch ansprechender bewertet und folglich besser erinnert werden als nicht-reimende Sequenzen. Zur Überprüfung dieser Hypothese wurde ein Dual-Task-Design verwendet, bestehend aus einer Bewertungs- und einer Gedächtnisaufgabe. Die Teilnehmenden (N=26) hörten akustische Reize, gereimte und ungereimte Strophen, die sie hinsichtlich ihrer ästhetischen Wirkung bewerten und in einem anschließenden Gedächtnistest wiedererkennen sollten. In der Bewertungsaufgabe sollten die Teilnehmenden die Ästhetik jeder Sequenz auf einer Likert-Skala einschätzen, während die Gedächtnisaufgabe als Item-Recognition-Test konzipiert war und die Wiedererkennung der Reize und nicht deren aktive Reproduktion, prüfte. Die Datenanalyse konzentrierte sich auf die Wiedererkennungsgenauigkeit und den Zusammenhang zwischen ästhetischer Bewertung und Gedächtnisleistung. Entgegen der ursprünglichen Hypothese zeigte sich kein signifikanter Unterschied in der Bewertung zwischen gereimten und ungereimten Sequenzen. Zwar war eine leichte Tendenz zur besseren Wiedererkennung von Reimstrukturen erkennbar, diese erwies sich jedoch als statistisch nicht signifikant. Die Ergebnisse deuten auf einen weiteren Forschungsbedarf im Hinblick auf das Zusammenspiel von Ästhetik, Reim und Erinnerungsfähigkeit hin.

Keywords: Ästhetische Linguistik, Reim, Merkfähigkeit, Item Recognition Task, Phonetik

1. Introduction

Aesthetics is a relatively novel field within linguistic research and, therefore, remains insufficiently studied. This is particularly surprising considering the expansive corpus of aesthetics related works in other disciplines, including music (Brattico et al. 2013: 206), objects (Jacobsen et al. 2004: 1253-1260), and art in a broader context (Zaidel et al. 2013: 100-109). Additionally, the investigation into the appeal of mathematical beauty (Zeki et al. 2014: 68) further accentuates the gap in research dedicated to the aesthetic qualities of language.

While direct investigations into the aesthetic properties of linguistic features remain relatively limited (cf. Rastall, 2008: 103-132), linguistic stimuli have been extensively studied in terms of their emotional dimensions, including valence, arousal, and processing fluency (Paulmann et al., 2013; Warriner et al. 2013). These dimensions are fundamentally linked to aesthetic experience (Leder et al. 2013; Reber et al. 2004; Shibles 1995). Acknowledging these interrelations underscores the need for a more deliberate examination of the aesthetic appeal of linguistic features and its broader implications for human cognition.

Moreover, the field of phonaesthetics, focused on investigating the aesthetic dimensions of speech sounds, remains equally understudied (Crystal 2008). This gap persists despite the common notion that prosodic features influence aesthetic perception, e.g., in poetry (Obermeier et al. 2016), and considering the occurrence of such linguistic elements in different contexts. Rhyme and meter in particular contribute to aesthetic appeal ratings and are, as such,

used in different forms of artistic expression, e.g., religious rites, political discourse, and advertisements. Rhyme, specifically, is not only proven to enhance aesthetic appeal but also facilitate the processing of poetry (Obermeier et al. 2016: 362-363). This poses the question of whether rhyme could ease the processing of information in general and, therefore, also affect memorability.

According to the cognitive fluency theory (Reber et al. 2004) the aesthetic response to an object is more positive if it can be processed more easily (Reber et al. 2004). With this in mind, cognitive fluency becomes a crucial factor influencing our preferences for works of art or objects, further supported by Ticini & Omigie (2013).

Returning to the rhetorical and poetic aspects of language, which this study is going to focus on, research has demonstrated the impact of rhyme on word comprehension (Lea et al. 2008). Additionally, rhyme has been found to play a role in the organization of lexico-semantic information within the mental lexicon (Allopenna et al. 1998). Effects associated with rhyming have been observed in the auditory domain as well as reported in studies such as those conducted by Coch et al. (2005) and Davids et al. (2011).

Negrete (2021) conducted a literature review on enhancing the memorability of scientific communication, offering insights applicable beyond the immediate context. The focus lies on narratives and their impact on memorability, serving as potent emotional triggers, enduring memory structures, and effective aids for learning. Findings from memory research suggest that narratives effectively aid recall by concentrating attention, facilitating memory rehearsal, and inducing long-term reinforcement through emotional engagement. In addition, narratives create semantic links that assist in the storage and retrieval of information from memory (Negrete 2021: 1). Memory evaluation emerges as a viable method for assessing learning (Sternberg 2003) and, consequently, measuring the efficacy of information communication. Exploring the memorability of diverse text formats becomes a crucial endeavour, aiming not only for comprehension but also for facilitating long-term memory retention (Negrete 2021: 1).

Also, experiencing emotions serves as a foundation for basic learning and memory processes, as indicated by Steinberg (2003). Emotional learning and memory represent simplistic forms of associative learning that facilitate knowledge acquisition. This type of learning is characterised by rapid acquisition and long-term retention (Maren 1999).

These insights are further explored within this study by taking a closer look at rhyme and its effect on memorability as a tool often considered to be aesthetically appealing and emotionally evoking. Furthermore, in cultures predating and persisting long after the advent of writing, stories were orally transmitted from memory, employing rhythm, rhyme, and melody as structural elements to enhance memorisation (Negrete 2021: 6). Various mnemonic devices, including acronyms, peg words, catchphrases, stories, as well as verses or rhymes, have been employed to aid memory recall. The *Qur'an*, for instance, incorporates mnemonic aids, being crafted both as rhythmic prose and an epic poem, thereby intertwining rhythm, rhyme, and meaning to create a memorable connection for each word (Luria 1986).

Considering the collective body of research, this study aims to deepen the understanding of the correlation between aesthetic appeal of rhyme versus no rhyme and its impact on memorability. This research allows for an in-depth exploration of this relationship and provides insights into the potential implications rhyme might harbour for learnability, among others. Based on the literature at hand, my hypothesis posits that, due to their similarities on a phonetic level, rhyming sequences will receive higher ratings in aesthetic appeal than non-rhyming sequences, suggesting that rhyme will be associated with increased memorability.

2. Methods

In the context of a broader testing session, this experiment aimed to investigate the memorability of rhymed stimuli as opposed to those devoid of such phonetic correspondence. This experiment encompassed an assessment of the aesthetic appeal of both rhyming and not-rhyming sequences, and a measurement of its potential impact on memorability. The entire study comprised four distinct experiments all connected through its common denominator: rhyme. The initial phase was dedicated to assessing the aesthetic preferences between rhyme and no rhyme (Viora Marquet 2024), aligning closely with the scope of my investigation. Subsequently, the second experiment delved into evaluating the aesthetic preferences between rhyme and alliteration (Dieplinger 2024) and simultaneously served as an interference task for this experiment. The third part of the study, my experiment, will be explained in detail below. Finally, the fourth experiment looked at the combined effects of frequency and rhyme on the perception and aesthetic perception of textual excerpts (Licina 2024).

2.1. Participants

In total, 28 participants successfully concluded the entire testing session, and the data from 26 participants was used in this experiment. The sample consisted of 18 females, 7 males, and 1 participant who chose not to disclose their gender. The age ranged from 14 to 52, mean age being 23.56 ($\pm$ SD 11,42). The sample collectively spoke 12 native languages, with German being the predominant language spoken by 10 individuals. In addition, participants reported proficiency in 12 other languages in addition to the native. English emerged as the most prevalent second language, reported by 19 participants, followed by German, reported by 16 individuals. Proficiency in English varied from intermediate (B1, B2) to proficient (C2), with the majority being advanced (C1) (12 participants). The majority of participants had completed high school (22 participants), while others either pursued higher education (3 participants) or had not completed any formal education yet (1 participant).

Participants ran the experiment on their personal devices, using their own headphones of unspecified brands. Participation in the study was voluntary, and individuals were provided with information about the experiments' content and gave their informed consent. In the debriefing, participants were informed of the studies' objectives and were once again given the opportunity to reaffirm their consent.

2.2. Stimuli

The stimuli used in my experiment (Table 1) were synthesized using artificial words generated by UniPseudo (New et al. n.d.) and were adjusted, if necessary, to suit the experimental purpose.

Old Rhyme	Old No Rhyme	New Rhyme	New No Rhyme
Abit conu dula <u>lebabs</u> Dohon exap floyok <u>hobabs</u> Ibed maly okin <u>pimed</u> Apod yeme tety <u>kamed</u>	Dohon exap floyok banton Abit conu dula asseld Apod yeme tety slopel Ibed maly okin winets	Caby idde dops <u>uphing</u> Acim mook atul <u>tihing</u> Coap sant cuey <u>blance</u> Opan knue laoy <u>klance</u>	Acim mook atul asseld Caby idde dops hosque Opan knue laoy chemon Coap sant cuey quaken
Acte coga fene <u>nelens</u> Dama gata tano <u>falens</u> Yavo sile pema <u>inting</u> Poge sape akim <u>upting</u>	Dama gata tano lassul Acte coga fene gloune Poge sape akim tunmes Yavo sile pema slonad	Lald knaw sphels <u>candes</u> Nace muts jeaw <u>mandes</u> Ibed opat pong <u>psylum</u> Pist tean diss <u>ksalum</u>	Nace muts jeaw clusen Lald knaw sphels salono Pist tean diss upting Ibed opat pong tunges
Alan bepe geve <u>clazet</u> Cono ampe idil <u>dizet</u> Bily dade juty <u>timax</u> Lega kili mafa <u>somax</u>	Cono ampe idil metgo Alan bepe geve litish Lega kile mafe sizzah Bily dade juty locans	Bude geve abss <u>suples</u> Flib dops folf <u>maples</u> Youg sosh bily <u>slimps</u> Biti difs idde <u>mlimps</u>	Flib dops roup snobis Bude geve abss admils Biti difs idde bugges Youg sosh bily sunity
Mido acun pupo <u>bastas</u> Opan бага fapi <u>sostas</u> Bune deme exap <u>tabib</u> Anis guta hona <u>embib</u>	Opan бага fapi hommos Mido acun pupo uplitz Anis guta hona dullo Bune deme exap patest	Eani ovan tein <u>fakeet</u> Zech pamp nond <u>bukeet</u> Nify ifft deng <u>solums</u> Exab inom eass <u>hulums</u>	Zech pamp nond lactim Eani ovan tein bastle Exab inom eass walted Nify ifft deng tawyed

Table 1. Stimuli used for the recognition task.

As per Table 1, the stimuli were comprised of 4-line stanzas, with each verse containing 4 disyllabic words. The rhymed stimuli followed a coupled rhyme scheme (AABB), with the second syllable of the final word of each line rhyming with the one below or above. The non-rhyming counterparts were identical to their rhyming equivalents, except for the last word of each line, which was modified to eliminate rhyme. Additionally, lines were rearranged, with the first and third lines interchanged with the subsequent lines, implemented to prevent the ceiling effect. Participants were exposed to recordings of the stimuli, generated using an AI voice generator (VoiceGenerator.io), appearing in randomised order. From the presented stimuli, 8 were taken from the initial rating task (old), and the participants were not exposed to the remaining 8 that served as distractors (new). As evident in Table 1, the stimuli were categorized in four conditions: old rhyme, old no rhyme, new rhyme and new no rhyme. Each condition included four versions of stimuli, totalling 16 stimuli overall.

2.3. Procedure

Before running the experiment, participants were informed of its general structure and were made aware of the memory task being linked to the initial rating task. Participants were also asked to provide information on their demographic background before starting the testing session.

The participants' initial exposure to the stimuli took place in the first segment of the study in the form of a rating task. In this task, they were asked to assess the perceived beauty of specific recordings on a 6-point Likert scale by pressing corresponding keys on their keyboard. Despite not having received explicit instructions to focus on the individual recordings, this phase functioned as the study phase. The second experiment in the testing session introduced another rating task, serving as a distractor for the upcoming memory task. Both the initial and second phase lasted approximately 5 minutes.

The memory task, designed as an item recognition task followed. As demonstrated in Figure 1, in the instructions preceding the experiment, participants were once more informed about what they were going to encounter in the following sequence of the experiment and what their task was.

Part 3

In this next part you will listen to various recordings, some of which you have heard before and some you have not.
You should then decide whether you have heard them before or not.
Press y for yes and n for no

Make sure you are in a quiet space and are wearing headphones!

Figure 1. Interface of the instructions.

The instructions, seen in Figure 1, tasked the participants with determining whether they had encountered a particular recording during the initial rating task and prompted them to ensure they were in a quiet space and wearing headphones.

After the instructions, the experiment commenced and participants were presented with the interface shown in Figure 2.

Did you hear this recording before?

press the spacebar to play the recording

Yes: press y
No: press n

Figure 2. Interface of a trial in the experiment.

Figure 2 shows the interface of the experiment where participants had to determine whether they had encountered the particular stimulus before or not. Responses were recorded as either "Yes", or "No".

The entire study was constructed using OpenSesame (Mathôt et al. 2012) and was linked to a MindProbe (Lange et al. 2015) account for data collection.

2.4. Analysis

In the data analysis, conditions “new rhyme” and “new no rhyme” were excluded as they exclusively functioned as distractors. Therefore, any subsequent reference to conditions refer only to the “old rhyme” and “old no rhyme” conditions. The analysis of the beauty ratings was conducted by Viora Marquet (Viora Marquet 2024). The remaining data analysis involved using Excel (Microsoft Corporation 2022) to calculate recognition accuracy (expressed in percentage) for each condition, perform an analysis of variance to investigate potential differences in recognition accuracy between the two conditions, and assess the correlation between beauty ratings and recognition accuracy. The recognition accuracy was calculated using the formula $(\text{number of correct responses} / \text{number of trials}) * 100$ (Rich 2018). Excel was also employed to analyse the demographic information.

3. Results

The average beauty ratings did not demonstrate a significant difference between individual conditions, with rhyming sequences registering a mean rating of 3.25 ($SD \pm 1.34$), and non-rhyming sequences recording a mean rating of 3.19 ($SD \pm 1.27$) (Viora Marquet 2024). Regarding recognition accuracy, no significant difference was registered, however, a tendency towards rhyme schemes being more memorable is evident, as per Figure 3.

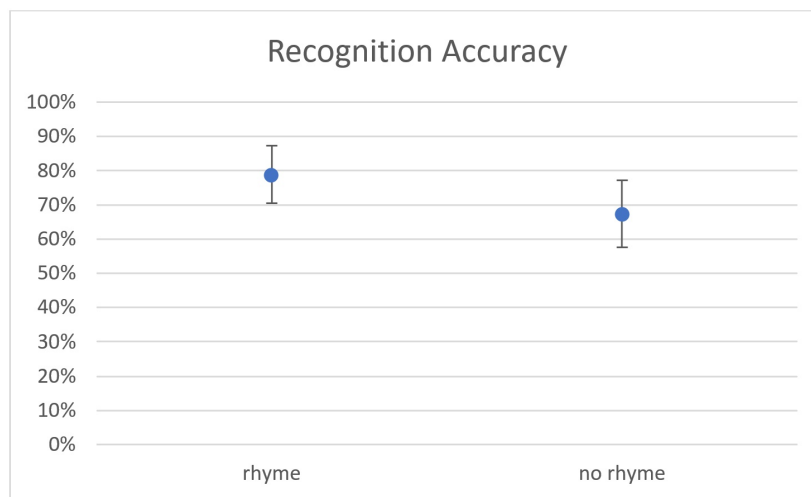


Figure 3. The mean recognition accuracy for rhyme and no rhyme (whiskers indicate a 95% confidence interval).

As Figure 3 indicates, the mean recognition accuracy for rhyme lays at 79,81% ($SD \pm 0.21$) and for no rhyme at 67,31% ($SD \pm 0.24$). Figure 4 below illustrates the study results in form of a boxplot.

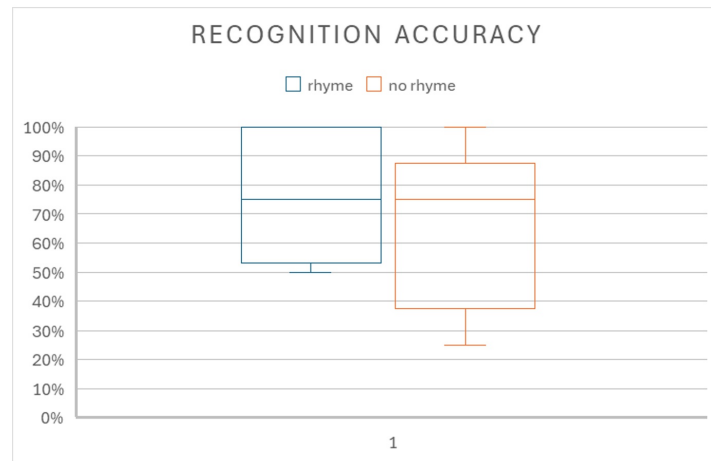


Figure 4. Results for recognition accuracy for rhyme and no rhyme.

As visible in Figure 4, the lowest result for recognition accuracy for rhyme is at 50% and for no rhyme at 25%. Some participants were able to recognise 100% of the stimuli items in both categories. The graph also indicates a 75% median for both rhyme and no rhyme. The biggest difference that can be extracted from the graphs is the distribution of the data: recognition accuracy in rhyme condition lies between 53% (Q1) and 100% (Q3). For no rhyme it lays between 38% (Q1) and 88% (Q3).

Additionally, Figure 5 showcases the distribution of correct responses per participant for each condition.

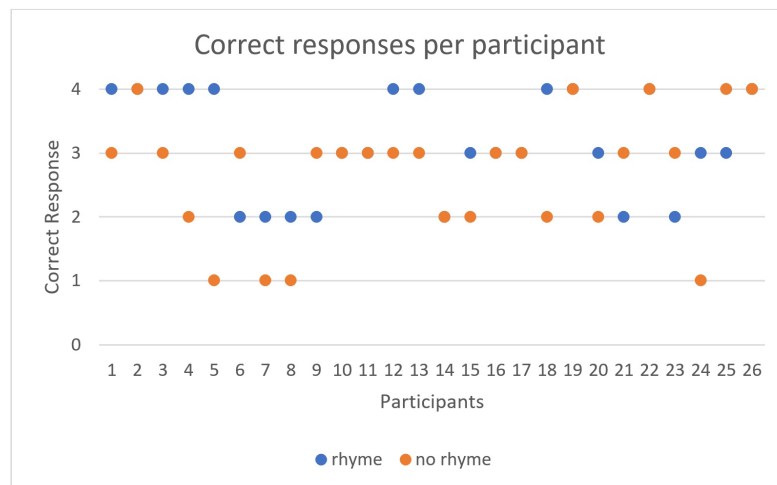


Figure 5. Correct responses per participant.

In Figure 5 it is once again evident that none of the participants provided more than half false responses in the rhyme category. Additionally, none of the participants failed to recognize at least one of the four presented stimuli in each condition.

4. Discussion

In summary, the hypothesis that rhyming sequences would be rated higher in aesthetic appeal and more easily remembered was not supported by the results of any one of the experiments. The rating task revealed comparable ratings for both rhyming and non-rhyming sequences, indicating no preference for either. Despite the memory task showing slightly increased recognition accuracy for rhyming sequences compared to non-rhyming ones, the difference was not statistically significant. These findings contradict the expectations derived from the literature review, which suggested that rhyme would be more aesthetically pleasing and memorable than non-rhyme (Leder et al. 2013; Paulmann et al. 2013; Reber et al., 2004; Shibles, 1995; Warriner et al. 2013;). This discrepancy suggests that other underlying factors may have influenced the study outcomes.

One potential factor could be the limited number of participants involved in the study, resulting in insufficient data to detect significant differences between the two conditions, particularly regarding memorability. However, given the similarity in ratings between rhyme and no rhyme in the rating task, it is unlikely that increasing the sample size would alter this outcome. This suggests that there may be no correlation between the aesthetic appeal and memorability of rhyming versus non-rhyming patterns.

If follow up studies with a higher number of participants would reveal a significant difference between the memorability of rhyme and no rhyme, it can be assumed that the reason does not lay within the aesthetic appeal of these conditions but rather in the nature of rhyme itself. Therefore, further investigation is warranted to explore the implications of these findings in broader contexts.

Another possible explanation for the lack of significant results may lie in the artificial nature of the stimuli. The human ear might be more attuned to natural, human-like speech patterns than to artificial or synthetic linguistic input. The unfamiliarity or perceived “strangeness” of the stimuli might have counteracted an aesthetic appreciation. Future studies benefit from addressing this limitation by using more natural sounding stimuli.

Furthermore, future studies could investigate the memorability of rhyme using different methods to measure memory aside from item recognition, e.g. by employing free recall.

As the results turned out to be inconclusive, there is a clear need for further research involving a higher number of participants to assess whether the outcomes align more closely with the existing literature. Additionally, further exploration of the potential implications of these findings in diverse contexts, such as commercial communication, education, or across different cultural backgrounds is warranted.

5. Conclusion

This study aimed to explore the correlation between aesthetic appeal and memorability of rhyming sequences. Despite the initial hypotheses suggesting a positive relationship between rhyme, aesthetic appeal, and memorability, the results indicated comparable aesthetic ratings in rhyming and non-rhyming stimuli, and did not achieve statistical significance in the memory

task either. The memory task could potentially detect a difference between the two tested conditions using a larger sample. These findings differ from what the literature review suggested and imply that factors beyond aesthetic appeal may influence the memorability of rhyme schemes, encouraging further research.

The results of the memory task, though not conclusive, still make it plausible that there are influences regarding rhyme and memorability which are not linked to their aesthetic appeal. As such this study can be seen as a pilot study harbouring a need for further investigations concerning the matter of the connection between rhyme and its influence on memory and possible explorations for the field of phonaesthetics on a broader scale.

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