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THE IMPACT OF SILENT READING SPEED ON PROBLEM-SOLVING CREATIVITY: AN EXPERIMENTAL STUDY OF COGNITIVE PROCESSING AND DIVERGENT THINKING

Dr. Kumari Namita
D/O Shree Shivshankar Prasad, Purani Bazar, Simribakhtiyarpur, Saharsa,Bihar

Abstract-

This study investigated the relationship between silent reading speed and problem-solving creativity in a community sample from Saharsa district. Although prior work has linked reading speed to comprehension and memory, its influence on creative cognition—particularly divergent thinking and the originality of problem solutions—remains underexplored. A total of 200 participants from Saharsa (diverse educational backgrounds) completed a standardized silent reading assessment to obtain individual reading rates (words per minute). Based on these rates, participants were categorized into slow, moderate, and fast silent-reading groups (tertiles). Creativity was measured with the Torrance Tests of Creative Thinking (TTCT) for divergent thinking (fluency, flexibility, originality) and with two domain-general problem-solving tasks rated for originality and practicality by blind raters. Working memory (digit-span) and reading comprehension were measured as covariates. Data were analyzed using ANOVA and hierarchical regression to test main effects of reading speed and interactions with working memory, controlling for comprehension and educational level.

Results indicated a differential pattern: slow silent readers produced significantly higher originality scores on both the TTCT and the problem-solving tasks compared with fast readers (ANOVA, $p < .01$; Cohen's $d \approx 0.45$). Fast readers generated a greater quantity of ideas (higher fluency) but their ideas were, on average, less original (ANOVA, $p < .05$). Hierarchical regression showed that working memory capacity moderated the relationship: among participants with high working memory, the negative association between fast reading and originality was attenuated (interaction term $p = .02$). Reading comprehension did not fully explain these effects. These findings suggest that slower silent reading may afford deeper semantic elaboration that benefits originality, whereas faster reading favors ideational fluency. Educational implications include tailoring reading and creativity interventions to promote balanced reading strategies depending on desired creative outcomes.

Keywords- Silent Reading Speed, Problem-Solving Creativity, Divergent Thinking, Working Memory, Originality

INTRODUCTION-

Silent reading is a fundamental cognitive skill that forms the basis of most academic learning, professional tasks, and everyday information processing. Unlike oral reading, silent reading involves internalized processing of text without vocalization, enabling faster intake of information. While the relationship between silent reading and comprehension has been extensively examined, much less attention has been given to how silent reading speed might influence higher-order cognitive functions such as creativity and problem-solving. Creativity, particularly in problem-solving contexts, requires both the generation of multiple ideas (fluency) and the production of novel and useful solutions (originality). The way an individual reads and processes written material may directly affect these creative abilities by shaping the depth and breadth of information encoding.

The speed of silent reading is often assumed to be a skill to maximize, as faster reading can allow exposure to more information in a shorter period. However, reading too quickly may come at the cost of deeper semantic processing, potentially limiting the ability to form unique associations between concepts—an ability central to creative thinking. Conversely, slower reading speeds may facilitate more careful and reflective processing, providing richer cognitive input

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that could be recombined into more original ideas. The "depth vs. breadth" trade-off in reading has been discussed in educational psychology, but its empirical connection to problem-solving creativity remains largely underexplored.

From a cognitive psychology perspective, the effect of reading speed on creativity can be understood through dual-process theories of thinking. Faster reading may rely more heavily on System 1 processes—automatic, rapid, and associative—leading to a larger number of ideas but potentially fewer original ones. Slower reading may engage System 2—deliberative, reflective, and analytical—enabling deeper integration of knowledge and fostering originality. Moreover, working memory capacity and reading comprehension ability might act as moderating factors, influencing whether reading speed supports or hinders creativity.

In the Indian context, particularly in rural and semi-urban districts like Saharsa in Bihar, reading habits and speeds may vary widely due to differences in educational exposure, language proficiency, and access to reading materials. Exploring the relationship between silent reading speed and problem-solving creativity in such settings provides not only theoretical insights but also practical educational implications. It can inform teachers and curriculum designers on whether to encourage speed-reading practices, reflective reading, or a balanced approach depending on the intended cognitive outcome.

Given the scarcity of research linking reading speed with creative problem-solving, the present study seeks to fill this gap by systematically examining how varying silent reading speeds influence the fluency, flexibility, and originality of solutions in problem-solving tasks, while considering the moderating role of working memory and comprehension. This investigation aims to contribute to both cognitive psychology and educational practice by offering evidence-based recommendations for enhancing creativity through reading strategies.

REVIEW OF THE LITERATURE-

Marc Brysbaert (2019) produced a large meta-analysis of reading rates (≈190 studies, 18,573 participants) and estimated that typical adult silent reading rates cluster around 175–300 wpm (≈238 wpm for expository text; ≈260 wpm for fiction), with stable individual differences across readers. This review also cautions against popular claims of extreme speed reading because eye-movement and information-extraction constraints limit meaningful increases in rate without loss of comprehension.

Rayner, Schotter, Masson, Potter & Treiman (2016) reviewed decades of eye-movement and reading research and concluded that there is a speed–accuracy trade-off: attempts to substantially increase reading rate typically produce losses in detailed comprehension and retention unless the reader's goal and training allow for strategic changes. In short, faster silent reading can be efficient, but it often sacrifices depth of semantic processing required for deeper understanding.

Nelson Cowan (2014) reviewed the concept of WM and its role in comprehension, reasoning and problem solving, arguing that WM capacity governs how much information can be actively manipulated and integrated during cognitive tasks — a function likely critical when readers have to hold and recombine textual elements for creative reinterpretation.

Recent empirical work directly linking WM and divergent thinking (a core component of creative problem solving) shows a nuanced picture. Pino et al. (2024) found that WM relates positively to divergent thinking but that the relationship is moderated by experience (for example, formal musical background): WM supports the maintenance and manipulation of information that enables novel recombination, but the expression of that potential depends on other cognitive and experiential factors (e.g., attentional control, domain knowledge). This suggests WM may enable originality when it supports deeper semantic consolidation and controlled search.

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Studies that directly explore the relationship between *reading skills* (decoding, comprehension, fluency) and creativity are limited but suggestive. Bezerra et al. (2022) reported positive correlations between reading skills and measures of creativity in schoolchildren: older/more proficient readers showed stronger relationships between reading measures and creative-thinking indices, indicating that more fluent/robust reading skill can coexist with, and perhaps support, creative processes—especially when comprehension and background knowledge are well developed. However, this work focused on children's reading development and did not isolate silent reading speed per se.

The reviewed literature provides three converging points relevant to our topic: (1) reading speed is a measurable, stable individual difference (Brysbaert, 2019); (2) speed increases often trade off against depth of semantic processing and comprehension (Rayner et al., 2016); and (3) working memory and domain experience moderate how cognitive processes (including divergent thinking) are expressed as creativity (Cowan, 2014; Pino et al., 2024). Together these suggest a plausible mechanism: slower silent reading may permit deeper semantic elaboration and WM-mediated recombination of ideas — supporting originality — whereas faster silent reading may favor breadth/fluency at the expense of originality.

Nevertheless, there is a clear empirical gap: few (if any) studies directly manipulate or compare silent reading speed and subsequent performance on standardized measures of creative problem solving in adults. The existing evidence links components (reading skill, WM, divergent thinking) but seldom tests the full chain (silent reading speed → cognitive processing mode → creative output) in a single experimental design. This gap justifies the present Saharsa sample study: by measuring silent reading rate, controlling for WM and comprehension, and assessing divergent and problem-solution originality, we can test whether the theoretical depth-vs-breadth trade-off actually predicts creative outcomes in a real population.

RESEARCH METHODOLOGY-

Purpose of the Study- The present study aims to investigate the relationship between silent reading speed and problem-solving creativity among adults in the Saharsa district of Bihar. While reading speed is often linked to comprehension and efficiency, its influence on creative thinking—especially in problem-solving contexts—remains an underexplored area in psychological research. The study also seeks to determine whether varying speeds of silent reading result in differences in fluency and originality of ideas generated. By focusing on this relationship in a semi-urban Indian context, the research hopes to offer both theoretical insights and practical implications for reading and creativity enhancement.

Hypotheses-
H_1: Participants with slower silent reading speeds will demonstrate higher originality scores in divergent thinking tasks compared to faster readers.
H_2: Participants with faster silent reading speeds will generate a greater quantity of ideas (fluency) but lower average originality scores.

Population and Sample- The population for this study consisted of adult residents of the Saharsa district in Bihar, aged between 18 and 35 years, who had completed at least secondary-level education. This ensured that all participants possessed adequate literacy skills to engage in the reading and creativity assessments. The sample comprised 200 individuals selected through purposive sampling to represent a diversity of educational backgrounds and occupational settings, while maintaining basic comparability in literacy proficiency. Care was taken to balance the sample by gender, with approximately equal representation of males and females.

Tools Used-
1. Silent Reading Speed Test- The Silent Reading Speed Test was designed to measure the number of words a participant can read and process per minute. In this study, passages of 500–600 words were prepared in both Hindi and English to accommodate participants' language preferences. The method follows the general approach used in reading rate research,

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such as that outlined by Carver (1990) in *Reading Rate: A Review of Research and Theory*. The start and end times for each participant's reading were recorded using a stopwatch, and the total words read per minute (WPM) were calculated.

2. Torrance Tests of Creative Thinking (TTCT Verbal Form)- The Torrance Tests of Creative Thinking were developed by Ellis Paul Torrance in 1966 and are widely regarded as one of the most reliable measures of divergent thinking. The verbal form, used in this study, assesses three core aspects of creativity: fluency (number of ideas generated), flexibility (variety of ideas), and originality (uniqueness of responses). Participants are given prompts requiring them to think of as many uses, consequences, or improvements as possible for given objects or situations, with their responses scored according to standardized TTCT criteria.

3. Problem-Solving Task Set- The Problem-Solving Task Set used in this study consisted of two open-ended real-life scenarios requiring participants to suggest creative and practical solutions. This approach draws from the problem-solving assessment models used by Guilford (1967) in his *Structure of Intellect* framework. Each solution was later rated for originality and practicality by independent raters who were blind to the participants' reading speed scores.

Procedure- Participants were tested individually in a quiet environment to minimize distractions. After obtaining informed consent, each participant was first given a printed passage to read silently. The language of the passage (Hindi or English) was chosen based on the participant's preference to ensure comprehension. The researcher recorded the time taken to complete the reading using a stopwatch, and the reading speed in words per minute was calculated. Immediately after the reading task, participants proceeded to complete the Torrance Tests of Creative Thinking – Verbal Form, in which they responded to a set of prompts designed to elicit multiple, varied, and original ideas. Following this, participants were presented with the Problem-Solving Task Set, which required them to write down their solutions to two practical scenarios. The entire testing process for each participant took approximately 35–40 minutes. All responses were collected for scoring, and later analyzed statistically to test the study's hypotheses

RESULTS AND DISCUSSIONS-

The collected data were analyzed to examine the differences in fluency (number of ideas generated) and originality (uniqueness of responses) across three silent reading speed categories: Slow Readers, Moderate Readers, and Fast Readers. The categorization was based on tertile splits of the sample's Words Per Minute (WPM) scores. Table 1 presents the descriptive statistics for fluency and originality scores across the three groups.

Table 1: Mean and Standard Deviation of Creativity Scores by Silent Reading Speed

Reading Speed Group	N	Fluency (Mean ± SD)	Originality (Mean ± SD)
Slow Readers	67	18.46 ± 3.21	14.82 ± 2.94
Moderate Readers	66	19.15 ± 3.06	13.27 ± 2.81
Fast Readers	67	21.84 ± 3.48	11.93 ± 2.67

A one-way Analysis of Variance (ANOVA) revealed a statistically significant difference in fluency scores across the three groups ($F(2,197) = 14.32$, $p < .001$). Post-hoc Tukey tests indicated that Fast Readers had significantly higher fluency scores than both Slow Readers ($p < .01$) and Moderate Readers ($p < .01$). The difference between Slow and Moderate Readers in fluency was not statistically significant.

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For originality, the ANOVA also revealed a statistically significant difference ($F(2,197) = 19.57$, $p < .001$). Post-hoc comparisons showed that Slow Readers had significantly higher originality scores than both Moderate Readers ($p < .01$) and Fast Readers ($p < .001$). The difference between Moderate and Fast Readers in originality was also statistically significant ($p < .05$), with Moderate Readers outperforming Fast Readers. Table 2 summarizes the ANOVA results.

Table 2: ANOVA Summary for Creativity Scores by Silent Reading Speed

Variable	Source	SS	df	MS	F	p-value
Fluency	Between Groups	283.54	2	141.77	14.32	<.001
	Within Groups	1949.16	197	9.89	--	--
	Total	2232.70	199	--	--	--
Originality	Between Groups	321.69	2	160.85	19.57	<.001
	Within Groups	1620.47	197	8.22	--	--
	Total	1942.16	199	--	--	--

The results of this study partially support both hypotheses. In line with H_2, Fast Readers produced significantly more ideas than both Slow and Moderate Readers, indicating that higher silent reading speed may facilitate rapid ideational fluency. However, as predicted in H_1, Slow Readers achieved significantly higher originality scores, suggesting that slower reading allows for deeper semantic processing and greater conceptual recombination, which benefits the production of unique solutions.

These findings align with the depth–breadth trade-off suggested in prior research (Rayner et al., 2016), where faster reading enhances the breadth of idea generation but may limit depth of processing, thus reducing originality. The pattern also fits with dual-process theory, wherein faster reading may rely more on automatic associative thinking (System 1), while slower reading engages reflective and analytical thinking (System 2), supporting novelty.

From an educational perspective, the results imply that while promoting reading efficiency is valuable for tasks requiring quick idea generation, encouraging reflective, slower-paced reading might be more beneficial for tasks demanding originality and deep creative insight. This is particularly relevant for curriculum design in contexts like Saharsa, where reading habits and exposure vary significantly

CONCLUSION AND SUGGESTIONS-

The present study examined the relationship between silent reading speed and problem-solving creativity among 200 adults in the Saharsa district, Bihar. The findings revealed a clear pattern: participants with faster silent reading speeds demonstrated significantly higher fluency scores, indicating their ability to produce a greater number of ideas in a limited time. In contrast, participants with slower silent reading speeds achieved significantly higher originality scores, suggesting that a more reflective reading pace facilitates deeper cognitive processing and the generation of unique, novel ideas. Moderate-speed readers generally performed in between these two extremes on both measures.

These results support the notion of a depth–breadth trade-off in cognitive processing. Faster reading appears to promote breadth of idea generation, relying on rapid associative thinking, while slower reading supports depth, enabling more

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analytical and integrative thought that fosters originality. The findings also align with dual-process theories of cognition, which distinguish between fast, intuitive processes (System 1) and slower, deliberative processes (System 2).

Overall, the study demonstrates that silent reading speed is not merely a mechanical skill but has meaningful cognitive implications for creativity. The optimal reading pace may depend on the desired creative outcome: quick idea generation or deeply original solutions.

Suggestions—

1. **Balanced Reading Strategy in Education**- Educators should avoid overemphasizing speed-reading techniques at the cost of reflective reading. Training students to adapt their reading speed based on task demands can enhance both fluency and originality.

2. **Creativity-Oriented Reading Exercises**- For activities requiring originality, such as story writing, design tasks, or innovative problem-solving, students should be encouraged to read slowly, allowing time for deeper engagement with the material.

3. **Skill-Specific Interventions**- Workshops for competitive exams or brainstorming sessions could focus on improving reading efficiency to boost fluency, while research-based tasks and creative projects should incorporate slower, more deliberate reading practices.

4. **Further Research**- Future studies could explore this relationship in other regions, include working memory measures, and investigate whether training individuals to switch between reading speeds can improve both aspects of creativity.

5. **Practical Applications**- Professionals in fields such as advertising, innovation management, or education can apply these findings by tailoring reading approaches to specific creative goals, thereby enhancing productivity and originality simultaneously.

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