

When the Coyotes Slept, They Could see Stars, Liquor and Smoke: Creativity, Engagement, and Play in Recombinatory Writing Games (RWGs)

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Abstract: This paper reports on mixed-method action research implementing and evaluating a battery of creative writing games for reading (CWGR) progressing from more open games (freewriting-based) to closed games (recombinant). The goal of the study was to investigate how the movement from open to closed games affected creativity (divergence), engagement, and play. It was hypothesized that the restrictive nature of closed forms would render them less engaging overall, particularly for students identifying as creative; however, it was also hypothesized that their rule-based nature would make the creative process clear, accessible, and inclusive, and thus would engage students who *did not* self-identify as creative. Surprisingly, the most recombinatory game was identified by both engaged and disengaged students as *more* creative than the others; more surprisingly, it was rated one of the most engaging games overall. Contrary to the secondary hypothesis, however, the high level of perceived creativity coincided with *lowered* engagement for students who identified as less creative. Other notable results include the following: while highly engaging, freewriting measured low in creativity (divergence) and play; the most engaging games were also the most disengaging for a relatively equal number of students; and finally, in *every* game, students responding in their native language scored *lower* on creativity (divergence). Overall, while results varied by game, most students found that *at least one* game raised divergent awareness. This is a surprising measure of success given the novelty of the games and the short time students were exposed to them. This points to the potential for recombinatory writing games (RWGs) to develop student creative skills (divergent thinking) in reading and writing. This investigation is important in terms of the larger conversation concerning open vs. closed game structures, for example, the effectiveness of open-world exploration and building versus closed, solution-based games. In this case, more closed, recombinatory games were surprisingly effective in terms of both creativity and engagement.

Keywords: Recombinatory games, Creativity, Divergent thinking, Engagement, Writing, Reading

1. Introduction

In response to the radical drop in reading levels in Norway (PISA 2022), the perennial problem of engaging upper-secondary students in reading and writing, and the central place of creativity in 1. the Norwegian curriculum (LK20); 2. the Organization for Economic Co-operation and Development's (OECD) measure of student skills "essential for full participation in modern societies" (PISA); and 3. overall success (Caughron et al, 2011), this study investigates upper-secondary students' engagement and creativity in a series of recombinatory writing games (RWGs). As this project brings together multiple fields, the research context is broken into sections. For a more in-depth treatment of creativity and engagement see Jones (2023), and for literary studies, see Jones (2024).

2. Literary Studies

Language as a game has a significant history in both literary studies and philosophy (Gunn, 2022); the twentieth-century experimental tradition has investigated games and processed-based tools for creative writing (Jones 2024); and the narrative-story debate in electronic literature has established a theoretical discussion treating game-based narratives (Aarseth, 2014); however, investigation into the practical use of literary games as tools for critical reading and interpretation has been limited. The key theoretical background in literary studies is McGann's (2001) "critical deformation", also called "algorithmic criticism" (Ramsay, 2011) and comparable to "decomposition" in creativity studies (Smith, 1998). While these approaches have seen success in literary interpretation and creativity training, they have not been pursued through game-based learning. This study focuses on a game-based approach to "critical deformation" and follows the lead of recent work done by Mills (2022), who explores game-based methods for framing the writing process as collaborative, creative play.

3. Creativity Studies

Creativity, generally defined as both novelty and usefulness in an idea or solution, is fundamental to success in the 21st century (McWilliam & Dawson, 2008; Caughron et al, 2011). It is also trainable and teachable (Ma 2006; Rose & Lin, 1984; Torrance, 1972) particularly idea production (Scott, Leritz, & Mumford 2004); however, its complexity makes research and implementation difficult. It can be measured in terms of a cognitive process, a personal characteristic, a creative product, or a facilitating context (Rhodes, 1961; Zeng et al, 2011), and it

includes seven separate approaches (Hennessey & Amabile, 2010), fourteen theories, and eighty-two processes (Bull et al, 1995). As this complexity makes measurement a challenge (Corazza et al, 2022), most studies focus on divergent thinking and use it interchangeably with creativity (Baer, 1993; Sternberg & Grigorenko, 2001). Therefore, this paper focuses on creativity as divergent thinking.

Divergent thinking is the ability to produce multiple ideas/solutions to a problem, convergent thinking is the ability to select the single best solution, and the creative process is the recursive movement between the two (Eyman et al, 2024; Basadur et al, 1982). The present study measures this process using the most commonly accepted methods (Amabile, 1983; Cortes et al, 2019): as a *process* through observation and as reported by students, as a *product* through game product analysis, and as an *ability* through the most commonly used tests (Cortes et al, 2019): for divergence, an Alternative Uses Task (novel uses for an object); for convergence, a Remote Associates Task (connect 3 words thematically). Game product measurement is complex, as each game has different rules/parameters, therefore, measurements were based upon the most commonly used scoring categories (Guilford, 1967): 1. **fluency**: the ability to produce *multiple* ideas; 2. **flexibility**: the ability to produce *differing* ideas; 3. **originality**: the ability to produce *unique* ideas; 4. **elaboration**: the ability to deepen or *develop* an idea. In creative writing games, this amounts to a quantification of “literal” (significant) narrative turns (Acar & Runco, 2019).

4. The Importance of Measuring Self-Efficacy and Self-Identification

Self-efficacy is a major factor in student engagement, development, and overall success (Hidi et al, 2006; Karwowski & Lebuda, 2017); it also affects effort, how long students will work on something, and anxiety surrounding a subject (Usher & Pajares, 2008). Self-efficacy is particularly at issue when studying creativity, as many people believe that creativity is innate, unteachable, impractical, and impossible to assess (Amabile, 2018; Guilford, 1950; Rhodes, 1961; Treffinger, Isaksen, and Dorval, 2000; Waitman & Plucker, 2009), and the creative impulse is often considered disruptive in the classroom (Beghetto, 2007; Amabile, 2018). Low self-efficacy in creativity was confirmed by the Organization for Economic Co-operation and Development’s (OECD), who found that students believing they can improve their creativity outscore those who don’t, but that this is only one in two students (PISA, 2022). Creative self-efficacy is particularly a challenge in creative writing, as most students do not consider themselves writers in the first place (Waitman, 2009; Runco, 2014). Finally, writing functions as an assessment method across the entire curriculum, a relationship that does not open the free, playful space necessary to develop creativity (Boscolo and Hidi, 2007). This challenging context for self-efficacy in creativity and writing makes it a key factor to investigate and develop.

5. Game-Based Learning

Game-based learning has coined the term “microworld”: “a small, but complete, version of some domain of interest” (Rieber, 1996: 46). Rieber gives the example of a sandbox as a microworld for a child. With a little imagination, the child can build endless worlds to wander, and in terms of learning domains, he or she can experiment with the physics of sandcastle building. There are two important keys to a microworld: 1. “it presents the learner with a simple case of the domain” (46). In other words, while the user can build with increasing complexity, the world contains only the basic building blocks in that field of knowledge. 2. microworlds “match the learner’s cognitive and affective states” (46). Put simply, no directions are needed. We arrive on a Minecraft beach with a hammer, and we simply figure out that the goal is to break and place blocks. While the notion of textual games as open worlds akin to Minecraft has been discussed elsewhere (Jones, 2024), here the notion of microworlds serves to clarify the idea that writing can be materialized in a game-based sandbox so that words, through recombinatory mechanics, serve as domain-specific building blocks for student/player experiment.

6. Relevant Studies

Relevant studies exist, but none has used a data-driven, game-based approach. Preliminary studies on Norwegian creativity (Jones, 2023) and recombinatory game theory (Jones, 2024) laid the foundation for this paper. Littlemore & Law (2006) investigate metaphors in EFL but focus on mastery not generation. Figgins (2007) explores Surrealist games but does not collect data. Bundy (2017) studies creative writing role-playing games, and Lee (2019) studies narrative-based games and engagement in EFL; however, neither examines recombinatory approaches. Frye et al (2015) examines the use of riddles, but in a different domain (science) and focused on information retention. Loffredo & Manuela Perteghella (2014) examine similar notions of textual transformation but without the game-based element. Motivation’s relationship to creativity (Amabile, 2001) sets up the relationship in this study, and the usefulness of random information in convergent processes has been demonstrated (Mastria et al, 2022) but without a game-based approach. Disney (2014) studies the use of

surprising poetic juxtapositions in L2 classrooms; however, his investigation focuses on traditional creative writing processes. McCallum (2012: 74) proposes the concept of L2 “re-creativity” (“manipulation of source material to bring something new into being”), which is very in line with “critical deformation”; however, McCallum also uses a non-game-based approach.

7. The Study

A within-subject research design compared the change in student engagement and creativity as games moved from open (freewriting) to closed (recombinant). The study consisted of a teaching intervention introducing divergent thinking, followed by seven questionnaires administered by the researcher and two Norwegian teachers over 4 weeks to 100 students, ages 16-19 ($n = 1, 49, 44, 6$), from two upper-secondary schools in Norway. The surveys included choice-based and open feedback questionnaires as well as guided gameplay. The data consists of the questionnaires, gameplay results, and teacher/researcher observations. The pre-survey included a divergent thinking test and information on creative self-efficacy, personality, and relationship to creative writing, reading, and games. Post-game questions focused on engagement and divergent awareness.

The games were creative writing games for reading (CWGR) chosen to compare more open (less recombination) to more convergent, recombinatory writing games (RWGs). The goal was to investigate engagement as games became increasingly closed/recombinatory and thus closer to the “critical deformations” that have proven useful as advanced critical reading tools (McGann, 2001). The games were simplified to clearly represent differing levels of recombination. While it was assumed this would reduce engagement when compared to testing fully developed games, this approach allowed the study to more precisely assess a sequential increase in recombination. Secondly, the goal was to investigate whether or not the rule-driven nature of recombinatory games would appeal more to self-identifying non-creatives. This connects to the larger project of proceduralizing/gamifying creativity to engage a larger group of students/users.

8. DROP Exploratory Analysis Framework

To add more analytical capability to the conclusions, the games were analyzed using a simplified version of the DROP framework (Jones, 2024):

- **Divergence (D):** the level of divergent writing (vs. convergent). This was measured using Guilford’s original categories modified to match each game’s particular design parameters.
- **Recombination (R):** to what extent the game uses a recombination of the curricular text.
- **Openness (O):** while this can mean open world (Jones, 2024), here it was simplified and put in contrast to recombinatory, rule-based, and solution-based game mechanics.
- **Play (P):** play refers to any of the following: competition, chance, vertigo, make-believe, role-playing, spontaneous play, rule-based play (Caillois, 1958), ludic activities (Salen & Zimmerman, 2004), performance play (Sutton-Smith, 1998), and narrative play (Aarseth, 2014; Ryan, 2009). Due to the subjectivity of the play experience, the resulting variation in its measurement, and because engagement is a key factor in the definition of play, engagement was used as a baseline from which to measure.

9. The Games in Detail

The games had two stages: a battery of skill-building freewriting exercises and then more developed games that moved toward increasing recombination (see Figure 1). The freewriting versions taught students to track the recursive movement between divergent and convergent thinking so they could more accurately track this in the developed games. After freewriting, each game used an increasing amount of recombination (words from the curricular reading text). This is clearly the case with cut-up story (**cu**), which *only* uses the reading text; however, it is arguable whether three words (**3w**) or metaphor riddle (**mr**) is more combinatory, as they both use 2-3 words from the reading text. The leap from this low level to a game that is completely recombinatory (**cu**) reveals the need for future design and research on a game design that can offer more recombination than **3w** and **mr** but less than **cu**; at the same time, the engagement and effectiveness of **cu** reveal real promise for extreme levels of recombination.

fw	open freewriting	students write without stopping
bfw	blind freewriting	freewrite with eyes closed
sfw	senseless freewriting	freewrite without making sense
wb	word bomb	textual words called out must be incorporated
cp	catch phrase	freewrite until stuck then write “I remember” and continue
sa	silly argument	list most possible arguments for “clowns should rule the world because...”
3w	three random words	choose three random words from text and find most possible connections
mr	metaphor riddle	five-clue, student-designed riddle comparing two textual terms
cu	cut-up story	use any 30 words from story to write a new ending

Developing skills in creativity

Increasing recombination

Figure 1: Games in order of play (skill building → increased recombination)

10. Results

Data and results were extensive. Included here are the most interesting and important results on overall engagement, engagement in creative vs. non-creative self-identifying students, divergence in L1 vs. L2 students, and the overall relationship between divergence (D), recombination (R), openness (O), and play (P).

11. Engagement

While **fw** was by far the most popular in the post-study measure (table 1), student familiarity may have positively affected the score; however, it also had a negative effect, as demonstrated in the qualitative feedback where some students found the familiarity “boring” and that the lack of constraints lead to less creativity and surprise or “shock”, as one student put it.

Table 1: Post-game/post-study engagement percents, rounded up; (n) varied due to absences.

post-game	wb: 62 (81)	cu: 61 (62)	cp: 52 (94)	mr: 51 (67)	3w: 48 (91)	sa: 36 (89)
post-study	fw: 73 (62)	wb: 58 (62)	3w: 58 (62)	bfw: 55 (62)	mr: 55 (62)	cu: 55 (62)

Note that the freewriting variations (**fw**, **bfw**, **sfw**) did not include post-game measures as creative divergence is lessened by assessment (Amabile 1982, 2018), and the study wanted to establish a preliminary exploration of divergence under optimal conditions, as it served not just for data collected but as a teaching intervention.

Despite its top position on the post-study Likert scale, **fw** is a completely open game with no recombination (O: 100/R: 0) and thus not useful as a critical deformation. We might assume this openness means it is high in play (P) and divergence (D), but in practice, it is typically low, a fact confirmed by this study. In freewriting, play and divergence are not structured and thus mirror the previously developed expertise of the student; thus, it is typically low when the sample is untrained in creative writing. While a free, unjudged space is key to divergent creativity, a complete lack of guidance leaves untrained students writing what one called “the same story”. In addition, zero recombination (R) means no relation to the curricular reading text. While this means freewriting is not very useful as a critical deformation, incredibly high engagement makes it a promising mechanic to integrate alongside recombination.

Wb was in the top post-game position on the Likert scale, the second post-study rating after **fw**, and in the “strongly like” category, it scored more than double the next game in the post-game scale. Additionally, when asked post-game if they liked **wb** better than **fw**, 48% agreed and only 16% disagreed (n=81). The qualitative data also revealed that in the two classes where the researcher did not administer the survey, some students felt **wb** contained difficult vocabulary words (qualitative data supported by game product data). This kind of word difficulty lowers divergent “fluency”, as the cognitive load of integration obstructs the flow of writing. Students also pointed out that the words were, in some cases, called too quickly. Both of these results points to a higher score for **wb** with correct administration. This is important as **wb**’s recombination, while low (typically R = 5-7 words), is higher than **fw**. So, while engagement is high for both **fw** and **wb**, **wb** functions better on the recombinatory scale in DROP, making it a promising mechanic for future studies and design.

In addition to the post-game and post-study Likert scale, the post-study questionnaire included a “favorite” game question. This was important in terms of examining what games had the most effect over time.

Table 2: “Favorite” game percents; rounded up at .05; partial results list (n = 62)

favorite	cu: 20.1	fw: 17.7	bfw: 14.5	mr: 14.5	wb: 14.5	3w: 10
least	cu: 29	bfw: 17.7	mr: 11.3	fw: 8.1	3w: 6.5	--

Interestingly, **wb** dropped to fifth place when students assessed favorite game overall (table 2). Note, however, that the four games scoring better than **wb** are both most *and* least favorite (**cu**, **bfw**, **fw**, **mr**). One conclusion is that no single game can speak to all students. This seems to go without saying, but it is interesting to see how radically the data supports a diverse set of games/mechanics. While **wb** does drop to the fifth spot, it is also in the last spot for “least favorite”, signalling a low barrier for initial acceptance. This makes **wb** a very promising set of mechanics for future development particularly in early stages of student use.

Due to observed difficulty in a previous study (Jones, 2023), **cu** was modified in this study to increase engagement: shorter recombination (50 to 30 words), a competitive element (students could not use what others chose), and a performative element of sharing the stories they made (P: performative play). Qualitative data supported performative play as a factor: *“It was kind of boring, but sharing the stories was fun”*. The positive engagement data here is important, as **cu** is the most recombinatory game. Surprisingly, while the sample was overwhelmingly positive about competition in games, here the competitive aspect had a negative effect for some students according to the qualitative feedback.

12. Divergent Awareness

In overall divergent awareness (table 3), **3w** and **cu** are in the top position (39%), though **wb** is virtually identical (38%). It is not surprising that **cu** was rated highly, as every word of the game puts a player through the divergent-to-convergent process: in other words, every word chosen draws the writer away from the narrative (divergence) and then must be integrated back (convergence); however, the words are chosen by the student, and thus there is the potential to choose convergent terms. Data results were mixed on this with a significant number of students creating radically divergent texts, far more divergent than **wb**. **3w** included both a clearly divergent and a clearly convergent level, which highlighted the two parts of the process: this may account for its high rating in divergent awareness. More research is needed to test this hypothesis.

Table 3: Top post-game divergent awareness percents; rounded up

Post-game div/conv	3w : 39/n=91	cu : 39/n=62	wb : 38/n=81	mr : 25/n=67
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While we might assume that an emphasis on divergence is the key to increased creativity, the results from **wb** showed the key role of convergence. In **wb**, the word “bombed” into the free space of a **fw** acts first as a divergent force (the player’s mind must race to a very random word), and then a convergent force (the player must try to incorporate the word into their narrative). The qualitative data showed that for some students, it was the convergent impulse/movement that most developed their creativity: *“I wanted the text to make sense even though it was really hard. I got really creative when trying to do this”*. Interestingly, while this particular student did not identify as creative, according to the pre-game divergence test, the student was in the 63rd percentile of creativity according to the initial creativity test. At the same time, the **wb** game product reveals this student in the lowest scoring group in terms of actual divergence or significant (“literal”) narrative turns: significant turns are ones that take the narrative in a new direction rather than simply being integrated into the same convergent narrative (Acar & Runco, 2019). This means that while the convergent movement made the student *aware* of the creative process, it did not actually *increase* creativity within the timeframe of the study; however, considering the positive relationship of creative awareness and self-efficacy to the development of creativity, it can be assumed that a game producing an awareness of success in creativity will improve the skill itself over time. Qualitative results speak to this, one student pointing out that the internal progression of **wb** increased divergent skills: *“Each time a word got dropped in, it got easier to think divergent.”*

13. “Creative” vs. “Non-Creative”

The pre-test questionnaire asked students to self-identify as creative/non-creative. A second question asked them to report liking/not liking creative writing. 22 marked non-creative and 29 marked disliking creative writing. Interestingly, the same group of female students marked both. The 7 new students (an increase of nearly one third) who marked themselves as creative but not liking creative writing were all male. This result may point to males associating creativity with non-writing activities more than females. More research is needed to confirm this. This is important as it can develop our understanding of the relationship between general notions of

creativity and creativity as it pertains specifically to reading and writing. If we can confirm that other types of creativity are more accepted by certain student groups, integrating these kinds of creativity into textual creativity can serve as an evidence-based method for increasing engagement.

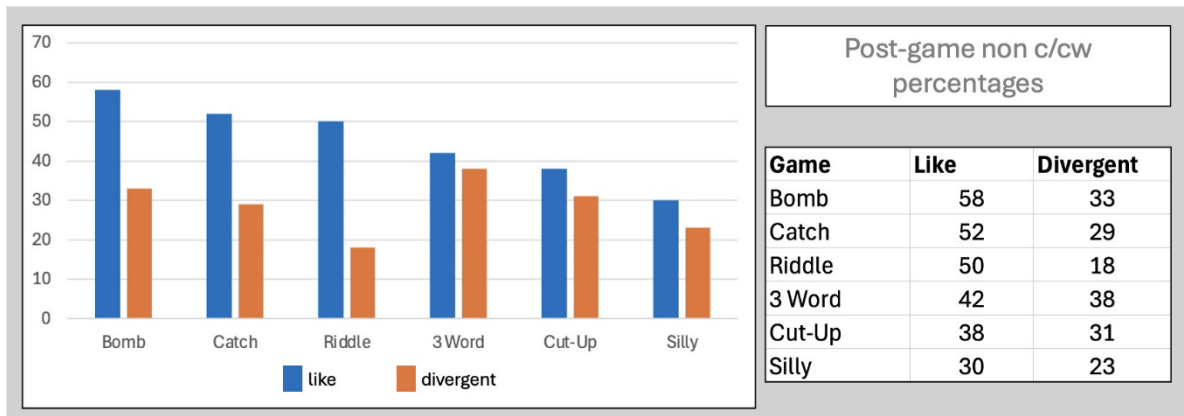


Figure 2: Top post-game percentages (Likert/divergent awareness) for non c/cw students, rounded up

The study revealed that not only was **wb** the most liked game, it was also the most liked by the group identifying as non-creative/disliking creative writing (non c/cw) (figure 2). In the measure of divergent awareness, though **3w** scored better (38%), **wb** was second (33%). This makes a convincing argument that **wb** is the most effective overall, if we take into account the goals of both engagement and awareness of creative skill usage. It is important to notice that while **3w** was in fourth place in terms of the Likert scale, it was rated highest in terms of making non c/cw students aware of divergent-convergent processes. This is significant as students had very brief exposure to creativity concepts. Continued awareness over time would presumably positively affect both divergent skills and engagement.

The qualitative data gives a more thorough picture of the relationship between divergent awareness and engagement. Students actually pointed to their awareness of divergent-convergent processes itself as a key engager for **wb**, one student pointing out that it was precisely the movement away from logical thinking that served as an effective engager: “It’s fun and you don’t have to think too much. Just do it.” This implies a possible value in developing this meta-awareness as a game mechanic. For non c/cw students, qualitative feedback on **wb** engagement added factors including “humor”, “writing fast”, “more concrete”, “gives a direction to write in” (convergent), and “random stuff happens” (divergent). The first three factors fall outside divergent awareness and could be considered on their own in future studies. One student who reported not liking the game pointed out that it “makes it easier to write without stopping”. This implies that the game can be productive even for students who do not find it enjoyable.

14. Divergence and Play on the Openness-Recombination Spectrum

The researcher expected completely recombinatory games to have lower engagement than more open games. The case turned out to be more complicated. In fact, there was a high level of divergence, play, and engagement when recombination was *most* pronounced (figure 3). This is surprising and promising for future game design that incorporates high levels of recombination; at the same time, it is important to note that *disengagement* was also the highest in the most recombinatory game. This implies that the entry threshold is higher and means either designing with this in mind or leveling games so that full recombination comes when the player has already developed skills and confidence. There is also an issue of L1 and L2 to consider (see below).

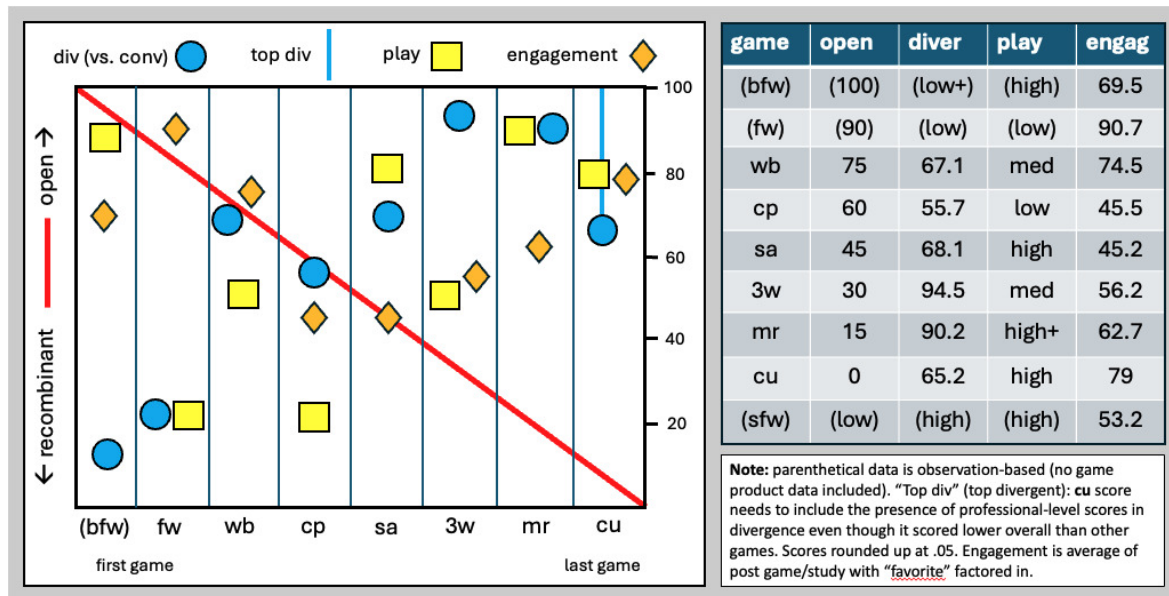


Figure 3: Divergence (d), recombination (r), openness (o), play (p), and overall engagement percents

15. L1 vs. L2 Students

Probably the most unexpected result was the difference in actual game-product divergence for L1 and L2 (figure 4). While divergence measures are complex, in every game, scores for significant narrative turns were higher for L2. Less surprising, and perhaps a partial explanation for the high disengagement numbers for cu overall, students responding in L1 overwhelmingly picked cu as their favorite game, whereas L2 students were far more likely to dislike it or choose it as their least favorite. This points to high disengagement resulting from the difficulty of high recombination in L2. Further research is needed to verify this.

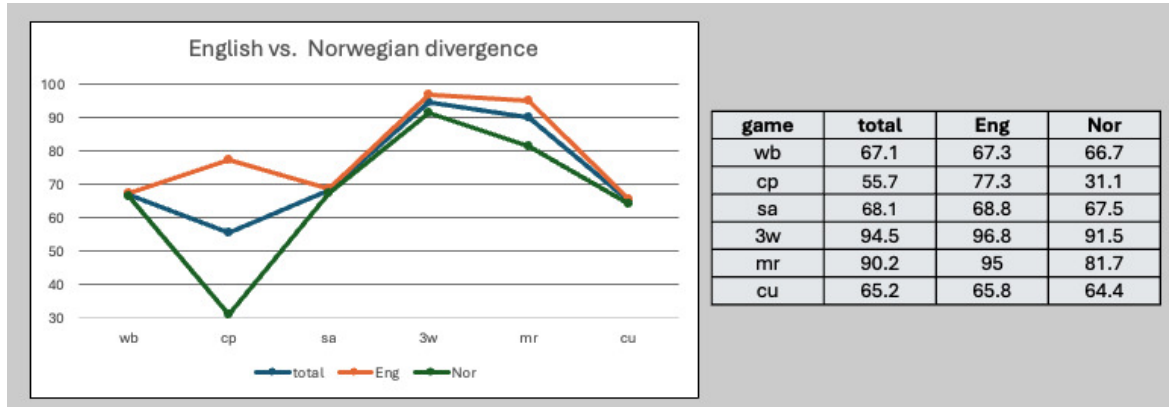


Figure 4: Divergence in game products for students answering in Norwegian vs. English

16. Conclusion

This paper has found that open freewriting is engaging but not effective creativity training, that recombination can engage both self-identifying creatives and non-creatives, that the most engaging games are also the most challenging for an equivalent group of students (L1 vs. L2 playing a factor), that non-creative students did *not* find the more recombinatory game more accessible (in fact students saw it as *more* creative overall), and finally, that across the board students allowed to respond in their native language scored *lower* on divergence. Interestingly, **cu** produced the highest level of creative writing. For example, one student wrote: "When the coyotes slept, they could see stars, liquor and smoke". This is exceptional work by professional creative standards in terms of its surprising, divergent juxtapositions and the way in which it combines thematic elements from the curricular text. Overall, the mechanics in **cu** and **wb** stand out as most effective in the most categories analyzed here.

Ethics declaration: No personal data was collected except a coded list of first names which was de-coded (destroyed) immediately after the study took place. The process was cleared with the Norwegian Ministry of Education and Research (Sikt).

AI declaration: No AI used for this paper.

Conflict Of interest: No conflicts of interest reported.

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