Does Collaboration Improve or Impair the Performance in a Divergent Problem-Solving Task?

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1 Introduction

Joint action research shows that individuals can outperform pairs in problem solving tasks based on convergent thinking (Pavliuchik and Knoblich, 2026). When required to find one specific solution to a problem, pairs are sometimes hindered by fixation: Both partners get stuck on an idea or a realm of ideas brought up by one individual. If that idea is not related to the correct solution, the fixation keeps them from progressing towards it. Additionally, it was shown that also in brainstorming fixation can arise from exchanging ideas (Kohn and Smith, 2011). Even in tasks where pairs do not need to converge in but can broaden their idea exploration, so called divergent thinking tasks, they produce similar outcomes.

It is however not clear if this phenomenon is also present in problem solving tasks based on divergent thinking. When pairs can submit multiple answers but are still constrained by the problem definition, how does the solving performance of pairs compare to those of individuals? Does fixation on certain ideas also occur and influence the performance?

Exploring this research gap will provide further insight into the mechanisms of joint problem solving and the phenomenon of fixation in collaborative contexts. It will clear up whether fixation is specific to the problem type or may be a generally occurring mechanism. Comparing the performance of pairs and individuals will illuminate whether fixation especially impairs the performance of pairs in divergent problem solving.

2 Methods

In an experimental study, pairs and individuals are asked to perform the Alternate Uses Task. Together or by themselves, they generate creative ideas on what 10 objects of daily life could also be used for. Individuals will be measured as nominal pairs, meaning they perform the experiment next to another individual and the results will be evaluated together, but there is no collaboration. The performance of pairs is compared via multiple dimensions, such as quantity and fluency of produced ideas. Additionally, to measure the originality of ideas and the presence of fixation, the submitted solutions within pairs are evaluated on the semantic distance to each other. Methodologically, this is a more precise way to quantify the conceptual (dis-)similarity of the submitted ideas (Beaty et al., 2022) than has been applied in prior studies. Specifically, this study will use a general word2vec model and an oscai model, which is especially suitable to score divergent thinking responses.

3 Results and Discussion

The results will show whether collaborating in this divergent problem-solving task improves or impairs the performance compared to working individually. The findings on the semantic distance of the ideas produced will give insight on whether and how strongly participants restrict their exploration of ideas in collaboration. Thus, it may also allow for an interpretation of the presence and strength of a fixation phenomenon. The findings will therefore further enrich the understanding of mental fixation in joint problem solving.

References

Beaty, R. E., Johnson, D. R., Zeitlen, D. C. and Forthmann, B. (2022). Semantic distance and the alternate uses task: Recommendations for reliable automated assessment of originality. *Creativity Research Journal*, 34(3):245–260.

Kohn, N. W. and Smith, S. M. (2011). Collaborative fixation: Effects of others' ideas on brainstorming. *Applied Cognitive Psychology*, 25(3):359–371.

Pavliuchik, E. and Knoblich, G. (2026). Does collaboration improve or impede finding remote associations? *Cognition*, 271:106484.