Utilising patent data for enhanced creativity and reduced fixation in product design

Wei, Ranzhi a; Gu, Eric Heng a; Yu, Cehao b
a Delft University of Technology, Delft, The Netherlands
b AECOM, London, United Kingdom
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1 Background
During the early stages of product design, designers often encounter knowledge-based and conceptual fixation, which can limit their capacity to address design problems and solutions innovatively. To surmount this challenge, designers typically rely on visual graphics for inspiration rather than textual forms. A patent data tool is intended to provide designers with graphical presentations of keywords extracted from millions of patent documents, potentially reducing fixation. However, limited studies have been conducted on the effectiveness of this tool and its influence on design creativity and fixation. This study aims to explore how designers interact with the patent data tool and whether it contributes to creativity and alleviation of fixation during the ideation process.

2 Methods
We conducted a within-subject user study involving two design tasks, namely teeth cleaning product design and rain and windproof product design, and two scenarios, i.e., with and without patent tool, resulting in four conditions. Six participants were given 20 minutes to brainstorm ideas for each condition. We used participants' self-reporting and third-party observation of the entire process to subjectively quantify creativity and fixation status. Additionally, the calculation of fixation rate per condition assessed the tool's effect on quantitatively reducing fixation. When calculating fixation per condition per participant, ideas were grouped based on three aspects, namely product functions, product behaviour and product structures variations. We calculated the fixation rate by the ratio between numbers of repetitive ideas and total ideas generated.

3 Results
Participants reported that the tool displayed "unexpected", "out of the box", and "diverse" keywords. By completing a questionnaire involving a 1-7 semantic scale, all participants agreed on its added value for divergent ideation, and five out of six concurred with the tool's positive impact on creativity.
Four individuals recognised the tool’s potential for sparking new design opportunities. In terms of design fixation, four participants noted that the tool helped reduce knowledge-based fixation and a tendency to choose low-risk solutions. When comparing word cloud visualisations of their query efforts based on the keywords searched per condition, the tool decreased the number of searches for information or inspiration. It encouraged them to reconsider different problems by chance. Interestingly, despite the positive feedback from participants, 25% of individuals demonstrated better performance in the patent data condition, with an 11% reduction in fixation rate.

4 Conclusions
The tool encouraged participants to ideate using abstract textual concepts from existing patents. By comparing conceptual fixation in the baseline condition, the tool prevented participants from imitating existing solution appearances by not revealing product visuals. Researchers may find it of interest to explore the impact of using patent data as design inspiration. This study illustrates that design participants favoured using patent data as divergent inspiration and acknowledged its value in reducing various types of fixations. The findings also offer valuable insights for both tool developers and designers. To further improve the study, future research should consider increasing the number of users and thoroughly examining the ideation process of individuals who excelled with the tool.

References


