

## Inspire and Create: Unveiling the Potential of VisDice in Visualization Design

Owen, Aron; Roberts, Jonathan C.

### Poster publications at IEEE VIS 2023: Visualization & Visual Analytics

Published: 22/10/2023

Peer reviewed version

[Cyswllt i'r cyhoeddiad / Link to publication](#)

*Dyfyniad o'r fersiwn a gyhoeddwyd / Citation for published version (APA):*

Owen, A., & Roberts, J. C. (2023). Inspire and Create: Unveiling the Potential of VisDice in Visualization Design. In N. Cao, B. Kozlikova, J. Xia, & W. Willett (Eds.), *Poster publications at IEEE VIS 2023: Visualization & Visual Analytics: IEEE VIS 2023 Posters* IEEE Computer Society Press.

#### **Hawliau Cyffredinol / General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal ?

#### **Take down policy**

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# Inspire and Create: Unveiling the Potential of VisDice in Visualization Design

Aron E. Owen\*  
Bangor University

Jonathan C. Roberts†  
Bangor University

## ABSTRACT

Visualization is a powerful tool for presenting complex data, but challenges of inspiration and ideation can hinder the creative process of designing compelling visualizations. We developed VisDice, a novel tool for stimulating creative thought and inspiring alternative design ideas to address this. By introducing randomness, VisDice prompts designers to explore uncharted territories and consider unconventional visualization solutions. This paper investigates VisDice's role in enhancing the creative process, drawing from psychological theories of inspiration. We explore how VisDice stimulates innovative thinking, leading to visually compelling designs. Our findings contribute to understanding the psychology behind creativity in visualization, offering practical insights for designers seeking to enhance their practices. Embracing the possibilities offered by VisDice unlocks new avenues for designing impactful visualizations.

**Index Terms:** Human-centered computing—Visualization—Visualization techniques—; Human-centered computing—Visualization—Visualization design and evaluation methods

## 1 INTRODUCTION

Visualization is an essential discipline that relies on inspiration to create visually compelling representations of data. VisDice, a unique tool, has been developed to facilitate creative thought within the design process, in the context of visualization, exploring its impact and underlying psychological mechanisms. This unique tool introduces randomness, inspiring designers with unexpected prompts for innovative solutions. The paper investigates how VisDice stimulates inspiration, fosters creativity, and enhances visualization outcomes. By understanding its influence on the creative process and examining empirical data, valuable insights are gained into VisDice's potential as a catalyst for inspiration in visualization. This research sheds light on the tool's role in guiding designers, unlocking new avenues of creativity, and potentially creating visually compelling representations of data.

## 2 RELATED WORK

Ideation is 'idea generation'. It involves a creative process that places emphasis on generating a multitude of alternative ideas and versions, each of which holds equal validity and effectiveness in terms of communication. By exploring various possibilities and considering diverse perspectives, this approach aims to foster innovation and enhance the quality of visual communication. When asked how he was inspired, the Nobel prize-winning chemist Linus Pauling said, "The best way to have a good idea is to have lots of ideas" [2]. However, the effectiveness of the ideation process is contingent upon the presence of a clear understanding and comprehension of the challenge or problem at hand. A crucial aspect of successful ideation is to gain a comprehensive understanding of the challenge, enabling

designers to channel their creative efforts towards generating relevant and impactful solutions [3]. To meet the client's requirements, visualization designers and developers should comprehensively understand their needs and become well-informed [5], understand the data [8], where the product/project fits in with the world [6], and the principles of design [12].

Ideas impinge on consciousness from the unconscious, the preconscious, or the perceptual field [11]. Certain processes are within our conscious awareness, while other thoughts may arise subconsciously. Ultimately, we take action based on these thoughts. Creativity involves employing the power of imagination to generate innovative concepts or construct something original. Creativity is a dynamic process driven by a specific objective: individuals channel their creative abilities into domains such as mathematics, engineering, writing, or music [10]. There needs to be more documentation on creativity in visualization, and designers often become fixated on particular solutions before exploring alternative approaches [7]. Hence, structured design methodologies like the Five Design Sheet methodology [9] exist. Subjecting many ideas to objective evaluation, regardless of correctness, can lead to more rigorous visualizations [4]. VisDice is a tool that harnesses the individual's creativity, enabling them to unlock a wealth of untapped ideas that may have otherwise gone unnoticed or overlooked. VisDice prompts individuals to explore alternative perspectives, challenge their existing assumptions, and venture into uncharted territories of design thinking. Through the rolling of the dice and the presentation of random symbols as prompts, VisDice injects an element of surprise and unpredictability into the ideation process. This approach encourages designers to break free from their conventional thinking patterns and consider unconventional solutions, ultimately fostering a more diverse and innovative range of ideas. By embracing the power of VisDice, designers can tap into their own creative potential and discover novel design solutions that propel their projects forward [1].

## 3 METHODOLOGY

This study adopts a mixed-methods approach to examine the effectiveness of VisDice in enhancing the creative process of visualization. The methodology involves qualitative data collection through interviews and observations, analyzing the experiences and perceptions of designers who have used VisDice. Quantitative data is collected through surveys or experiments to measure the impact of VisDice on creativity and visualization outcomes. Additionally, a literature review explores psychological theories of inspiration and creativity in visualization design. Ethical considerations are incorporated to ensure participant consent and data confidentiality. This methodology provides a comprehensive understanding of VisDice's role in fostering creativity and inspiration in visualization design.

As for the technical details, VisDice is designed as a set of six dice, each representing different aspects of the visualization design process. Dice 1 (Blue) focuses on Design Inspiration, presenting symbols related to Space, Nature, Animals, Ocean, History, and Modern concepts. Dice 2, denoted as Environment (Green), covers Virtual Reality (VR), Reports, Mobile, Desktop, Tablet, and Augmented Reality (AR) elements. Dice 3 (Red), known as Proxemics, captures Intimate, Personal, Social, Public, Assertive, and Passive aspects of design. Dice 4 (Purple), identified as Type of Visual-

\*e-mail: aron.e.owen@bangor.ac.uk

†e-mail: j.c.roberts@bangor.ac.uk

ization, encompasses Circle Plot, Linear Plot, Categories, Pictures, Process Diagram, and Plots. Dice 5 (Brown) represents the Art Style dimension, featuring Realism, Expressionism, Pointillism, Surrealism, Action, and Cubism styles. Lastly, Dice 6 (Yellow), Interaction, includes Computer, Gestures, Physical, None, Touch, and Motion.



Figure 1: Part A compares visualizations created without (left) and with (right) VisDice's influence, based on pitch data of the top 100 songs on Spotify. Part B displays the six manufactured dice, designed to spark innovative ideas and expand visualization designers' creative horizons.

#### 4 EVALUATION

The evaluation of VisDice encompasses a comprehensive assessment of its influence on the creative process of visualization design, shedding light on its efficacy and impact. A mixed-methods evaluation approach is employed to gather a holistic understanding, encompassing both qualitative and quantitative data collection methods. Qualitatively, interviews and observations are conducted with designers who have utilized VisDice, capturing their firsthand experiences, valuable insights, and any challenges encountered during the creative journey. Thematic analysis is employed to identify recurring patterns and themes, unravelling the effectiveness of VisDice in stimulating creative thinking and fostering the generation of alternative design ideas. Surveys or experiments are conducted to quantitatively measure the impact of VisDice on creativity, visualization outcomes, and user satisfaction. Rigorous statistical analysis is then applied to the collected quantitative data, enabling the identification of significant findings and establishing correlations. By employing this comprehensive evaluation approach, a rich understanding of VisDice's effectiveness as a tool for enhancing the creative process and generating innovative visualization designs is attained, paving the way for further refinement and optimization of this unique tool.

#### 5 DISCUSSION

The findings from the evaluation of VisDice highlight its potential as an effective tool for enhancing the creative process in visualization design. The qualitative data gathered through observations reveal that designers perceive VisDice as a valuable source of inspiration and a catalyst for generating alternative design ideas. Designers reported that the random prompts provided by VisDice stimulated their creative thinking and encouraged them to explore new design territories that they may not have otherwise considered. This aspect of VisDice aligns with its potential as an educational tool, as it helps designers expand their creative horizons and overcome mental blockages.

Additionally, the discussion explores the potential educational benefits of using VisDice in teaching and learning visualization design. By incorporating VisDice into design education curricula, instructors can introduce students to new design approaches, stimulate

their creativity, and encourage them to think beyond conventional design solutions. The interactive and engaging nature of VisDice makes it an appealing tool for both novice and experienced designers, facilitating the development of essential design skills and promoting a growth mindset. Overall VisDice seems to have a positive impact on the creative process of visualization design, reinforcing its potential as a valuable educational tool.

#### 6 CONCLUSION AND FUTURE WORK

In conclusion, the findings of this study underscore the potential effectiveness of VisDice as an educational tool in enhancing creativity and inspiration in visualization design. The results demonstrate its ability to stimulate creative thinking, overcome mental blockages, and generate alternative design ideas, providing valuable support for its integration into design education. By incorporating VisDice into the curriculum, educators can cultivate a growth mindset and foster innovative thinking among students. While the results are promising, there is still room for further research and refinement of VisDice. Future studies can explore additional design prompts, themes, and integration with other digital tools to enhance its versatility and provide a more comprehensive design experience. By expanding the scope and functionality of VisDice, its potential as an educational resource can be further maximized. Overall, this research contributes to a deeper understanding of psychology inspiration in visualization design and highlights the significant potential of VisDice as a tool to support the creative process. The insights gained have practical implications for designers and educators alike, offering valuable guidance on how to enhance creativity and overcome design challenges.

#### REFERENCES

- [1] H. K. Bako, X. Liu, L. Battle, and Z. Liu. Understanding how designers find and use data visualization examples. *IEEE Transactions on Visualization and Computer Graphics*, 29(1):1048–1058, 2023. doi: 10.1109/TVCG.2022.3209490
- [2] F. Crick. The impact of Linus Pauling on molecular biology. In *The Pauling Symposium: Special Collections, The Valley Library, Oregon State University, OR*, 1996.
- [3] Interaction Design Foundation. An introduction to design thinking: Process guide. Technical report, Hasso Plattner Institute of Design, 2010.
- [4] X. Lan, Y. Shi, Y. Zhang, and N. Cao. Smile or scowl? looking at infographic design through the affective lens. *IEEE Transactions on Visualization and Computer Graphics*, 27(6):2796–2807, 2021. doi: 10.1109/TVCG.2021.3074582
- [5] M. Meyer and J. Dykes. Criteria for rigor in visualization design study. *IEEE Transactions on Visualization and Computer Graphics*, 26(1):87–97, 2020. doi: 10.1109/TVCG.2019.2934539
- [6] T. Munzner. A nested process model for visualization design and validation. *IEEE Transactions on Visualization and Computer Graphics*, 15:921–928, Nov 2009. doi: 10.1109/TVCG.2009.111
- [7] P. Parsons, P. Shukla, and C. Park. Fixation and creativity in data visualization design: Experiences and perspectives of practitioners. In *2021 IEEE Visualization Conference (VIS)*, pp. 76–80, 2021. doi: 10.1109/VIS49827.2021.9623297
- [8] A. J. Pretorius and J. J. V. Wijk. What does the user want to see? what do the data want to be? *Information Visualization*, 8(3):153–166, 2009. doi: 10.1057/ivs.2009.13
- [9] J. C. Roberts, C. J. Headleand, and P. D. Ritsos. *Five Design-Sheets – Creative design and sketching in Computing and Visualization*. Springer, 2017. doi: 10.1007/978-3-319-55627-7
- [10] K. Robinson. *Out of Our Minds: Learning to be Creative*. Capstone, 2001.
- [11] T. M. Thrash and A. J. Elliot. Inspiration as a psychological construct. *Journal of personality and social psychology*, 84(4):871, 2003. doi: 10.1037/0022-3514.84.4.871
- [12] J. van Wijk. The value of visualization. In *VIS 05. IEEE Visualization, 2005.*, pp. 79–86, 2005. doi: 10.1109/VISUAL.2005.1532781