Geovisualization of Dream Spaces

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Abstract

The study of dreams has historically been the domain, academically, of psychoanalysis and cognitive science, with little to no attention paid to how space operates within dreams. In this paper, I propose to investigate that gap, focusing on how those spaces might be visualized. The visualization of hyperspatial or non-Euclidean spaces in dreams could potentially lead to the development of novel visualization techniques for datasets that may be difficult or impossible to visualize using Cartesian systems.

1998 ACM Subject Classification Applied computing → Cartography

Keywords and phrases geovisualization, dreams, cartography, spatial cognition, hyperspace

Digital Object Identifier 10.4230/LIPIcs.GVIZ.2018.3

1 Introduction

Dreaming is a pervasive neurological phenomenon occurring throughout time and across cultures, with descriptions and representations appearing in media from myths and literature, to film and stage productions, to video games and other visual artworks. Even though a portion of the world's population is regularly unable to recall their dreams in detail, or even recall them at all, there nevertheless appears to be visual grammar which representations of dreams operate within. This is evidenced by recurring tropes in the aforementioned media– surreal, spatially unstable environments, otherworldly physics, scalar incongruencies and so on. But even though research has been produced examining the elements of dream content[19, 21, 11], there has only been one published attempt at the geovisualization of these environments[13] such as imaginative cartographies[14, 4] or cinematic cartographies[5, 20], research on dream cartography specifically has been almost nonexistent.

The research proposed here aims to characterize the spatial phenomena found in dreams, and subsequently develop a set of "spatial variables" based on those characteristics, ultimately investigating their efficacy when used for the visualization of a broader range of datasets, especially those that deal with uncertainty, probability or otherwise vague or imprecise information. The fact that dream environments are often vague or incongruous themselves[21] suggests that they may be able to communicate uncertainty with more nuance relative to conventional visualization techniques. Iosifescu Enescu et al.[13] have already generated promising proof-of-concept visualizations of incongruous dream environments, and I intend to extend their line of inquiry to include datasets beyond dreams themselves. Thus, I ask: how can the visualization of dream spaces help advance geovisualization practice? What lessons can we learn from the visualization of surreal spatial (albeit not geographic) data that are nevertheless lawful[10]?

Dreams have enormous affective power [15]; they have been regarded as communications from higher powers and/or deceased loved ones [24, 12]. And while attempts have been made to decipher dreams as psychoanalytic tools, perhaps most famously by the likes

of Sigmund Freud and Carl Jung, contemporary research tends to focus on the insights that dreams hold regarding memory, stress, trauma and other neuropsychological topics. Departing from this type of research, I propose to leverage the visuo-spatial characteristics of dreams for the purposes of geovisualization. This research could generate insights for a broad range of disciplines, including GIScience, cartography, spatial cognition, psychology, neurology, and visual data analytics. At the same time, the possibility for non-academics to use these techniques to communicate spatial information could also prove to be of great importance. For example: a two-dimensional map with arrows may be able to communicate the spatial information about a refugee's arduous journey, but not its emotional weight. And a documentary about the journey may communicate emotion well, but not space. Instead, by using the affective power of dream- or even nightmare-like environments, one could communicate both spatial and emotional information about the journey without sacrificing the fidelity of either one.

Creating visualizations of dreams could be accomplished by way of identifying and developing "dream variables," similar to visual variables in cartography and data visualization[2]. These variables could include vastness, mutability, recursion, ambiguity, transposition, colocation and so on. Additionally, they could include the experiences of the dreamer themselves, such as immobility, forced mobility, changing/changed perspective, various temporal abnormalities and so on. These sorts of phenomena are typically discussed in oneirology (dream studies) using a qualitative scale of "bizarreness" [6, 22]. For example, Revonsuo and Salmivalli [21] classified elements of dreams (places, people, events, actions, etc.) according to four categories of "bizarreness:" non-bizarre, incongruous (distorted, exotic or impossible elements), vague, and discontinuous (i.e. unstable or fluctuant). However, a visual description of the elements is only found in the dream narrative itself. In other words, this system of classification offers an epistemological starting point for examining dream-specific spatial phenomena, but is missing information about their visual presentation. Classifying those variables will result in being able to assemble a 'dream-making toolset,' with which one might be able to model dreams with reasonable faithfulness.

2 Potential Methods

The success of this research rests in large part on the quality of data about dreams that is gathered. There are two avenues for going about this, although they are likely best combined.

(1) *Analyzing the representation of dreams in media.* There is a well-established precedent for this sort of research [17, 16, 3], although again, it was not produced with the intention of eventual visualization. The advantages to analyzing extant dream representations in media is that there is a large corpus to draw from, they are varied in their subject matter and their collection requires only searches through databases. Downsides include the fact that there is no way to know how much these representations resemble actual dreams, or if they are merely the wakeful imaginings of authors. Indeed, all dreams besides one's own are representations in some form. However, this research aims to analyze the representations of actual dreams rather than the tropes used to visualize dreams in media. That being said, there is likely a certain amount of overlap between dream tropes in media and elements of actual dreams, so cross-analyzing media representations with dream reports could prove to be illuminating.

(2) *Analyzing dream reports.* These nearly always take the form of a narrative description of the events that occurred in one's dream, and can be vary in length and detail. There are several ways of gathering dream reports. A commonly-used method is a dream diary [23] in which study participants keep form of journal that they record dreams in upon waking. This

is a flexible method but lacks control. Laboratory interviews [7] are more commonly used in neuropsychological studies, as they entail having study participants sleep in a lab and are typically awakened several times throughout the night and asked (over an intercom) to recount any dreams that they may have been experiencing. This allows for a substantial amount of control over the type of information that can be asked of the participant, but requires the use of a sleep lab and staff. A related method is the use of archived dream reports, such as those compiled by researchers on dreambank.net [9]. This provides an vast selection of reports from hundreds of different people to analyze, however because they are gathered from a variety of sources, finding reports that elaborate on particular details may be difficult or impossible.

After gathering a dataset, analysis to identify common visuo-spatial elements would take place in line with the classification methods outlined above. Depending on the method by which dream records are gathered, participants, if available, may be asked to create maps of their own dreams in order to generate further insight into how bizarre dream elements may be visualized. There exists a well-established precedent of using mental or cognitive maps as a method [1, 18, 8], although few or none have attempted to map a study participant's dreams. Two more options exist after identification and classification of common dream elements. The first option is to create visualizations of a study participant's dream record, then ask them to evaluate the fidelity of the visualization. The second option is to ask the participant to create their own map using the classified dream elements, then ask them about its fidelity. The possibility of creating a lightweight "dream editing" application might be considered for this step. Finally, the most successful dream elements from previous evaluations will be applied to visualizations of datasets that are not dreams. Of particular interest are datasets that are vague, uncertain, subjective, or unstable.

3 Conclusion and Further Research

As discussed earlier, the visualization of dreams could have potential implications for a wide range of fields, such as psychotherapy, visual data analytics and GIScience. Visualizing information in environments that do not conform to Euclidean or Cartesian space may open up avenues of possibilities for exploratory data analysis, science communication, psychological/therapeutic research as well as other areas, especially using virtual, augmented and mixed reality technologies.

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