

Paris Lodron University Salzburg

EyeTracking Study

Geovisualization & Advanced Cartography

Nicole Salazar

s1109456

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Objectives of the study

This study aimed to evaluate the effectiveness of the presented cartographic piece and determine whether its intended message was successfully conveyed and understood by the audience. The map illustrates the decline of Arctic sea ice from 1979 to 2021, using a color gradient from light tones to deep reds. The darker hues represent areas of maximum impact—regions that are now rarely covered by ice.

To achieve this, the study employed a structured step-by-step methodology designed to capture audience comprehension and their interpretation of the map.



Figure 1. Test Flow.

Step 1: Initial Observation

The first phase involved presenting participants with an image that lacked essential cartographic elements such as a title, legend, and labels. Instead, participants were given explicit instructions to simply observe the content. This approach sought to identify their natural observation patterns and assess whether they recognized the image as a map. Participants were then asked to justify their interpretations, providing insights into how they processed the information in the absence of traditional cartographic cues.

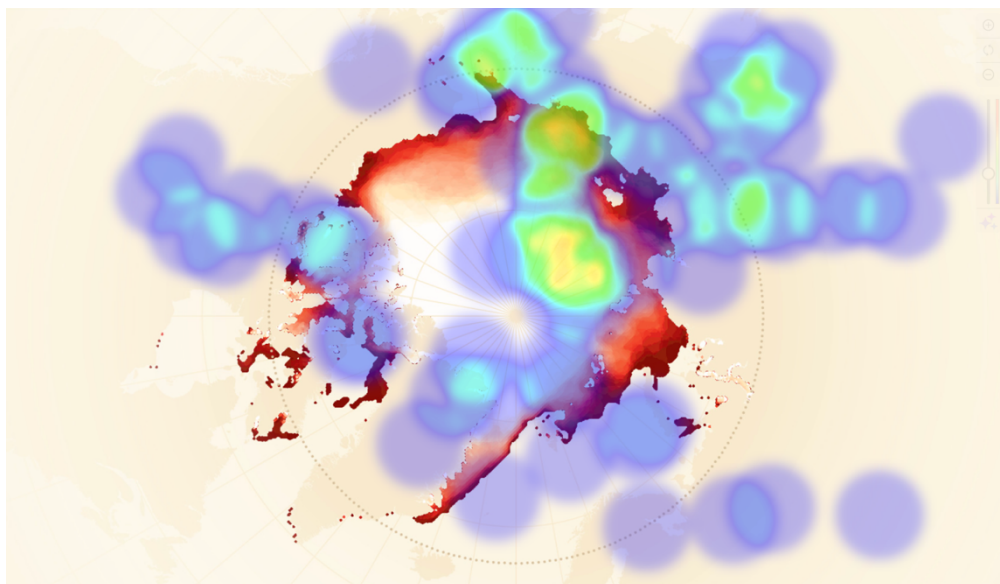


Figure 2. Heat Map for Step 1.

The observation patterns of the image in the absence of cartographic elements appeared to be non-sequential and largely random. The audience seemed to focus predominantly on prominent and straightforward visual features such as distinct shapes and striking colors, rather than interpreting the image systematically. This suggests that without guiding elements like titles, legends, or labels, attention is drawn to the most visually salient aspects of the map rather than its overall structure or message.

Do you consider this a map?

Total participants: 5

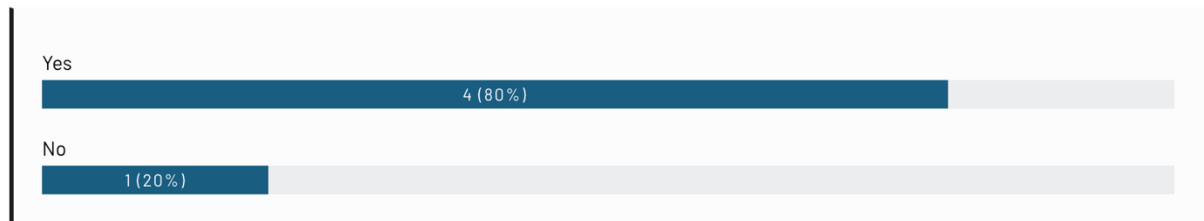


Figure 3. Responses to Question 1 – Participant interpretations of the image.

Although the image lacked the essential criteria required to be considered a map, 80% of participants still associated the geographic elements displayed with a map. Interestingly, one participant successfully identified the absence of critical cartographic components and concluded that the image could not be classified as a map. This highlights a general tendency among the audience to rely on familiar geographic patterns when interpreting visual data, even in the absence of standard map conventions.

Why?

Total participants: 5

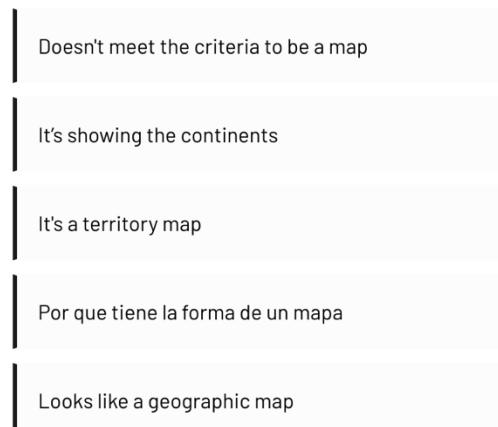


Figure 4. Justification of the Audience for the Previous Response.

Step 2: Enhanced Map with Complete Elements

In the second phase, participants were shown a complete map that incorporated all the essential cartographic features missing from the first image. Similar to the initial step, they were asked to observe and identify areas consistently covered by ice. This was followed by questions regarding the color scheme and its representation of the phenomenon. Additionally, participants were prompted to note the name of the study area and comment on whether the map's title effectively captured their attention.

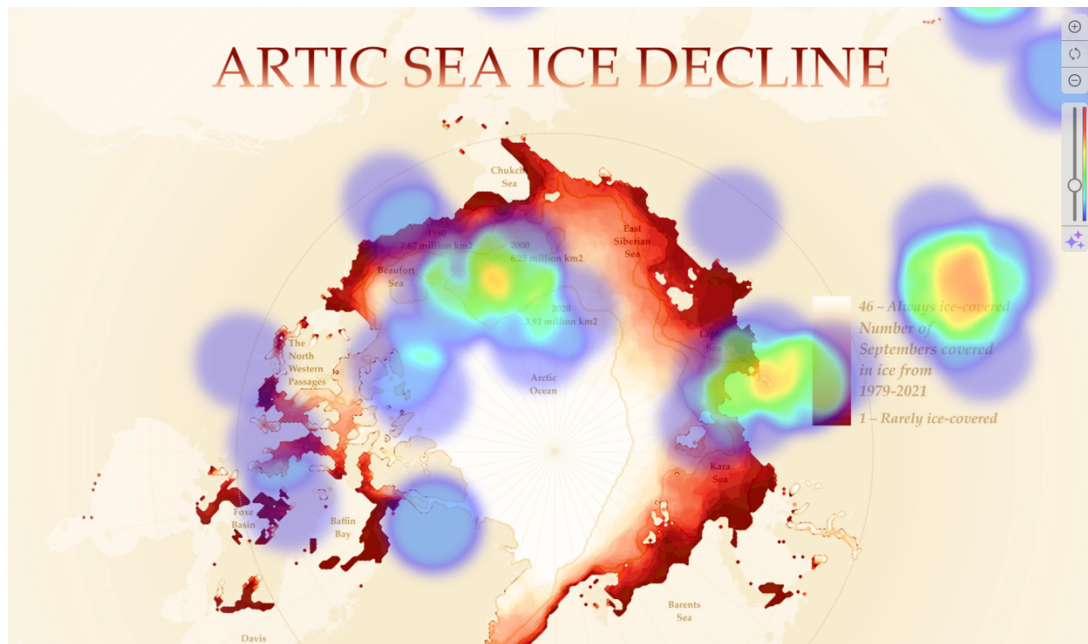


Figure 5. Heat Map for step 2.

The results from Step 2 reveal a clearer and more structured observation pattern, attributed to the inclusion of cartographic elements. Participants appeared to have a visual guide that directed their attention, allowing them to engage more effectively with the details and information presented on the map. This suggests that elements such as titles, legends, and labels significantly enhance the audience's ability to interpret and focus on key aspects of the visual data.

What color symbolizes the areas still covered by ice?

Total participants: 5

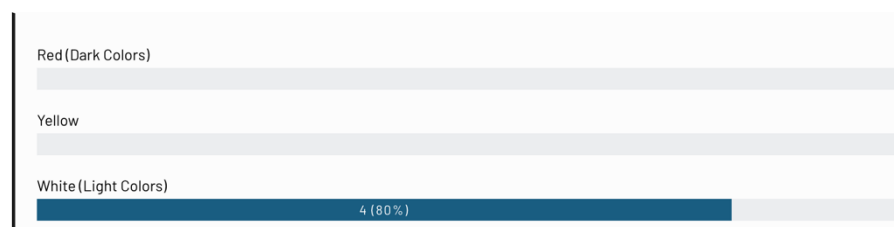


Figure 6. Responses to Question 3 – Color representation of areas still covered by ice.

Participants were able to respond confidently since all the attributes were now integrated into the map's narrative. These elements helped communicate the message more effectively and were reflected in the participants' responses. Notably, all participants answered the question correctly.

It is interesting to note that the title of the map did not seem to influence the observation pattern on the map itself. Despite this, participants were still able to identify the study area accurately. This suggests that, even without direct guidance from the title, the map's content and context were sufficient for participants to recognize key geographical features.

What is the study area?

Total participants: 5

The Arctic Sea
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Artic
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Artic Sea

Figure 7. Responses to Question43 – Study Area.

Step 3: Targeted Interaction

In the final step, participants were tasked with a more complex instruction. They were required to observe and click on a specific area of the map, testing their ability to locate and interpret detailed information. This step aimed to assess their navigation skills and determine the effectiveness of the map in guiding users to specific insights.

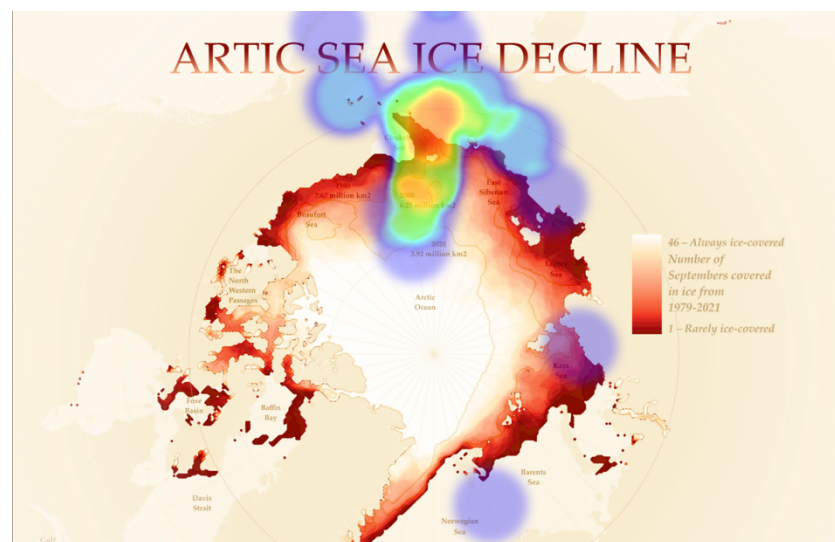


Figure 8. Heat Map for step 2.

This time, participants efficiently identified the boundary lines of the phenomenon, which helped them accurately address their answer. The presence of these cartographic elements provided clear guidance and enable them to focus on the key information needed to respond correctly.

In conclusion, the study effectively analyzed the map's clarity, how well it conveyed its message, and how it engaged the audience. By gradually adding cartographic elements, it was clear that these features helped participants better understand and interact with the map. The results highlight the importance of a well-designed map, showing that when clear visual cues are provided, participants can more easily interpret and respond to the information.