

Geography 970

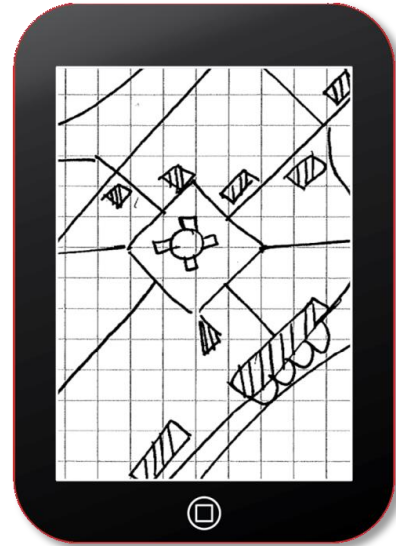
Methodology for an Interactive Cartography

Instructor:

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375 Science Hall
Office Hours: Monday & Wednesday, 4-5pm

Discussion (378 Science Hall):

Wednesday 10:30am-1:00pm



Course Motivation

The advent of a digital, interactive medium has had a profound impact on the ways in which maps—and geographic concepts of space and place—are perceived and understood. For many, interactive maps are inescapable: they are in our cars, on our phones, and in our public spaces. Further, professionals in a variety of fields are embracing interactive maps as the front-end of their information systems. Arguably, the renaissance of “geo” throughout popular culture and across professions is due at least in part to the pervasiveness of interactive maps that are location-aware, mobile compatible, and/or web-based. The outlook for such interactive cartography is great.

Yet, not all interactive maps “work” as they could or should; as the general public becomes more map-savvy through exposure to (and reliance on) these maps, they are becoming increasingly aware of the shortcomings and failures of these designs. Perhaps these maps portray geographic information that are inaccurate or incomplete. Perhaps these maps violate time-tested conventions of cartographic design (but perhaps this is good!?). Perhaps the interfaces to these maps are difficult to learn and use, and include unexpected or unhelpful functionality. Finally, perhaps these interactive maps work quite well, but only for particular user groups and particular tasks, leaving other target users and use case scenarios unsupported. While the outlook for interactive maps is great, ensuring they “work” successfully for the target users remains a challenge for designers and developers.

In this seminar, **we will explore the role of user studies for interactive cartography**, translating methodological influences from geography, information visualization, usability engineering, etc., for the interactive, online, and mobile context. Specifically, the seminar is motivated by a recent research agenda on user studies in interactive cartography and visualization organized through the International Cartographic Association. We will discuss and problematize the recommended opportunities of this agenda, and pursue solutions to methodological gaps in interactive cartography through review of extant literature and execution of original case study user evaluations. #InteractiveMapsRock

Target Audience

The Geography 970 seminar is designed for GIScience graduate students with an interest in cartographic design, geocomputation, and user experience design. Accordingly, this seminar—and really any epistemological discussion—is going to garner widely varying opinions. In particular, this seminar welcomes graduate students:

- seeking careers in industry/government—where user studies are administered in a discount manner to generate rapid feedback during a larger design process—and academia—where faculty and staff need to mentor students across a range of research questions, methods, and epistemological perspectives;
- with a range of interests across areas of GIScience, including within cartography; our focus during discussion will be on interactive rather than print/static design, user needs over technical requirements, and client-side design rather than full-stack solutions, but other aspects of GIScience can be explored in course deliverables;
- who will be using primarily quantitative methods (e.g., controlled experimentation, inferential statistical analysis, algorithmic data mining) or primarily qualitative methods (e.g., ethnography, content analysis, transcription/coding);
- at different points in their degree progress and with different levels of research, writing, and design experience.

Throughout the course, **we will work collectively to ensure these differences are *productive and in no way marginalizing***. The goal of the course is not to arrive at *the* answer to user studies in interactive cartography, as this frankly does not exist. Instead, our goal is to characterize the possibility space for user studies in interactive cartography and identify new challenges and opportunities therein.

Pre-requisites: The seminar assumes familiarity with topics covered in Geography 370, or an equivalent course on reference and thematic mapping, and Geography 575, or an equivalent course on interaction design and web mapping. If you have not yet completed Geography 370 or 575, please review the additional background readings for the course.

Reflexivity Statement: Robert Roth

My research and teaching philosophies are informed by my situated experiences:

- I am white, male, and well-educated. I have color vision deficiency. I am relatively young for my appointment (but am feeling my years more every day).
- I received my graduate training at the two universities (Penn State and Wisconsin) perhaps most closely tied to positivist experimentation on cartographic design rooted in visual perception, cognition, and structural semiotics.
- I identify professionally as an educator, geographer, and cartographer, and epistemologically as a mixed-methods social scientist.
- I am more likely to value a critical intervention if motivated by or substantiated with empirical evidence.
- I increasingly lean qualitative based on my research experience.

- I think we need to consider interaction as a complement to representation in cartographic design.
- I think interactive maps require new methodological approaches, but that these approaches are likely to be applicable to paper/static maps as well.
- I think industry and government sectors should more greatly value user evaluations, and that a user-centered approach saves project resources when executed properly.
- I do not trust conventional wisdom about cartographic design or mapping technology, particularly when originating in industry or government.
- I preferred lecture and lab formats over discussion sections as a student.
- I believe in the power and promise of my students, but I can be extremely difficult to convince.

Evaluation

The seminar is structured around weekly, student-led critical discussion of readings and will require you to individually design and execute one user study including interactive maps. Each evaluated item represents a percentage of the total course weight; final grades are assigned according to your composite percentage.

| | <i>Item</i> | <i>Weight</i> | <i>Description</i> |
|------------------------------|-------------------------------|---------------|--|
| Literature Discussion | Participation | 10% | Weekly reading and discussion of assigned papers; collegial and respectful treatment of others in all seminar interactions |
| | Discussion Lead | 10% | Preparation of one hour discussion on assigned method readings (Weeks 5-10) |
| | Annotated Bibliography | 10% | Selection/summary of relevant papers regarding assigned method (due 2/8) |
| | Method Summary | 20% | Write-up of assigned method prepared for Cart Lab website and blog (draft 3/17; final 4/19) |
| Case Study | Proposal | 10% | Proposed user study, including purpose, significance, literature review, case study, and methods (due 3/8) |
| | Protocol | 10% | Protocol document of user study, organized by research questions (if applicable), participants, materials, and procedure (due 3/29) |
| | Report | 30% | Group term paper write-up of user study targeted towards a cartography journal outlet (due 5/9) |

*UW-Madison encourages persons with disabilities to participate in its programs and activities; contact Rob at the outset of the course if you need any type of accommodation.

Literature Discussion (50% of Course Grade)

While graduate seminars vary widely based on the topic under investigation, they are united in their dual emphasis on critical reading/discussion of emerging literature and critical reflection through writing. Being a “critical thinker” as demonstrated through reading and writing is essential for successful completion of a thesis or dissertation, and may be the most valued skill in the academy generally. However, reading and writing also are important to professional cartography, as positions that allow you to remain on the cutting edge of cartographic design, and to contribute back to the discipline, tend to be the most desirable. **To stay relevant in cartography, a pdf reader, a web browser, and a word processor are equally as important as a graphic design package, GIS software, and coding.**

1. Participation (10% overall)

Each seminar is broken into two “hours” (lasting ~75 minutes). The majority of these seminar hours are dedicated to the critical reading and discussion of papers, book chapters, and other material (see Composite Schedule). You are expected to have reviewed all assigned readings before class. The outcome of the seminar, positive or negative, depends on your dutiful participation.

Critical reading and discussion are skills you will hone throughout the seminar. As you read, think about the following aspects of each article:

- the main **purpose** of this article and the primary **contribution** the author seeks to make;
- the key **research questions** that the author is asking;
- the main **point of view** taken by the author and the main **assumptions** underlying the author’s thinking;
- the viability of the **method design** to address the research questions, and possible **alternatives** that could better/differently address the questions;
- the main **conclusions** of the article; and
- the **novelty** and **significance** of the research;
- the **implications for user studies in interactive cartography**, if we take this line of reasoning seriously.

2. Discussion Lead (10% overall; Weeks 5-10)

You will lead discussion for one seminar hour during the semester. The discussion leader is expected to do a much more comprehensive review of the discussed topic and will meet with Rob **following seminar the week before** leading discussion to outline a set of discussion prompts or other activities.

Student-led discussions focus on individual user study methods applicable for interactive cartography. You will select **two** papers for review by your colleagues: **(1)** a synthesis piece introducing the method (book chapter or article); and **(2)** a case study applying the method in interactive cartography and visualization, or a related field. Additional web materials can be included as supplemental to the pair of readings.

Selected methods should be empirical and user-based, qualitative or quantitative (avoiding mixing for individual method discussion), and include (among others):

- participant observation
- surveys / questionnaires
- interviews
- focus groups
- journaling
- card sorting / q-sorting
- concept mapping
- storyboarding
- talk aloud / think aloud studies
- cognitive walkthroughs
- interaction logging
- content analysis
- scenario-based design
- controlled experiments

3. Annotated Bibliography (10%; due February 8th)

You will be responsible for reviewing key articles on your assigned topic prior to discussion and for submitting an annotated bibliography summarizing these materials. While the content and size of your annotated bibliography will vary by assigned method, most entries should include one sentence on each of the following topics:

- The complete citation (author, year, title, journal/book, volume/issue, pages, DOI);
- Purpose of article (“This article approaches the topic of ___ by doing ___”) + perspective of the author (e.g., cartography, human-computer interaction, usability engineering, etc.);
- Synthesis structure (book chapters) or method design (empirical articles);
- Major findings, recommendations, or conclusions;
- Implications for user studies in interactive cartography;

The annotated bibliography should include ~15-18 relevant entries and each article synopsis should be ~100 words in length, with particularly interesting or relevant papers receiving slightly longer entries. Use bibliometrics (e.g., Google Scholar, Web of Science) to balance high impact articles with newly published ones, and articles specific to interactive mapping with those from related disciplines. **Do not include tangential or flawed papers just because you read them!** We will negotiate the template and organization of the annotated bibliography during seminar, and pool our entries together as a resource for the Cart Lab website.

You will present a summary of your annotated bibliography as a **concept map** on **February 8th**. (instructions provided on January 25th). We will select the pair of readings on the method based your recommendations and the class discussion, meaning that we are looking for multiple options from which to choose as a collective.

4. Method Summary (30%; 10% draft due 5pm on March 17th;; 20% final due April 19th)

After leading discussion, you will prepare a condensed written summary of your assigned method as it relates to interactive cartography. The summary will integrate your background review from the annotated bibliography and our seminar discussion.

A draft of the method summary is due on **March 17th** before you leave for Spring Break. The final entry for the Cart Lab website is due on **April 19th**. We will negotiate the template and requirements for the method summary as a collective on **March 8th**.

Case Study (50%)

Critical reading, discussion, and writing on literature will be complemented with the conceptualization, design, and execution of an original user study on interactive cartography. The evaluated map(s) can be complete designs or experimental trials.

Group final projects of **2-3 students** are encouraged. At the end of the seminar, you will be required to assess your group contributions by percentage across four categories: **(1)** study conceptualization (as outlined in proposal), **(2)** study design (as outlined in protocol, including development of materials), **(3)** study administration and analysis, and **(4)** writing.

1. Proposal (10% overall; presented March 1st, due March 8th)

The case study proposal is a succinct overview of your intended user study. The proposal serves to negotiate expectations for the case study and report, as well as to begin writing towards a target journal outlet. The proposal must include the following sections:

1. **Cover page:** preliminary title, author list, abstract, keywords, and publication outlet;
2. **Introduction:** succinct statement of the purpose and significance, including research questions if appropriate;
3. **Background:** review of literature relevant to the user study, including concepts from interactive cartography and the application domain (if relevant) that **inform** the study purpose and **structure** the method design;
4. **Case Study** (if a design study): summary of functional and technological scope of evaluated interactive;
5. **Preliminary Method Design:** identification of method with justification from literature (draw from associated annotated bibliography).

The proposal should be no more than **3,000 words** not including references and can include figures and tables as needed. You will present an initial sketch of the proposal to the class for feedback on **March 1st**. The proposal is due on **March 8th** and serves as the first draft towards the case study report (particularly **Sections 1-4**).

2. Protocol (10% overall; due and presented March 29th)

The case study protocol is a **bulleted** overview of the intended study design prepared before implementing the study. The protocol must include the following sections:

1. **Statement of Research Questions** (if applicable);
2. **Participants:** Recruited subjects, including sample size, characteristics (demographic, background, expertise, etc.), assignment into groups, etc.;
3. **Materials:** Tested maps, including complete interactive or prepared map trials, organization into blocks, design controls, etc.; **all materials** should be completed and included with the protocol (links/screenshots for interactives);
4. **Procedure:** Study prompts, including testing apparatus, presented tasks/questions, ordering and organization or tasks/questions, length, etc.;
5. **Measures & Analysis:** Statement of independent and dependent variables (if quantitative), listing of coding scheme (if qualitative), descriptive and inference statistics, etc.

You will present your protocol for feedback on **March 29th**. You do not need to resubmit revisions after seminar discussion, but it is recommended to maintain study design revisions within the protocol document for easier reporting.

3. Report (30% overall; presented May 3rd, due May 9th)

The seminar culminates with a report of your case study targeted towards a cartography journal. You will present your case study on **May 3rd**, focusing on changes to the method protocol and major findings. You then will integrate feedback into your report, which should include the following sections:

1. **Cover page** (revised): preliminary title, author list, abstract, keywords, and publication outlet;
2. **Introduction** (revised): succinct statement of the purpose and significance, including research questions if appropriate;
3. **Literature Review** (revised): relevant literature on the research topic, including concepts from interactive cartography and the application domain (if relevant);
4. **Methods** (written-up): description of case study, participants, methods, procedure, and measures/analysis;
5. **Results** (new): key findings from the user study, emphasizing: relation to the research questions, changes to the evaluated interactive map, connections to recommendations (or gaps therein) in the literature, and broad insights for interactive cartography;
6. **Conclusion** (new): summary of work completed and discussion of future directions.

The final report is due on **May 9th** and represents the first complete draft of a scholarly manuscript. Feedback will be focused on getting the report ready for peer-review over the summer. Publication is **not** a requirement for the seminar, but highly encouraged for successful user studies.

Attendance and Grading Policy

Attendance is mandatory for all seminar meetings. Alert me **immediately** if you expect to miss class. Because of the emphasis on classroom discussion, two discussion absences require completion of an additional reading/writing deliverable to make up for participation. Absence when you are scheduled to lead discussion results in a **0%** for that deliverable.

A penalty of **10%** per day is applied to the annotated bibliography, method summary (draft and final), proposal, and protocol. These assignments are due 1-hour before seminar (**9:30am**), excepting the method summary draft (due 5pm, March 17th). Late final reports at the end of the semester **are not accepted**. You must submit the current state of your project (however complete it is) by **Noon on May 9th** to avoid a zero for the deliverables.

Extensions for all assignments without medical or institutional notes must be arranged **4 weeks** in advance. Requests for grade changes must be submitted in writing (via email) within **24 hours** of receiving your feedback.

Plagiarism is not tolerated. As with other evaluated items, any offense results in a **0%** for that activity and disclosure of the impropriety to the Department and University.