



Cartography M.Sc.

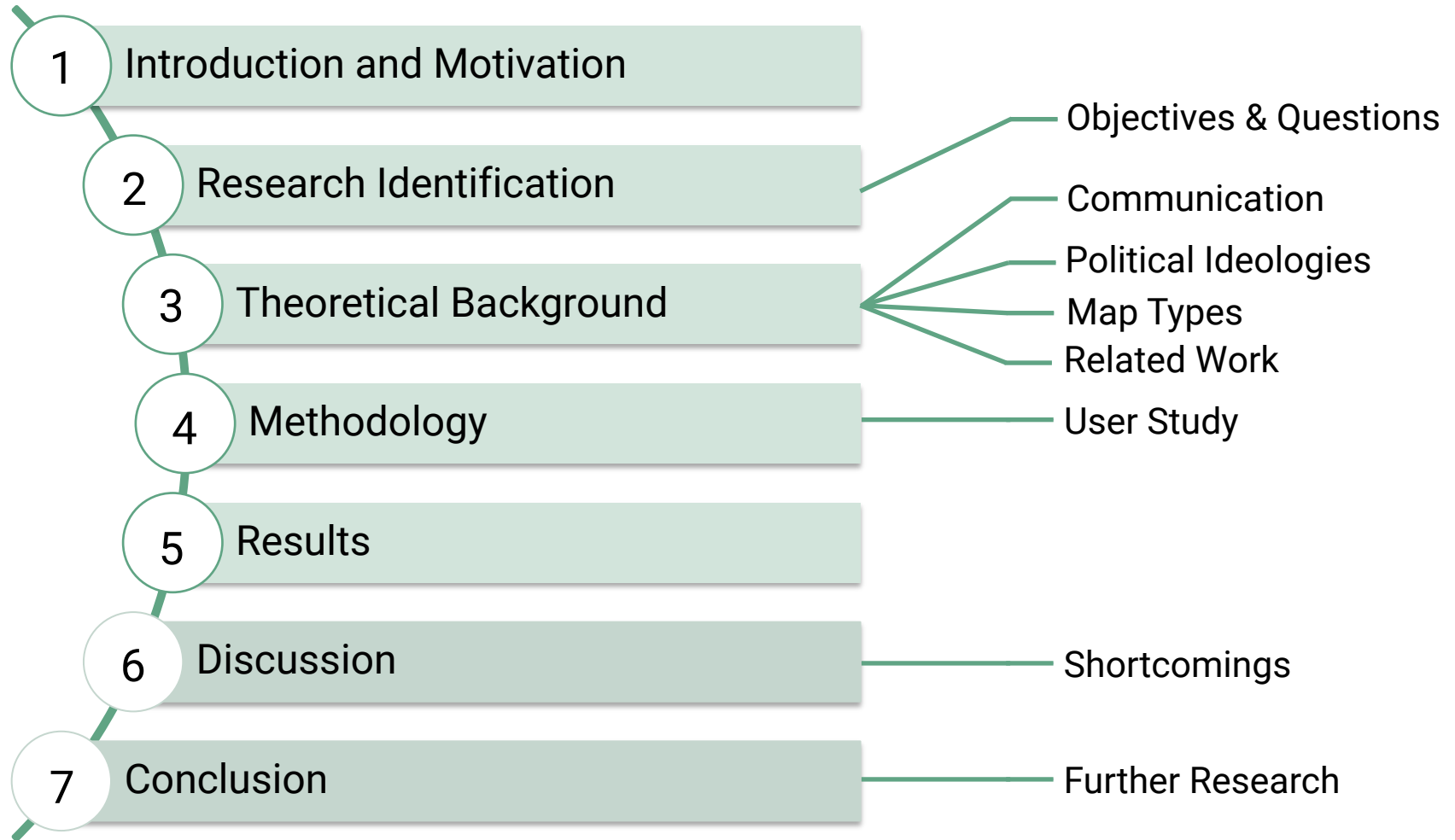
How Maps have been used: Towards a Typology of Map Functions

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18.09.2023

Outline



1 Introduction and Motivation

“we always get the map that our age deserves” (Friedmann, 2013)

Map Functions:

1. Cognitive
2. Communicative
3. Decision Support
4. Social

Freitag (1993)

Everyday
Human
Experience

Power Relations -> Politics

Maps



2 Research Identification

- R01** Identifying broad political trends in different time periods in history in Europe and today and determining if these features are reflected in according maps.
- RQ1** What broad political trends have existed in different time periods in history in Europe and today, and how have they manifested themselves?
 - RQ1.1 Did political characteristics of a specific time period influence the content of according maps?
 - RQ1.2 Are map users able to correctly identify the political trends of an epoch from them?

2 Research Identification

- R02** Identifying map functions, in respect to their political context, of several map types in different time periods of history in Europe and today and across various user groups.
- RQ2** Which map functions, in respect to their political context, can be found in different user groups?
- RQ2.1 Is there a difference in map functions in different time periods of history in Europe and today?
- RQ2.2 Is there a difference in map functions between different map types?

3 Theoretical Background

Communication

“a process by which information is exchanged between individuals through a common system of symbols, signs, or behavior”

(Merriam-Webster, n.d.b)

Speech Production & Reception

Faerch & Kasper (1984)

3 Theoretical Background

Cartographic Communication

*“a process by which information is exchanged between individuals through a common system of **symbols**, signs, or behavior”*

(Merriam-Webster, n.d.b)

Colors, symbols, level of generalization,...

(Cartwright, 2009)

more information  The better

(Peterson, 1987)

3 Theoretical Background

Political Communication

Sugarcoating

(Iyengar & Simon, 2000)

Privatization

(Van Aelst et al., 2012)

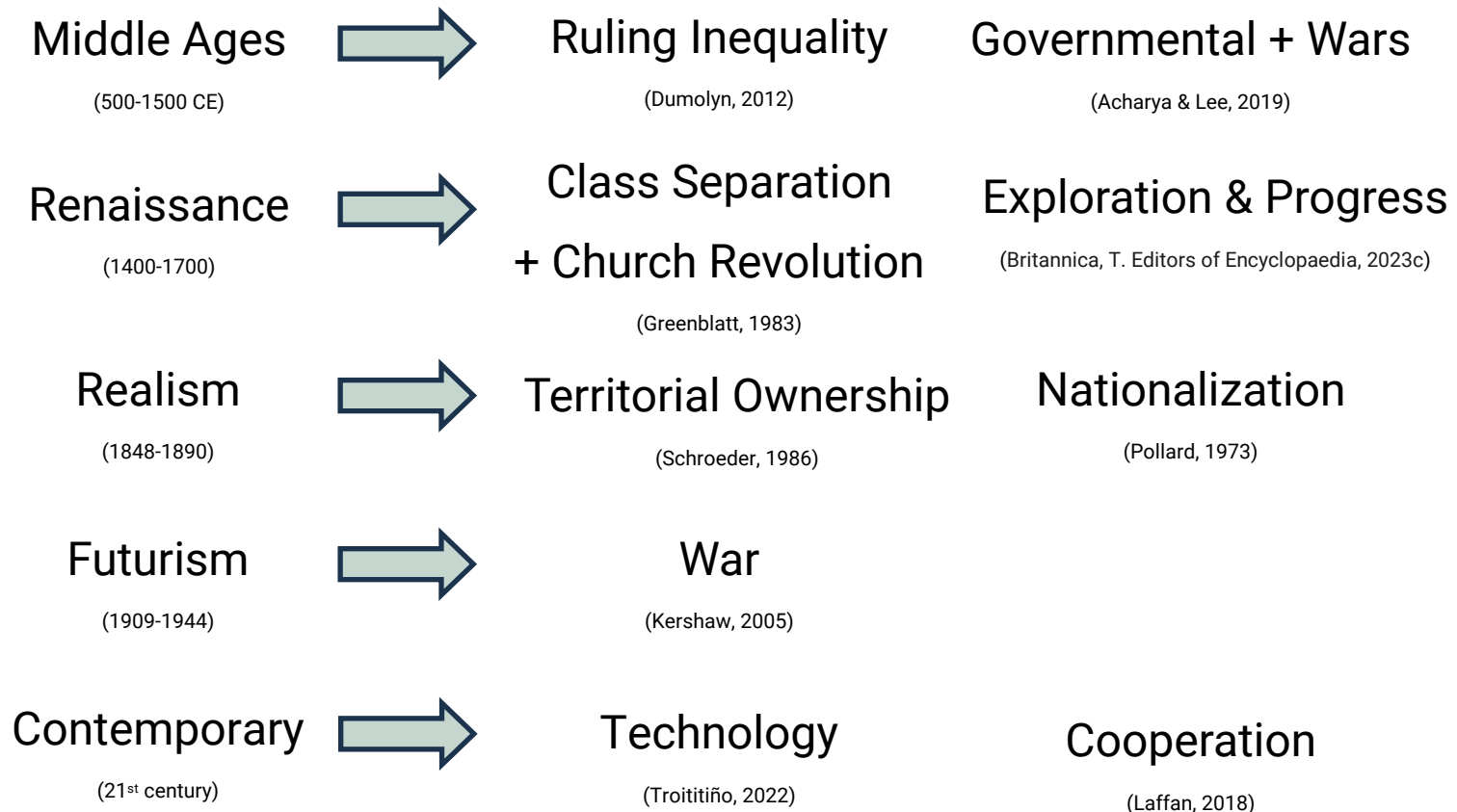
Identification

(Schill, 2012)



3 Theoretical Background

Political Ideologies



3 Theoretical Background

Map Types

(ICSM, n.d.b, n.d.c, n.d.d, n.d.e, n.d.f)

General Reference



Fig. 1: Digital interactive and modifiable World Map showing country as well as European Union boundaries (Map Chart, n.d.).

Topographic

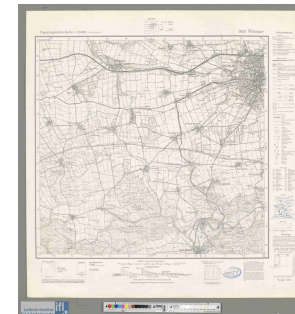


Fig. 2: Topographic Map of Weimar, Germany, 1944 (Deutsches Reich / Reichsamt für Landesaufnahme, 1944).

Thematic



Fig. 3: Map of the world showing the extent of the British Empire in 1886. British territories colored in red (Crane, 1886).

Navigational

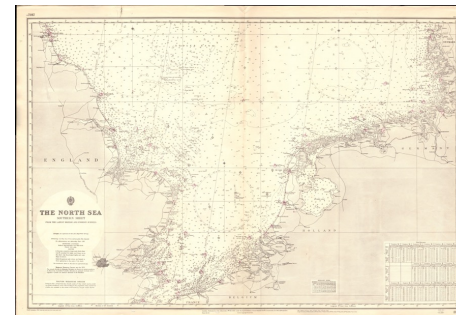


Fig. 4: Nautical chart of the southern part of the North Sea, at a scale of 1:754,400 (United Kingdom Hydrographic Office, 1920).

3 Theoretical Background

Related Work

Freitag (1993)

Krygier (1995)

Caquard (2009)

Tsou (2011)

Fairbairn et al. (2021)

User Evaluation?

Map Selection

“everything is related to everything else, but near things are more related than distant things”

(Tobler, 1970, p. 236)



Europe

5 Maps / Epoch

5 Maps / Map Type

User Study – Questionnaire 1

Map 1: 1914



Source: Map of Europe in the Year 1914, by W. Trier, 1914.
Accessed via [Staatsbibliothek Berlin](#) on the 30th April 2023.

Fig. 5: Questionnaire 1 – Map 1

Map 1: Please enter the in your opinion most fitting three keywords or short descriptions of the functions of this map, in respect to its political context.*

Remember these questions to help you provide an answer:

Which purpose does this map serve, in respect to its political context?
What motivations or intentions of a mapmaker can be found, in respect to its political context?
Which aim should it fulfill, in respect to its political context?

You can answer in a free associative manner.




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Fig. 6: Questionnaire 1– Question for Map 1

User Study – Questionnaire 1 Evaluation

| Phrase | | Function |
|--------------------------------------|---|---------------|
| „create enemy image“ |  | Propaganda |
| „vivid explanation of the situation“ |  | Information |
| „Amusement“ |  | Entertainment |

+ Counting

4 Methodology

User Study – Questionnaire 2

Map 2: 1929



Source: Warszawa Mapa, by Zjedn. Zakłady kartogr. i wyd. Książnica-Atlas S.A., Lwów-Warszawa, 1930.
Accessed via [Wikimedia Commons](#) on the 30th April 2023.

Fig. 7: Questionnaire 2 – Map 2

Map 2: Please pick the in your opinion most fitting three key words of the function of this map, in respect to its political context.*

Remember these questions to help you provide an answer:

Which purpose does this map serve, in respect to its political context?
What motivations or intentions of a mapmaker can be found, in respect to its political context?
Which aim should it fulfill, in respect to its political context?

You can answer in a free associative manner.

| | | | |
|--|--------------------------------------|--|-------------------------------|
| <input type="checkbox"/> Religion | <input type="checkbox"/> Economy | <input type="checkbox"/> Interactivity | |
| <input type="checkbox"/> Government | <input type="checkbox"/> Choice | <input type="checkbox"/> Manipulation | |
| <input type="checkbox"/> Travel | <input type="checkbox"/> Navigation | <input type="checkbox"/> Advertisement | |
| <input type="checkbox"/> Strategy | <input type="checkbox"/> Information | <input type="checkbox"/> War | <input type="checkbox"/> Ease |
| <input type="checkbox"/> Art | <input type="checkbox"/> Emotion | <input type="checkbox"/> Entertainment | |
| <input type="checkbox"/> Safety | <input type="checkbox"/> Ideology | <input type="checkbox"/> Courage | |
| <input type="checkbox"/> Generalization | <input type="checkbox"/> Propaganda | | |
| <input type="checkbox"/> Self-expression | | | |

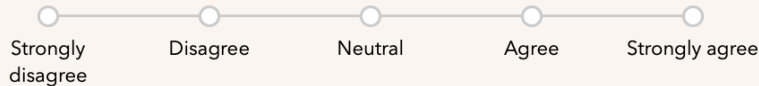
Fig. 8: Questionnaire 2 – Question for Map 2

Map 2: Can you think of any other function for this map, in respect to its political context, that is not mentioned above?

Fig. 9: Questionnaire 2 – Additional Question for Map 2

User Study – Questionnaire 2

I am familiar with the Middle Ages Epoch (ca. 500-1500 AD).*



Please provide your associations with the Middle Ages.

The term "associations" refers to everything you know about this time period. Not only political events, but also the social image of that time are examples. You can write anything you think is important regarding the understanding of this era.

If you are not familiar with this epoch, simply leave it blank.

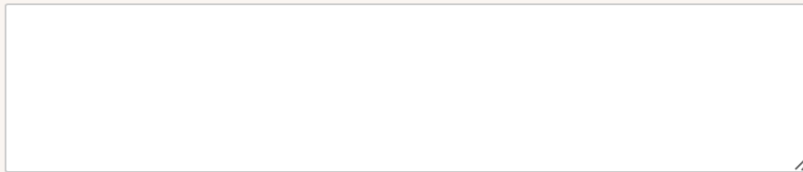
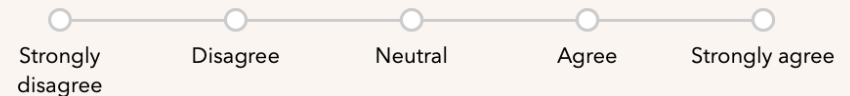


Fig. 10: Questionnaire 2 – Familiarity Question for Epoch

I am familiar with art paintings or artists in general of the Middle Ages.*



Please provide your knowledge about art paintings or artists in general of the Middle Ages.

If you are not familiar with art of this epoch, simply leave it blank.

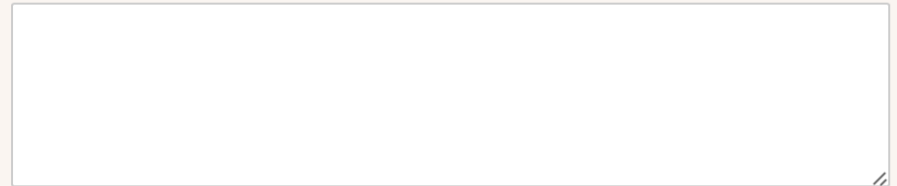


Fig. 11: Questionnaire 2 – Familiarity Question for Art within Epoch

User Study – Questionnaire 2

Part 4

Do you personally benefit from maps? Please explain.*

This is a required question

Are you grateful that maps exist? Please explain.*

This is a required question

Fig. 12: Questionnaire 2 – Personal Questions about Maps

User Study – Questionnaire 2 Evaluation

Counting + Percentages

| | Non-Experts Male (12) 7+5 | Non-Experts Female (9) 5+4 |
|----------------|------------------------------|-------------------------------|
| Min | 279 | 216 |
| Real minus Min | 75 | 51 |
| Max | 409 | 320 |
| Max minus Real | 55 | 53 |
| Real | 354 | 267 |
| Information | 83 | 61 |
| Government | 24 | 13 |
| | | |

Fig. 13: Evaluation by Numbers of Questionnaires

$$7 \times 12 \times 1 + 5 \times 13 \times 3 = 279$$

$$83 + 24 + \dots = 354$$

$$7 \times 12 \times 1 + 5 \times 13 \times 5 = 409$$

$$83/354 = 23,45\%$$

4 Methodology

User Study – Questionnaire 2 Evaluation

Middle Ages

| Familiar with Epoch | Experts | Facts | Non-Experts | Facts |
|---------------------|---------|--|-------------|--|
| Strongly Disagree | I | | ### | End of the ancient world, beginning of the modern era, crusades, Knights Templar; Church is very powerful, much poverty, dirty, Plague and other diseases; |
| Disagree | I | Many European people in China for culture and export; | | |
| Neutral | ### | People beginning to explore the world; Fall of Rome; Beginning of Renaissance Period; Royal Family Relationships & Christian Religion development; Plague; Uneducated society, religious and easily manipulated through fear, immensely scared of all unknown, major population under protection and government of church installed and empowered leaders; | III | Different kingdoms, crusades, monarchy, hierarchical society; |
| Agree | | | I | Crusades, knights, castles, origin of many legends; |
| Strongly Agree | | | | |

Fig. 14: Questionnaire 2 – Self-Evaluation about Knowledge of Epoch

| Familiar with Art | Experts | Facts | Non-Experts | Facts |
|-------------------|---------|---|-------------|---|
| Strongly Disagree | ### | | IIII | Religious art; |
| Disagree | I | Dark tone, mainly focuses on religious imagery; | IIII | Religious; Karl the Great, Martin Luther; |
| Neutral | I | Religious art paintings | I | |
| Agree | | | | |
| Strongly Agree | | | | |

Fig. 15: Questionnaire 2 – Self-Evaluation about Knowledge of Art in Epoch

User Study – Questionnaire 2 Evaluation

Do you personally benefit from maps? Please explain.

- Part of work environment
- Use for navigation/orientation and location of things
- Planning & Learning
- Use as tools to generate solutions for people
- Map style from various ages, which reflects their background and the social situation at that period
- Provide me with happiness and being able to express things through art
- Enjoy the more creative use of them
- Following street signs without map -> disorientation, experience in getting lost
- Information (for travel)
- Navigation for travel
- Driving, up to date maps help a lot before and while driving
- They are a great help for dealing with one's environment.
- Even in cities I know if I am searching for a specific address

Fig. 16: Questionnaire 2 – Answers to „Do you personally benefit from maps?“

Are you grateful that maps exist? Please explain.

- Essential for mankind to know where they are and where they can go
- Extension of the knowledge of the world around us
- Makes travel less complicated, navigation in unknown places
- Maps are the result of our need to understand and organize our world, they have evolved with our society adapting to its needs in every epoch
- Maps are crucial for our development
- Understanding of your own location or the city you are in
- Valuable reference for art, science and historical research
- Delicts of old times
- Double-sided: hurting people's ability in location awareness
- They can condense so many information in a beautiful way
- Better organize visits
- Travelling would be a lot harder without maps
- enable life the way we are living it right now, starting with the trade and logistics of everyday objects or groceries. E.g. one cannot get something from France without knowing where France is located. Globalization, from which we as humans largely benefit, would not function at all without maps.
- provide information and to give orientation. In terms of digital era, where most people use mobile apps for navigating they are even more important
- unknown places, help in traffic, important in school for e.g. main cities or states
- information
- they always help you reach your destination
- find your way around quickly and also on your own
- car navigation

Fig. 17: Questionnaire 2 – Answers to „Are you grateful that maps exist?“

5 Results

Cartography throughout Epochs

Middle Ages

Renaissance

Realism

Futurism

Contemporary

Always a matter of interpretation

Cartography throughout Epochs

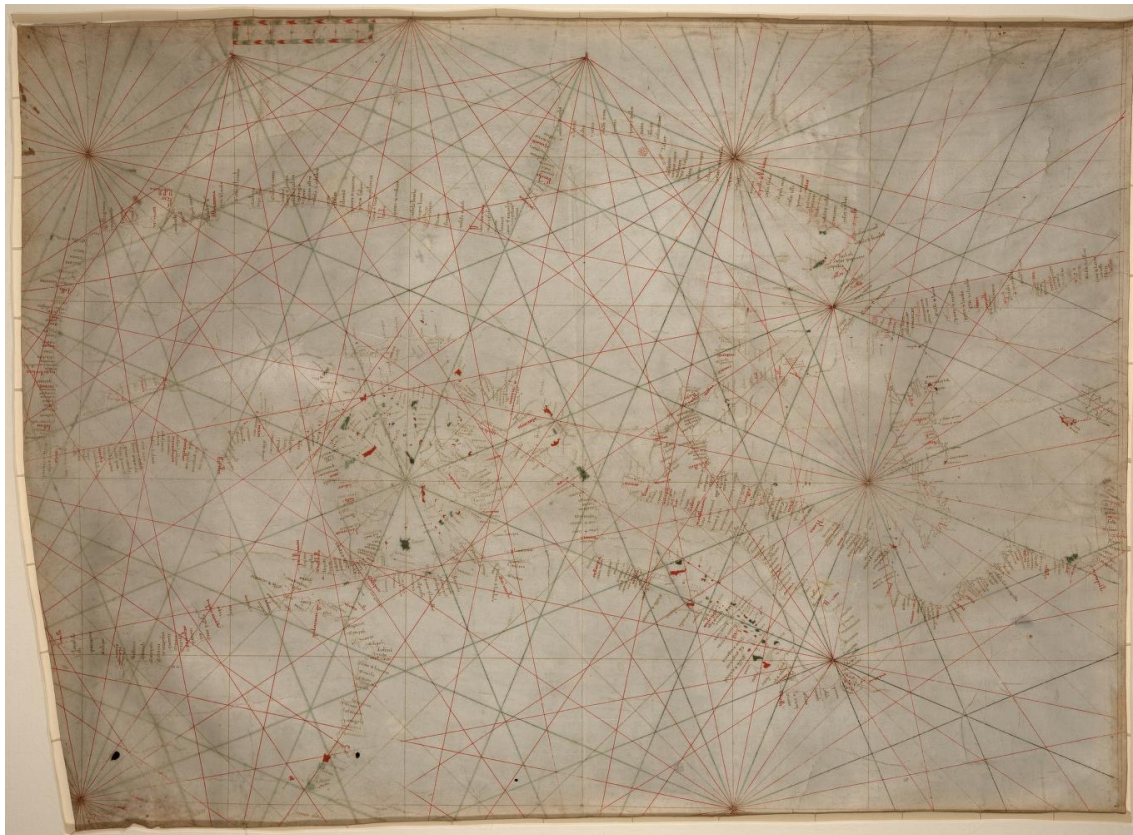


Figure 18: Portolan Chart of the Mediterranean Sea Ca. 1320 to 1350: Manuscript Chart of the Mediterranean and Black Seas on Vellum (Unknown Author, ca. 1320-1350). Accessed via <https://www.loc.gov/item/2003630429/> on the 28th April 2023.

5 Results

User Questionnaires - Functions

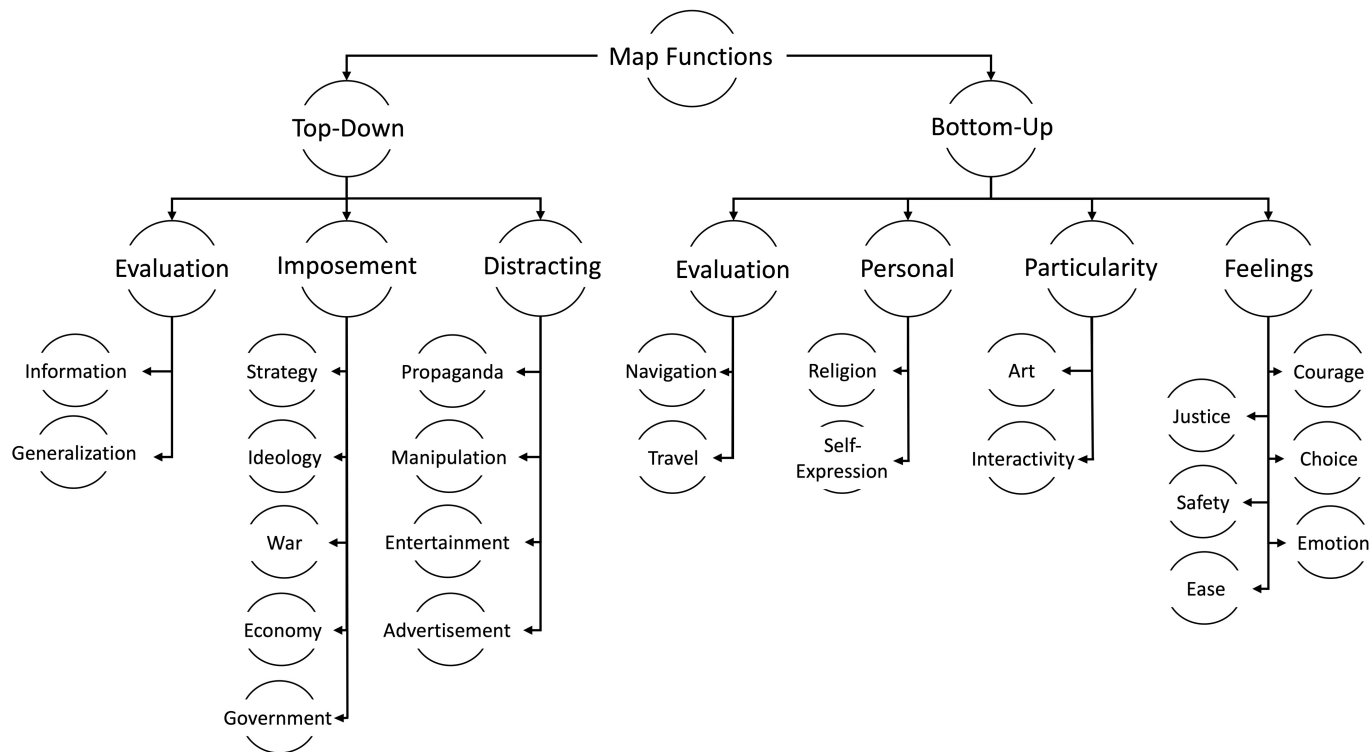
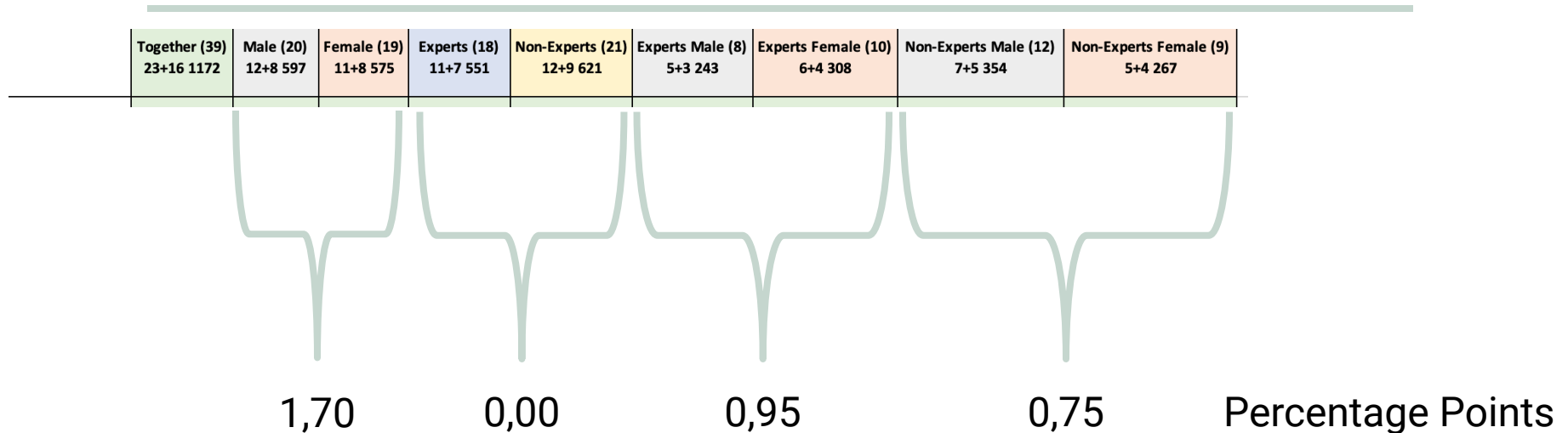


Fig. 19: Extracted Map Functions from Questionnaire 1: Top-Down vs. Bottom-Up Typology of Map Functions. Image by the author.

5 Results

User Questionnaires – Functions of different user groups



5 Results

User Questionnaires – Functions and Epochs

| Middle Ages | Renaissance | Realism | Futurism | Digital |
|-------------|-----------------|----------------|----------|---------------|
| Navigation | Propaganda | Entertainment | | Information |
| Religion | Government | Travel | | Choice |
| Ideology | Emotion | Advertisement | | Interactivity |
| Art | Strategy | Economy | | Ease |
| | Self-Expression | Manipulation | | Justice |
| | Safety | Generalization | | |
| | Courage | | | |
| | War | | | |

Tab. 1: Map functions assigned to the epochs in which they have the largest percentage share in relation to all epochs.



5 Results






User Questionnaires – Functions and Map Types

| General Reference | Topographic | Navigational | Thematic - Political | Thematic - City |
|-------------------|-----------------|--------------|----------------------|-----------------|
| Information | Self-Expression | Navigation | Propaganda | Entertainment |
| Travel | Generalization | Economy | Religion | Government |
| Choice | | Safety | Emotion | Emotion |
| Interactivity | | Courage | Ideology | Strategy |
| Ease | | | Justice | Advertisement |
| | | | War | Manipulation |
| | | | | Art |
| | | | | War |

Tab. 2: Map functions assigned to the map types in which they have the largest percentage share in relation to all types.



User Questionnaires – Identifying Political Trends

| | | |
|--------------|---|--|
| Middle Ages |  | "major population under protection and government of church installed and empowered leaders" |
| Renaissance |  | "Invention of letterpress printing, capitalism" |
| Realism |  | "industrialization" and "imperialism" |
| Futurism |  | "Modernization processes, war, relation to the past" |
| Contemporary |  | "technological progress, coalition between governments" |

5 Results

User Questionnaires – Gratitude for Maps

| | Experts | Non-Experts |
|------------------|---|-----------------------------------|
| Benefits | Work & learn with/from them | Navigation & Localization |
| Gratitude | Important part of our environment & development | Organization, e.g. when traveling |

Tab. 3:: Differences between Experts and Non-Experts regarding benefits and gratitude in/for maps

Biases

User Questionnaires – Participants

Historians

My Subjective Interpretation

Shortcomings

User Questionnaires – Spelling Mistakes

Difficulty in recognizing political map content

Demographic

Art Paintings

6 Discussion

Map Functions

1. Cognitive
2. Communicative
3. Decision Support
4. Social

Freitag (1993)

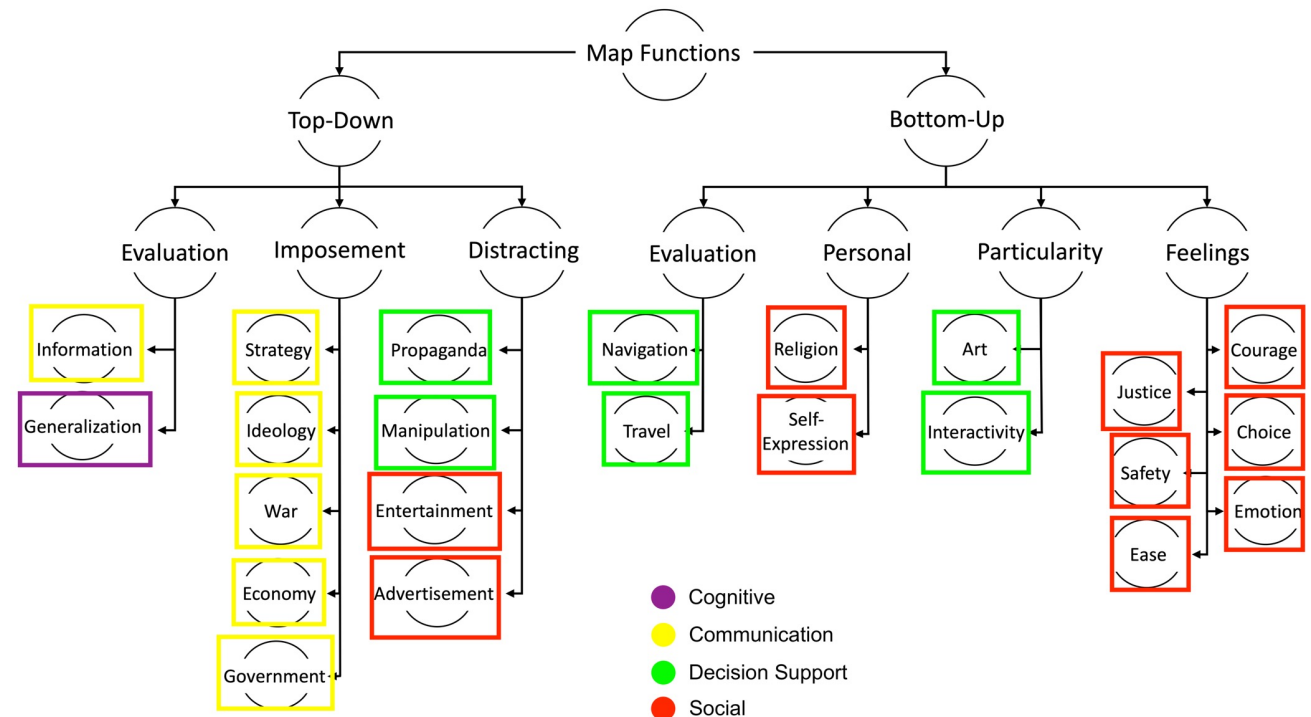


Fig. 20: The Top-Down vs. Bottom-Up Typology of Map Functions in regard to Freitag's (1993) proposal. Image by the author.

Research Objectives & Questions

R01 Identifying broad political trends in different time periods in history in Europe and today and determining if these features are reflected in according maps.



RQ1 What broad political trends have existed in different time periods in history in Europe and today, and how have they manifested themselves?







RQ1.1 Did political characteristics of a specific time period influence the content of according maps?



RQ1.2 Are map users able to correctly identify the political trends of an epoch from them?



Research Objectives & Questions


- RQ2** Identifying map functions, in respect to their political context, of several map types in different time periods of history in Europe and today and across various user groups. 
- RQ2** Which map functions, in respect to their political context, can be found in different user groups? 
- RQ2.1 Is there a difference in map functions in different time periods of history in Europe and today? 
- RQ2.2 Is there a difference in map functions between different map types? 


Implications for further Research

 Art paintings

“Art provides the ‘public face’ of cartography
(and if we include the cartographer’s passion when designing
particular products, perhaps the soul as well)”

(Cartwright, 2009, p. 9)

 Same time period / different parts of the world

 Is the found Typology applicable to other contexts?

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