

# Why Geographic Analysis

HES 505 Fall 2023: Session 2

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# Checking in

1. What are some advantages and disadvantages of using **R** for spatial analysis
2. What can I clarify about the course?
3. How do you feel about git and github classroom? How can I make that easier for you?

# Today's Plan

- What can we do with geographic information?
- Conceptual challenges
- Analytical challenges
- Critiques of quantitative geography

A scenic view of icebergs floating in a body of water under a cloudy sky. The icebergs are of various sizes and shapes, some with dark rock visible underneath. The water is calm, reflecting the sky and the ice. The sky is filled with large, white, fluffy clouds, and the overall color palette is cool, with blues, greys, and whites.

# What can we do with spatial data?

# What is geography

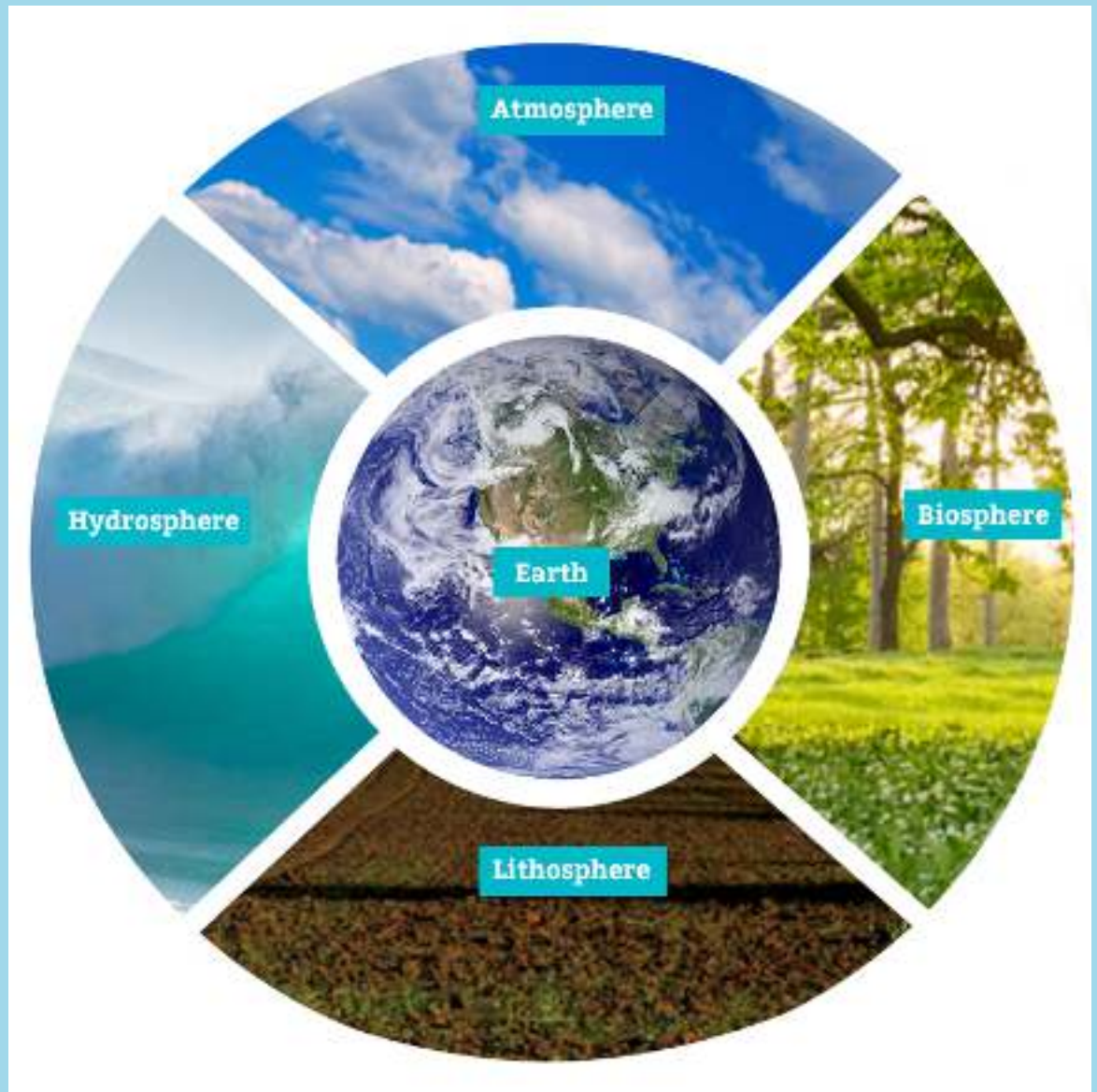
- **Geo:** land, earth, terrain
- **Graph:** writing, discourse
- Tuan: **Space** (extent) and **Place** (location)
- Analysis of the effects of extent and location on events or features

# Five Themes in Geography





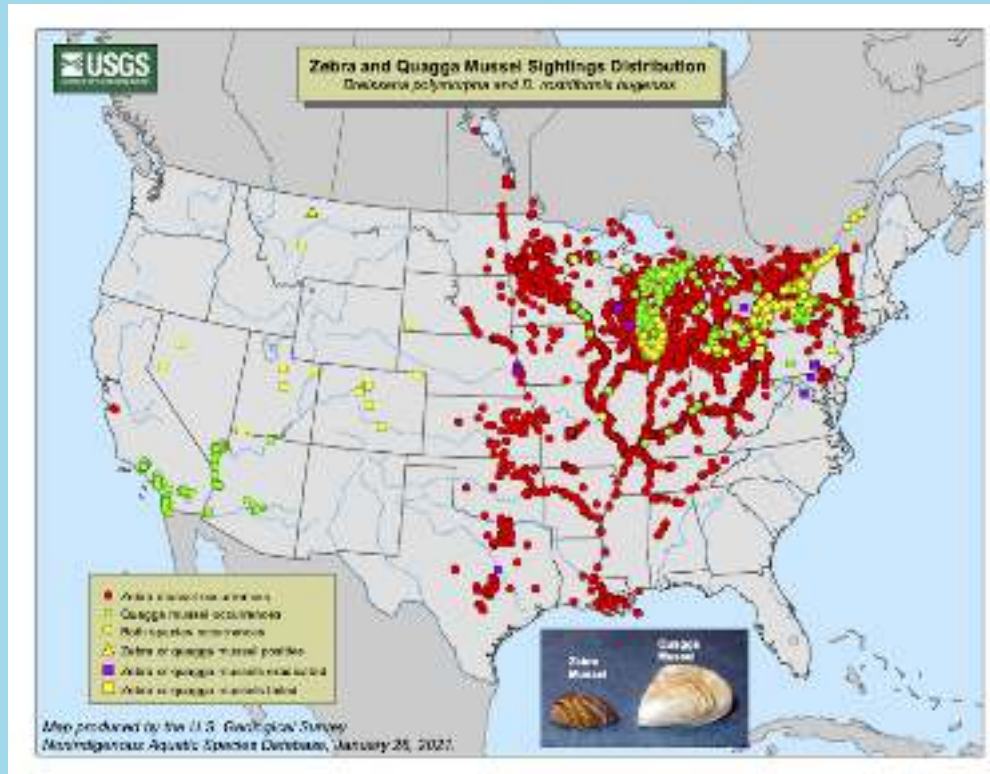
- Location
- Place
- Region
- Movement
- Human-  
Environment  
Interaction



WGBH Educational Foundation

# Location

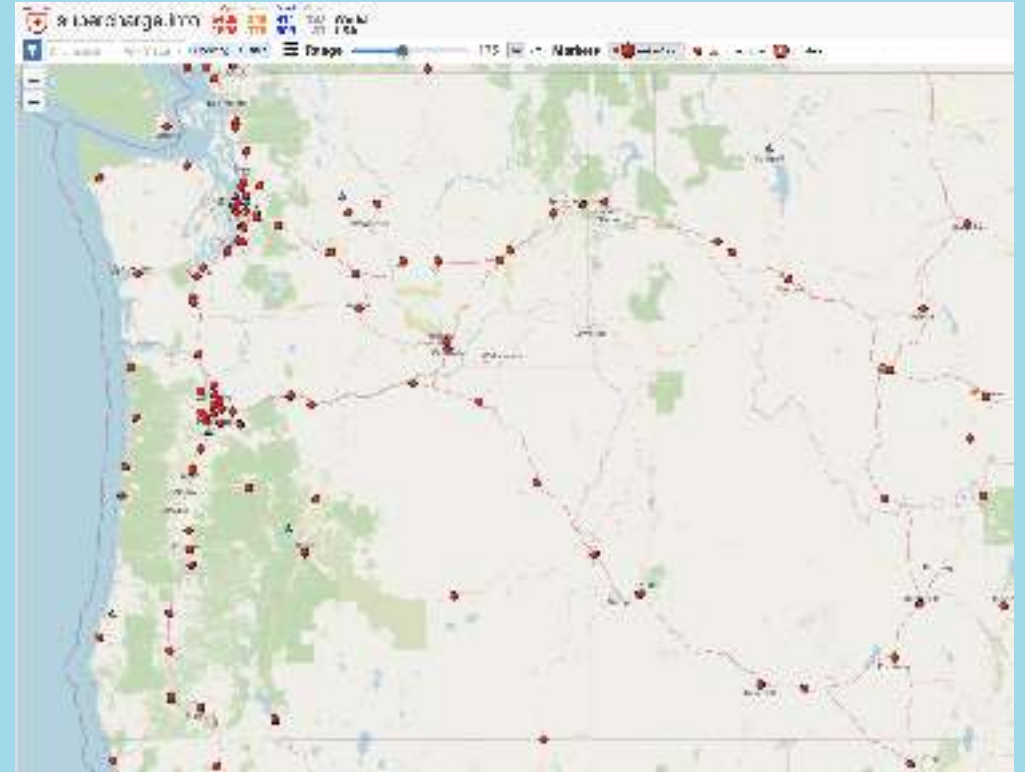
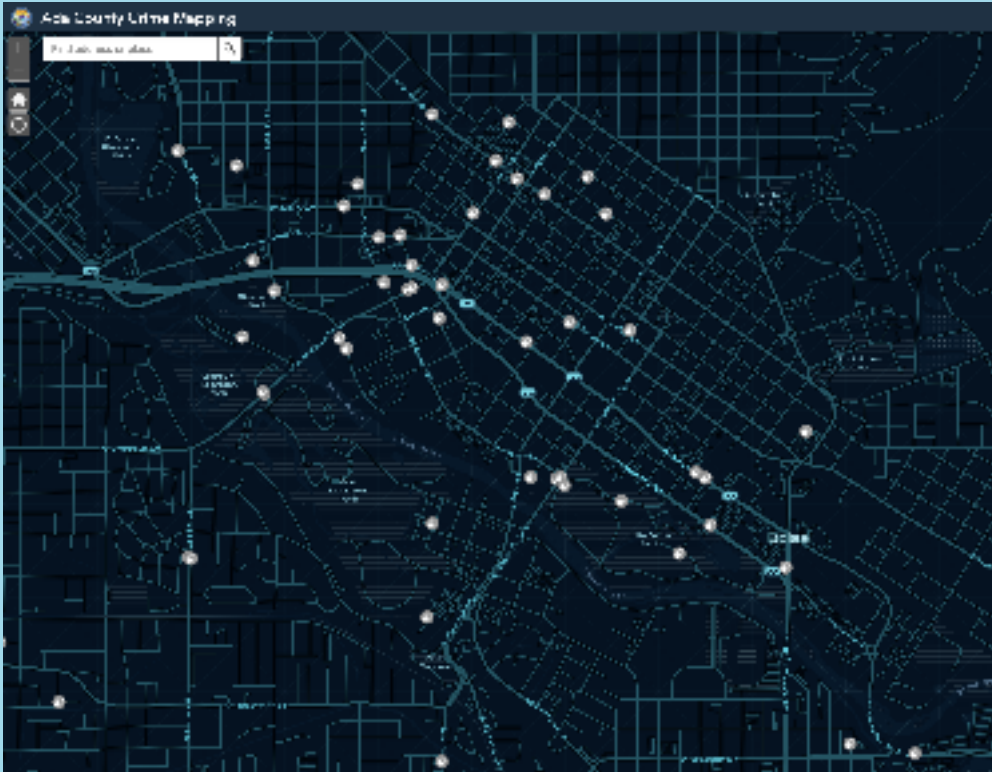
The place (on Earth) of a particular geographic feature





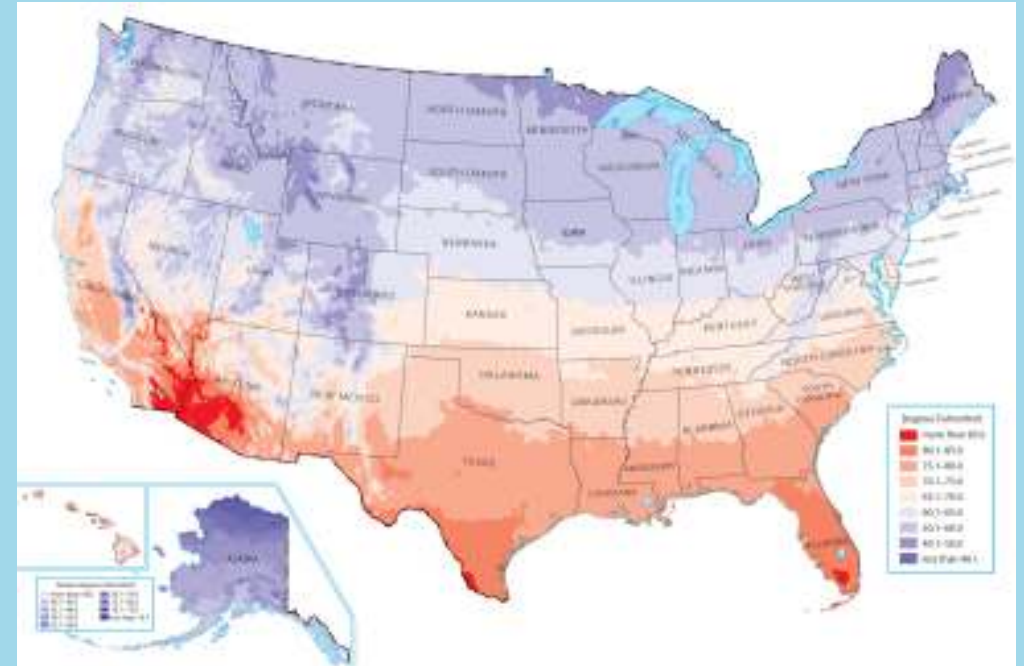
# Location

The place (on Earth) of a particular geographic feature



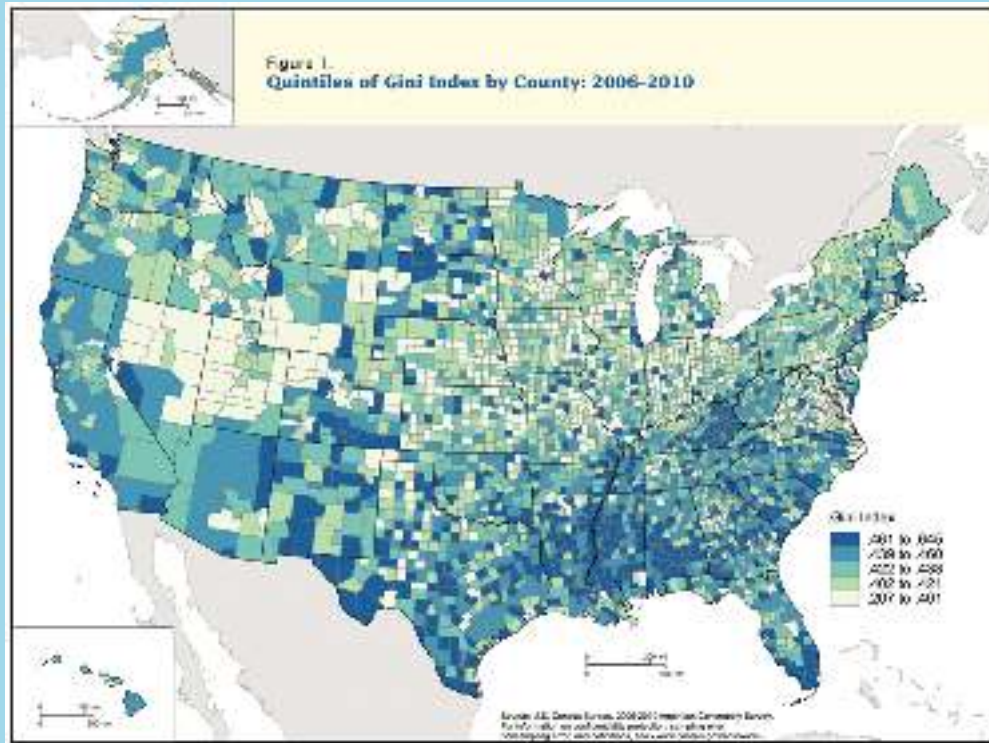
# Place

What is a location *like*?



# Place

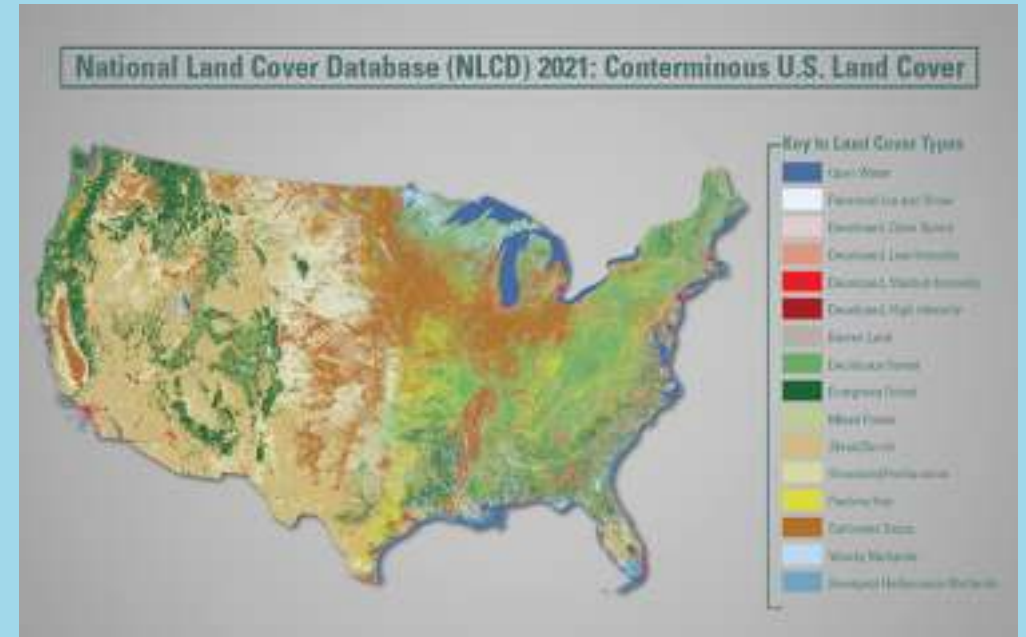
What is a location *like*?





# Region

How are different areas similar or different?



# Region

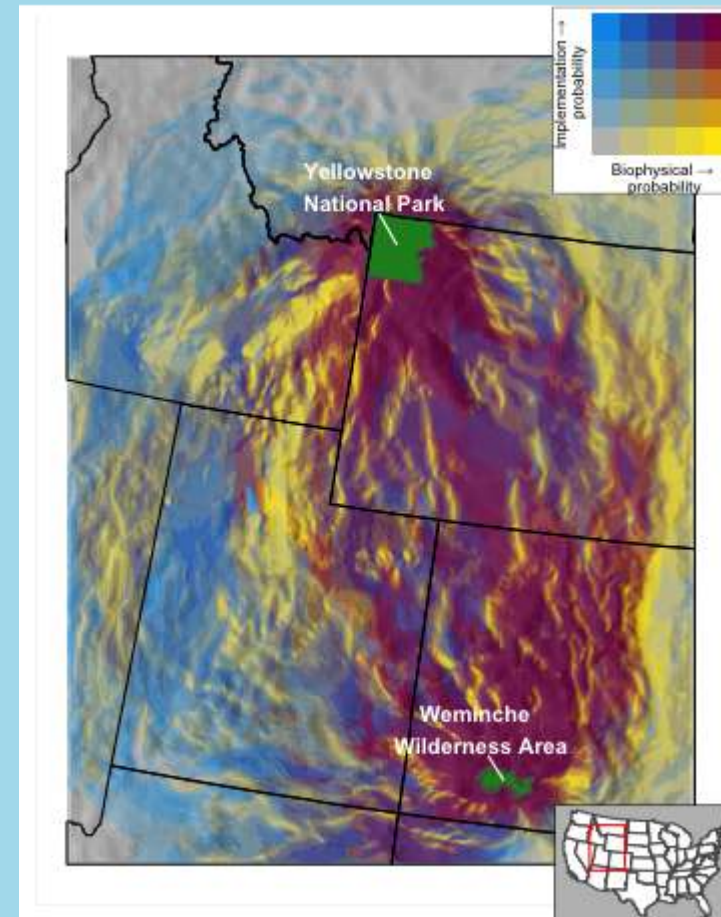
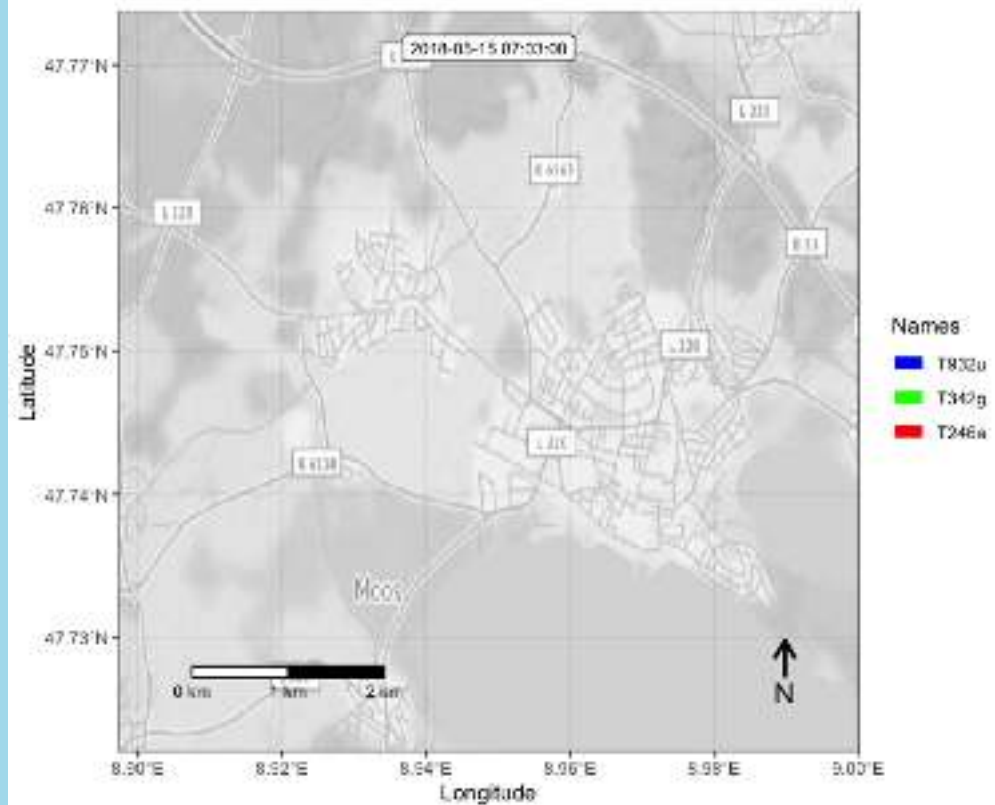
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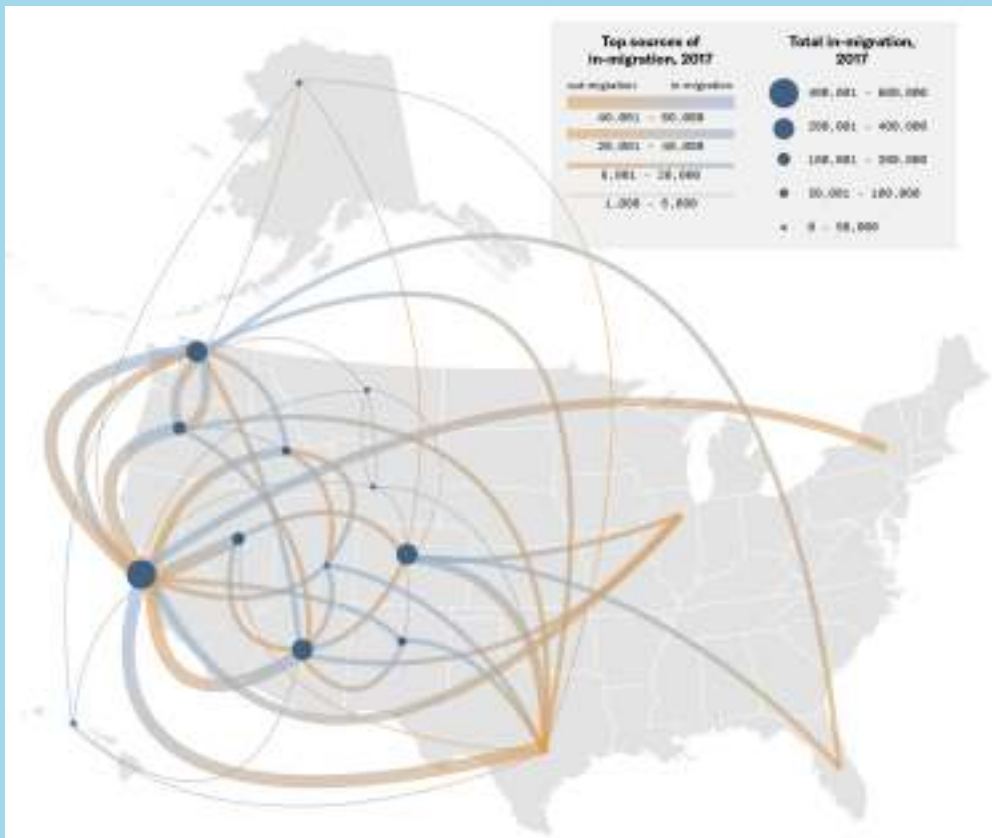
# Movement

How do genes, individuals, populations, ideas, goods, etc traverse the landscape.



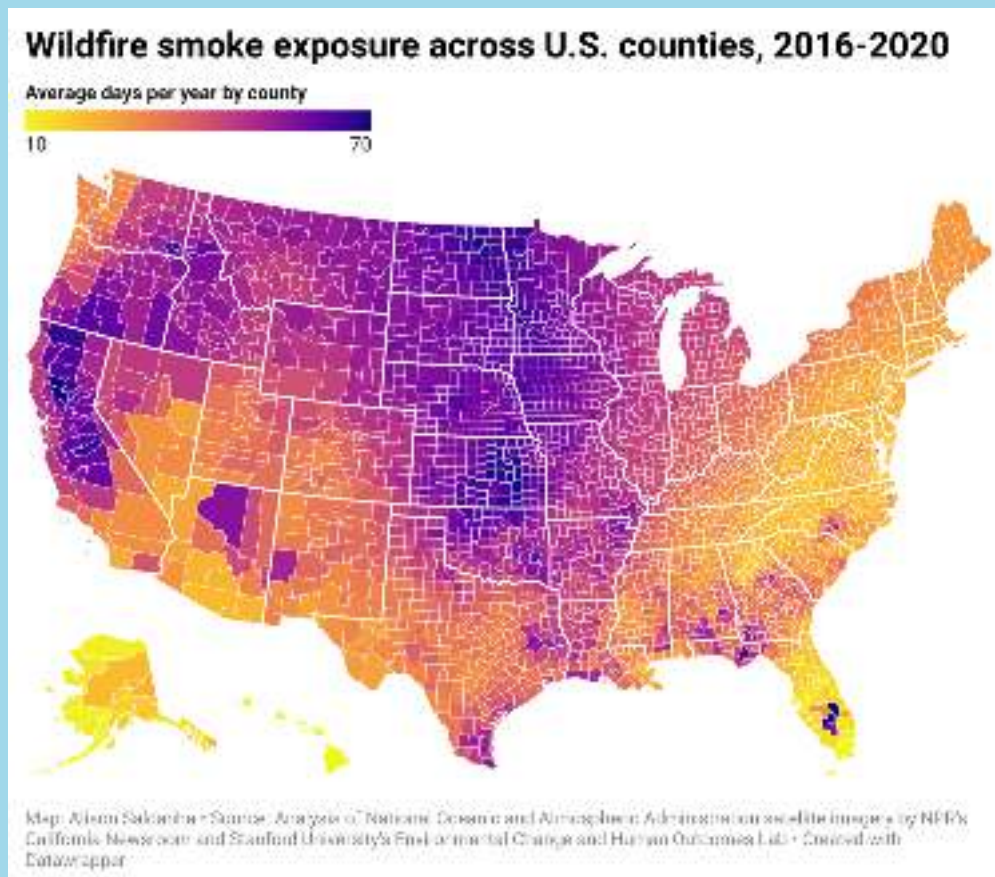
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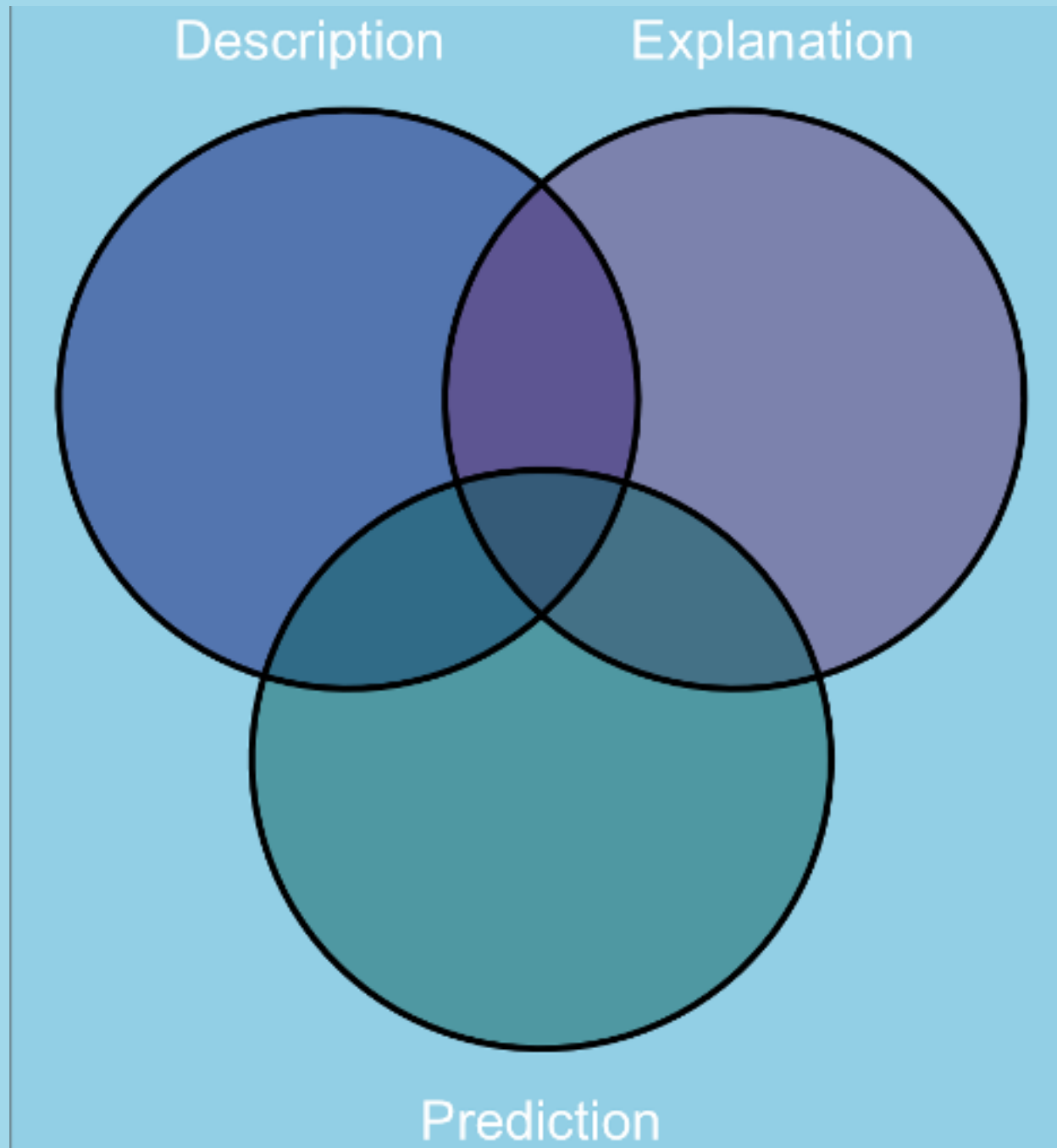
# Human-Environment Interactions

How do people relate to and change the physical world to meet their needs?



Towards *quantitative* spatial analysis

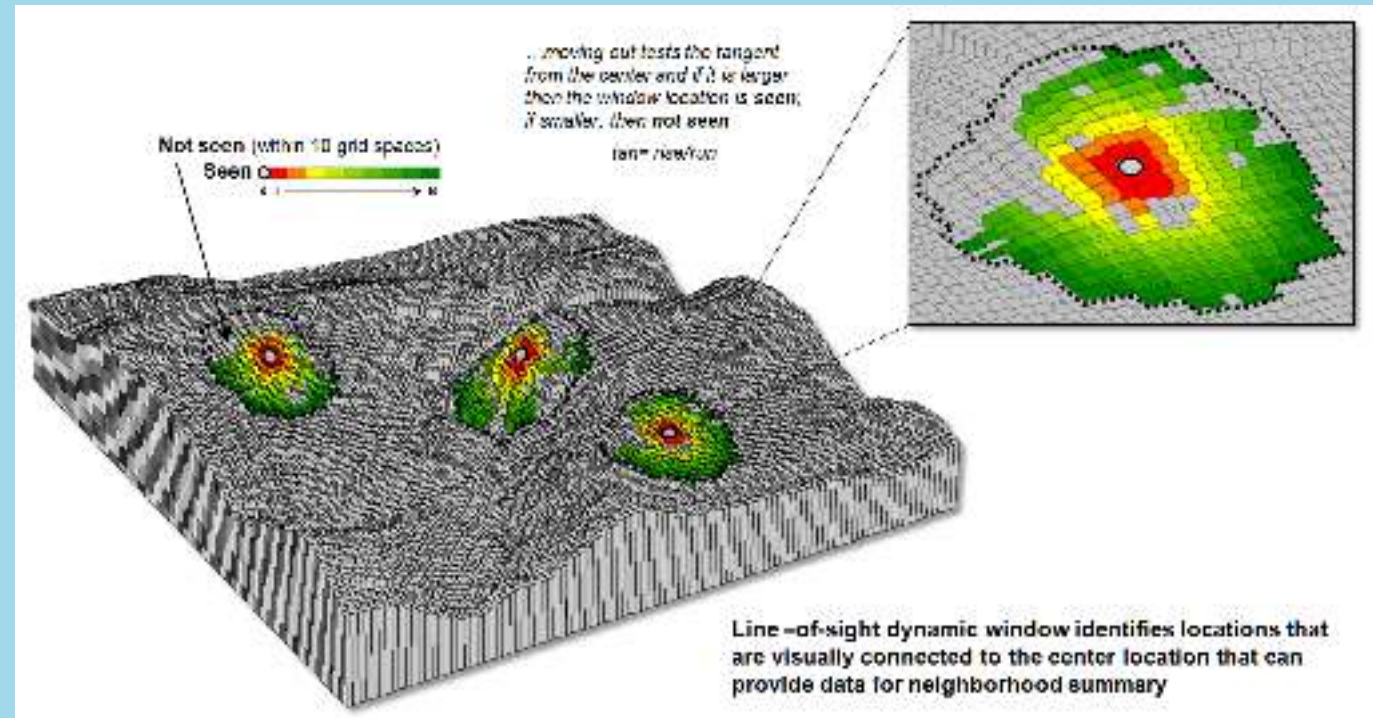




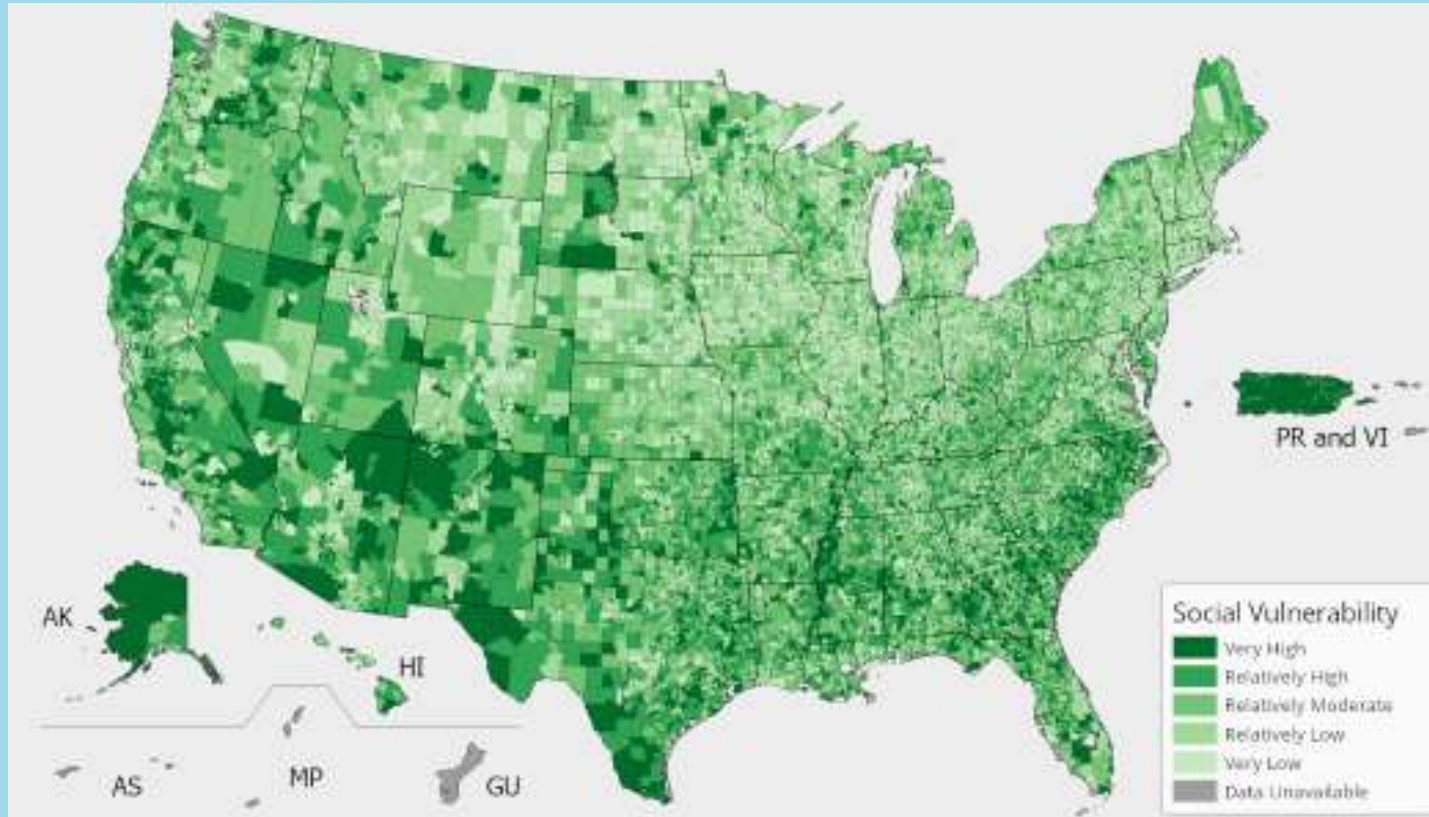


# Description

- Coordinates
- Distances
- Neighbors
- Summary statistics



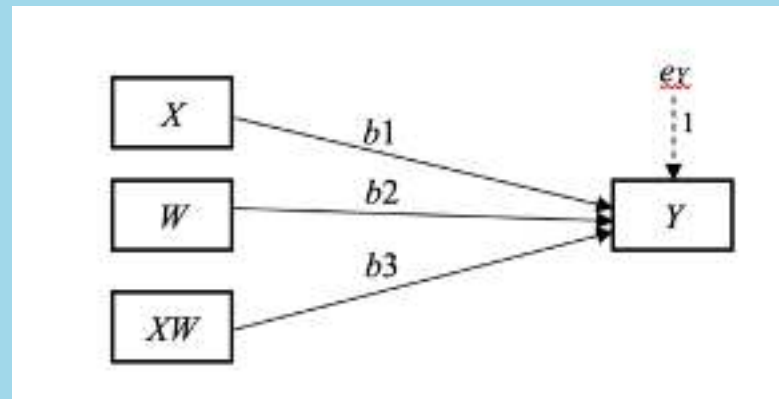
# Description



- Range Maps
- Hotspots
- Indices

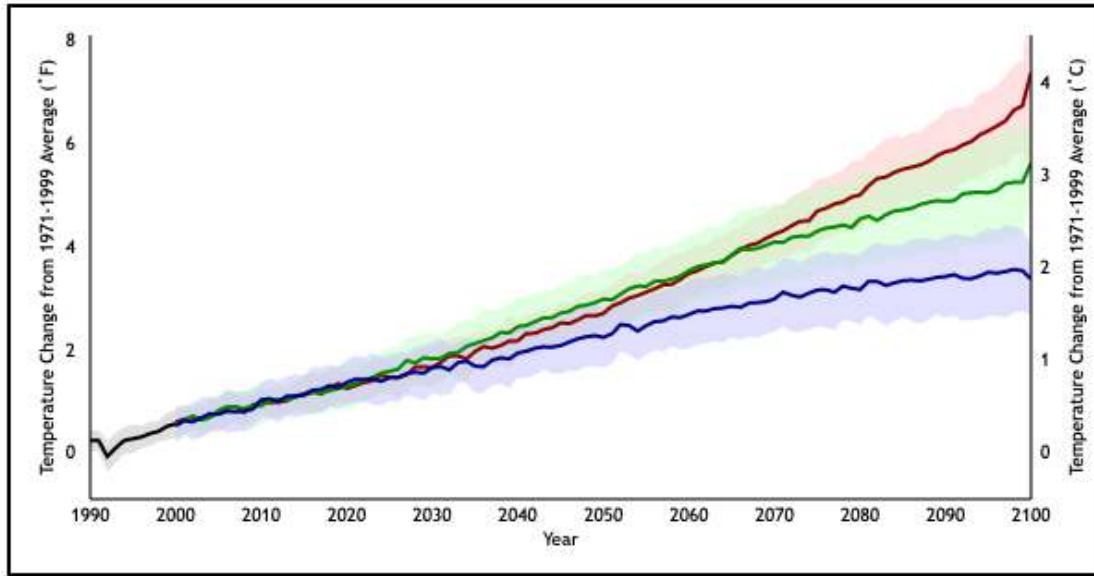
# Explanation and Inference

- **Cognitive Description:** collection ordering and classification of data
- **Cause and Effect:** design-based or model-based testing of the factors that give rise to geographic distributions
- **Systems Analysis:** describes the entire complex set of interactions that structure an activity





# Prediction



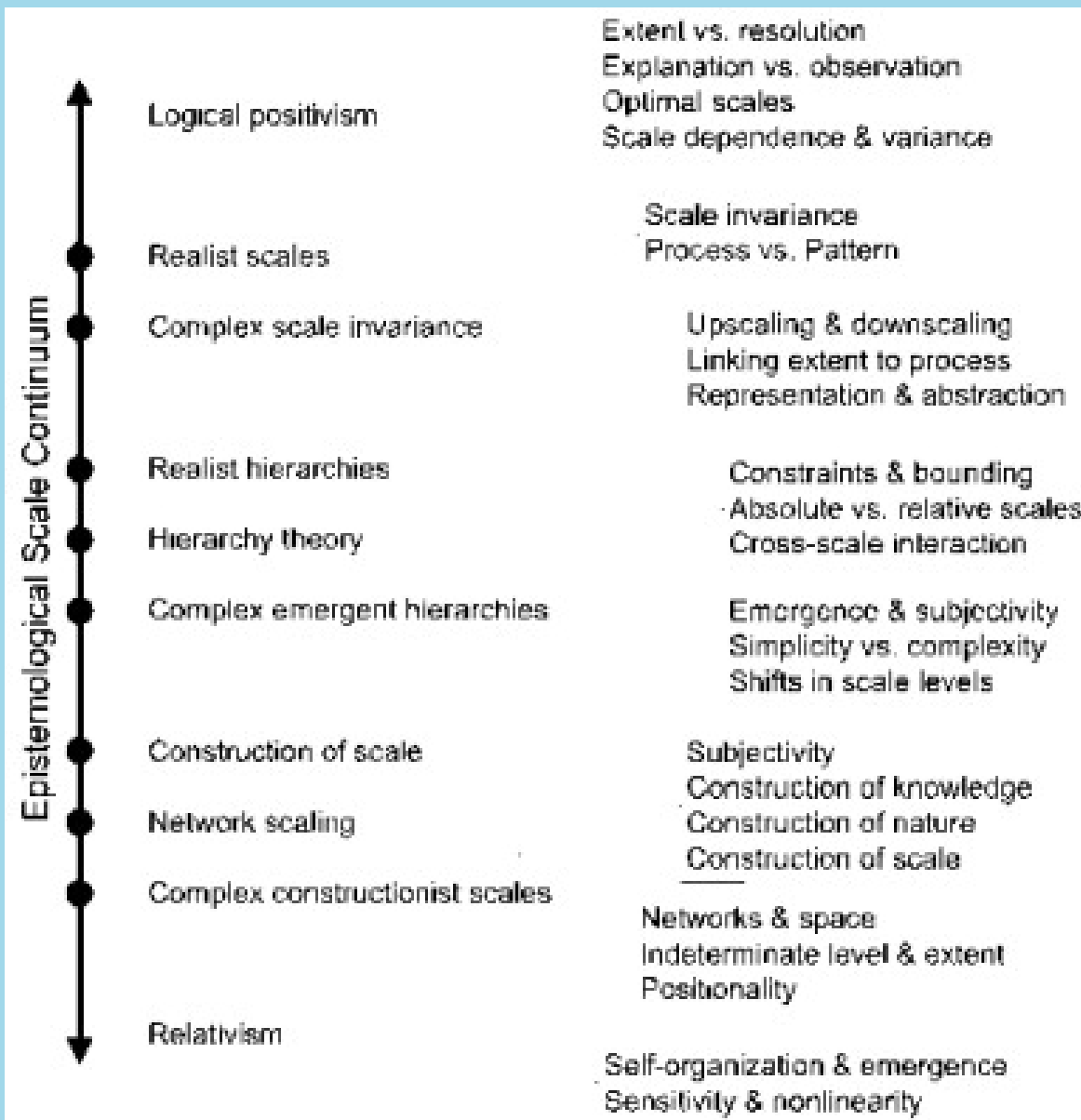
- Extend description or explanation into unmeasured space
- Stationarity: the rules governing a process do not *drift* over space-time



# Conceptual challenges

# Scale

What do we even mean?

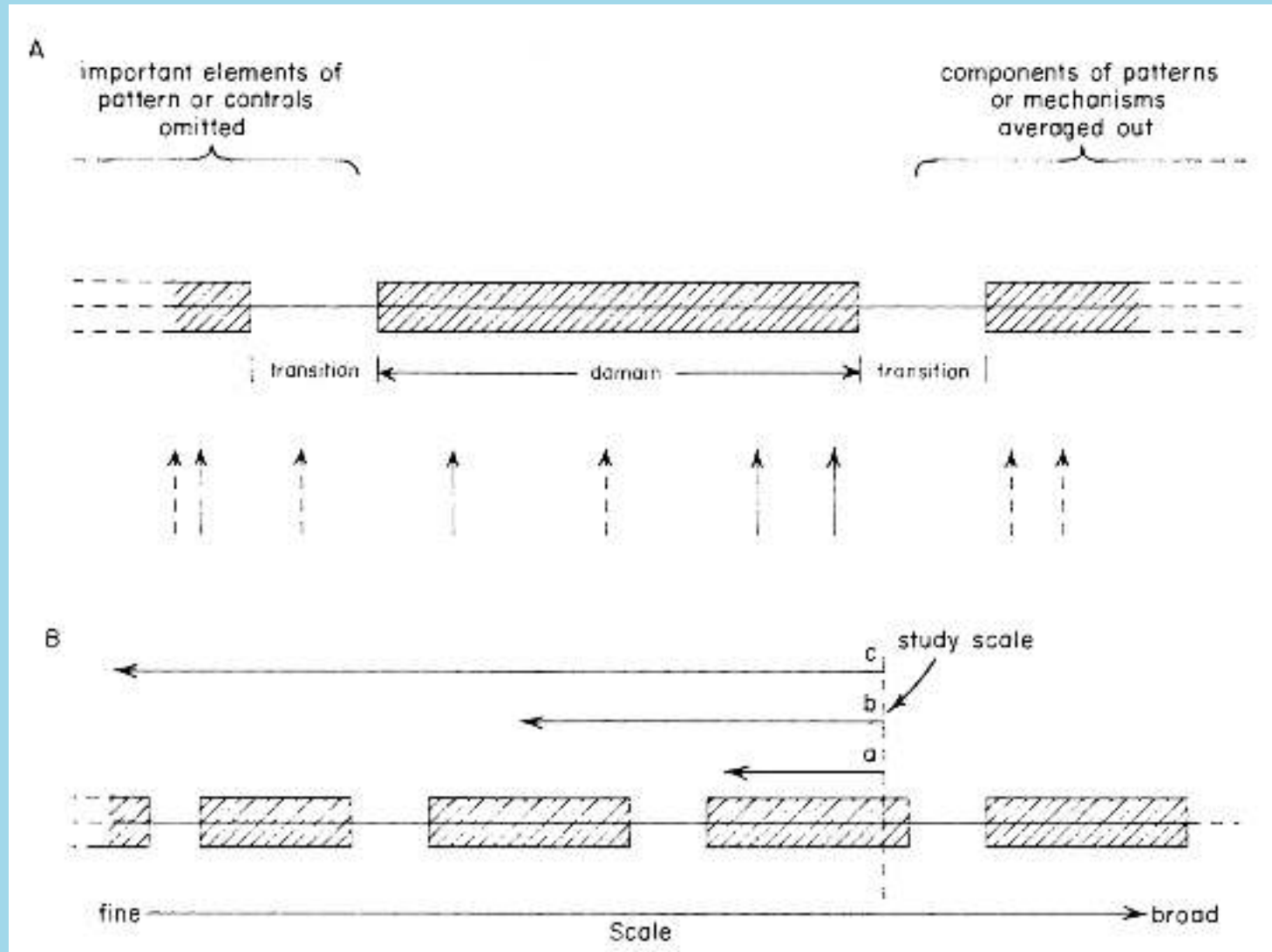


- **Grain:** the smallest unit of measurement
- **Extent:** the areal coverage of the measurement

From Manson 2008

# Scale

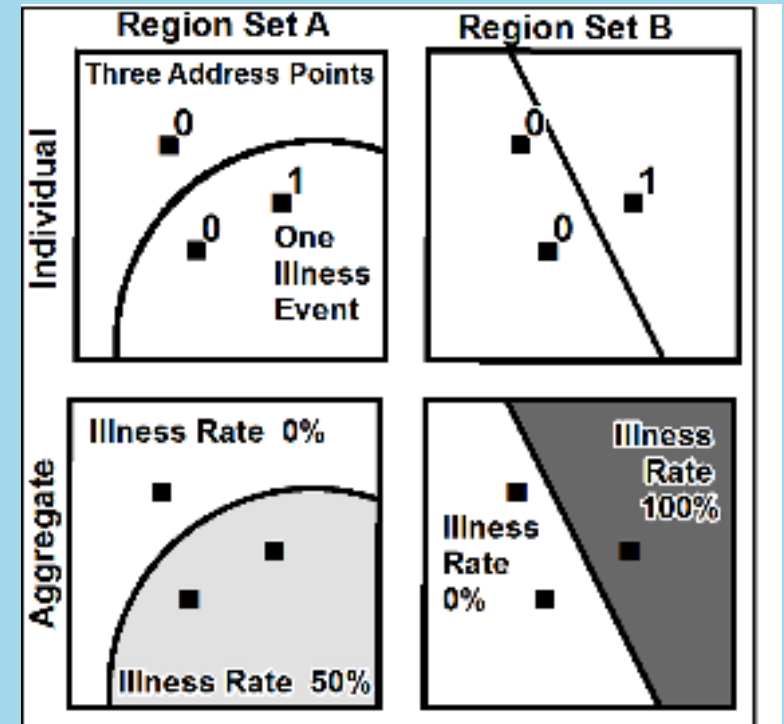
Even if it exists, how do we know we are measuring at the *right* scale?



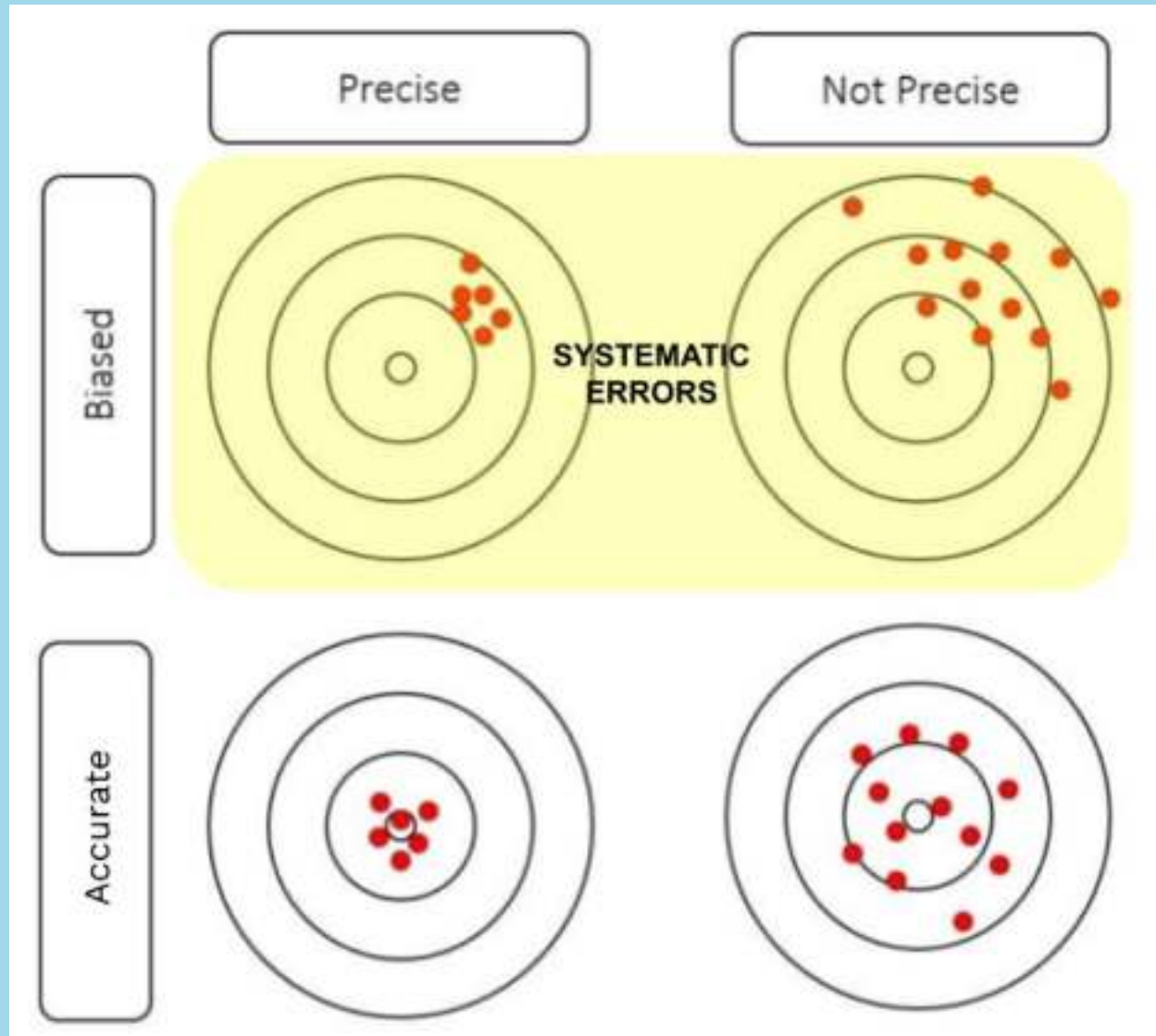


# Fallacies

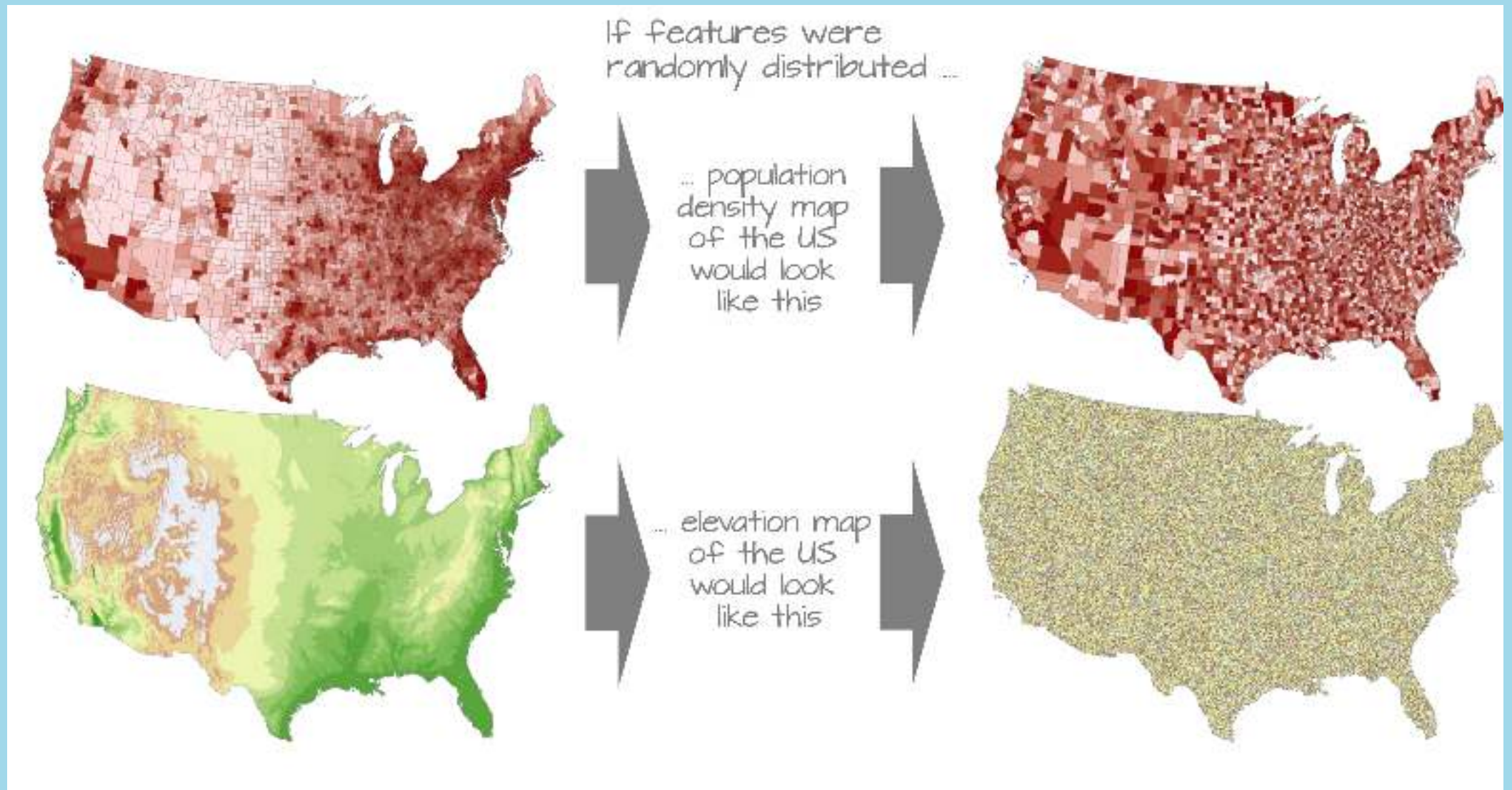
- **Locational Fallacy:** Error due to the spatial characterization chosen for elements of study
- **Atomic Fallacy:** Applying conclusions from individuals to entire spatial units
- **Ecological Fallacy:** Applying conclusions from aggregated information to individuals



# Measurement Error and Mismatch



# Spatial Autocorrelation

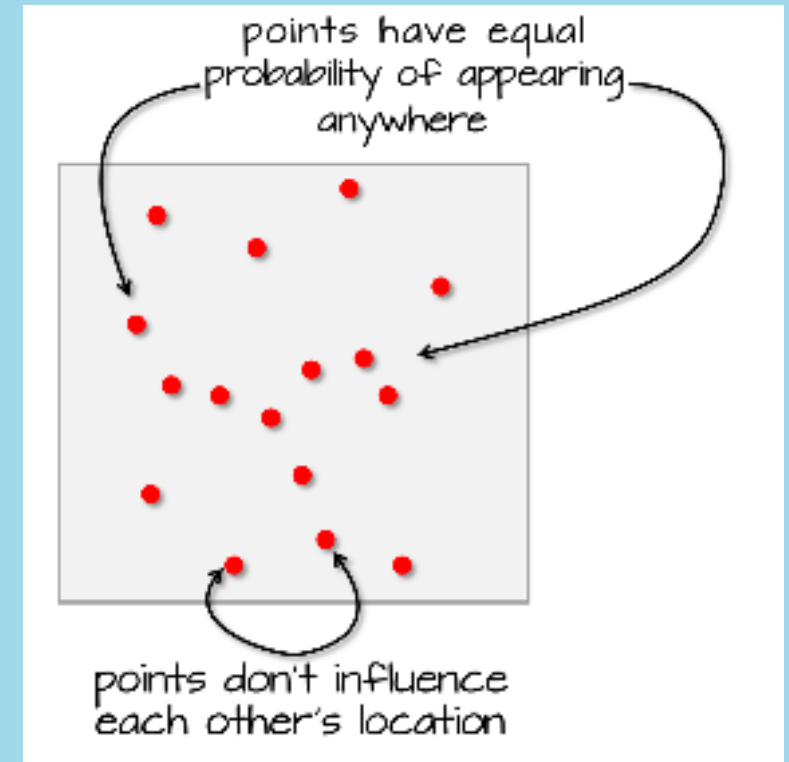


From Manuel Gimond

# Stationarity

The rules governing a process do not *drift* over space-time

- **First Order** effects: any event has an equal probability of occurring in a location
- **Second Order** effects: the location of one event is independent of the other events



From Manuel Gimond

# Key Critiques



# Not all geography needs to be quantitative

1. Abstraction removes the interesting part
2. What “is” may require assumptions we don’t want to accept
3. Wholly dependent on the military-industrial complex

# Wrapping Up

1. Themes in geography
2. Description, explanation, prediction
3. Key challenges and critiques

