Spatial Thinking: The Analytical Skills of Geography
Primary goals of studying Geography

1. Conditions at places: why people in particular places act the way they do

2. Connections between places
Purpose of this Chapter

- To convey implications of current research about brain anatomy & physiology
- To show specific ways teachers can help students engage the “brain regions” that do various kinds of spatial thinking
Spatial Thinking - Advantages

Recent brain-scanning research seems to say that the human brain has several "regions" that are structured to do spatial thinking.

And that memories are more likely to persist when multiple brain regions are engaged.

Deliberately engaging the spatial-thinking areas as part of our teaching is therefore likely to promote better learning of geography.
8 Modes of Spatial Thinking

- Comparison
- Aura
- Region
- Transition
- Hierarchy
- Analog
- Pattern
- Association
Location

Where is it?  Why is it there?

These are the fundamental questions that make an investigation geographic, as opposed to historic, scientific, etc.

**BUT**

... they are very hard to answer without applying some specific skills that are usually called spatial thinking.
Conditions

What is it like there?

What can you see, hear, smell, feel, etc. at that particular location?

- CLIMATE
- LANDFORM
- ETHNICITY
- POPULATION DENSITY
- LAND USE
- VEGETATION
- ART
- RELIGION
Connections

How is this place linked to other places?

What natural processes and human features help connect this place with others?

- River
- Wind
- Slope
- Railroad
- Canal
- Family
- Corporation
- Internet
- Government
Comparison

How does this place compare with that one?

- Difference
- Density
- Ratio
- Comparing Index
- Scaled Symbol Map
- Bar Graph
- Pie Graph
- Choropleth Map
Comparison

How does this place compare with that one?

Bangladesh is roughly the same size as Iowa, but it has 50 times as many people.

What state (or other familiar area) is comparable to the country you are studying today?

Would a comparison be the same if you did it from a different perspective, e.g. old/young, male/female, black/white?
Aura

How does the presence of something in this place affect other places nearby?

- Smoke plume (pollution)
- Park (amenity)
- Heat island (health)
- Transit station (access)
- Eyesore (view)
- Major employer (land value)
- Missile (threat)
Aura (influence)

How does the presence of something in this place affect neighboring places?

Which global cities are within the aura of a nuclear missile in North Korea?

__ Beijing
__ Hong Kong
__ Seoul
__ Shanghai
__ Taipei
__ Tokyo
Region

Identify a group of places that are
- similar to this place in some way, or
- connected to this place in some way
(and draw a line around them).

- Climate Region
- Farming Region
- Fire Hazard Region
- Great Plains
- Enterprise Zone
- Puerto Rican Neighborhood
- Channel 2 Television Market
Region

Identify places that are
- like this place in some way, or
- connected to it in some way.

Students could simplify this map by tracing the outline of the cropland region onto another blank map.
Transition

What is the nature of the change between this place and that one over there?

- Steep Cliff
- Gradual Rise
- Series of Steps
- Profile Graph
- Isoline Map
- Border Effect
- Uniform Slope
Transition

What is the nature of the change between this place and another one?

Students can draw side-profile graphs to show the change in land elevation as you cross a ridge such as this one at Harpers Ferry.
Hierarchy

What larger area is this one inside?
What smaller areas are inside it?

- Country
- States
- Counties
- Watershed
- Subwatersheds
- Individual slopes
- Hospital
- Clinics
- Doctors
- Soil region
- Associations
- Local map units
- Port
- Warehouses
- Stores
Hierarchy

What larger area is this area inside?
What smaller areas are inside it?

Students could explore the idea of hierarchy

- in political geography by listing the governments that have jurisdiction over a particular place
- in physical geography by tracing a local stream all the way to the ocean.
Analogy

Are there places that have similar situations (e.g., on different continents, mountains, cities, etc.) and therefore might have similar conditions?

- Mediterranean Climates
- Railroad Suburbs
- Watergaps Thru Ridges
- Border Crossings
- Fjorded Coasts
- South-Facing Slopes
- Gentrifying Neighborhoods
Analogy

New York City and Seoul, Korea, have similar latitudes and positions on their continents. Not surprisingly, they have similar climates.
Pattern

Is the spatial arrangement of things random, or does it have a pattern?

- RINGS, DONUTS
- CLUSTERS
- STRINGS
- PAIRS, TRIOS, ETC.
- ALIGNMENTS
- EVEN SPACING
- BIASES, IMBALANCES

Association of American Geographers, 2008  www.aag.org
Pattern

Do Israeli settlements on the West Bank have a spatial pattern that is not random?

If so, is there a plausible reason that might explain their arrangement?

Association

- What features usually occur together?
- What features seldom occur together?

- Mosquitoes and Malaria
- Malls and Freeways
- Factories and Theaters
- Schools and Playgrounds
- Faults and Earthquakes
- Courthouses and Law Offices
- Hog Feedlots and Hotels
Association

What features tend to occur together?
Which of these six "bugs" occurs in the same areas as malaria and therefore is a plausible carrier of the disease?
3 Spatio-Temporal Dimensions

- Change
- Movement
- Diffusion
Change

How has this place changed through time?
What were its conditions/connections before and after:

- City expanded
- Colonists arrived
- Election
- Earthquake
- Hurricane
- New mall
- Factory closed
- Terrorist attack
- Glacier receded
Change

How has this place changed through time?
(Which three buildings remained when a new freeway was built?)
Movement

How do things change position through time?

PETROLEUM TRADE
BIRD MIGRATION
HURRICANE
COMMUTER TRAIN
CLOTHING FACTORY
MOUNTAIN CLIMBER
OCEAN CURRENT
ENEMY ARMY
CENTER OF POPULATION
Movement

How do things change position through time?
(Where does oil used in the United States come from?)

500M bbl/y

US Production: 3B bbl (45%)
Diffusion

Has something expanded through time (or shrunk, or changed position)?

URBAN AREA
CROPLAND
MAD COW DISEASE
OZONE HOLE
ZEBRA MUSSEL
OZONE HOLE
REPUBLICAN MAJORITY
FLOOD PRONE AREA
Polar ICECAP
Diffusion

Has something expanded through time?

Expansion of European Settlement 1600-1900
(Darker shading indicates older settlements)
Building Spatial Models

- A scientific statement of how we think things might be related in space
- Usually involves applying several spatial-thinking skills to different aspects of a big problem
- Long-distance connections
- Things that happen in 1 part of world can affect other places
Spatial Model

What processes allow conditions or events that occur in one place to have effects on other places, perhaps far away?

- Forest clearing and urban floods
- Crop failures and emigration
- El Nino near Peru and drought in Canada
- Terrorism and tourism
- Interest rates and trade
Exceptions

Where are the places in which things do NOT "follow a rule" observed elsewhere?

- RESIDENTIAL AREAS WITH NO PARKS
- SWAMPS WITH FEW MOSQUITOES
- RIVER FLATS WITH NO FLOODS
- COMMERCIAL FARMS RUN BY WOMEN
- DESERTS NEAR THE EQUATOR
- HIGH MOUNTAINS WITH LITTLE SNOW
- HILLY SUBURBS WITH TINY HOUSES
Critical Thinking Questions

1. What is the connection Gersmehl makes between the brain research he presents & teaching Geography?

2. Which of the 8 Modes of Spatial Thinking &/or the 3 Spatio-Temporal Thinking dimensions do you think best connects to the teaching of U.S. History? Why? Give an example of an activity.

Tactics for Teaching Spatial Thinking

Here are some examples of lesson topics:

Analogy - Spain and California, NY and Seoul
Transition - terrain around Harper's Ferry
Association - malaria and mosquitoes
Connection - oil pipelines near the Caspian
Aura - range of a missile from North Korea
Comparison - countries and familiar states
Diffusion - spread of Plague in Europe
Get back into your groups…

**Lesson Plan Part B Task:**
Help each other come up with a specific geographic activity using the 8 Modes of Spatial Thinking &/or the 3 Spatio-Temporal Thinking Dimensions for your lesson/content standard that will help students answer your Essential Question.