CHAPTER 2

Spatial Concepts and Geographic Analysis

Topics 1.4–1.7

Topic 1.4 Spatial Concepts

Learning Objective: Define the major geographic concepts that illustrate spatial relationships. (PSO-1.A)

Topic 1.5 Human-Environmental Interaction

Learning Objective: Explain how major geographic concepts illustrate spatial relationships. (PSO-1.B)

Topic 1.6 Scales of Analysis

Learning Objectives: Define scales of analysis used by geographers. (PSO-1.C)
Explain what scales of analysis reveal. (PSO-1.D)

Topic 1.7 Regional Analysis

Learning Objective: Define different ways that geographers define regions. (SPS-1.A)

A lot of these regional boundaries are porous and messy, allowing for a rich diversity of cultural flow. But knowing how we interact as part of a complex society, instead of only looking at political borders, can explain a lot more than we might have imagined.

—Samuel Arbesman, Bloomberg.com, 2012

Source: Getty Images

Much of the Netherlands has been reclaimed from the sea. Wind turbines were built on *polders* along highway A6 of the country's west coast, and are one of the most recognizable elements of the built environment. (See Topic 1.5 for more on how humans interact with the environment.)

1.4

Spatial Concepts

Essential Question: What are the major geographic concepts that illustrate spatial relationships and patterns?

A **spatial approach** considers the arrangement of the phenomena being studied across the surface of the earth. This approach focuses on things such as location, distance, direction, orientation, flow, pattern, and interconnection. A spatial approach also looks at elements such as the movements of people and things, changes in places over time, and even human perceptions of space and place. Using Four-Level Analysis from Unit 1 Overview, geographers ask and attempt to answer questions about spatial distributions such as these:

- Why are things where they are?
- How did things become distributed as they are?
- What is changing the pattern of distribution?
- What are the implications of the spatial distribution for people?

Major Geographic Spatial Concepts

Historians look through the lens of time to understand the past. Similarly, geographers look through the lens of **space** to understand place. Space is the area between two or more phenomena or things. Space is at the heart of geography and geographers are intensely interested in how space is arranged, used, and reflected in people's attitudes and beliefs.

Location

Location is an important spatial concept to geographers. (See Topic 1.1.) **Location** identifies where specific phenomena are located either on a grid system or relative to another location. The concepts of absolute and relative location are essential to define the amount of space and relative or absolute distance between locations. Additionally, geographers use the concepts of place, site, and situation to further develop an understanding of a specific location.

Place

Place refers to the specific human and physical characteristics of a location. A group of places in the same area that share a characteristic form a **region**. (See Topic 1.7 for more about regions.)

Two ways to refer to place are its site and situation. **Site** can be described as the characteristics at the immediate location—for example, the soil type, climate, labor force, and human structures. In contrast, **situation** refers to the

location of a place relative to its surroundings and its connectivity to other places.

The site of Riyadh, the capital and most populated city in Saudi Arabia, is a desert climate, a large labor force, and a modern Islamic city. The city's situation includes being located roughly in the center of the Arabian Peninsula. The situation of the Arabian Peninsula is between the continents of Africa and Asia and Riyadh is connected to the world with a large modern airport. Another example of how situation can change relates to when the interstate highway system was created in the United States in the 1950s. The situation of many small towns changed dramatically. Towns along old railroad lines became less important as centers of trade, while towns along the new interstate suddenly became more important.

Sense of Place Related to the concept of place is a **sense of place**. Humans tend to perceive the characteristics of places in different ways based on their personal beliefs. For example, the characteristics of Rome, Italy, might be described differently by a local resident than by an outsider or by a Catholic than by a Hindu. If a place inspires no strong emotional ties in people or lacks uniqueness, it has placelessness.

Toponyms Finally, locations can also be designated using **toponyms**, or place names. Some toponyms provide insights into the physical geography, the history, or the culture of the location. The entire coast of Florida is dotted with communities with "beach" in the name—Fernandina Beach, Miami Beach, Pensacola Beach—all of which are on beaches. Iowa is named for a Native American tribe. Pikes Peak is named for an explorer, Zebulon Pike.

Sometimes toponyms get confusing. Greenland is icier than Iceland, while Iceland is greener than Greenland. And some toponyms are deceiving. Lake City, Iowa, is not on a lake, and few people consider Mount Prospect, Illinois, a mountain—at an elevation of only 665 feet above sea level. Toponyms are often created to inspire an ideal view of a location, memorialize an event or person, or even to express power and ownership and can be full of controversy and disagreement. One such controversy involved the debate over the name of the tallest mountain in the United States. Should the Alaskan mountain take the name Mt. McKinley after the former U.S. President, William McKinley? Or Denali, the name from the traditional Native American Koyukon language, meaning Great One? In 2015, President Obama restored the mountain's name back to Denali.

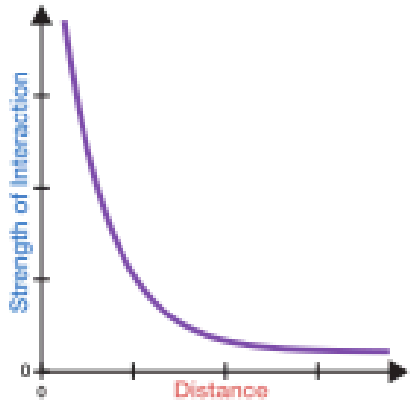
Distance and Time

Distance (see Topic 1.1) can be measured in terms of absolute or relative distance. **Time-space compression** is the shrinking "time-distance," or relative distance, between locations because of improved methods of transportation and communication. New York City and London are separated by an ocean, but the development of air travel greatly reduced travel time between them. As a result, they feel much closer today than they did in the 19th century even though the absolute distance of 3,500 miles has not changed.

One result of time-space compression is that global forces are influencing culture everywhere and reducing local diversity more than ever before. In the 19th century, the mountainous regions of southeastern Europe were famous for the local variations in their music. Today, because of radio, Internet, and other changes, people in southeastern Europe listen to the same music as everyone else in the world.

The Impact of Distance The increasing connection between places is reflected in the growth of **spatial interaction**. Spatial interaction refers to the contact, movement, and flow of things between locations. Connections might be physical, such as through roads. Or they can be through information, such as through radios or Internet service. Places with more connections will have increased spatial interaction. **Flow** refers to the patterns and movement of ideas, people, products, and other phenomena. You will learn about specific flows in every unit and apply Four-Level Analysis to better understand the flows of culture, migration, and trade in the world.

The **friction of distance** indicates that when things are farther apart, they tend to be less connected. This inverse relationship between distance and connection is a concept called **distance decay**. A clear illustration of this concept is the weakening of a radio signal as it travels across space away from a radio tower. Friction of distance causes the decay, or weakening, of the signal. Natural characteristics like waves, earthquakes, and storm systems exhibit the distance-decay function. Human characteristics also exhibit distance decay, although the key issue is more accurately described as connectedness than distance. When a new pet store opens, its influence is strongest in the area closest to the store but only among the pet owners who have a connection to the store. Improvements to infrastructure, such as transportation and communication, have reduced the friction of distance between places as they have increased the spatial interaction.



Declining Influence of Distance Concepts such as accessibility and remoteness are changing. The world is more spatially connected than ever before in history. The Internet can be used to illustrate several of these concepts. It allows a person living in El Paso, Texas, to shop at a store in New York City (via its website) and receive a product shipped from a warehouse in Atlanta, Georgia. Distance decay is less influential than it once was.

Patterns and Distribution

Patterns (see Topic 1.1) refer to the general arrangement of things being studied, and geographers must be able to describe patterns accurately and with precision. Geographers often use the concept of **distribution**, the way a phenomenon is spread out or arranged over an area to describe patterns.

Geographers look for patterns in the distribution of phenomena across space that give clues about causes or effects of the distribution. Common distribution patterns include but are not limited to the following: clustered, linear, dispersed, circular, geometric or random. (See Topic 1.1 for more on distribution patterns.)

Matching patterns of distribution is called **spatial association** and indicates that two (or more) phenomena may be related or associated with one another. For example, the distribution of malaria matches the distribution of the mosquito that carries it. However, just because two distributions have a similar pattern does not mean one is necessarily the cause of the other. The distribution of bicycle shops in a large city might be similar to the distribution of athletic wear stores—but one probably does not cause the other. They both might reflect the distribution of active people.

1.5

Human-Environmental Interaction

Essential Question: How do human-environmental interaction and major geographic concepts explain spatial relationships and patterns?

The dual relationship between humans and the natural world is at the heart of human geography. The connection and exchange between them are referred to as **human-environmental interaction**. Geographers who focus on how humans influence the physical world often specialize in studying sustainability, natural resources, land use pollution, and environmental issues. But the environment can also have large influences on humans, so geographers also study the impacts of this interaction and how people respond. Topics of natural hazards, physical geography, water scarcity, poor soil, extreme climates, and a changing climate are often discussed and analyzed.

Geographic Concepts

Human-environmental interaction can be understood through the geographic concepts of natural resources, sustainability, and land use.

Natural Resources

The world is made up of mostly neutral matter that is of little value to people, but that matter is considered a resource is when it becomes useful or beneficial to people. The term **natural resource** includes items that occur in the natural environment that people can use. Examples usually include air, water, oil, fish, soil, and minerals.

Natural resources are usually classified as either renewable or non-renewable resources. **Renewable natural resources** theoretically are unlimited and will not be depleted based on use by people. **Non-renewable natural resources** are limited and can be exhausted by human uses. These resources are often discussed in terms of energy resources to power the world's societies but also include uses related to human consumption, agriculture, and building materials.

The world's natural resources are not distributed evenly—some countries have abundant natural resources, while others have few. In addition, the level of development of a country may influence whether a group of people can gain access to the resources within their borders because they lack the technological tools or finances to acquire and utilize the resources. This uneven access to resources can have an impact on cultures, political systems, and the rate of economic development from the local to global scale.

NATURAL RESOURCES	
Renewable Natural Resources	**Non-Renewable Natural Resources**
• Air: wind power • Water: surface water and hydro-electric • Solar: sun's energy • Biomass: organic material from plants and animals; examples include wood, crops, and sewage	• Fossil fuels: from a biological origin; examples include petroleum, natural gas, and coal • Earth minerals: natural inorganic substances; examples include gold, copper, and silver • Underground fresh water: from deep aquifers • Soil

Sustainability

Sustainability is an overarching theme of human geography and relates to trying to use resources now in ways that allow their use in the future while minimizing negative impacts on the environment. Sustainable development policies attempt to solve problems stemming from natural resource depletion, mass consumption, the effects of pollution, and the impact of climate change. Geographers are concerned with sustainability issues because of the influence that people have on the environment at the local, regional and global scale. An example of a sustainable policy would be to encourage companies to increase the use of renewable, less air-polluting energy sources and decrease the use of non-renewable fossil fuels.

Land Use

The study of how land is utilized, modified, and organized by people is the essence of **land use**. Geographers study the patterns of this land use and draw conclusions on the reasons for the specific use and the varying impacts on the environment, landscapes, and people. The word "environment" is usually a reference to nature and natural things. Plants, air, water, and animals are all part of the natural environment.

Human geographers consider the **built environment**, the physical artifacts that humans have created and that form part of the landscape, in their understanding of land use. Buildings, roads, signs, farms, and fences are examples of the built environment.

The architectural style of buildings varies from place to place. Think of typical homes and buildings in China, and then think of homes and buildings in Germany. These differences occur because people with different cultures who live in different physical landscapes will construct buildings, roads, and other elements to create a unique built environment. Anything built by humans is part of the **cultural landscape** and is in the realm of land use.

Theories of Human-Environmental Interaction

The study of how humans adapt to the environment is known as **cultural ecology.** The belief that landforms and climate are the most powerful forces shaping human behavior and societal development while ignoring the influence

of culture is called **environmental determinism**. In the 19th and early 20th centuries, geographers developed a theory using environmental determinism to argue that people in some climates were superior to those of other climates. The theory is largely discredited because of its reliance on the use of Europe as a case study and it does not account for the rise of non-European powers such as China today and in the past. Additionally, the theory is usually criticized for overstating the role of the environment in the development of and the success or failure of a country or society.

In reaction to environmental determinism, contemporary geographers developed a theory known as **possibilism**, a view that acknowledges limits on the effects of the natural environment and focuses more on the role that human culture plays. Different cultures may respond to the same natural environment in diverse ways, depending on their beliefs, goals, and available technologies. Possibilism views humans as having more power and influence over their circumstances than the environment. Societies may face environmental challenges of fewer natural resources or harsh environments, but people can overcome these limitations with ingenuity and creativity.

The Netherlands, with nearly 35 percent of its land below sea level, is an example of possibilism in action. The threat of floods and rising sea levels is a legitimate challenge to the country. For centuries, the Dutch have developed a water management system of dykes (dams), walls, canals, and pumps. These developments allow low-lying land to be reclaimed from the sea (creating *polders*), keeping land suitable for settlement or agriculture.

1.6

Scales of Analysis

Essential Question: What are scales of analysis, and what do they reveal to geographers?

Scale of analysis, or level of generalization, allows geographers to look at the local, regional, country, or global scale and is one of the most powerful concepts in geography. **Geographic scale**, sometimes called **relative scale,** refers to the area of the world being studied. For example, global scale means a map of the entire planet, showing data that covers the whole world. In contrast, local scale means using a map of a city or neighborhood to study local issues. Geographers often zoom in and out of maps that use different scales in order to see the patterns that exist at each scale. In addition, the reasons patterns exist can often be explained differently depending on the scale of analysis. A rise in unemployment might be shaped by global forces at a global scale or by local forces at a local scale.

Different Scales of Analysis

Changing scale of analysis involves studying phenomena by zooming in and zooming out in order to develop a more complete understanding of the topics being studied. Geographers will reference a continuum of different scales running from global, regional, national, and local. Each of these scales will show more or less area on the map.

SCALES OF ANALYSIS

Scale	Area Shown	Examples
Global	The entire world	• Global Earth at night image • world population density map
World Regional	Multiple countries of the world	• North America • South Asia
National	One country	• the United States • Thailand
National Regional	A portion of a country or a region(s) within a country	• the Midwest • eastern China
Local	A province, state, city, county, or neighborhood	• Tennessee • Moscow

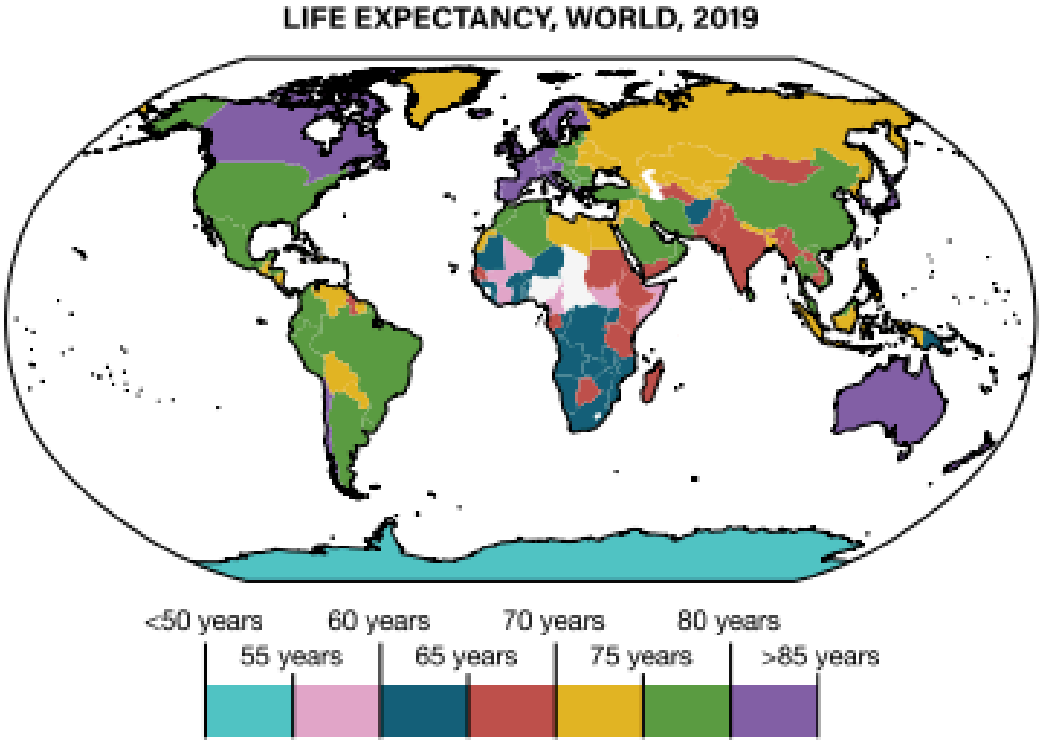
Data Aggregation

While the geographic scale of a map is important, it is only half of the story. Understanding the scale of the data is just as important. Data on maps can also be organized, or aggregated, at different scales. **Aggregation** is when geographers organize data into different scales such as by census tract, city, county, or country. This allows the data to be more easily mapped or organized in a chart or graph.

Importance of Scales of Analysis

Geographers seek to identify patterns, but patterns may differ depending on the scale of analysis. In order to fully understand a topic in depth, geographers must be able to analyze and understand the patterns and processes at multiple scales of analysis. A world map with data aggregated by country can be used to identify global patterns. The world is more interconnected than ever, and looking for trends and patterns on a global scale can help geographers study real world circumstances.

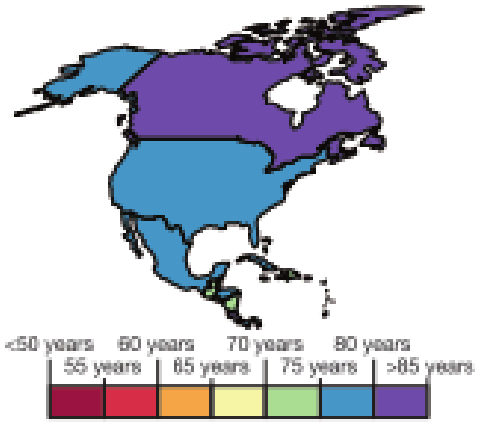
The "2019 Life Expectancy" map shows a variety of patterns of where life expectancy is high, medium, or low. The life expectancy in most African countries is less than 65 years, while in most of North America, the life expectancy is more than 75 years. This is an example of using a global scale map to describe world regional scale patterns. However, this map does not show a complete picture of life expectancy and doesn't allow for a local analysis of the data.



Source: ourworldindata.org

Use this map to practice Four-Level Analysis—specifically levels 1 and 2. What is the scale of the map? What is the scale of the data? Describe a global and regional pattern visible on the map.

LIFE EXPECTANCY, NORTH AMERICA, 2019



Source: ourworldindata.org

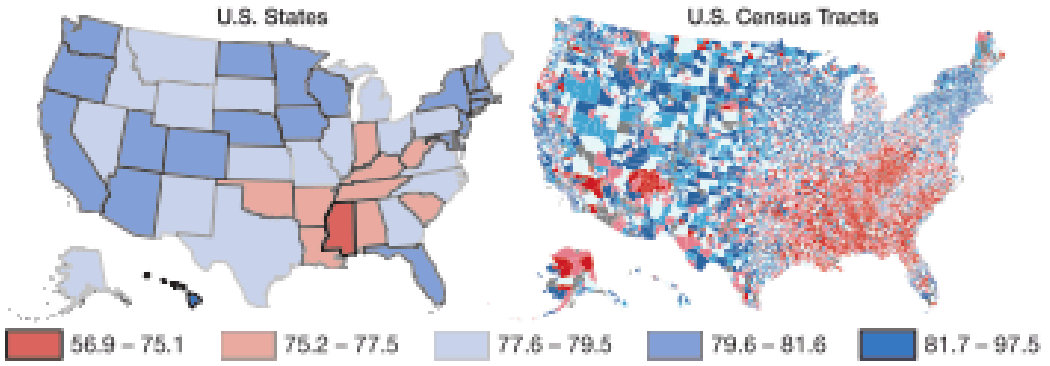
This is a zoomed-in map of North America showing the world regional scale with data aggregated by country. What are the benefits of zooming into this scale of analysis?

Zooming in to a Map and Data

If geographers want to dig deep into the data and discover patterns about the different states, regions, or local communities of the United States, the maps above do not work because the scale of the data is too generalized. The solution is to find data or maps that zoom in to different scales of analysis to study the data. Both maps below are national scale maps of the United States, but the data is aggregated by U.S. state (left) and by county (right). Using these maps, we can see patterns of life expectancy by regions of the United States, individual states, or even the local scale.

According to the U.S. Center for Disease Control (CDC), the average life expectancy in the United States for 2020 was 77.8 years but the variation of life expectancy in the country varied greatly depending on where you live. By zooming in farther, all the way to the neighborhood or census tract scale, more localized patterns can be studied. If a particular neighborhood has a much lower life expectancy, this might require a state or local government to investigate why.

LIFE EXPECTANCY AT BIRTH



Source: Centers for Disease Control and Prevention

What regions of the United States tend to have life expectancies above the national average? Below? What are the benefits of using the map aggregated by counties?

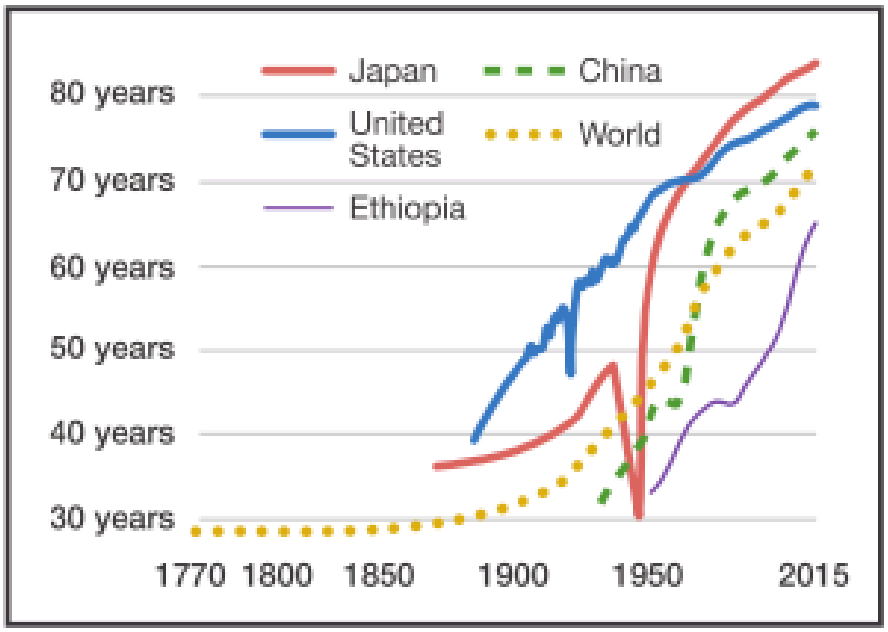
Graphs and Other Visuals

The concept of scale of analysis can also be used on charts, graphs, or other visualizations. The process is essentially the same for charts and graphs as it is for maps—look at the data set and attempt to understand the data at different scales. Graphs often show change over time, but pay attention to the scale of the data for clues as to why the changes occurred.

The graph below shows trends in life expectancy for select countries and the world. Part of the data is aggregated by country, while part of the data is aggregated at the world scale. A reasonable global scale pattern description would be that the world's average life expectancy increased from 30 years in 1850 to over 70 years in 2015. A national scale pattern would be that U.S. life expectancy steadily increased from 40 years in the late 1800s to nearly 80 years in 2015. The graph below does not really support any regional or local analysis because the data lack the detail required for these scales of analysis.

When viewing images, it is also appropriate to apply scale of analysis. Consider what is being shown in an image and the limits of what you can see in the image. Is it a picture of a local landscape of a neighborhood, or is it showing a larger aerial photo of an entire city or region of the world?

LIFE EXPECTANCY, 1770 TO 2015



Source: ourworldindata.org

Different Interpretations of Data

Drawing conclusions and generalizations based on patterns in data sources is a critical skill, but be careful with your conclusions. It is easy to draw **false conclusions**, or inaccurate generalizations, that are not supported by the data or logical reasoning. Accurate conclusions need to be supported with accurate

and scale-appropriate data. An example of a false conclusion would be to use national U.S. data to support that life expectancy in your local community is increasing. To avoid false conclusions, consider the following questions:

- Is the conclusion supported by the scale of the data?
- Is the scale of the conclusion appropriate for the scale of the data?
- Is the data accurate and trustworthy?
- Is there other data that could support or negate the conclusion?

It is possible that different interpretations of data can occur depending on the scale of the data. Recall the graph above related to life expectancy. The global trend of life expectancy between 1940–1950 was increasing; however, the life expectancy of Japan during the same time frame dropped dramatically. Which conclusion is true? Both are correct because the answers change based on the scale and time frame of analysis. Geographers must be precise and accurate for their conclusions to be accurate and use scale-appropriate data to support their reasoning.

1.7

Regional Analysis

Essential Question: What are the ways geographers define regions?

Geographers often find it necessary to divide and categorize space into smaller areal units. This regionalization process is much like how a writer divides a book into chapters and then names (or classifies) them. **Regions** have boundaries, unifying characteristics, cover space, and are created by people. What makes identifying regions challenging is that they are often dynamic, and the boundaries can change depending on who defines them and the scale of analysis used. Often the boundaries of regions overlap, which can result in tension or disagreements.

Types of Regions

Regions can exist at every scale of analysis from the local to the global. Geographers classify regions into one of three basic types—formal, functional, or perceptual.

Formal Regions These are sometimes called **uniform regions**, or **homogeneous regions**, and are united by one or more traits:

- political, such as Brazil in South America
- physical, such as the Sahara, a vast desert in northern Africa
- cultural, such as southwestern Nigeria, an area where most people speak Yoruba
- economic, such as the Gold Coast of Africa (Ghana), which exports gold

Functional Regions These regions are organized around a focal point and are defined by an activity, usually political, social, or economic, that occurs across the region. Functional regions or **nodal regions** are united by networks of communication, transportation, and other interactions:

- Pizza delivery areas are functional regions; the pizza shop is the node.
- A state or country is a political functional region because its government makes regulations that apply within its boundaries; the capital city is the political node.
- An airport is a node, and the locations that flights connect form a functional region.

A necessary part of any functional region is the flow of some phenomenon across the networks that unite the region, whether the flow is visible (cars delivering pizza using roads) or invisible (political and legal authority from the capital city).

Perceptual Regions Perceptual regions differ from formal and functional regions in that they are defined by the informal sense of place that people ascribe to them. The boundaries of perceptual regions vary widely because people have a different sense of what defines and unites these regions. The American South, the Middle East, and Upstate New York are examples. While all of these regions exist, their exact boundaries depend upon the person who is defining them. Perceptual regions are also known as **vernacular regions**.

World Regions

In the same way that historians divide history into eras and periods, geographers divide the world into regions and subregions. One type of large region is a continent. However, dividing the world into continents is not simple. Are Europe and Asia two continents or one? Where is the dividing line between North and South America? Is Greenland its own continent? Notice that all of the maps shown in this topic are global scale but the aggregation or classifications within the maps change.

Large World Regions

The following map shows the ten large regions used in AP® Human Geography. It includes the seven continents that are based on physical features. It also includes three cultural regions that are based on shared languages and histories:

- Central America is part of North America, but its culture is more influenced by Spain and Portugal than by Great Britain and France.
- Sub-Saharan Africa is distinguished from the rest of Africa.
- The Russian Federation spans eastern Europe and northern Asia.

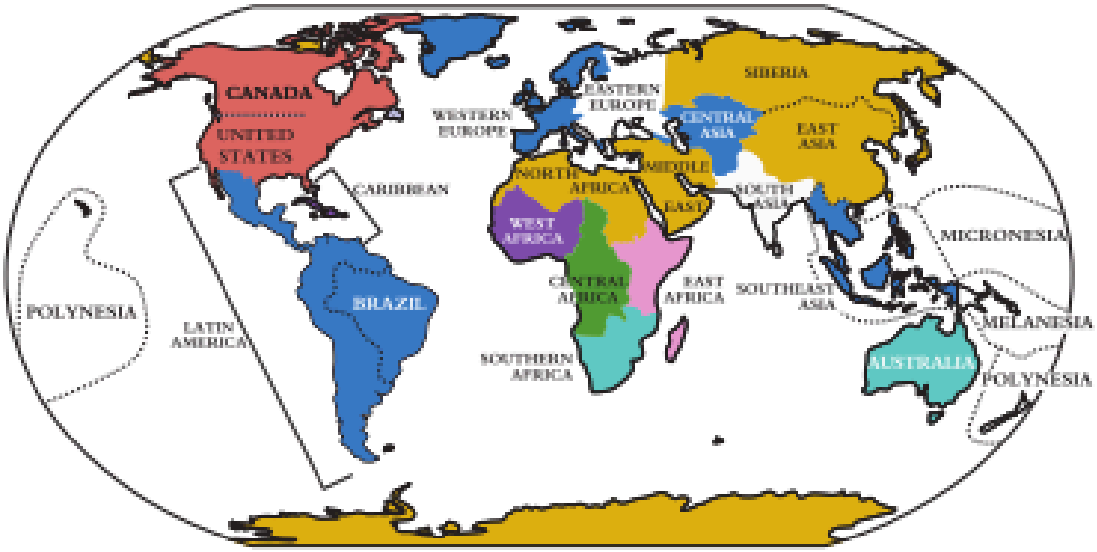
WORLD REGIONS: A BIG PICTURE VIEW

World Subregions

Geographers divide regions into smaller areas, or **subregions**. A subregion shares some characteristics with the rest of the larger region but is distinctive in some ways. For example, the region of Latin America covers parts of North and South America, from Mexico to Chile. Within it is the subregion of Brazil. As in other Latin American countries, most people in Brazil are Roman Catholics. However, Brazil's primary language is Portuguese, which makes it unlike any other country in the mostly Spanish-speaking Latin America. Because of its language, Brazil is a distinct subregion.

The map below shows the standard subregions used in AP® Human Geography. For example, Sub-Saharan Africa is subdivided into West, Central, East, and Southern Africa. Asia is divided into five subregions: Middle East, Central Asia, South Asia, East Asia, and Southeast Asia.

WORLD REGIONS: A CLOSER LOOK



National, Subnational, and Local Regions

By changing the scale and zooming in, subregions can be even further divided. The further subdivisions can be based on elements of physical geography—such as climate and landform—or human geography—such as culture, politics, or economics. Western Europe can be divided into Northwestern Europe and Southern Europe, each unified by more specific traits. Additionally, regions can occur at the national, subnational (within a country), or at the local scale such as cities or counties within a state.

Since many kinds of regions exist, any one place is part of many regions or subregions at the same time. For example, Georgia is part of numerous regions:

- a climate region based on its warm weather
- a cultural subnational region known as the South
- an economic region known as the Sun Belt
- a political region known as the United States

Problems with Regions

Regions are generalizations. Just like generalizations in spoken language, they can lead people to overlook variations and differences. Think of the languges spoken in the United States. On a map showing languages, the United States is usually shown as an English-speaking country. This accurately reflects that more than 78 percent of people in the country speak English at home and more than 90 percent of the population speak English well.

However, showing the United States as an English-speaking country does not tell the entire story. Some people, mostly immigrants, primarily speak a non-English language. Far more are bilingual, speaking English and another language comfortably. Taken together, these two groups make up approximately 20 percent of the population. As a region, the United States might be described as English-speaking, but it is also a country where dozens of languages are widely spoken.

Additionally, people and characteristics within a region are transitional and often do not create a sharp boundary. Just because there is a formal political border between the United States and Mexico does not mean that people suddenly stop speaking Spanish or English when they cross the border. The reality is that people who live in the borderland region on either side of the border often speak both English and Spanish. Being aware of such realities helps a geographer understand how complex the world is.

When regions overlap, occasionally tension and disagreements can occur. These differences can be good-natured teasing such as when rival football teams' fan bases live close to each other. The differences can also be deadly serious disagreements over territory, political power, resources, or cultural views that have occurred in numerous hot spot locations of the world, such as between Sudan and South Sudan.