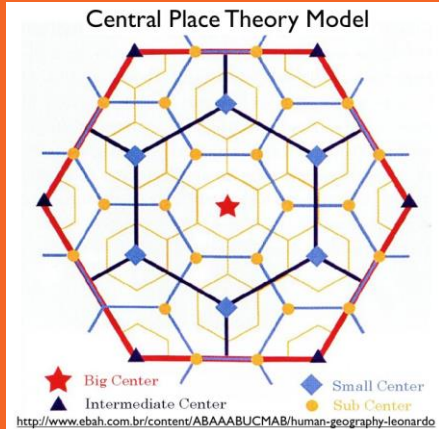
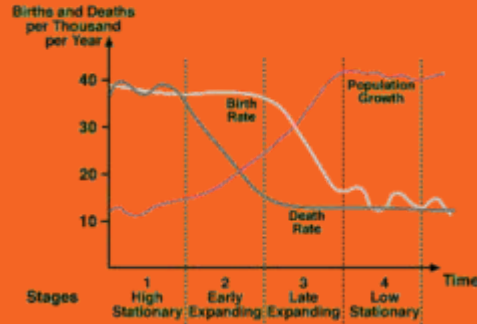


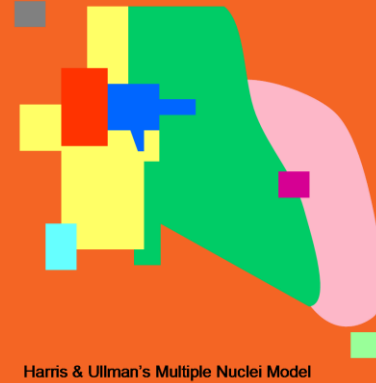
Introduction to Models



Demographic Transition Model



- Central business district (CBD)
- Wholesale, light manufacturing
- Low class residential
- Medium class residential
- High class residential
- Heavy manufacturing
- Outlying business district
- Residential suburb
- Industrial suburb



Unit 1 - Geography: Its Nature and Perspectives

Entry task: Journal - what kind of region is it?

State of WA

Amazon River Basin

Puget Sound

The Sun Belt

circulation

King County

Brazil

The I-90 Corridor

12th Man

Seattle Times

Quiz: Chapter 1.3

Pair Share: Textbook Review

Which types of diffusion are each of the examples below and why?

1. Slang terms
 2. New Pakistani restaurant opened by an immigrant family
 3. New Bluetooth system installed in Toyota followed by Kia
 4. New fashion color for fall: jewel green
-

Objectives

Content: I can **apply** the gravity model to cities in the US.

Language: I can summarize my findings in a written response.

Reading Review

—

What is diffusion?

**What are the
different types?**

Diffusion

Relocation: physical movement of people from one place to another

Expansion: spread the feature from one place to another in an additive process

Hierarchical diffusion: spread from persons or nodes of authority/power to other persons or places

Contagious diffusion: rapid, widespread diffusion of a characteristics throughout the population

Stimulus: spread of an underlying principle even though a characteristic itself apparently fails to diffuse (Apple iPhone)

EXAMPLES?

Model

An abstract
representation of
reality created to
simplify complex
systems

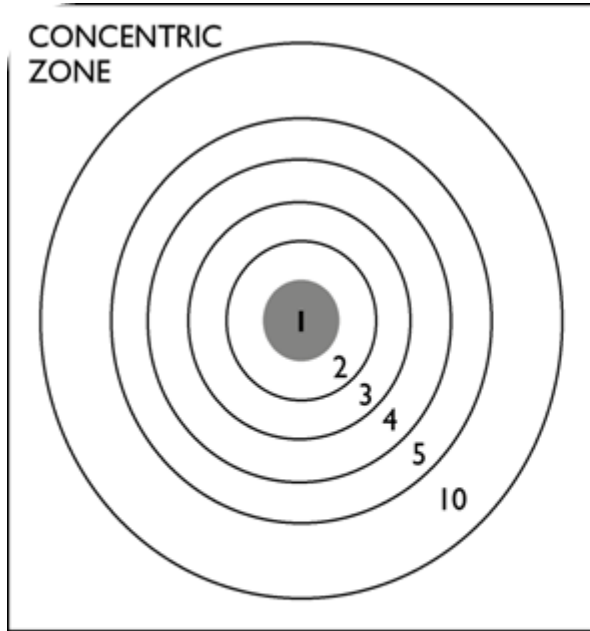


Types of Models

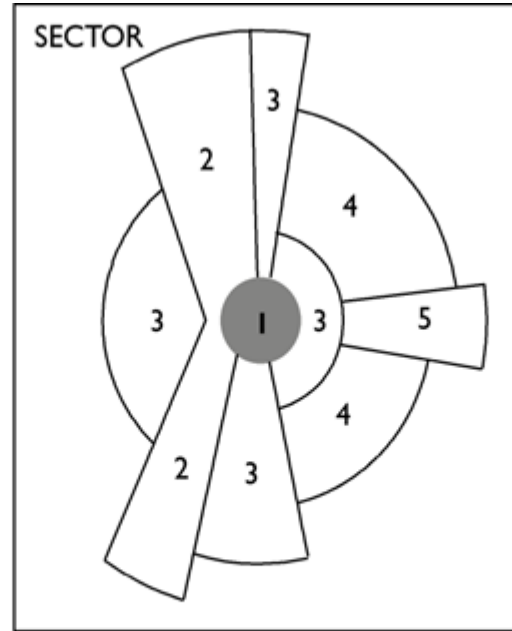
- Graphic models = visual (2D or 3D)
- Verbal models = textual
- Mathematical models = formulas



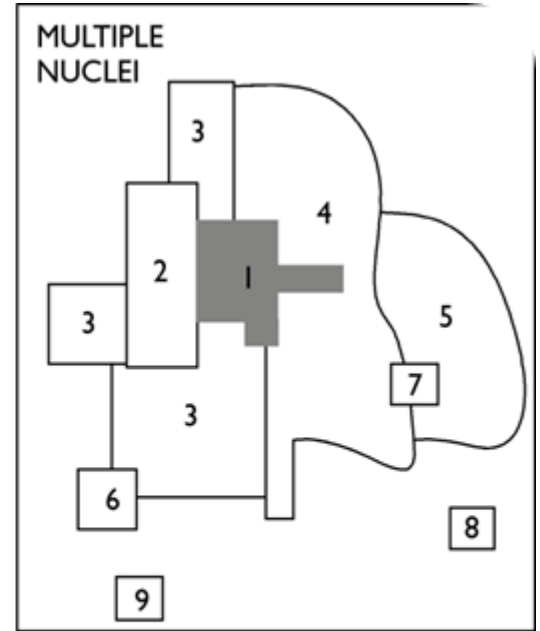
Graphic Model



- 1 Central business district
- 2 Wholesale light manufacturing
- 3 Low-class residential
- 4 Medium-class residential



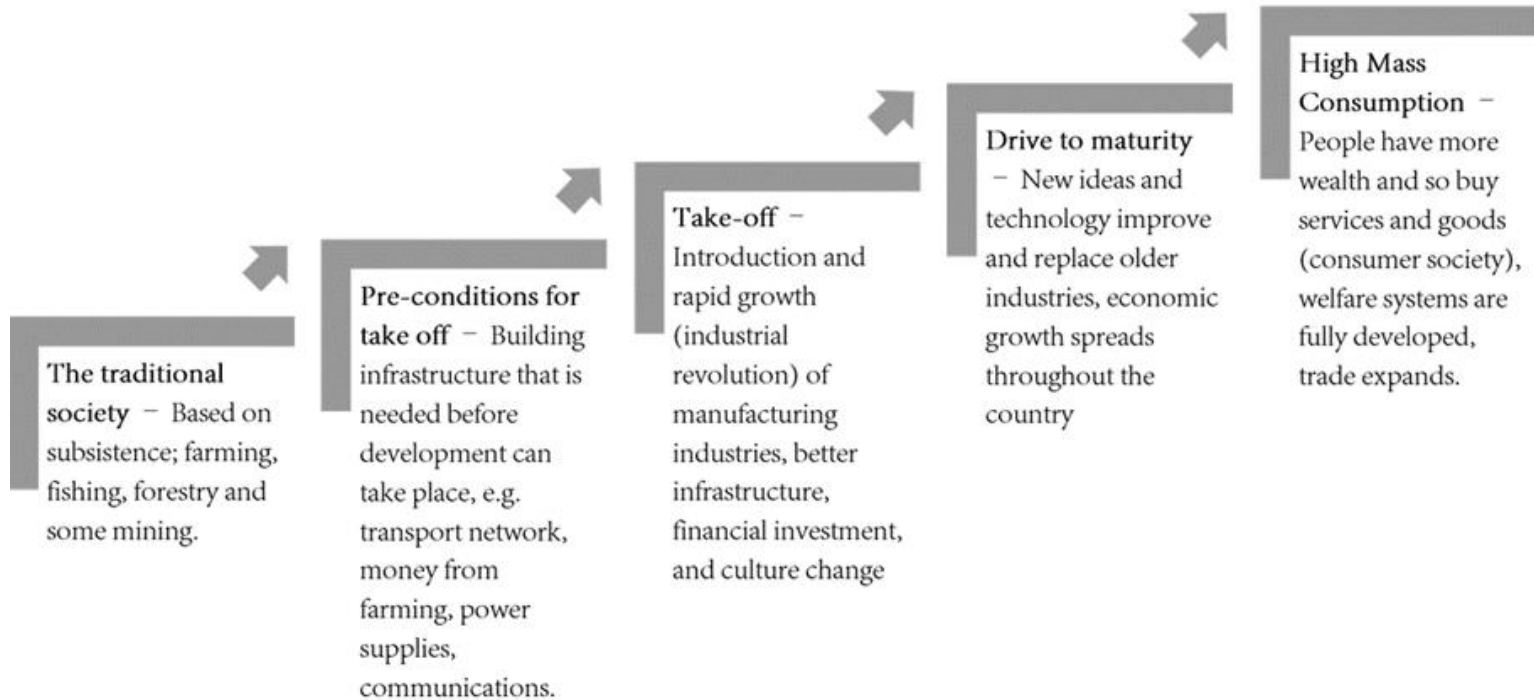
- 5 High-class residential
- 6 Heavy manufacturing
- 7 Outlying business district



- 8 Residential suburb
- 9 Industrial suburb
- 10 Commuter zone

Verbal Models

The Rostow Model



Mathematical Model

$$I_{ij} = \frac{P_i P_j}{d_{ij}}$$

Which one is the model?

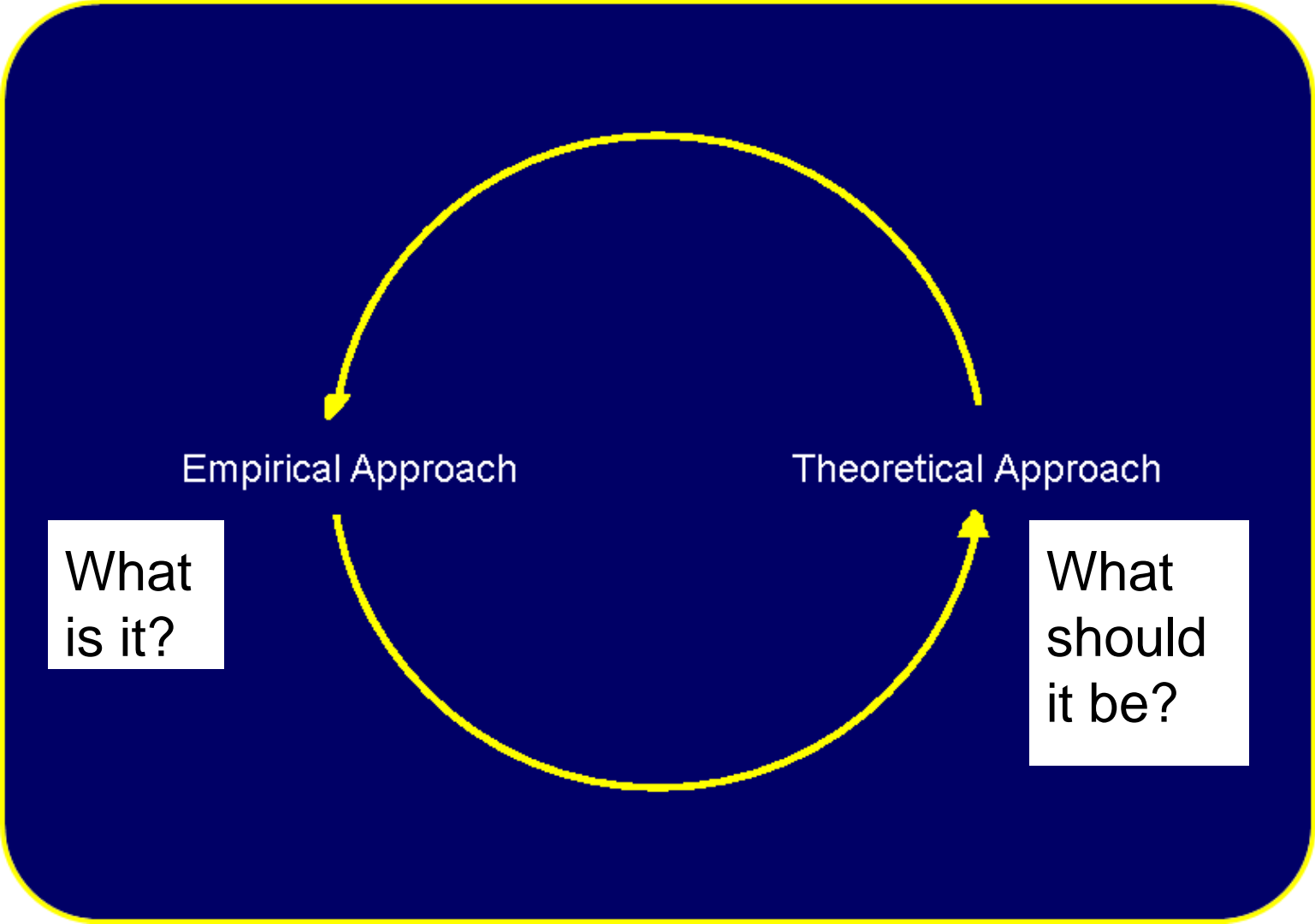


What
is it?

Empirical Approach

Theoretical Approach

What
should
it be?



```
graph LR; A[What is it?] --> B[Empirical Approach]; B --> C[Theoretical Approach]; C --> D[What should it be?]; D --> A;
```

Practice in Building Models

State Welcome Signs - A state's first impression





WELCOME TO
COLORFUL
COLORADO

Welcome To

VERMONT

THE GREEN MOUNTAIN STATE





Welcome to
RHODE ISLAND

THE
OCEAN STATE

Governor Bruce Sundlun

**"HOME OF THE 1993 WORLD
SCHOLAR-ATHLETE GAMES"**

NEBRASKA

... the
good life



Home of  Arbor Day



WELCOME TO

Kentucky
UNBRIDLED SPIRIT



Steven L. Beshear, Governor

Birthplace of Abraham Lincoln

Welcome to
DELAWARE
SMALL WONDER
THE FIRST STATE

Home of Tax-Free Shopping

TURN
LANE
↑



THE PEOPLE OF
IOWA
WELCOME YOU



Fields of Opportunities



WELCOME TO

MISSOURI

THE SHOW-ME STATE

WELCOME TO

MAINE

The Way Life Should Be





STATE LINE

SCOTLAND CO

Welcome to
Virginia



HOME OF

PROJECT
LIFESAVER



FOUNDED 1634

MARYLAND
WELCOMES YOU



ENJOY YOUR VISIT!

Parris N. Glendening
Governor

Massachusetts



*Welcomes
You*

MASSACHUSETTS





WELCOME TO
GALLATIN NATIONAL FOREST



welcome
to
Kansas



Welcome
To
Mississippi

WELCOME TO

Arkansas[®]
THE NATURAL STATE

HOME OF
PRESIDENT BILL CLINTON

A large wooden sign with a yellow center stands in a desert landscape. The sign reads "Welcome to NEW MEXICO Land of Enchantment". The background features a range of mountains under a cloudy sky.

Welcome
— to —
NEW MEXICO
Land of Enchantment



WELCOME TO

OHIO

THE BUCKEYE STATE



WELCOME
TO

Minnesota

Welcome to
Alaska



Historic Alaska Highway - Gateway to the 49th State

Welcome to Texas



DRIVE FRIENDLY - THE TEXAS WAY

Proud Home of President George W. Bush



WELCOME TO

West Virginia



Welcome to

FLORIDA

THE SUNSHINE STATE



Welcome



We're Glad Georgia's
On Your Mind
Site Of The 1996
Olympic Games

Sonny Perdue, Governor



CONTINENTAL
DIVIDE
EL. 7,072



The People of
Illinois
welcome you

Welcome to

Indiana

Crossroads of America



Welcome to

Alabama
the Beautiful



Governor Bob Riley



WELCOME

TO

NEVADA

125 YEARS OF VISION









WELCOME TO

New Jersey

South Dakota



GREAT FACES GREAT PLACES

Tennessee
The Volunteer State

Welcomes You

Home State of Vice President Al Gore

EXIT 12A
64 70 79
Crump Blvd
↓

Jack n Miss

AMERICAN
EX-PRISONERS OF WAR
HIGHWAY

EXIT
25



Pennsylvania
Welcomes You

STATE OF INDEPENDENCE

800·VISIT·PA | visitPA.com

South
15

The Pennsylvania State University



END
ROAD WORK

Welcome to

NEW
HAMP^SSHIRE

THE GRANITE STATE

Bienvenue



6x5 6-02

*Welcome to
California*



ENTERING PACIFIC TIME
+PMS

Welcome to Louisiana



Bienvenue en Louisiane



6 MI

60

Connecticut
Welcomes You

Connecticut
We're full of surprises

John G. Rowland
GOVERNOR



STEEP MOUNTAIN
PASS AHEAD
10% GRADES

CONTROL
MILES
UNIVERSITY

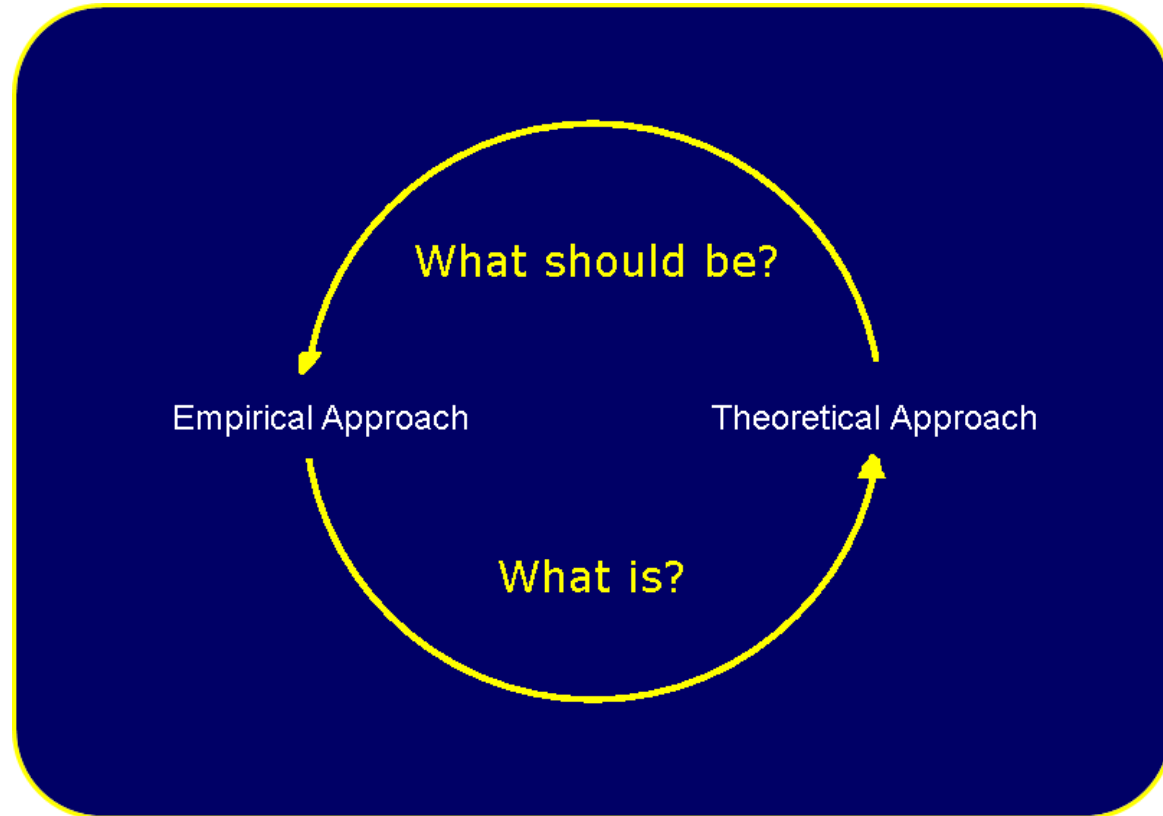
A Model of State Welcome Signs

What are the components of our model?

Textual Components, 5

Graphic Components, 5

Applying the Model



WELCOME
TO



NEW YORK
The Empire State

Aloha

WELCOME TO HAWAII





INDUSTRY

RECREATION

AGRICULTURE

WISCONSIN

WELCOMES

YOU

Jim Doyle
GOVERNOR

EXIT 400
EXIT 401
EXIT 402



WELCOME
TO
OREGON



Tobler's First Law of Geography

Everything is related to everything else, but near things are more related than distant things.



— Friction of Distance: a measure of how much absolute distance affects the interaction between two places

Tyranny of Distance
(same concept)



—

**Distance: Geography::
Time: History**



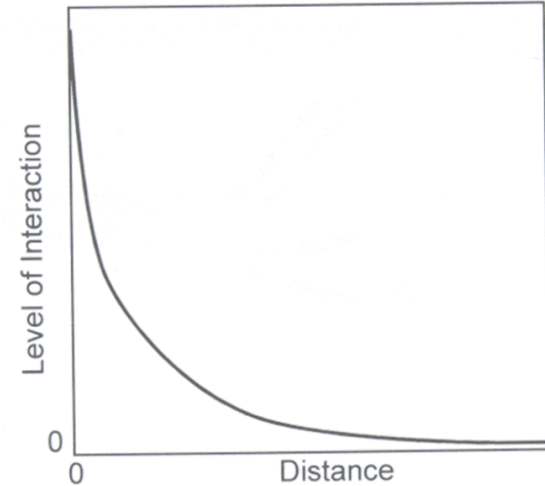
Gravity Model

The Gravity Model is a mathematical model which was devised to represent **a wide range of flow patterns** in human geography.

Includes: exchanges, movement, and connections

Big things have a stronger effect and can conquer distance.

DISTANCE-DECAY

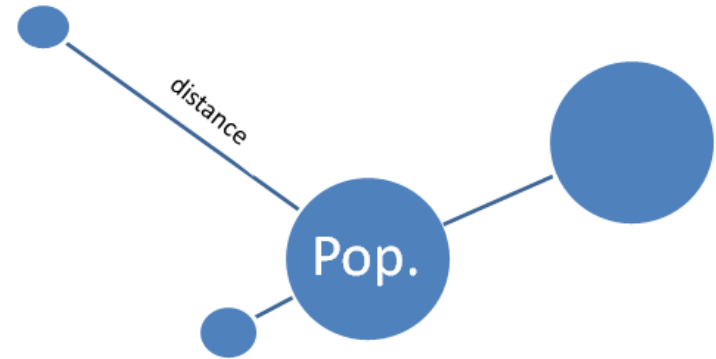


It is based on newton's Law of Gravity

“Any two bodies attract one another with a force that is proportional to the product of their **masses** and inversely proportional to the square of the **distance** between them.”

Tobler: added the idea that bigger has more gravity of force

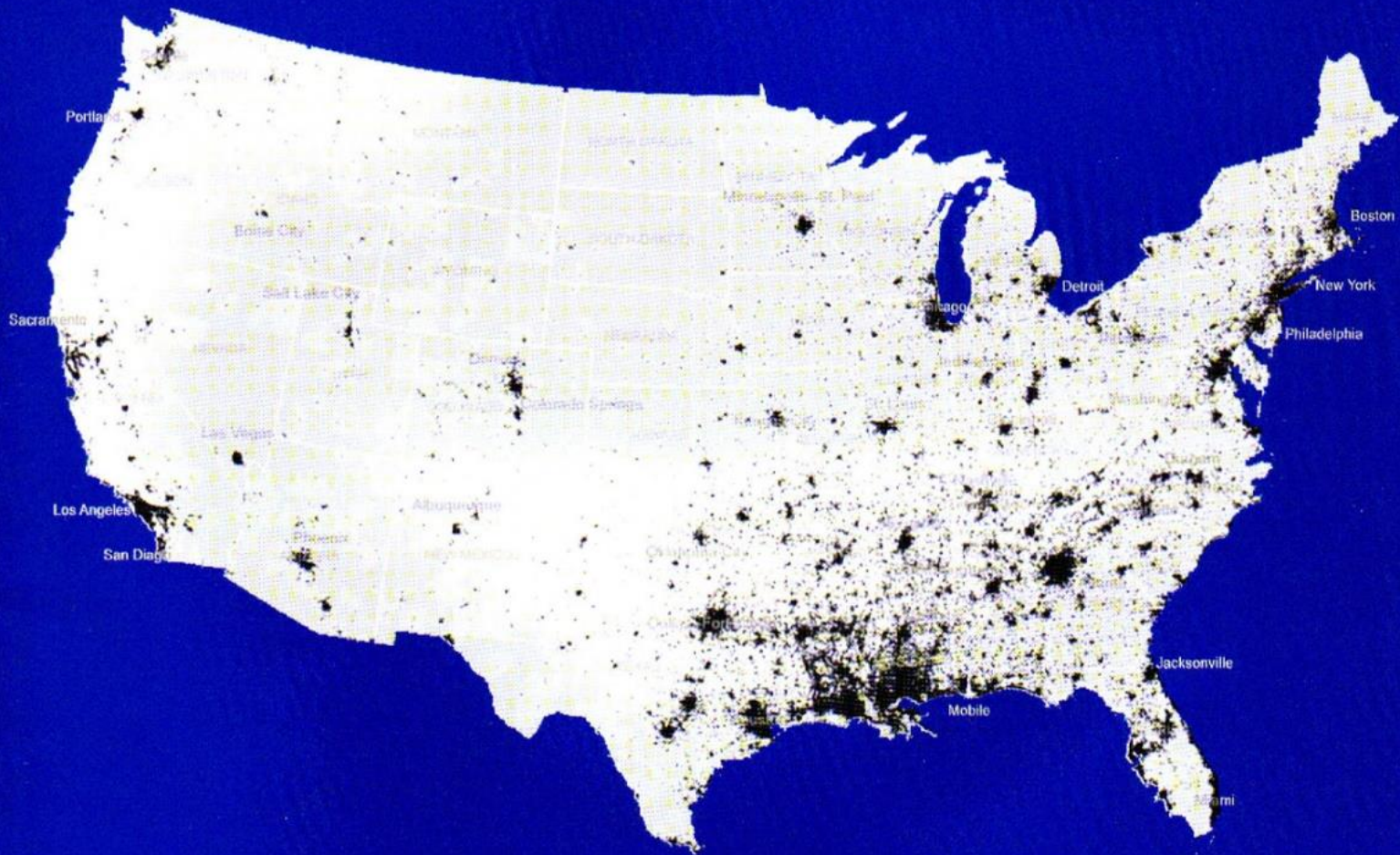
Which has the most gravity?



Interaction is gravity!



Louisiana Diaspora!



Components of the Gravity

Model

1. Population
2. Distance
3. Interaction

I = interaction

i = city A

j = city B

P_i = Population of city A

P_j = Population of city B

D_{ij}^2 = distance between cities A and B

$$I_{ij} = \frac{P_i P_j}{d_{ij}}$$

mass
distance



Adaptation and Application of the Gravity Model

- **Migration:** larger places attract more migrants than do smaller places
- **Vacation Destinations:** more distant locations have a weaker pull effect than do closer opportunities
- Anticipate traffic between two places
- Number of telephone calls
- Transportation of goods and mail
- Other types of movement



Adaptation and Application of the Gravity Model

- Compare the gravitational attraction between two continents, two countries, two states, two counties, or even two neighborhoods
- If a situation doesn't fit the model then you are challenged to figure out what caused the exception (cultural? financial incentive? etc.)



Criticisms of the Gravity Model

- Cannot be confirmed scientifically
- It is based on observation
- Unfair method of predicting movement because it is biased towards historic ties toward the largest population centers
- Can be used to perpetuate the status quo



Application - New York to Los Angeles

New York MSA (Metropolitan Statistical Area): 20.2 million (2015)

Los Angeles MSA: 18.68 million (2015)

Distance: 2462 miles squared = 6,061,444.

RESULT = 62,251,833.1 or simplified gravity = 62.25

Los Angeles and El Paso, Texas

Remember NY to LA = 62.25

Population Los Angeles 2015: 18.68 million

El Paso, Texas 2015: 877, 248

Distance: 712 miles squared = 506, 944

Result: 32,325,054.9 or **simplified gravity = 32.33**

Space-Time Compression

New developments in technology and transportation help to conquer distance.

Horse, train, car, airplane, internet, etc.



Application Activity: Gravity Model