PART B
Push and Pull Forces in U.S. Colonial History

by
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POPULATION DYNAMICS  
Connecting Past, Present and Future  
A Four-Part Curriculum  
http://clexchange.org/curriculum/complexsystems/populationdynamics/

PART A  
Push and Pull Forces in Settling America

PART B  
Push and Pull Forces in U.S. Colonial History

PART C  
U.S. Urbanization from 1820-1920

PART D  
America’s Baby Boom and Global Youth Bulges
OVERVIEW

The history of Colonial New England, characterized by growth and prosperity, also incorporates major episodes of social upheaval, as evidenced by such disparate events as King Philip’s War, the Salem Witch Trials, and the American Revolution. All of these events are connected, in some form, with changing population dynamics, as New England’s birth rates, death rates, and migration are shaped by its environment and social systems. This lesson asks students to reconstruct the causes underlying New England’s changing populations, and to assess their impact on PUSH factors (diminishing conditions or circumstances) versus PULL factors (relative benefits or attractiveness of a different location) that contributed to the larger set of events that shaped Colonial New England.

Following guided handouts, students use two computer simulations to investigate the significance of population change in United States history. The computer simulations are supplemented with a variety of primary and secondary sources, and students are challenged to reconstruct and experiment with long-term patterns of population change (based on births, deaths, in- and out-migration). Connecting changes in population dynamics with environment and social systems (e.g., economy, religion, culture, identity) helps students see patterns that inform major developments and events in America’s past. Additionally, students can apply the principles of historical population dynamics to current and possible future events.

These lessons can be done either during or outside of class time, or within a flipped classroom context. They provide a frame to help students conceptualize how populations change and how those changes can affect social systems and environments while also being affected by them (graphic on right). Additionally, simulations encourage students to explore the conditions under which populations grow due to different birth and death rates, together with migration, and to experiment with managing sustainable long-term scenarios. Using multiple resources and structured problem-solving, these lessons encourage students to connect historical trends, structures, and relationships with real-world present and future challenges.
INTRODUCTIONS TO SIMULATIONS/STUDENT ACTIVITIES
http://clexchange.org/curriculum/complexsystems/populationdynamics/popdynB.asp


In the simulation, students actively and progressively reconstruct important dimensions of New England's colonial history in three ways:

- by comparing New England’s pattern of population growth with a timeline of important events and a table showing migration rates (in and out of New England);
- by learning HOW populations change over time; and
- by connecting patterns of population change to environmental, economic, political, and cultural developments.

Students will:

1. Use a timeline of important events, a migration table, and a graph of New England’s changing population between 1620-1780 to discuss possible factors that may have influenced the population growth of New England over time.
2. Use a demographic simulation to determine the extent to which New England’s economy and environment altered birth and death rates from those in England. They then use that information, together with data on immigrants, to assess the relative importance of natural growth (births exceeding deaths) versus immigration.
3. Use primary and secondary historical sources to describe how the particular pattern of population dynamics in New England throughout the 17th and 18th centuries contributed both to changing environment and economic transformations and, subsequently, to major events.
4. Explore issues of globalization, religion, culture, the planting of New England and the creation of an American identity.

Simulation 2: How Can Population Dynamics Shape Local and National Borders?

Students explore the implications of different birth and death rates, together with immigration rates and physical limits on growth (that, when activated, trigger emigration), on long-term issues of population growth and sustainability within a fictional, present-day community and beyond.

Students will:

1. Use a simple demographic simulation to create scenarios of their own choosing (varying initial populations, immigration, birth and death rates, specified population “limits” under which quality of life is compromised);
2. Analyze and interpret graphical output to demonstrate full understanding of different patterns of long-term population change.
NOTE: Each of the two simulations includes a student handout with clear instructions and specific prompts for written responses intended to challenge students to document and explain their learning.

STANDARDS AND METHODS

As with Part 1 of this lesson, Part 2 strives to actively engage students in putting pieces together to develop problem-solving skills and apply their learning in identifying the relevance of historical processes in the modern world. These processes address three important sets of standards:

1. **Content:**
   The College Board identifies twelve major themes that encourage students to think conceptually about the American past and to focus on historical change over time.¹ This lesson challenges students to integrate eight of those Advanced Placement (AP) themes while reconstructing the story of New England’s colonial history: demographic changes, economic transformations, environment, globalization, religion, war, culture and the American identity.

2. **Method:**
   The Common Core Standards stipulate that students learn to integrate information from both primary and secondary sources to forge a coherent understanding of an idea or event, noting discrepancies between sources.² This lesson uses primary and secondary historical sources, incorporated with demographic simulations. Students actively reconstruct a past where population change is both the result of and the agent for change in other areas including the economy and environment.

3. **Relevance:**
   The National Council For Social Studies specifies the need to empower students to make connections between learning and their world, to support active citizenship.³ This lesson encourages students to explore their changing demographic world, and to assess impacts of change on their lives.

² [http://www.corestandards.org/ELA-Literacy/RH/11-12/ for 11-12th Grade English/Language Arts standards involving teaching History](http://www.corestandards.org/ELA-Literacy/RH/11-12/ for 11-12th Grade English/Language Arts standards involving teaching History)
³ [http://www.socialstudies.org/standards/execsummary](http://www.socialstudies.org/standards/execsummary)
FOR THOSE INTERESTED: HOW DOES THE SIMULATION MODEL WORK?

Each of the two simulations uses a system dynamics model similar to the one above. Much like a demographer, the model starts (box in the center) with a TOTAL POPULATION. That population grows annually as people flow into the population with New Births and Immigration. The population is reduced as people flow out of the TOTAL POPULATION by New Deaths and Emigration.

The model calculates each of these four flows based on two factors shown as arrows leading into each flow:

1. In the case of new births and new deaths, demographers use a “Birth Rate” and “Death Rate.” These rates, typically, are between 5 and 50, referring to the number of births and deaths per thousand people in the total population.

2. Multiplying this rate by the total population determines the specific number of new births and new deaths.

   New Births = Birth Rate (#/1000) x total population
   New Deaths = Death Rate (#/1000) x total population

The same logic is used for calculating annual rates of immigration and emigration.

As a result of these core structures, populations change in nonlinear and often explosive ways. Where growth factors (birth rate and immigration rate) exceed a death and emigration rate, the total population grows at an ever-rising pace. That’s because new births and the total population work in a cyclical relationship called a “reinforcing feedback loop”: more births create more people, which in turn gives rise to more births, which causes…. Understanding this pattern, one of many oft-repeated in history, further explains what is happening in many places today with implications for the future.
What Was Changing New England’s Population and Why?

This handout will guide you through a series of problem-solving exercises that:

- Combine historical sources with a simulation to reconstruct how migration, birth and death rates contributed to New England’s changing colonial population.
- Use that information, together with primary and secondary sources on changing environmental and social systems, to help you assess the impact of population change on New England history.

http://clexchange.org/curriculum/complexsystems/populationdynamics/popdynB.asp

STEP 1. Familiarize Yourself With the Introduction (omit if you did this in Lesson 1)

Open and read each of the links. Define what demographers mean by:

**Birth Rate:**

**Death Rate:**

Demographers’ define birth rates and death rates as a number per 1000 population (typically between 10 and 50). You may want to show students some examples to connect to previous learning about percentages, e.g., an annual birth rate of 30/1000 is equivalent to 0.03 or 3% per year.

What happens if the rates are different? If the birth rate is greater than the death rate, the population grows. Over time, the pace of growth accelerates, as a growing population generates a larger number of births (even if birth rates are constant). This, in turn, leads to a still larger population, a larger number of births, and so on. This cycle (shown below) is referred to as a “reinforcing feedback loop”, and, if left unchanged, can create explosive growth over long periods of time (like the one shown).
PUSH and PULL Dynamics:
Push and pull refer to the movement of people from one place to another. People experiencing major difficulties, either due to a lack of resources/opportunities (e.g., jobs, food, land) or political unrest, often feel a push to leave. People who are not experiencing difficulties but who see better opportunities elsewhere are said to be pulled into a new place.

The larger importance of push and pull dynamics rests in the movement of people from one place to another, something that has shaped the past (as in the case of the Puritan settlement of America), the present (see map in Push and Pull Dynamics), and the probable future.

Open Sim 1 and review the materials on Page 1. Carefully review what is happening in colonial New England in the population graph, major events timeline, and migration table.

• Start with the population graph (in red): How is the population changing over time? When is it growing fastest (adding the most people)?

• Now use the migration table: During what period is there consistent growth? What is happening outside that period?

• Finally, consider the timeline of “Great Events” together with the first two sources: What is your theory (or hypothesis) for what caused the pattern of growth in New England shown on the graph? Why?

Students should notice several details as they review the three sources on Page 1:
  a) Colonial New England experienced a pattern of continued growth. In contrast, England’s growth from 1300-1650 was u-shaped.
  b) After 1680, more migrants LEFT (settled elsewhere or emigrated) than ARRIVED (immigrated).
c) The selected “Great Events” transposed onto the graph highlight the pathway toward independence but do not explain the pattern of accelerating growth over time.

While immigration in the early years of New England’s history is important, the main story in this lesson is one of natural growth as the predominant factor in shaping New England’s demographic history. This lesson focuses on how populations grow with birth rates exceeding death rates; how population growth accelerates over time; and how this accelerated rate of growth contributes to major events, including wars, economic changes, and migrations (see explanation after #4).

Because this pattern of growth typically occurs over a long period of time (decades), and because cultural patterns that govern birth rates (e.g., when women marry, desired family size) change slowly, people at the time often do not fully appreciate what is happening or the implications of that growth. This is an important lesson that bears both on historical and current experience.

STEP 3. How and Why Were Birth and Death Rates In England and Colonial New England Different?

Unlike migration, we do not know the exact numbers for New England’s birth and death rates during the colonial era, so you will use the simulation to figure them out. Start on Page 2 by reviewing the topics contained in the triangle.

- Do you think New England’s birth rates were higher or lower than those in England? Use your sources to explain why.

- Do you think New England’s death rates were higher or lower than those in England? Use your sources to explain why.

There are two factors at work that students should recognize:

1. Self-contained agricultural communities with independent land ownership.
2. Healthier environmental conditions with lower population densities.

Underlying each was Winthrop’s original vision of self-sufficient agricultural communities which guaranteed better nutrition, lower population densities with more sanitary conditions and fewer infectious diseases. Historical research also indicates that infant mortality was lower and average life span was longer in New England than in England.

- Contemporary English birth rates averaged 30 (range of 28-34) per 1000 and death rates were 26 (range of 24-32) per 1000 population. Based on your analysis, what would you estimate for New England? Your estimates will provide you with a starting point for running the simulation.
Birth Rate was ____ per 1000 and Death Rate was ____ per 1000

Students should be able both to project HIGHER birth rates than contemporary England (28-34/1000) and LOWER death rates (24-32/1000). This is the starting point with which students can “test” their initial predictions and then revise and refine them.

**STEP 4. Use the Simulation to Determine New England’s Birth and Death Rates**

Go to the Simulation (Page 3). Insert your estimates for birth and death rates and run. Continue to make thoughtful (and realistic) changes in either the birth or death rates to “match” what actually happened as best you can. When you have your best match, record your final rates below.

Colonial N.E. Birth Rate:____/1000 Colonial N.E. Death Rate:____/1000

There are a number of possible combinations that will produce the best “fit” with the data; all involve a birth rate that is either 22 or 23 per thousand greater than the death rate (see graphs below). Assuming the death rate is set at, say, 19/1000 (a significant drop from the English 24-32), the birth rate would need to be 41 or 42; if the death rate were higher (say, 23), the birth rate would need to be 44 or 45.

The graph on the left shows a birth rate of 41/1000 and a death rate of 19/1000, a difference of 22/1000. The graph on the right is slightly changed, using a birth rate of 42/1000 and the same death rate.

- Recalling that immigration to New England had largely ended by 1680, can you explain how the birth and death rates you’ve discovered explain the long-term pattern of New England’s population growth? (You may print the simulation page.)
The large difference between birth and death rates drives accelerating growth in New England’s population over time. While initial immigration to New England accounts for the largest share of residents in 1650 (see Page 2 of the graph, “Consider Impact of Migrants on Population”), the overall pattern of growth is caused mostly by births exceeding deaths. See below for explanation.

If the birth rate is greater than the death rate, the population will grow. Over time, the pace of growth will accelerate. A growing population generates a larger number of births even if birth rates are constant, which leads to a still larger population, a larger number of births, and so on. This cycle (shown below) is called a “reinforcing feedback loop” and, if left unchanged, can create explosive growth over long periods of time.


Begin with the 17th century (Page 4). How important, if at all, were population dynamics in contributing to (or causing) King Philip’s War? Explain below.

Clearly, rapid population growth was a central issue in fostering this major conflict. New England’s population growth required growing land upon which to develop new “Godly” communities, and westward settlements that increasingly encroached on native lands. In many ways, King Philip best understood the future implications of this continued growth on native peoples. White settlers, meanwhile (as evidenced by Randolph’s report to the King), continued to assert their divine right, as superiors, to continue to decimate a once large (estimated at 140,000) native population from New England.

How important, if at all, were population dynamics in contributing to (or causing) the Salem Witch Trials? Explain below.
The role of population dynamics is only one of several factors that converged to create this event that included political issues (the loss of the New England charter and concerns about its future), religious divisions (arising out of the Halfway Covenant dispute), and even crop blight (ergot, thought to cause hallucinations), to name but a few.

What is interesting, as developed in Boyer and Nissanbaum’s book, *Salem Possessed*, is the social factionalization pitting traditional farmers against those benefitting from growing commerce from the town. Traditionalists, who supported their minister, Samuel Parris, felt worldliness and wealth were drawing Puritans from Winthrop’s original vision, and, at some level, felt increasingly powerless. Samuel Parris served both as their voice and, as an embattled minister fighting for his salary and property rights, an individual who sought to uphold his personal interests.

Certainly there is far more to this story than this short summary and students should be encouraged to learn more to put together all of the pieces.

Move on to American Revolution (Page 6). How important, if at all, were population dynamics in contributing to (or causing) the American Revolution? Explain below.

By the 18th century, rapid population growth gave rise to still greater demands on new lands. This theme would continue throughout the 1700 and 1800s. Equally important was the continuing struggle of traditional New England agricultural towns, which had effectively reached their physical limits in providing land for future generations. Again, recent historical scholarship emphasizes why Boston and the surrounding farm towns became the hotbed of revolution. As young men reached maturity and sought to marry and raise families on farms, the scarcity of lands in their towns and the great distance and uncertainly on the western frontier led many to question their futures. Young men with limited prospects and hopes often form the vanguard for revolution. This is as true today as throughout history.

The lessons from that historical period continue to be valid in the present and possibly also into the future. Knowing the dynamics that create conditions for conflict and crisis BEFORE they unfold is an important lesson to learn from history.
Student Guide – Part B, #1
What Was Changing New England’s Population and Why?

This handout will guide you through a series of problem-solving exercises that:

• Combine historical sources with a simulation to reconstruct how migration, birth and death rates contributed to New England’s changing colonial population.
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Open and read each of the links. Define what demographers mean by:

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- Do you think New England’s birth rates were higher or lower than those in England? Use your sources to explain why.

- Do you think New England’s death rates were higher or lower than those in England? Use your sources to explain why.
• Contemporary English birth rates averaged 30 (range of 28-34) per 1000 and death rates were 26 (range of 24-32) per 1000 population. Based on your analysis, what would you estimate for New England? Your estimates will provide you with a starting point for running the simulation.

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Colonial N.E. Birth Rate:____/1000 Colonial N.E. Death Rate:____/1000

• Recalling that immigration to New England had largely ended by 1680, can you explain how the birth and death rates you’ve discovered explain the long-term pattern of New England’s population growth? (You may print the simulation page.)

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How important, if at all, were population dynamics in contributing to (or causing) the Salem Witch Trials? Explain below.

Move on to American Revolution (Page 6). How important, if at all, were population dynamics in contributing to (or causing) the American Revolution? Explain below.
**Teacher Guide – Part B, #2**

**How Can Population Dynamics Shape Local and National Borders?**

This handout will guide you through a problem-solving exercise that:

- Uses a simulation to assess the impact of different birth and death rates (numbers of births and deaths per 1000 population), immigration and emigration on changing populations.
- Asks you to reflect on what you’ve learned from the simulation regarding “limits to population growth.”


**STEP 1. What Are Limits That Push People Out of Their Communities?**

Open Sim 2 and read Pages 1 and 2. Identify three potential limits on local/national borders that lead people to be pushed out of their communities.

Within a specific geographical area, examples of limits might involve physical constraints (land to feed or house a population), rising population density causing unhealthy or unsafe conditions, and lack of job availability.

**STEP 2. How Do Different Rates of Immigration, Birth and Death Rates Impact Changing Populations Over Time?**

Go to Page 3 of Sim 2. Assume an initial local population of 2000 and a population limit (sustainable population) of 10,000. Assume NO Emigration (Activate Emigration is “off”). Next, run and analyze three different scenarios:

- **Scenario 1:** The town experiences no immigration, and birth rates are only slightly higher (within 5 per 1000) than death rates.
- **Scenario 2:** Same as #1, with immigrants (10 per 1000) arriving in town annually.
- **Scenario 3:** Same immigration, but town’s birth rate exceeds its death rate by more than 10 per 1000.

These instructions assume students are familiar with how birth and death rates are calculated by demographers (typically running between 10 and 50 per thousand) and how they operate, independent of migration rates. If students are not familiar, they should carefully read the “Instruction” page and, as a first step in using this simulation, leave “Immigrants” at zero and focus solely on birth and death rates.
Part B - Teacher Guide #2

### Scenario #1:
- Immigrants (per 1000): 0
- Birth Rate (per 1000): 0
- Death Rate (per 1000): 0
- Total Population: 0
- Total # Emigrating: 0
- Total Emigrants & Families: 0

### Scenario #2:
- Immigrants (per 1000): 10
- Birth Rate (per 1000): 10
- Death Rate (per 1000): 0
- Total Population: 0
- Total # Emigrating: 0
- Total Emigrants & Families: 0

### Scenario #3:
- Immigrants (per 1000): 10
- Birth Rate (per 1000): 10
- Death Rate (per 1000): 0
- Total Population: 0
- Total # Emigrating: 0
- Total Emigrants & Families: 0

Analyze your results below. Assuming no one emigrates, under what conditions is population growth most sustainable? Least? Explain.

Students should see that immigration (Scenario #2), joined with high birth rates (Scenario #3), foster the greatest rates of growth. The story is not solely about individual immigrants, but rather the fact that over time, they have children, and grandchildren, and thus contribute to the same natural growth as the rest of the population. Highlighting immigration as a major modern force across the globe, this simulation focuses on the long-term combined impact of immigration and birth rates exceeding death rates.

### STEP 3. Add Emigration

Now consider how emigration works. Next, assume a population limit (one you’ve identified above) of 10,000. You will run the simulation from Step 2 above with the “Activate Emigration” (people will be forced to emigrate as the total population approaches its limit) toggled “off” and “on.”

Run Scenario #3 from Step 2 above with “Activate Emigration” switched “off.” Record the results below.

- FINAL POPULATION: ________
- Total # Emigrating: ________
- Total Emigrants & Families: ________

Now Rerun with « Activate Emigration » switched “on.” Record the results below.

- FINAL POPULATION: ________
- Total # Emigrating: ________
- Total Emigrants & Families: ________

Analyze emigration. What happens to the population in town? The overall population? What is the overall impact of emigration?
Under Scenario #3, students should see that the population exceeds its limits. Running it with the “Activate Voluntary Emigration” button on does NOTHING to change the overall total population, but it redistributes that population out of the original town and into one or more other towns. Hence, what emigration does, assuming the birth and death rates for emigrants living elsewhere parallel those in the town, is to provide an outlet wherein populations can continue to grow beyond their original limits.

The underlying limits that trigger emigration are not developed explicitly here. However, students should be encouraged to think about what a limit (or limits) might be (jobs? land? problems associated with population density, like noise or crime or…?). There are many possibilities. And while students are directed here to undertake only a single scenario involving emigration, the simulation allows them to experiment and ask “what if” questions to gain greater insight into where and how even small differences in growth factors (immigration and/or birth rates) or in the environment (where limits are different) have long-term implications.

STEP 4. Reflect on What You’ve Learned

- Under what conditions will a population likely exceed its limits? Include these factors in your answer: immigration rates, birth rates, death rates, limits, and time (up to 100 years). Based on Simulation 1, where and how did limits affect the American colonial experience?

The dynamics of population growth are based on (a) the difference between growth factors (births and immigration) and deaths, (b) time, because growth accelerates over time, and (c) limits.

- Based on Simulation 1, where and how did limits affect the American colonial experience?

Limits arose in colonial New England grounded in high rates of natural growth (births versus deaths) combined with the need for more farmland. To overcome these limits, the population expanded into new areas of settlement.

- Why is it important in the modern world for communities and/or nations to be aware of population dynamics and limits? Give an example.

In today’s world, many people are leaving certain places (often, the result of limits) and moving to other places. In some cases, they are pushed, in others pulled, but always there is an underlying assumption that a new location has some comparative advantage over their existing situation. Growth rates involving high birth rates (true of many, particularly underdeveloped countries), and diminishing death rates (due to improved medical care) contribute to the pattern. All of these factors raise significant issues for the future in much
the same manner as they triggered conflicts, wars, revolutions, and the like in the past. While it is true that there are ways to change the limits, through technology or housing or jobs, there are places where the absence of voluntary emigration processes accelerates growth. That growth in turn often compromises traditional cultural institutions and practices, raising concerns about both safety and the necessities of life.
NAME___________________

Student Guide – Part B, #2
How Can Population Dynamics Shape Local and National Borders?

*This handout will guide you through a problem-solving exercise that:*

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Analyze emigration. What happens to the population in town? The overall population? What is the overall impact of emigration?

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