

[Unit 5: Averages, Law of Large  
Numbers, and Central Limit](#)[Course](#) > [Theorem](#)> [5.2 Interactives: Bus Stop Paradox  
and Central Limit Theorem](#)> [5.2.1 Interactive: Bus Stop Paradox  
Part 1](#)

## 5.2.1 Interactive: Bus Stop Paradox Part 1

Blissville and Blotchville have very different bus systems. In Blissville, buses run on a fixed schedule and are extremely punctual, with the time from one bus to the next always the same, 24 hours a day. In Blotchville, the system is much more chaotic. The *average* time from one bus to the next is the same as in Blissville, but these interarrival times are i.i.d. Exponential random variables. See Example 5.8.6 in this unit for more about Blissville vs. Blotchville.

In Example 5.8.6, buses ran 24 hours a day. Now however, buses arrive at the bus stop of interest only between 6 am and 10 pm each day. If the next bus on a day would have been after 10 pm, that bus simply doesn't arrive. To avoid riders being stranded overnight, both towns send a *sweeper bus* at 10 pm to pick up any riders who are still waiting.

This interactive explores the waiting times of riders at a bus stop in Blissville and a bus stop in Blotchville.

### Bus Stop Paradox Part 1 - Directions for Use

1. Press "Start" to start the simulation and see some buses appear on the two timelines. You can adjust the slider to change the average time between bus arrivals.
2. When the simulation pauses, click on each timeline at 5 points in the future (10 points total) to have people arrive at the bus stops at those times, and then click "Continue". Orange dots represent buses, while green dots represent riders.

### What You'll Notice:

- Arrival times of riders in each town, represented by green dots (you get to choose these times).
- Arrival times of buses in each town, represented by orange dots (you don't get to choose these times).
- The sample mean and sample standard deviation of time spent waiting for a bus, for the riders in each town.


YOU SHOULD TRY, FOR A GIVEN AVERAGE INTERARRIVAL TIME:

- Getting as low an average wait time as you can in each town.
- Getting a lower average wait time in Blissville than in Blotchville.
- Getting a lower average wait time in Blotchville than in Blissville.



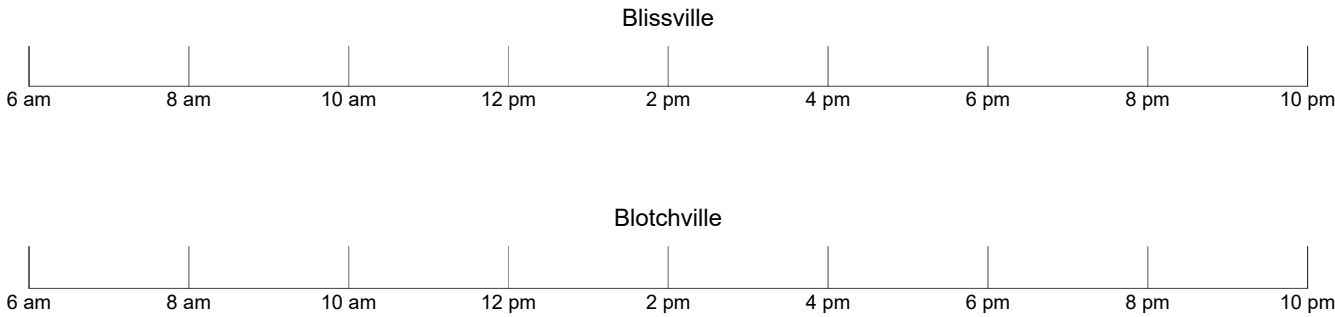
Controls

Show screen reader enhancements: ☐

Average bus inter-arrival time:  
  
60 minutes

Start

Reset



The orange dots represent buses as they arrive to pick up passengers, and the green dots represent people when they get to the bus stop.

