The Pace of Life

In season 8, episode 4 of the WYNC produced podcast, *Radiolab*, the hosts Jad Abumrad and Robert Krulwich investigate what makes a city a living and growing object. In a segment of this episode, titled "It's Alive" they talk to psychologist Robert Levine who discusses his efforts in quantifying and predicting attributes of cities all over the world.

Listen to this segment (4:25 – 11:20)
(http://www.radiolab.org/story/96043-its-alive/)

Much of Levine's research is based on the work of Marc and Helen Bornstein, who originally studied the pace of life in 1976. To see if life becomes more hectic as the size of the city becomes larger, they systematically observed the mean time required for pedestrians to walk 50 feet on the main streets of their cities and towns. In the table below, we present some of the data they collected. The variable P represents the population of the town or city, and the variable V represents the mean velocity of pedestrians walking the 50 feet.

Location	**Population, P**	**Mean Velocity V (ft/sec)**
Brno, Czechoslovakia	341,948	4.81
Prague, Czechoslovakia	1,092,759	5.88
Corte, Corsica	5,491	3.31
Bastia, France	49,375	4.90
Munich, Germany	1,340,000	5.62
Psychro, Crete	365	2.76
Itea, Greece	2,500	2.27
Iraklion, Greece	78,200	3.85
Athens, Greece	867,023	5.21
Safed, Israel	14,000	3.70
Dimona, Israel	23,700	3.27
Netanya, Israel	70,700	4.31
Jerusalem, Israel	304,500	4.42
New Haven, CT, USA	138,000	4.39
Brooklyn, NY, USA	2,602,000	5.05

Determine which model for V (linear, exponential, power, logarithmic) as a function of P is the best.

Try each of the potential models, do the following:

1. Attempt to linearize the data with an appropriate technique.
2. Determine if the technique applied successfully linearized the data.
3. If successful, find the equation that expresses V in terms of P.
4. Compute the residuals for your final model and the residual data.
5. Calculate the mean (i.e. the average) of the errors (absolute value of the residuals). What do the results suggest about the merit of the model?

Which of the models seems the most reasonable?

Resources

Bornstein, M.H. (1976). The Pace of Life. *Nature,* 259, 557 - 559

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Levine, Robert (1999). The Pace of Life in 31 Countries. *Journal of Cross-cultural Psychology*, 30(2), 178-205