

# **Instructions for Performing Virtual Experiments Using SimSeg Lite**

---

## **Overview**

This document provides instructions for using the SimSeg Lite program to perform “virtual experiments” to explore questions concerning how different factors in the simulation model may influence patterns of residential segregation. Such exercises can help clarify thinking about segregation dynamics and generate evidence suggesting how different factors might affect segregation outcomes under specific conditions.

These virtual experiments should be seen as theoretical *explorations*; not definitive “tests” of hypotheses. The SimSeg Lite program is a relatively simple simulation model and does not pretend to capture the full complexity of “the real world”. Thus, the results of experiments conducted using SimSeg Lite apply *only* in the context of the simulation model. They may not necessarily apply in the “real world”. (More technically, the model may have only limited “external validity”.)

### **Step 1: Review the Basic Features of the Simulation Model**

To perform an analysis, it is first necessary to gain a basic understanding of the simulation program and the features of the “real world” that it tries to model. Several different variables and processes are represented in the SimSeg Lite simulation model. The following aspects of the model are “constant” or “fixed”; that is, they are in effect any time the model is run. They include the following:

1. households vary on ethnic status (i.e., households may be “white”, “black”, or “Hispanic” and the city-wide mix is 60% white, 20% black, & 20% Hispanic).
2. households vary on socioeconomic status (i.e., SES scores from 1-99).
3. housing units vary in quality (also on a scale of 1-99).

Other aspects of the model are “variable”. Their role in the simulation will depend on the settings the user chooses. These include the following:

4. households may seek higher-quality housing and/or higher-status neighborhoods.
5. access to higher-quality housing may be means-tested.
6. area stratification may concentrate higher-quality housing in outlying areas.
7. minority populations may be disadvantaged in socioeconomic status.
8. ethnic groups may hold varying preferences for in-group & out-group contact.
9. households may take account of the ethnic mix in immediate & nearby areas.
10. discrimination may limit minority access to predominantly white neighborhoods.

### **Step 2: Develop a Hypothesis to Explore**

Specify a hypothesis to investigate and develop a brief rationale for it. For example, consider the following hypothesis and rationale.

H1: Ethnic segregation will be greater when (a) minority groups are disadvantaged with regard to socioeconomic status, *and* (b) suburbanization concentrates higher-quality housing in outlying areas.

Rationale: Households seek out the highest-quality housing they can afford in the “nicest” neighborhoods they can find. When access to higher-quality housing is means-tested and such housing is concentrated in outlying areas, groups that are socioeconomically disadvantaged will be residentially separated from other groups.

### Step 3: Specify “Scope” and “Control” Conditions

Next, clarify the conditions under which the hypothesis should be tested. For example, for the hypothesis just introduced, we should specify the following conditions:

1. households **seek** higher-quality housing and high-status neighborhoods.
2. access to higher-quality housing **is** means tested.
3. ethnic preferences are **not** active.
4. discrimination is **not** active.

Scope conditions consist of factors that are not of particular interest in the analysis, but are thought to have an important bearing on whether the hypothesis is correct or not. That is, the hypothesis may be believed to be correct under some conditions and but not under others. If so, it is crucial to identify the scope conditions (i.e., the conditions under which the hypothesis is expected to be correct).

In this case, the hypothesized impact of minority socioeconomic disadvantage and area stratification is presumed to operate under conditions where households are motivated to seek higher-quality housing and high-status neighborhoods (condition 1) and where their attempts to move to higher-quality housing are means-tested (condition 2).

Control conditions are conditions under which the hypothesis is tested, but which are not necessarily *presumed* to have an important bearing on whether the hypothesis is correct or not. They are specified for two reasons. One is that this facilitates replication of the experiment (others can repeat the experiment by implementing the same control conditions). Another is that, since the results of the test *may* depend on the control conditions, interpretation of the success or failure of the test might involve speculation about the role of the control conditions. (For example, perhaps an investigator would speculate that a test that failed would have succeeded under different control conditions.)

### Step 4: Specify a “Baseline” Simulation Scenario

In this step, design a “baseline” simulation scenario. The purpose of this scenario is to establish a point of comparison against which the impact of the experimental treatment can be compared and evaluated. The baseline scenario satisfies two requirements.

- it implements the scope and control conditions for testing the hypothesis.
- it **does not** implement the experimental conditions.

In the present case, the baseline scenario should be specified as follows:

#### Settings to Implement the Scope and Control Conditions

1. households **do** seek higher-quality housing and higher-status neighborhoods.
2. access to higher-quality housing **is** means-tested.
3. ethnic preferences are **not** active.
4. discrimination is **not** active.

#### Settings for Experimental Variables (Appropriate Contrast Values)

5. minorities are **not** disadvantaged in socioeconomic status.
6. high-quality housing is **not** concentrated in outlying areas.

### **Step 5: Run Repeated Experiments Using the “Baseline” Scenario**

Run several experiments (trials) using the baseline scenario and systematically record the segregation outcomes that are obtained.<sup>1</sup> (A form for recording these results is provided at the web site where this document is found.)

It is important to run several experiments because the final residential pattern and even the segregation scores can vary from one trial to another even when the separate trials are based on identical settings for all variables. Whether segregation patterns are consistent or highly variable will be evident in the recorded results for the repeated trials.

### **Step 6: Revise the Baseline Scenario to Introduce “Treatments” Implied by the Research Hypothesis**

Change the scenario to introduce the key experimental or “treatment” conditions identified in the research hypothesis. In the example developed here, the scenario would be changed as follows:

5. minorities **are** disadvantaged in socioeconomic status.
6. high-quality housing **is** concentrated in outlying areas.

Note that all other aspects of the baseline scenario are unchanged. The changes just introduced may be thought of as “treatments” that have been introduced. The question is whether these treatments will have affect segregation outcomes.

### **Step 7: Run Repeated Experiments Using the “Treatment” Scenario**

Run several experiments using the treatment scenario and systematically record the segregation outcomes that are obtained. Again, it is important to run several experiments to see whether the results are consistent from one simulation experiment to the next.

### **Step 8: Evaluate the Effect of the Treatment**

Evaluate the effect of the treatment by comparing the segregation outcomes obtained using the baseline scenario to the segregation outcomes obtained using the treatment scenario.

For the purposes of this exercise, simply compare the median scores from the “baseline” experiments and the “treatment” experiments. (That is, find the middle score in each set of scores and compare them.)

This is a crude method of comparison appropriate only for exploratory analysis. With training in statistical methodology, it would be possible to perform more rigorous comparison (e.g., a formal difference of means test or a Wilcoxon rank sum test).

Describe the results of the comparisons made above. Then draw a conclusion about whether the results produced by the experiments are consistent with the hypothesis or not.

---

<sup>1</sup> It is important that each trial should run for the same duration; that is, an identical number of “cycles” (e.g., at exactly 30 cycles).

## **Examples of Some Simple Hypotheses**

### ***Minority Socioeconomic Disadvantage Generates Higher Segregation***

Are higher levels of ethnic segregation generated when minorities are disadvantaged in terms of socioeconomic status (i.e., purchasing power)? Specify appropriate scope and control conditions. Then specify minority socioeconomic disadvantage (i.e., ethnic inequality) to be lower in the baseline scenario and higher in the experimental scenario.

### ***Area Stratification Generates Higher Segregation***

Are higher levels of ethnic segregation generated when areas are stratified (i.e., when higher-quality housing is concentrated in outlying neighborhoods)? Specify appropriate scope and control conditions. Then specify area stratification to be lower in the baseline scenario and higher in the experimental scenario.

### ***Discrimination Generates Higher Segregation***

Are higher levels of ethnic segregation generated when discrimination blocks minority entry into predominantly white areas? Specify appropriate scope and control conditions. Then specify discrimination to be lower in the baseline scenario and higher in the experimental scenario. (Discrimination effects only make sense when the setting for ethnic preferences gives whites a moderate to strong preference for in-group [i.e., white] contact.)

### ***Ethnic Preferences Generate Higher Segregation***

Are higher levels of ethnic segregation generated when households have preferences for in-group contact? Specify appropriate scope and control conditions. Then specify ethnic preferences to be lower in the baseline scenario and higher in the experimental scenario.

## **Examples of More Complex Hypotheses**

### ***Status and Housing Concerns Dampen the Impact of Ethnic Preferences***

For a given set of ethnic preferences, are lower levels of ethnic segregation generated when households seek for higher-quality housing and high status neighborhoods? Specify appropriate scope and control conditions (including a particular set of ethnic preferences). Then specify households to ignore housing and status concerns in the baseline scenario and to seek higher-quality housing and higher status areas in the experimental scenario.

### ***Area Stratification Increases the Impact of Ethnic Inequality***

For a given level of ethnic inequality, are higher levels of ethnic segregation generated when area stratification is higher? Specify appropriate scope and control conditions (including a particular level of ethnic inequality). Then specify area stratification to be lower in the baseline scenario and higher in the experimental scenario.

### ***Considering Nearby Areas Increases the Impact of Ethnic Preferences***

For a given set of ethnic preferences, are higher levels of ethnic segregation generated when households consider the ethnic mix in nearby areas? Specify appropriate scope and control conditions (including a particular set of ethnic preferences). Then specify area stratification to be lower in the baseline scenario and higher in the experimental scenario.