Lizz Bartos

EECS 372

Designing and Constructing Models with Multi-Agent Languages

Prof. Uri Wilensky

15 July 2013

**Safe Sex Attitudes and Behaviors**

**Overview**

This NetLogo model aims to simulate the spread and development of safe sex attitudes and behaviors in response to the presenceof a sexually transmitted infection (STI) throughout a social network of young adults. It also takes into account how these variables interact with one another and change over time using theories of attitude change and certainty.

**Relevance and Motivation**

This project specifically focuses on modeling college students in the United States, making it relevant to a specific demographic where this is a problem…? (something about relevance.) Male and female students come to universities with diverse backgrounds, including [varying] education and attitudes regarding/towards safe sex. It was of interest to see if the NetLogo model could emulate those behaviors. The model also aimed at modeling the complex social behavior associated with sexual partnering.

This model will focus/focuses more on the sexual attitudes and behaviors of agents in relation to the spread of STIs, rather than the spread of sexually transmitted infections themselves. This contrasts with previous models in the NetLogo library that focus on the actual spread of a disease, such as the AIDS model, the Virus model, or the Virus on a Network model.

**Guiding Questions**

* What factors seem to be most influential in determining whether an individual will contract an STI?
* What factors influence the spread of attitudes towards safe sex?
* Are the two above questions interdependent? What implications could this have for targeting information campaigns to this age group?

**Model Parameters [Model Interface Parameters? Visible Model Parameters?]**

(include image of model interface??)

**Social network:** Parameters are provided to initialize a simple social network, consisting primarily of discrete social groups (cliques). Users can control the number and size (number of members) of cliques (**num-cliques** and **clique-size** sliders), and whether they are initialized with a limited number of inter-group links between “clique leaders” (**social-butterflies?** switch enabled). These cliques consist of agents that primarily interact with members of the same group. Each agent has a specified number of desired friends (**avg-num-friends** slider), which generates a fixed number of friend links within the group. [clarify this wording] Specific values for each agent start with random value drawn from a normal distribution. randomly distributed on normal curve….

**STI characteristics:** users can control the likelihood (out of 100%) of an infection spreading during an unprotected sexual encounter (**infection-chance** slider), and [choose] which genders (if any) show symptoms of the infection (using the **symptomatic?** chooser). When the user presses **setup**, one random agent in the model will be infected by default. However, the user can also choose to **select** an agent in the model to infect with their mouse, or press **infect-random** to infect an additional agent in the model with a sexually transmitted infection. These functions are optional, but can be called multiple times before, or at any time during, the simulation.

**Agent Parameters Impacting Practice of Safe Sex**

**Global Averages of Agent Parameters Impacting Likelihood of Safe Sex Behaviors/Practicing Safe Sex**

**Attitude:** users can separately define the [average] initial intention/desire (dad suggested “tendency”, but that’s implicative of behavior/likelihood) of a male vs. female agent [in the model] to practice safe sex, i.e., condom use/use a condom (using the **avg-male-condom-intention** and **avg-female-condom-intention** sliders, both with ranges/which both range 0 to 100%). The desire that an agent wants to practice safe sex …. is set by a normally distributed random variable ranging from 0 to 100% which is gender dependent.

feelings about / desire/intention to use / condoms…. wants to use a condom/practice/have safe sex … which is used as an average for generating (~~randomly~~ normally distributed random) chance out of 100% that an agent wants to use a condom (depends on gender)

**Certainty:** agents have an initial confidence in their attitude [towards safe sex], which influences how resistant they will be to adopting alternate viewpoints/changing their attitude. This variable reflects how much [of] their upbringing encouraged safe sex. These views might consist of parents' beliefs, life experiences, religious attitudes, etc. So/Hence why the initial average population value is set with [the] **avg-mesosystem-condom-encouragement** [slider] [slider 0-100%].

… however… bring up that certainty is independent of extremity, polarity, or strength of attitude..;. its more of an emotional attachment to it, and influences resistance to change it. …. how emotionally attached/strongly an agent feels about their opinion/attitude

certainty - likelihood/degree to which attitude changes is inversely proportional to certainty

100 - certainty = likelihood/willingness to change attitude

A derivative variable which would be [100 - certainty] would be willingness to change their attitude.

**Justification:** agents have an initial reasoning why they have their attitude and what logical explanations they have to back up their attitude. Users can indicate the percentage of agents that receive sexual education including condom use, (**%-receive-condom-sex-ed** [slider 0‑100]). Agents that receive ~~sex/ual~~ health education including information about condoms as protection against STIs will have a higher level of accurate knowledge about safe sex practices and benefits, and those who don’t will have a lower level of accurate knowledge. ~~But~~ both values will be normally distributed over the higher or lower value, and used as the initial justification for a given agent.

These variables of **attitude**, **certainty**, and **justification**, which influence their/an agent’s **likelihood** of engaging in safe sex using protection, will interact and ultimately determine whether the agent practices safe sex.

The [approximate] likelihood of an agent practicing in safe sex is demonstrated through the color of each agent. Enabling the **show-labels?** switch will also display the exact likelihood value of each agent to engage in safe sex behaviors. (rather than within a range of 5, as colors do… but discussed below, so many remove??) The user can press **go-once** to see changes per step (often very useful if examining a person that was just infected) or press **go** to view a continuous progression of the model simulation.

**Agent Parameters:**

Individual agents are initialized by setting gender and unique member variables. Custom values for each agent are generated randomly following an approximately normal distribution using the average global variables indicated above, as well as some additional variables that are hard-coded and invisible to the user. [Reference the big 3 components influencing likelihood will be discussed in further detail below when talking about agent parameters, behavior, and rationalization…]

**Attitude:** An agent’s attitude is initially set to [condom desire or whatever].Attitude evolves during/over the course of the model and changes/has the potential to change [on each tick.] based on talking to peers or getting infected.

**Certainty:** Certainty is initially set to a value near? (redundant if already talked about normal random distribution?) the avg-mesosystem-condom-encouragement. Certainty is the best determination of behavior, according to research (citation). However, this NetLogo model has certainty as an influencing variable for Attitude, which ultimately determines the likelihood of whether safe sex is practiced.

**Justification:** Justification is initially set to the level of accurate education this agent has about safe sex and condom usage. (revisit)

**Agent Appearance:** (/reference to visual something)

**Shape:** Shape – Agent shape is determined by gender and sick/health/infection status. Infected turtles have a dot on their shape, and the color of the dot indicates whether or not they “know” they are infected (white: known? = true; black: known? = false), which is based on being symptomatic.

**Color:** Color – The color of the agent indicates his or her individual/personal likelihood of practicing safe sex. A green agent is more likely to engage in safe sex, while a red agent is less likely to use a condom. The likelihood is a scale from 0 to 100, and agents that are 50% likely of having safe sex are displayed as white.

**Label:** Label – The labels, if enabled, also indicate each agent’s likelihood of practicing safe sex, but it is more accurate because it shows the exact value, whereas color changes by increments of 5 (clarify more/reword).

**Links:** Links – In this model, turtles can have multiple friends, but only one sexual partner at a time. The type of relationship between the two agents is distinguished/indicated by color of the [connecting] link: a blue link denotes friendship, and magenta link denotes a sexual partnership.

**Model Setup**

The social network of agents is arranged~~/initialized/set~~ as mostly discrete social circles, with some (optional) social butterflies that have links to [central] members of other social groups, in addition to links to all members in their clique. Agents start with a certain number of friend links, and no sexual partner links. Establishing networks consisting of "friendship" links and "sexual partner" links (differentiated by color). Friend links are gender independent, but sexual partners are not – they require a coupling of one male and one female agent. ~~Individual variables per agent~~ [Individual] Agent variables are assigned randomly following a normal distribution based on slider or global values [assign-normally-distributed-member-variables]

When the model is set up/initialized, everyone is initially single and uninfected. [except one person!]

The system has several stop conditions/conditions under which the simulation will stop running:

* If every single agent in the model is infected
* If the certainty of every agent gets so high that attitudes won’t/will not change anymore (based on this model’s implementation)
* If every agent comes to the same attitude consensus (need to implement, think its only on polar ends right now)
* If attitudes/likelihoods???/some variables? aren’t changing any more…. reach some sort of stable state?
* (If likelihoods of all agents stop changing significantly, the simulation will stop.