Supplemental Materials to "An Agent-Based Model of Gender and Sexual Orientation Differences in Short-Term Mating Behaviors as a Result of Mating Preferences"

Overview, Design Concepts, and Details of the Model

This description of the model follows the standard ODD protocol of reporting individual-based and agent-based modeling (Grimm et al., 2006).

Purpose

The model simulated sex differences in short-term mating behavior. Findings in evolutionary psychology suggest that men have a stronger desire for short-term mating than women (Regan, 1998). They are also less choosy regarding short-term mating partners (Buss & Schmitt, 1993; Buss & Schmitt, 2019). This model explores both heterosexual and gay men's as well as heterosexual and lesbian women's behavioral outcomes under these assumptions.

The first version of the model simulated short-term mating behaviors among heterosexual individuals, short-term mating and/or long-term relationships were formed only between individuals of the opposite sex. The second version of the model simulated the behaviors among gay men and lesbian women, where individuals only had short-term matings and/or formed long-term relationships with those of the same sex. The key parameters were individuals' likelihood of engaging in short-term mating and their standards for a short-term partner. We varied those parameters to examine conditions under which sex differences in behavioral outcomes may emerge.

Entities, state variables, and scales

The model included two types of entities: global and agents. In this model, time and space were modeled as discrete variables. During each time step, agents executed the commands described in the schedule. Space was represented as discrete locations on a two-dimensional 33*33 lattice. All state variables are summarized in Supplemental Table 1.

Process overview and scheduling

The model was written using Netlogo 6.2.1 (Wilensky, 1999). The model proceeded in discrete time steps, and the entities executed commands in the following order:

1. Setting up (Global, only executed once)

(a) 300 agents were created with all state variables set to the default

(b) A number of agents were set to either men (number-of-male) or women (300 – number-of-men) with their respective short-term mating likelihood (short-term-likelihood), and standard for a short-term mate (mating-standard)

2. Moving (The following procedures were executed by agents unless specified otherwise)

   (a) If not coupled

      i. If staying within a distance of movement-range from the initial point on both the x and y axis, randomly set their heading and move by a random distance less than movement-range / 2

      ii. If staying outside the distance of movement-range from the initial point on either the x or y axis, head toward the initial point and move by a random distance less than movement-range / 2

   (b) If coupled, do not move

3. Deciding on short-term mating behavior

   (a) Set short-term-mate? to true by short-term-likelihood

4. Short-term and long-term mating (To avoid double count, only women execute this chunk. This does not affect the model outcomes.)

   (a) If any men here, women randomly select one as the target for short-term mating

      i. If the target has desirability higher than her mating-standard & she has desirability higher than the target's mating-standard & both of them have short-term-mate? set to true,

         A. Both of them add 1 to short-term-count

         B. Both of them add each other's ID number to their short-term-history if not in it yet

   (b) If any men here and women are not coupled, women randomly select one as the potential partner for long-term mating

i. By long-term-likelihood, they form a long-term relationship, and

A. Both of them set coupled? to true

B. Both of them set each other as their long-term partner

5. Updating state variables

(a) Set number-of-partner-short the length of short-term-history

(b) If short-term-likelihood equals male-/female-short-term-likelihood, set short-term-likelihood to a third of its value

Design concepts

Sensing. Agents were able to detect other agents' mate value so that they could decide whether to have short-term mating with them.

Interaction. Women and men interacted to have short-term mating behaviors or form long-term relationships.

Stochasticity. Agents' movement in this model had stochastic elements, with the heading and the movement distance being randomly selected. Whether agents decided to have short-term mating or form long-term relationships was also randomly determined.

Observation. Simulations were run for 1,000 time steps. The dependent variables were measured at the end of each run.

Supplemental Table 1: Overview of state variables associated with each type of entity.

Entity	State variable	Description	Default or initial value [scale]	Unit
Global	number-of-male	Number of men in the population	150 [0-300]	Individuals
	movement-range	The maximum distance an agent can move from the location where they have been generated	3 [1-15]	Patches
	all-homosexual?	Whether agents are heterosexual (F) vs. gays/lesbians (T)	[True/False]	
Agent	long-term-likelihood	The likelihood of two agents forming a long-term relationship upon meeting	10 [1-100]	%
	coupled?	Whether agents are single (F) or in a long-term relationship (T)	False [True/False]	
	partner	Long-term partner		ID number of the partner
	short-term-likelihood	The likelihood of an agent deciding to engage in short-term mating	40 (men), 25 (women) [0-100]	%
	mating-standard	The minimum mate value of a partner with whom an agent is willing to have short-term mating upon meeting	3 (men), 5 (women) [0-10]	
	desirability	Mate value for short-term mating	Mean = 5; SD = 1.5	
	short-term-mate?	The decision to have short-term mating (T) or not (F) during each time period	False [True/False]	
	short-term-count	Number of past short-term mating behaviors	0	
	short-term-history	List of all short-term mates in the chronological order		ID number of partners
	number-of-partner-short	Number of past short-term mates		Individuals
	initiator?	Whether an agent initiates short-term mating (T) or not (F) (used only in the experiments for gay men and lesbian women)	False [True/False]	

Supplemental Table 2: Parameter setting in the eight conditions of two experiments. Parameters manipulated across experiments are highlighted in italics. Parameters manipulated across conditions are highlighted in boldface.

	Experiment 1: Heterosexual individuals				Experiment 2: Gay men and lesbian women			
	Same likelihood* Same standard	Same likelihood* Different standard	Different likelihood* Same standard	Different likelihood* Different standard	Same likelihood* Same standard	Same likelihood* Different standard	Different likelihood* Same standard	Different likelihood* Different standard
number-of-male	150	150	150	150	150	150	150	150
movement-range	3	3	3	3	3	3	3	3
all-homosexual?	*FALSE*	*FALSE*	*FALSE*	*FALSE*	*TRUE*	*TRUE*	*TRUE*	*TRUE*
long-term-likelihood	10	10	10	10	10	10	10	10
male-short-term-likelihood	**25**	**25**	**40**	**40**	**25**	**25**	**40**	**40**
female-short-term-likelihood	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**
male-mating-standard	**5**	**3**	**5**	**3**	**5**	**3**	**5**	**3**
female-mating-standard	**5**	**5**	**5**	**5**	**5**	**5**	**5**	**5**

Supplemental Table 3: Mean proportion of heterosexual men and women in the mating pool and its standard deviation after 1,000 time steps in the model.

	Men		Women	
	M	*SD*	*M*	*SD*
Same likelihood*Same standard	0.22	0.04	0.23	0.04
Same likelihood*Different standard	0.32	0.04	0.41	0.05
Different likelihood*Same standard	0.28	0.04	0.28	0.04
Different likelihood*Different standard	0.38	0.04	0.51	0.05

Note. N = 2,500 in each condition.

References

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