Australian National University

CHOOSE YOUR MATE

This project is designed to make students think about what factors affect the benefit of being choosy.

In this activity there are two games to play. The first one with three scenarios needs two equal sized groups, and the second game requires a minimum of five groups.

Game one

Materials

- Small coloured stickers – two colours (hereafter red and blue)
- Marker pen
- White board and marker pen and cloth
- 2 x Bags that contain 90 or 100 numbered pieces of paper/plastic discs (digital copy provided). Numbers are between 1 and 10. You decide the relative proportion that are of each number, but ensure it is the same for two bags.
- Stopwatches (you can use your phone!)

Instructions for the teacher

1. Divide the class into two even sized groups such as 15 red and 15 blue. Note how many of each.

2. One group is assigned the red stickers, the other group the blue stickers.

3. Write numbers between 1 and 5 on the appropriate number of stickers. Try to have an approximately 'bell-shaped' (i.e. normal) distribution of numbers (i.e. more 3's than 4's or 2's and more 4's and 2's than 1's or 5's) .

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4. Place a numbered sticker on each student's forehead. They must not see the number.

5. Tell the class that they must not tell each other the number on their sticker.

6. You can now run the various scenarios to teach the students about the effect of time constraints on choosiness when selecting a partner.

7. In each scenario tell the students that their goal is to get the partner with the highest score. Incentive them with small prizes if needed.

8. Depending on the age/type of class you can present the exercise as a way to explain either choice of mating partners (biology) or economic decision making.

This project is best run outside (more fun) but could also be run in a large room.

Scenario 1

Ask students to find a partner. They can take as long as they like. Each time they ask someone to be their partner that person can accept or reject. Once they have a partner tell them to line up as a pair in front of the teacher.

Use a white board or notepad to plot the value of the red sticker number against that of the blue sticker for each pair. If the students are playing properly there will be a tight positive correlation between the two numbers (i.e. fall along the line of equality). In biology this is assortative mating.

You can then discuss with the students how they made their decision to accept a partner. Did they start to work out if they think they have a high or low number? How? And how sure are they? Did they expect to see an assortative pairing pattern – especially given that they do not know their own value? Replay the game and see if there is a stronger correlation the second time around. Ask the students to discuss why.

Switch or assign new stickers to students between scenarios, or repeats of a scenario, otherwise they will 'learn' their number.

Scenario 2

The same as scenario 1 except that you tell the students the game ends once ¾ of them have formed pairs. You should see less choosiness, hence less assortative mating, as there is now a risk of failing to score anything.

If you like, you can even re-run the scenario with the game ending once ½ the students have paired. There should be an even weaker assortative relationship. Ask the students to discuss why.

Scenario 3

As with scenario 2 but now you split the students into three 'choice arenas'. Make these far apart so that students must run between them. Ensure there are equal (or close to equal) numbers of red and blue sticker students in each arena. Students can only seek partners when they are in the choice arenas. You should find that mating is less assortative. Ask them to discuss why they chose to stay in their arena or move to another.

Ask the student what general lessons they have learned about choosiness based on comparing what happened in these different scenarios.

Ask the students how information that suggests you have a low or high value (i.e. how many people initially ask you to be a partner) affects your choosiness. They should conclude that when you have a high value you can be more choosy because it is easier to find a partner who will accept you (i.e. you have more available partners)

Game two

Materials

- 5 x bags of 90 or 100 numbers (digital copy provided)

Instructions for the teacher

1. Ask the students to form teams, teams could be a single person or several people. We recommend it's best with two people per team or minimum of five teams.

Note: If a team is too big most people won't be doing anything (i.e. neither recording the time nor pulling numbers out of the bag). They may get bored and disrupt the class.

2. Each team gets a bag with 90 or 100 numbered items/cards.

3. Tell the students their goal is to get the highest total score based on adding up all the numbers they pick out and accept (i.e. chose rather than reject).

4. To start the game, each team reaches into the bag (or some other container) and randomly take out a number (don't cheat and look first). They can then decide to accept it or reject it.

5. Tell the students that if they accept an item they then have to wait **1 minute** before picking the next item. If they reject it, then must wait **15 seconds** before picking a new item. In both cases, they then put the item back into the bag and shake it up.

6. Tell them to write down the number if they accept an item.

7. Now the students know the rules, tell them to work out a strategy to accept or reject an item once they take it out the bag. Offer a small prize to incentive them.

Start playing the game and keep going for as long as you like. Then see who got the highest/lowest scores. Discuss the strategy used and how well it aligned with their score.

Students should be thinking about (a) the need to first sample to see how common different value numbers are, and (b) the cost of rejection is a slower rate of adding numbers BUT the chance of getting a higher number.

Play the game again, but now tell the students they wait **30 seconds** if they accept an item before picking the next. The students should be less choosy if they want to do well. Simply put, if the delay after accepting were 15 second they should accept every item. The shorter the delay (i.e. the sooner new options come along) the less the benefit of being choosy. Total score = acceptance rate x value of accepted items.

Learn more about this experiment

The biological rational behind this game is to think about the benefits of mate choice. Why chose a mate? Also, why in most animals are females choosier than males? This is why males are often brighter than females or have elaborate courtship displays or other kinds of ornaments. Think of a peacock's tail. A peahen, in contrast, is a dull coloured bird with a short tail.

The games will hopefully teach students that the speed with which you encounter mating partners is a critical factor in the evolution of choosiness. In brief, rather than focusing on choice, focus on the act of rejecting a potential mate. What does this do? Well, it slows down your total mating rate and, all else being equal, the more times you mate (and breed) over your lifetime the more descendants you will produce.

Evolution is all about selection for traits that increase your lifetime reproductive success. So mate rejection is costly because it slows your mating rate. To be beneficial, the gain from 'waiting' for a better quality mate has to be greater than the cost of a reduction in mating rate. This cost is smaller if you encounter mates more often (reject one and the next potential mate will be there very soon).

In animals, females usually provide parental care. This means they spend longer out of the mating pool when they breed. Males return quickly. The mating pool therefore has more males than females. Consequently, females encounter potential mates at a faster rate than males do. Hence the cost of mate rejection is lower for females. So, if some mates are better than others then, all else being equal, females can be choosier than males.

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