



How fairly do humans share with a stranger?

The Ultimatum Game and the Dictator Game

Suitable Grade Levels: 7th-12th	Time: 30 - 90 min
Materials: <ul style="list-style-type: none">• Handouts and worksheets	Related content: <ul style="list-style-type: none">• "Fair" does not always mean the same thing• Noticing moral intuitions• Game theory: The Public Goods Game• Introduction to social dilemmas and the payoff matrix• Exploring design-principles for cooperation• Life in groups and conflict

Lesson overview

These lesson materials introduce students to game theory as well as two concrete methods, the ultimatum game and the dictator game. The terms and rules of these games are intended to reflect the problem of distributing resources within a group. In both games, one player receives a sum of money and then has to decide if he/she wants to give some of the money to an unknown (anonymous) second person. The first player can give whatever he wants, or nothing. In the Dictator game, Player 2 has a passive role, and simply has to accept the offered amount. In the Ultimatum game, however, the second player must decide whether he accepts the money offered to him, or rejects it. If he rejects, both players will receive nothing.

Behavioral scientists play these games with adult people in different cultures, as well as with children and even with other animal species, in order to explore human and other animals' altruistic behaviors, sense of fairness, as well as proximate and ultimate causes of these behaviors. These experiments also let students reflect on the nature of human altruism, sense of fairness, learned social norms, and their variation among individuals and cultures. They point to the reason why perceived fair distribution of resources, costs and benefits is important for the sustainability of a community.

Learning goals

Competencies: cooperation competency, evaluation competency, intercultural competence, evolutionary thinking

Understandings

Students are able to

- understand that many human behaviors can be caused by intuitions that we are often not aware of. One such intuition is a sense of fairness, and it can make us notice unfair distribution of resources, costs and/or benefits in a group, can motivate us to share with others, and can make us angry or become more selfish if we perceive that resources are not shared fairly.
- understand that intuitions are the result of evolutionary history and developmental experiences.
- understand that humans have been shaped by natural selection and cultural evolution to behave according to the social norms of their group, which allow them to cooperate in groups.
- understand that behaviors exhibit variation both between individuals or groups within a species, as well as between species, because of different influences in the past.

Learning objectives, Skills

Students can

- describe game theory as a methodology for exploring human social behavior;
- explain the possible proximate and ultimate causes of human behavior under different conditions of the ultimatum and dictator game;
- represent the possible motivations of people to behave in a certain way, including the costs and benefits arising from behavior, in a payoff matrix.

Concepts

games, game theory, sense of fairness, (moral) intuitions, fair distribution/equality, self-interest, empathy, social norms, punishment, reciprocity, reputation, variation of behavior, evolutionary causes, development, proximate causes, payoff matrix

Essential questions

- Do you think all humans care about fairness? Why, or why not?

- Can there be a different meaning of “fairness” for different people or in different situations?
- In what situations are consequences of a behavior influenced by what other individuals do?
- What factors motivate people to behave in a way that benefits others?
- Do people always need to be monitored and threatened with punishment in order to behave in a way that benefits others? Why, or why not?
- What is the role of intuitions and emotions, beliefs, personal preferences and goals, and learned social norms in motivating people to behave in a certain way?
- What role do fairness and equal distribution play when a group of people have to share a resource? Is fair distribution of resources important for the sustainable development of a community? Why, or why not?

Introduction for teachers

This lesson introduces a method of sustainability science: experiments of game theory.

Game theory is an important method of behavioral research, which has been used increasingly since about 1980. The goal of game theory is to explore the behavior of people in different social situations, which are in certain aspects transferable to situations of real life.

Methods of game theory are used with people of different ages and with people of different socio-economic and cultural backgrounds, as well as in part with other species, especially with chimpanzees. By looking at similarities and differences in the behavior of these groups of participants under comparable conditions, researchers gain insights about the proximate and evolutionary causes of human social behavior.

These lesson materials introduce students to game theory as well as two concrete methods, the ultimatum game and the dictator game. The terms and rules of these games are intended to reflect the problem of distributing resources within a group. In the ultimatum game, one player receives a sum of money and then has to decide if he/she wants to give some of the money to an unknown (anonymous) second person. The first player can give whatever he wants, or nothing. The second player must then decide whether he accepts the money offered to him, or rejects it. If he rejects, both players will receive nothing. Behavioral scientists played the ultimatum game with adult people in different cultures, as well as with children. These experiments let us reflect on the nature of human altruism, sense of fairness, learned social norms, and their variation among individuals and cultures. They point to the reason why

perceived fair distribution of resources, costs and benefits is important for the sustainability of a community.

Suggested Lesson Plan

Phase	Materials	Questions
<p>Initial Reflection on the concept of fairness</p>		<p>What do you understand by fairness? How would you define it?</p> <p>Can you think of a situation in which you felt you have been treated unfairly? How did you feel?</p> <p>Do you think all humans care about fairness? Why, or why not?</p> <p>Can there be a different meaning of “fairness” for different people, or in different situations?</p>
<p>Initial reflection on hypothetical scenario</p>	<p>see below</p>	<p>What factors motivate people to behave in a way that benefits others?</p> <p>Do people always need to be monitored and threatened with punishment in order to behave in a way that benefits others? Why, or why not?</p>
<p>Introduction to game theory and Ultimatum-/Dictator game across cultures</p>	<p>Handout</p>	<p>What kind of behavior do you expect from people in the role of "Player 1" in the Dictator and Ultimatum game?</p> <p>What kind of behavior do you expect from people in the role of "Player 2" in the ultimatum game?</p> <p>Do you expect differences between people of different cultures or social backgrounds? Why, or why not?</p>
<p>Payoff Matrix</p>	<p>see below</p>	<p>What is the role of intuitions and emotions, beliefs, personal preferences and goals, and learned social norms in motivating people to behave in a certain way?</p>

Discussion of results	Handout	
Reflection questions	see below	
Discussion questions: influence of conditions	see below	<p>What factors motivate people to behave in a way that benefits others?</p> <p>Do people always need to be monitored and threatened with punishment in order to behave in a way that benefits others? Why, or why not?</p> <p>What is the role of intuitions and emotions in motivating people to behave in a certain way?</p>
Reflection on fair distribution and sustainability	see below	<p>Do you think there are other animal species who also have a sense of fairness? Why, or why not? → <i>Link to Biology (behavioral ecology)</i></p> <p>Can you think of events in history or current society in which the human sense of fairness might have played a role? → <i>Link to History, Social studies</i></p> <p>What is the role of fairness for the sustainable development of a community? What else, other than natural resources, can be or needs to be sustained in a community, for it to be called “sustainable development”?</p>
Ultimatum Game with children	see below	
Ultimatum Game with Chimpanzees	see below	
<p>Reflection on conceptual understanding</p> <p>Students write a short reflection essay on a subset of these questions (depending on lesson and unit focus), using insights gained from this lesson content</p>		<p>In what situations are consequences of a behavior influenced by what other individuals do?</p> <p>What factors motivate people to behave in a way that benefits others?</p> <p>Do people always need to be monitored and threatened with punishment in order to behave in a way that benefits others? Why, or why not?</p>

		<p>What is the role of intuitions and emotions, beliefs, personal preferences and goals, and learned social norms in motivating people to behave in a certain way?</p> <p>What role do fairness and equal distribution play when a group of people have to share a resource? Is fair distribution of resources important for the sustainable development of a community? Why, or why not?</p> <p>Do you think all humans care about fairness? Why, or why not? Can there be a different meaning of "fairness" for different people?</p>
--	--	---

Initial reflection

[as a group discussion, think-pair-share, individual reflection etc.]

Imagine a complete stranger unexpectedly gives you 20 € (*adjust sum or currency, or choose another attractive resource*), just like that.

Then he asks you if you want to give some of that money to another person. You can not choose who the other person is, he or she is unknown to you.

Would you give some of the unexpected gift to a stranger? How much of it would you give? Why or why not?

To what extent could the behavior between different people differ in this situation? What role could e.g. age, social, economic and cultural origin play?

Provide a hypothesis about how different people usually behave in such a situation.

What circumstances would affect your behavior in this situation? Under what circumstances would you be willing to give something of the gift to a stranger?

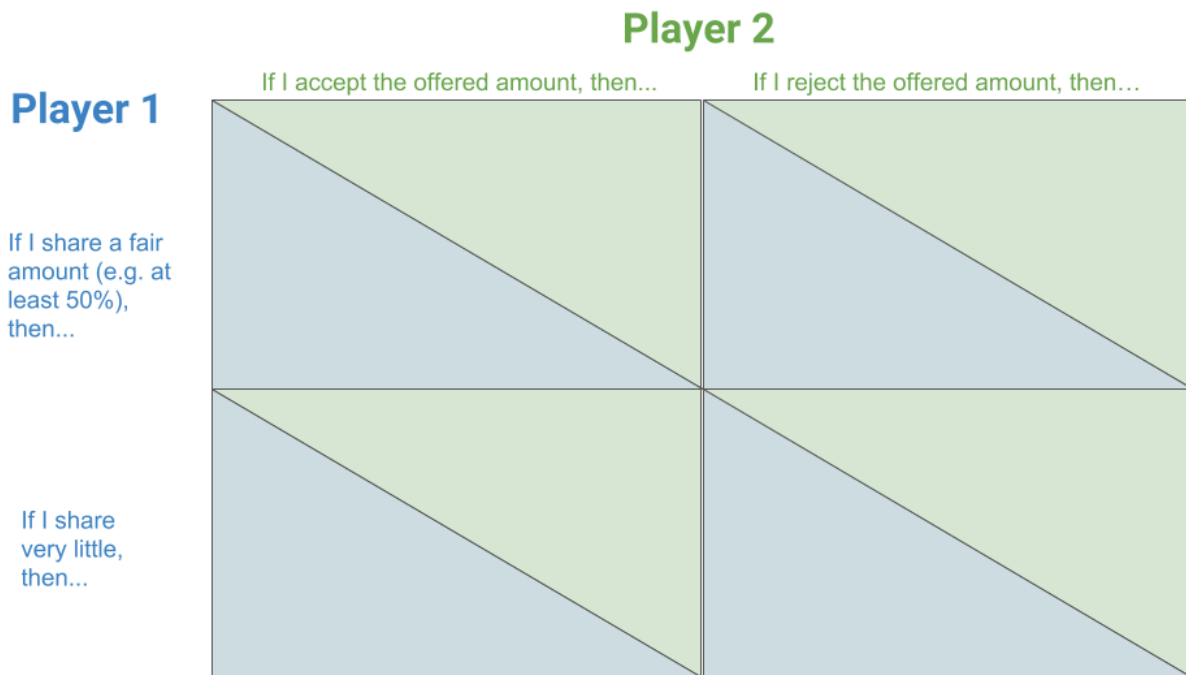
Under what circumstances would you not be willing to give anything?

How could we find out about how different people actually behave in such a situation? Think of an experiment that you would perform if you were a behavioral scientist.

Payoff Matrix

Let students represent their thoughts about the **motivations of Player 1 and Player 2** in the Ultimatum Game in a **Payoff Matrix**.

What is the role of **intuitions and emotions, beliefs, personal preferences and goals, and learned social norms** in motivating people to behave in a certain way?



Possible answers/reflections:

		Player 2	
		If I accept the offered amount, then...	If I reject the offered amount, then...
Player 1	If I share a fair amount (e.g. at least 50%), then...	<p>I get less money than I could. I feel good about myself, and I feel good for the other person (empathy). I think we should treat others like we want to be treated.</p>	<p>I get a fair amount of money. The other guy gets something too, but that's ok, because he shared fairly.</p>
	If I share very little, then...	<p>I get a lot of money. Maybe the other guy will accept this offer....? Maybe I'll feel bad about myself (guilt, shame).</p>	<p>I get a little money. But I feel like I got treated unfairly. Maybe I'll feel angry about myself for not punishing the guy.</p>
		<p>I get nothing. But why would this guy do this?? This would make me pretty angry, after all, I wanted to share with him..</p>	<p>I get nothing. Why would I do this? Maybe because I feel like I owe the guy something for being so generous?</p>
		<p>I get nothing. Maybe I'll feel bad about myself for trying to be selfish. The other guy might really do this, because he wants to punish me.</p>	<p>I get nothing. But maybe I'll feel better because at least the mean guy got punished. That seems just.</p>

Reflection questions

What are the similarities and differences in the behavior of Player 1 between the dictator and ultimatum game? What could be the reasons?

In the "Dictator game" the providers offered on average a little less than in the ultimatum game, but still a relatively high proportion. Behavioral researchers interpret this as follows: The motivation of the provider in the ultimatum game is a combination of direct self-interest and a more altruistic sense of fairness. Out of self-interest, he offers a sum that he expects to be accepted by the recipient, so that he does not leave empty-handed himself. But this also means that people expect others to have certain social motivations and emotions that influence their behavior, such as fairness and anger. The sum offered in the dictator's game, however, points more to purely altruistic motivations and / or a (learned) tendency to want to follow social norms for fairness, or to want to be considered as a "good person". Because the provider could certainly offer the smallest amount, without it creating a risk for him.

*(If the dictator game is played several times in a row and the players change roles, then the player in the provider role would again offer a fair sum because his partner would otherwise penalize him as a provider in the next round, also giving an unfair sum. Scientists call this behavior **reciprocity** - "tit for tat".)*

What could be the reason why people tend to voluntarily and relatively fairly offer received resources to strangers, as well as to punish others for unfair behavior, even if this comes at a cost? What could have been the function of these behaviors for the survival and reproduction of our ancestors? → [Link to Human Evolution](#)

Significance of prosocial behavior, resource sharing, and group affiliation in human evolutionary history: In groups whose members volunteered and contributed more efficiently to community activity (e.g., joint hunting, voluntary resource sharing within the group), individuals had on average better chances of survival and higher reproductive success than individuals of other groups. In groups whose members punished each other for negative (group-life-harming) behavior, even if this cost them individually, individuals had on average better chances of survival and reproduction than individuals of other groups. An automatic sense of fairness, and social emotions such as guilt and empathy, have probably been selected as an efficient mechanism for this behavior in social interactions. Moreover, through education and communication, social norms that favored this behavior were selected and passed on within groups - the groups that had a norm of fairness passed onto offspring had better chances of survival and reproduction than other groups. Thus, in virtually all cultures of the world today, we find variants of norms that consider generosity and fairness "good" and greed and theft "bad" ("Thou shalt not steal," etc.).

What could be the reasons why the results differ between cultures?

Variation in local economic, political, and cultural characteristics. The scientists have e.g. looked at how each group provides for their livelihood, the size of their group, and whether they belong to a religion. They have found that groups that receive more of their food supply through market

relationships (rather than self-subsistence) are more likely to share the money fairly with a stranger. The larger the group size, the more likely participants were to punish providers for unfair offers (by rejecting the offer). Participants who were affiliated to a world religion have also tended to offer a larger sum.

According to the scientists, these results indicate that growing up in a particular social environment, and the appropriation of social norms and rules for how to behave in social situations, in particular for the expression of the human sense of fairness, play a major role for the variation in human behaviors we can observe among humans of different backgrounds.

What could be the reason that people in some cultures even rejected very generous offers?

The scientists interpret it by pointing out that it is customary in these cultures to cultivate social relationships through mutual gifts. The more generous the present, the more the recipient is in debt and is subordinate to the donor. Thus, members of these cultures are more willing to reject unexpectedly generous gifts, as one does not know to what expectations and conditions the gift is coupled. This cultural peculiarity has also been observed by other researchers in the ultimatum game with these groups.

Other possible questions about the influence of conditions in the dictator / ultimatum game

The conditions of these games can also be changed in other ways to explore how certain conditions affect human behavior in social situations.

What kind of behavior do you expect from people in the role of Player 1 if

- **if both players were not anonymous and sitting opposite each other? Why?**

The provider would be more motivated to offer a fair sum, e.g. exactly half, to give to player 2. When people have direct contact, face each other, etc., it has a strong impact on us and causes social emotions such as empathy and feelings of guilt or shame. These motivate us to behave towards known people in a cooperative way - it just feels better, you have a "quiet conscience"! This effect will be all the stronger, the more time we have spent with the other before and will spend in the future, and the more opportunity we have had to build a bond and identity with him / her (e.g. through small talk, common interests, shared activities and experiences, common origin, etc.)

Conversely, the provider would tend to offer less or nothing if he identified the other as "outsider," "enemy," or member of a group to which he himself has a hostile attitude.

- **if the provider himself would have earned the sum of money through his own work, instead of receiving it unexpectedly from a stranger? Why?**

The provider would rather refuse to give up some of the self-earned money to another person, especially if this other person is anonymous. At least he would not be inclined to

share as much. He no longer feels so much guilt, and he feels entitled to keep the whole amount. However, this depends on many other factors again, such as if they know each other, or if they have learned a norm that one should always share equally with others in the group.

→ merit-based fairness

- **if both players had earned the money through shared equal work?**

The provider would probably share the money voluntarily exactly half with Player 2, otherwise he would have strong feelings of guilt (especially if they have spent time working together).

- **if the rules of the game are designed so that Player 1 could only choose between relatively unfair offers to player 2?**

Player 2 would probably be more inclined to accept the unfair offers as well, knowing that Player 1 had no choice and did not necessarily make this unfair offer on purpose. He will be less likely to become angry and wanting to punish Player 1. People make a big difference in whether behavior appears to have been done intentionally or unintentionally.

- **What other conditions do you think that could influence the behavior of people in the dictator and ultimatum game?**

Links to Biology, History, Social Studies, Sustainability

Do you think there are **other animal species** who also have a sense of fairness? Why, or why not? Which kinds of species?

→ [Link to Biology \(animal behavior, behavioral ecology\)](#)

Can you think of **events in history or current society** in which the human sense of fairness (or similar **moral intuitions**) might have played a role?

Hint: think of protests, riots, and strikes; independence wars, Boston tea party, civil rights movement, women's rights, fall of the Berlin wall, Occupy Wall Street, Brexit

→ [Link to topics in history, social studies](#)

What does this tell us about the role of fairness for the **sustainable development** of a community? What else, other than natural resources, can be or needs to be *sustained* in a community, for it to be called "sustainable development"?

trust, well-being, social order, stability, safety

Ultimatum Game with children

Youtube-Video: [Ultimatum-Game with 7 and 8 year old children](#)

Ultimatum Game with chimpanzees

Several research groups have also carried out simplified forms of the ultimatum game with chimpanzees in order to compare their behavior with the behavior of humans in similar situations.

Consider how the Ultimatum game could be modified to be played with chimpanzees, yet reflect the important conditions of the game.

- Can the chimpanzees be anonymous?
- Does the previous relationship (in particular the dominance ratio) of chimpanzees play a role in the outcome?

What behavior do you expect from chimpanzees in the role of provider (Player 1) in this game? Will the behavior of chimpanzees be similar or different to human behavior? Why why not?

What behavior do you expect from chimpanzees in the role of the receiver (Player 2) in this game? Will the behavior of chimpanzees be similar or different to human behavior? Why why not?

It is not so easy to construct game situations for chimpanzees that match the game situation with humans in important factors, and yet are understandable to chimpanzees. It must be ensured that all motivational factors that could influence the behavior of chimpanzees in the experiment are taken into account so that their reactions are not misinterpreted.

Experiments by different research groups, which have used different formats of the ultimatum game, therefore come to different conclusions. Scientists discuss how these different outcomes come about, and what they actually say about the similarities and differences in the social behavior of chimpanzees and humans.

A common feature of the experiments is that the ultimatum game was simplified in that the proposer can only choose between two distribution options.

In one experiment, it was observed that the supplier chose mainly unfair offers, whereas in another experiment exactly the opposite was the case.

Moreover, it has not yet been clearly established that recipients obviously reject unfair offers. Some interpret this as an indication that chimpanzees have no spite reaction and no sense of fair distribution comparable to the human sense of fairness. Others point to weaknesses in the experimental design, according to which the reaction of the recipient can be interpreted differently.

In addition, the number of chimpanzees participating in such trials is relatively low and many factors can affect their behavior (how they live, in which group, their past experiences and relationships). Unlike anonymous situations that can be done with humans, the social relationship between chimpanzees, in particular, is likely to play a major role in their behavior in the ultimatum game.

All these are the reasons why scientists are still discussing much about how humans and chimpanzees as well as other primates resemble and differ in their sense of fairness - many observations from various chimpanzee groups, both in experiments and in the wild, are contradictory, because many factors play a role in their observed behavior. However, we can say that chimpanzees are not as motivated as humans are to share valuable resources with other conspecifics - at most they do so more or less well with close relatives and "friends." The fact that people have a higher prosocial attitude towards conspecifics than chimpanzees and that humans act according to the social norms they have learned will most likely contribute to this.

Reflection on conceptual understanding

- In what situations are consequences of a behavior influenced by what other individuals do?
- What factors motivate people to behave in a way that benefits others?
- Do people always need to be monitored and threatened with punishment in order to behave in a way that benefits others? Why, or why not?
- What is the role of intuitions and emotions, beliefs, personal preferences and goals, and learned social norms in motivating people to behave in a certain way?
- What role do fairness and equal distribution play when a group of people have to share a resource? Is fair distribution of resources important for the sustainable development of a community? Why, or why not?
- Do you think all humans care about fairness? Why, or why not? Can there be a different meaning of "fairness" for different people?

Students write an essay answering these questions (or a subset of questions), using insights they have gained from studying the Ultimatum and Dictator game.

Further Links and Materials

Center for Advanced Hindsight: [Ultimatum Game Video](#), [Dictator Game Video](#)

Capuchin monkeys reject unequal pay ([Youtube link](#))

References

Henrich, J., Boyd, RT, Bowles, S., Camerer, C., Fehr, E., Gintis, H., & McElreath, R. (2001). In search of Homo economicus: Behavioral experiments in 15 small scale societies. *American Economic Review*, 91 (2), 73-78. <http://doi.org/10.1257/aer.91.2.73>

Henrich, J., Boyd, RT, Bowles, S., Camerer, C., Fehr, E., & Gintis, H. (2004). *Foundations of Human Sociality. Economic Experiments and Ethnographic Evidence from Fifteen Small-Scale Societies*. New York, NY, USA: Oxford University Press.

Henrich, J., McElreath, R., Barr, A., Ensminger, J., Barrett, C., Bolyanatz, A., ... Ziker, J. (2006). Costly Punishment across Human Societies. *Science*, 312 (5781), 1767-70. <http://doi.org/10.1126/science.1127333>

Jensen, K., Call, J., & Tomasello, M. (2007). Chimpanzees are rational maximizers in an ultimatum game. *Science*, 318 (5847), 107-109. <http://doi.org/10.1126/science.1145850>

Max Planck Research (2009). Culture and society. Game theory. https://www.mpg.de/792374/W006_Kultur-Gesellschaft_080-085.pdf

Milinski, M. (2013). Chimps play fair in the ultimatum game. *Proceedings of the National Academy of Sciences*, 110 (6), 1978-1979. <http://doi.org/10.1073/pnas.1222132110>

Proctor, D., Williamson, RA, de Waal, FBM, & Brosnan, SF (2013). Chimpanzees play the ultimatum game. *Pnas*, 110 (6), 2070-2075. <http://doi.org/10.4161/cib.23819>

Proctor, D., Brosnan, SF, & de Waal, FBM (2013). How to play chimpanzees play the ultimatum game? *Communicative and Integrative Biology*, 6 (3), 1-3. <http://doi.org/10.4161/cib.23819>

Wittig, M., Jensen, K., & Tomasello, M. (2013). Five-year-olds understand fair as equal in a mini-ultimatum game. *Journal of Experimental Child Psychology*, 116 (2), 324-337. <http://doi.org/10.1016/j.jecp.2013.06.004>

Author: Susan Hanisch Susan@GlobalESD.org

If you would like to use this material in your classroom, we would be happy if you contact us. For more information and teaching materials, visit our website:

<http://www.GlobalESD.org>

<http://openevo.eva.mpg.de>



This material was developed in collaboration with the department of Comparative Cultural Psychology at the Max Planck Institute for Evolutionary Anthropology.



Comparative
Cultural Psychology

<https://www.eva.mpg.de/comparative-cultural-psychology/education.html>

This work is licenced under a [Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International \(CC BY-NC-SA 4.0\) licence](https://creativecommons.org/licenses/by-nc-sa/4.0/).

