Supplementary Methods for “Risk and the Evolution of Human Exchange”

Experiment Instructions
>Welcome

This is an experiment in the economics of decision making. The instructions are simple, and if you follow them carefully and make good decisions you can earn a considerable amount of money which will be paid to you in CASH at the end of the experiment.

In this experiment, you will be represented by the <Blue, Red, Yellow, Green, Purple, Orange, Brown, Teal> avatar you see in the middle of the screen. You and the 7 other people in the experiment each have the ability to move around the environment and capture hexagons. The experiment will consist of many periods each lasting 150 seconds.
Movement
You can move around the environment by left clicking on the spot you wish to move to (try clicking in the green grassy area now). Notice that a red circle marks the spot your avatar is moving towards. When the experiment begins, you can see the other people who are also moving in the same environment. The green grassy area contains three landmarks: shrubs at the top, trees in the middle, and rocks at the bottom.

In the top left portion of the screen there is a mini map that displays the environment including the landmarks and your current location represented by a gray square.

Movement
Your task in this experiment is to capture hexagons in either the left red grassy area or the right blue grassy area. Each period you can only choose one side or the other.

You will not be able to see any of the other avatars while moving around the red and blue areas. The timer next to icon at the top of screen indicates how much time you have remaining to capture hexagons.

Move your avatar to either the red or blue area now.

Capturing Hexagons
The hexagons move around in a random portion of the red and blue areas. To capture a hexagon, right click on a moving hexagon. Move around until you see a hexagon and right click on it. A tractor beam will attempt to draw the hexagon to you.

Each hexagon is worth a number of calories. If you are successful in capturing the hexagon, your body displays the number of calories you are currently carrying. If you are unsuccessful capturing a hexagon, the hexagon will dart away from you, never to be seen again during the current period.
Go capture at least 3 calories now.

Consuming Calories
When the time to capture hexagons ends, you must head back to the green grassy area to convert calories into health.

To consume calories, you first must set a pot down anywhere you would like in the green grassy area. Do this now by clicking the button and then clicking somewhere on the green grassy area. The maximum number of calories that your pot can hold is 18.

Your pot is the same color as you. When the period expires, calories in your pot are converted into health points and added to your current total, which is displayed in green on the right portion of your screen and on your body. Each calorie is worth one unit of health.

To move calories from your body to your pot, right click on your pot, choose the number of calories to move, choose the Me -> Pot option in the dropdown box, and click the icon. Do this now.

You can also move calories from your body and pot to other avatars and their pots. First click on the other avatars or pots and then choose the direction from the dropdown box.
Health and Your Earnings
At the end of the period, the current level of health is converted into cash and added to your total cash earnings. One health point equals one US cent. Suppose your current health is 54 at the end of the period. At the end of the period, your cumulative earnings, which are displayed at the bottom right portion of the screen, would then increase by 54 cents.

At this point in the experiment you should be heading toward either the red or blue grassy area. When the capture phase begins, your current level of health will decrease by 8 health points. Think of it as metabolism. Your health cannot fall below 0 nor rise above 100.

Chat
Every person in the experiment may chat. Type your messages at the bottom of the screen and then press ENTER or click the Chat button. Your chat will appear next to your avatar as long as you don’t click anywhere else on the screen.

You are free to discuss any and all aspects of the experiment, with the following exceptions: you may not reveal your name, discuss side payments outside the laboratory, or engage in inappropriate language (including such shorthand as ‘WTF’). If you do, you will be excused and you will not be paid. Other avatars will not be visible until the experiment begins.
Summary
After every 5 periods, there will be a “break” of 60 seconds during which nobody can capture hexagons.
This is the end of the instructions. The important points are:

1. You can capture hexagons on either the left red area or the right blue grassy area each period.

2. Calories that have been moved to your pot at the end of the consumption phase will be added to your health total. One calorie equals one point of health.

3. At the end of the consumption phase the current level of your health is converted into cash and added to your current earnings. One health point is worth one US cent.

4. At the beginning of the capturing phase, your health decrements by 8 health points.

5. You can move calories from your body and pot to other avatars and their pots. First click on the other avatars or pots and then choose the direction from the dropdown box.

If you have any questions, please raise your hand and a monitor will come by to answer them. If you are finished with the instructions, please click the Start button. The instructions will remain on your screen until everyone is ready and the experiment starts. Your health will reset to 30 when the experiment begins.

Procedures
Eight participants at a time were taken into the laboratory, seated at visually-isolated computer stations to preserve anonymity, and presented with the same virtual environment on their computer screens. They privately read a set of experimental instructions describing the environment and the capabilities of their avatars during which they could practice moving around the environment, capturing hexagons, and moving hexagons to a pot for consumption (see above). The experiment proper lasted for 53 minutes: 20 periods of 2.5 min each, plus 3 break periods of 1 min each (after periods 5, 10, 15). After
the experiment, participants were individually and anonymously paid their show-up payment plus experimental earnings and then dismissed. The participants were recruited for a 90-minute experiment, but were not informed in advance of the total number of periods in order to mitigate potential end-game effects. The self-paced instructions were completed in approximately 5-10 minutes, and it took 10 minutes to privately pay the participants their earnings. Participants were paid $7 for showing up on-time, plus what they earned as a result of their decisions (mean=$9.37, s.d.=$4.40).

Parameters and Other Software Details

Each period is subdivided into three phases. In the first phase, participants have 10 seconds to walk to the left red grassy area or to right blue grassy area for the next phase of 90 seconds. A mini-map at the top of screen gives a bird’s eye view of where the participant is currently located in the larger area as the participants only have limited view of the area around them. During the second phase of 90 seconds the participant’s task is to capture hexagons. Each participant has their own private red and blue grassy areas for capturing hexagons so that each individual’s experience with collecting food is independent of the others. The calories from successfully captured hexagons are processed at the conclusion of the third phase of 50 seconds.

If the participant chooses the left red grassy area (HV strategy), the computer software randomly spawns 3 hexagons that independently move around a red grassy area. Once avatar enters the red or blue area, the other side is unavailable to the participant (blacked out) until the next period of decision. The hexagons move in independent straight lines to a randomly chosen location unknown to the participants. After the hexagon reaches its destination, it immediately embarks on a path towards another randomly chosen location. If successfully captured with probability .15, a hexagon in the red grassy ear yields 36 calories which are displayed numerically on the avatar (see instructions above). If the participant is unsuccessful with probability .85, the hexagon darts off the screen never to be seen again. Thus, each hexagon is an independent trial that follows a binomial distribution. With probability $0.85^3 = 0.6141$, a participant will capture no prey, and with probability $0.3859$ the participant will capture at least one 36-calorie hexagon.

In the right blue grassy area (LV strategy), the computer randomly spawns $X$ small hexagons from the discrete uniform distribution $f(x) = 0.25$, for $x = 7, 8, 9,$ and 10. Each small hexagon in the blue grassy area is worth 1 calorie and also moves in an independent straight line to a randomly chosen location unbeknownst to the participants. However unlike the 36-calorie hexagons on the left, once a participant clicks on the blue grassy area hexagon, it is successfully captured with probability 1.

When the 90-second capturing phase ends, the software automatically marches the avatar back to the center area of the screen at which point the participant retakes control of the avatar’s movement. At this point in the period, the left and right areas are both blacked out. Once back in the central area, the software prevents the participant from returning to the red and blue grassy areas until the start of the next period. If two people are in the same vicinity of the central area, they can chat via a speech bubble seen above their head. Anyone in the same viewable area can see the chat of anyone in the same area.
To convert the captured calories into earnings, a participant sets up a pot, which is the same color as the individual. Anyone who has seen a pot in a viewable area can see the pot displayed in the mini-map. A participant must transfer his calories to his pot before the third phase (and period) ends. When period ends, the calories in the pot are converted into health units and added to the current health total for the individual. Each pot has a maximum capacity of 18 calories. If an avatar has more than 18 calories on his person, only 18 can be moved to the pot. The remaining calories stay on the avatar or they can be moved to another pot or another avatar. Any calories remaining on an avatar disappear when the period ends and are wasted. Avatars can only move their calories to pots and other avatars; they cannot move food from other pots or avatars.

The calories in a pot are added to the health index of an individual when the first phase of a new period begins. The health index at the beginning of the period is converted in the cash earnings at the rate of one health point to one US cent. Each participant begins the experiment with an initial health index of 30. The maximum health of an avatar is 100 and the minimum 0. At the end of the 10-second first phase (as avatars are preparing to enter the red or blue grassy area, the health index of every individual is decremented by 8 health points due to metabolism. If the health index is less than 8, then the health index drops to zero. In one half of the sessions, the current level of the health index was displayed on the avatar, and in the other half it was not. We did not find any significant effects of this difference in information.

If a participant chooses to the right blue grassy area (the LV strategy), his expected calorie yield is 8.5/day. This is greater than the expected calorie yield of 6.95 (=18 × .3859) from the HV strategy without sharing. If two participants team up to share calories from HV strategy when one of them is not successful, their expected calorie yield is 11.21 (= 18 × (1 – .61412)) which is greater than the LV strategy. With a metabolism of 8 health units per day, a participant that choose LV every period will on average earn $8.65 and end the experiment with a health index of 48. Two participants who share return from the HV strategy every period will on average add 3.21 health points per day and can reach a health index of 100 in 20 periods. A pair of HV participants who share for the entire experiment would earn $14.31 on average. The health index of a loner HV participant will erode each period.