

Experimental Design

The experiment comprises an extensive-form game of altogether 12 full rounds and one partial one. We opted for a setup with a known length of play rather than an indefinitely repeated game because of its clear subgame perfect prediction and easy experimental implementation.

The basic setup for the game is as follows. In each of the first 12 rounds, each player makes three different decisions on the same computer screen (see Figure 1):

Lottery Decision: In each round, both subjects earn a payoff, paralleling income from engaging in productive activities. How this occurs is not essential for our research purpose. To avoid experimenter demand effects, we decided to make subjects perform a meaningful task, rather than just giving them a sum of money each round. We opted for lottery choice tasks, as they are standard tools in experiments. Each player chooses between two lotteries which are played out independently with the player privately informed of the outcome. The lottery pairs comprise two series of Holt and Laury (2002)-style lottery pair sequences. The lottery outcome ranges from AU\$1.70 to AU\$3.40. The sequence in which the lottery pairs were presented was randomized for each participant.

Rocket-buying Decision: Each player decides whether or not to buy a rocket, or, in the language of the experimental instructions, spend AU\$1.00 to buy a “token.” (In each round, players are only allowed to buy one rocket.) Any rocket bought in the current round will be effective in the next. Expenses on rockets are non-refundable and the stack of rockets grows from round to round.¹

Deactivation Decision: Each player decides whether or not to strike against their opponent. In the experimental language, this means spending AU\$1.50 to “deactivate” the other player. If the player with more rockets presses the deactivation button during a round, the other will be deactivated. However, if the player with fewer rockets presses the deactivation

¹ Players are endowed with a startup fund of AU\$5 (in addition to a show-up fee of AU\$5) at the beginning of the experiment. This startup fund allows them to buy rockets in the first round.

button, they will only deactivate themselves; if both have an equal number of rockets, both will be deactivated when either presses the deactivation button. Note that players who press the deactivation button still need to pay the deactivation cost (cutting into the show-up fee) even if they themselves are deactivated in that round. The deactivated person faces severe payoff losses: (1) they will lose all earnings from previous lotteries; 2) they will only earn 10% of the value of future lotteries; and 3) they will not be able to deactivate the other side in the future. In this sense, deactivation is a small-scale equivalent of an all-out nuclear first strike: the targeted country is devastated beyond recovery, and no longer poses any threat to the attacker. Note that the constellation with equal armament corresponds to the MAD world, in which a first strike immediately triggers a counterstrike.

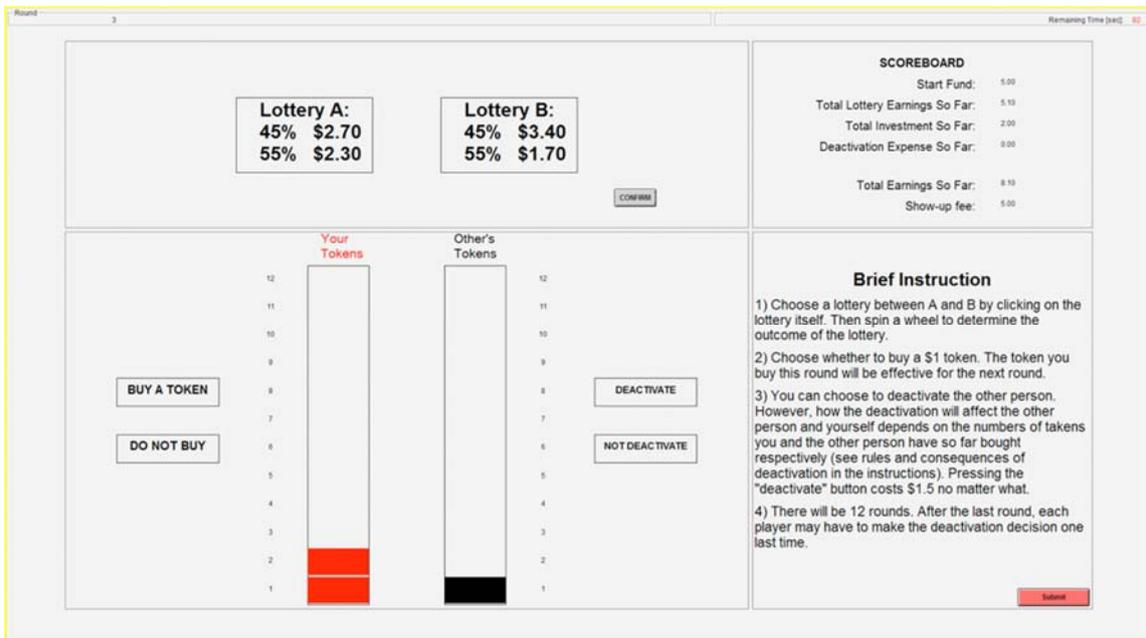


Figure 1: a screenshot of the game interface (Base treatment)

Notes: This figure is a screenshot of the game interface (in the Base treatment). In the upper left panel, after a player chose a lottery, the payoff would be realized immediately. In the lower left panel, a player made two decisions: whether to buy a rocket (token) and whether to deactivate the other player. The upper right panel listed a player's accumulated earnings and expenses up to the current round. Only after all three decisions were made could a player proceed to the next round.

In the 13th round, players only need to make the deactivation decision. This is to allow any rocket bought in the 12th round to be effective.

The experiment was programmed in z-Tree (Fischbacher, 2007) and conducted at the Monash Laboratory for Experimental Economics (MonLEE). We recruited 228 participants from a university-wide undergraduate student pool. Participants were randomly seated in a partitioned computer terminal upon arrival. The experimental instructions were provided to them in written form and were read aloud by the experimenter at the start of each session. Participants were then asked to complete a comprehension quiz, which was designed to ensure that every participant understood the instructions. This was particularly important in our game since mistakes made early in the experiment (like inadvertent deactivation) cannot be rectified later. An average of 25 minutes per session was dedicated to ensuring comprehension. At the end of the experiment, participants completed a survey concerning demographics and strategies used in the game. Participants were then paid privately and instructed to leave the laboratory one at a time. A typical session lasted about one hour with average earnings of AU\$31.50 (approximately US\$23.80 or €20.40).