**Instructions (Section 1)**

Thank you for your participation in this experiment! This experiment will last approximately 80 minutes.

*This experiment is about how likely you think an uncertain event is to have occurred.* You will consider four such separate events today, which will be presented one at a time. For these events, we want you to think in terms of the percent chance out of 100 that they occurred. For example, you may believe that there is 50% chance that when flipping a coin it will come up TAILS. This experiment has been designed so that you have the greatest chance of earning the most money when you carefully and accurately think about the percent chance of such an event occurring.

You will be awarded a $10 show-up fee for your participation until the end, in addition to anything you may earn during the experiment. Please also note the following during the experiment:

- Please put away any cell phones/devices. Outside communication or accessing the internet during this experiment is forbidden. Violators will not receive payment and will be blacklisted from the lab.
- Please do *not* communicate with others in the lab, except to ask questions
- If you have a question please do not hesitate to ask! Questions are *encouraged*!

We will now introduce the experiment through Instructions 1-3 and three short practice sessions that go with each set of instructions. ***The practice sessions are to help you get familiar with the experiment's components that will ALL be combined when doing the final experiment for money.***

***The 'Main Event'***

In this experiment you are estimating the percent chance that a **'main event'** occurred. An example of a **'main event'** is: *the average temperature in the contiguous USA was warmer in 2013 than 2012.* Your earnings are in part based on the accuracy of your predictions of whether the **'main event'** occurred. Think about the following: What is the probability the average temperature in the USA was warmer in 2013 than 2012?

***How will I record my percent chance estimate?***

First we introduce a gumball machine with 100 green and black gumballs. For example, suppose there are 40 green and 60 black gumballs. Most people would agree that the probability of drawing a green gumball is exactly 40%.

Now think back to the '**main event'** about the weather being warmer in 2013 than 2012 in the US.

We next *give you ${3,10,20}*. But this ${3,10,20} *must* be wagered on one of two scenarios. 1) The '**gumball event'**: Drawing a green gumball from a machine with 40 out of 100 green, OR 2) The '**main event'**: the average US temperature in 2013 was warmer than it was in 2012.

You have to decide if you think the chance that the weather was warmer in 2013 is greater than 40%, or less than 40%. If you decide to wager the ${3,10,20} on the '**gumball event'**, the computer randomly draws a gumball from the machine with 40 green (60 black) gumballs. If it's green you win the ${3,10,20}. If black, you get nothing. If you decided to go with the '**main event'**: the climate being warmer in 2013, we check the statistics. If it was warmer, you win the ${3,10,20}. If it was colder, you get nothing.

*You may use these sheets for scrap paper – however they will be collected at the end of this experiment*

**Consider different numbers of green gumballs:**

If the gumball machine has only 2 green gumballs (98 black) would you prefer to wager ${3,10,20} on the '**gumball event'** or the **'main event'**? Most of you probably think the climate being warmer in 2013 than 2012 is more likely than 2% and prefer to wager the ${3,10,20} on the '**main event'**.

What if the gumball machine has 25 green gumballs? Those who think the **'main event'** is more likely than 25% would want to wager on the **'main event'**.

Now, what if the gumball machine has 90 green gumballs? The '**gumball event'** now pays off with 90% chance. Probably, almost everyone will prefer to wager the ${3,10,20} on the gumball machine, except for those that think there is a greater than 90% chance that the weather was warmer in 2013.

*Example – You think there is a 35% chance the weather is warmer in 2013 than 2012.*

> *Case 1:* Whenever you see a gumball machine with 34 or less green gumballs, to earn the most money you would want to wager the ${3,10,20} on the '**main event'**. E.g. if there were 5 green gumballs, 5% is a lower chance than 35% of earning the ${3,10,20}.
>
> *Case 2:* If you see a gumball machine with 36 or more green gumballs, you would prefer to wager the ${3,10,20} on the **'gumball event'**. E.g. If there were 60 green gumballs, this is a 60% chance of drawing green – better than the 35% chance you think the weather would be warmer.

If there are exactly 35 green gumballs, you probably don't care whether to wager your ${3,10,20} on the **'gumball event'** or the **'main event'**. Both give you a 35% chance of earning the ${3,10,20}.

**The 'Slider'**

In this experiment you are going to indicate on a '**slider'** exactly how many gumballs need to be green before you prefer to wager ${3,10,20} on the '**gumball event'** instead of some other **'main event'**. In other words, you will indicate the *minimum* number of gumballs that have to be green, before you prefer to wager ${3,10,20} on the gumball machine.

To make sure it is in your best financial interest to do this, after you have made your slider choice we are going to randomly fill a gumball machine with 0 to 100 green gumballs and the rest black. Each possible number of green gumballs is equally likely – and *your slider choice has no effect on the number chosen*. Based on your slider choice, we will then make the ${3,10,20} wager *for you*. If there happen to be less green gumballs than the *minimum* you chose, your ${3,10,20} is wagered on whatever main event you are predicting. If there happen to be more (or the same) green gumballs than the *minimum* you indicated in the slider, we will wager your ${3,10,20} on drawing a green gumball from this machine we randomly filled.

If this is a little confusing, you can just remember, **to have the highest chance of earning money, your slider choice should be exactly the probability out of 100 you think the event has of occurring.**

***Summary of Section 1***

- Make selection on the **'Slider'** for your estimate of the **'main event'**
- Computer randomly generates an amount (out of 100) of 'green gumballs'
- The amount of green gumballs determines how the ${3,10,20} is wagered in your best interest. 1) The '**main event**' or 2). The '**gumball event'**. The outcome of the ${3,10,20} wager is then revealed.

***Are there any questions?***

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**Instructions (Section 2) – 'Feedback'**

Now we're going to make things more interesting. Suppose now the 'Main event' is that the average temperature in 1998 was warmer than 1997 in the contiguous USA.

*Please note – these events are used for practice. The real events may (and will) be different.*

You will again adjust the slider to indicate how likely you believe this is to be true. But now, after you adjust the 'Slider' the first time, you are going to get some 'feedback' about whether or not 1998 was in fact warmer than 1997.

***What is 'Feedback'?***

'Feedback' is information about the main event that gives you additional clues to help you make your selection. Please note that you are provided three rounds of this 'feedback' – *however each time you are presented with this 'feedback' it* ***may or may not be telling you the truth****.*

For our experiment we use gremlins to provide the three rounds of feedback when making your selection. For each round, two gremlins always tell the truth while one of them, Larry, always lies. You will not know which gremlin is talking and after you get this 'feedback', you can adjust your prediction on the `Slider' if you choose to use their information.

Note: The gremlins are randomly chosen "with replacement", meaning that every time you get 'feedback' it is true with 2/3 probability. This means, that it's even possible (though unlikely) that all three rounds of feedback come from the gremlin that lied!

*Remember: All 3 gremlins always know whether the event happened or not. It's just that only 2 of these 3 tell the truth.*

*When we determine your earnings, before filling the gumball machine we are going to randomly only pick* ***one*** *of these four slider choices.*

**Are there any questions at this point? Next we proceed to the second practice.**

*In this example please note two additional tools for your use.*

1) *Calculate Fraction: Pulls up a calculator in case you want to transform a fraction to a decimal.*
2) *Show History: Shows you your history of feedback from gremlins AND your past slider choices.*

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**Instructions (Section 3) – Payment groups**

The last component explains how you might earn additional money during this experiment. This is very important to understand when conducting the final experiment.
You will all be in one of **two** payment groups: 'red' or 'blue'. **NOTE: You will not know which payment group (red or blue) you are in when you make your slider choices.**
*Suppose now the* ***`main event'*** *is whether the climate in the USA was warmer in* ***1990 than 1980.***

***'The Red Group'***

Half of you are going to be in the 'red' group. In the 'red' group, your payment at the end looks exactly like how we have been practicing so far. We will pick one of your four slider choices incorporating the 'feedback', and then fill a gumball machine with a random number of green gumballs. Based on your selection, if the ${3,10,20} is wagered on the **'gumball event'** then a gumball would be drawn – if green you earn the ${3,10,20}. If the ${3,10,20} is wagered on the **'main event'**, then if that event occurred you earn the ${3,10,20}.

**'The Blue Group'**

The other half of you will be in the 'blue' group. The 'blue' group automatically gets $20, just for being blue. *In this group, the slider choices previously selected* ***do not matter*** *for payment.* Instead payment depends on a 'blue bonus chip' provided that pays out *only if* the event you are predicting actually occurs. Taking the example of climate, if 1990 was warmer than 1980, and if you are in the blue group, you would receive $20 automatically, plus whatever amount is on the 'blue bonus chip'. The amount on the chip is either $0 or $80. Each is equally likely.

> *Example: If you're in the 'blue' group you would automatically earn $20, and if the main event you are predicting occurs you would also earn the amount on the blue bonus chip ($0 or $80): for a maximum earnings of $100.*

***'Blue Bonus chip'***

E*veryone* will get a 'blue bonus chip' *prior to knowing which group you are in* and prior to each of the four events. The experiment coordinator will fill a bag with half $0 chips and half $80 chips. Then, each of you will draw one of these chips from the bag. Note that having a 'blue bonus chip' is only significant when you end up in the 'blue' group and indicates how much is earned *if* the event happens AND *if* you are in the 'blue' group.
Each of you has a fair, 50% chance of drawing an $80 bonus chip. There is no advantage to drawing a chip earlier or later, everyone in this room has the same 50% chance. Even if you are the last to draw, and there is only one chip left, that one chip is $0 with 50% chance and $80 with 50% chance.

Since you don't know if you're 'red' or 'blue' until all slider choices have been made, in order to have the best chance of earning the most money, it pays to be as accurate as possible when making slider choices.

**Are there any questions at this point? Next we proceed to the final practice. Note that your 'blue bonus chip' has an 8-digit code that you are required to enter into the computer.**

**Your 'blue bonus chip' does not affect in any way the event that you will be predicting. The event is the same if you pick a $0 chip or an $80 chip.**
*Forget about the gremlins or 'feedback' for this practice, yet they will be in the main experiment.*

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**Summary for the Final experiment**

Now we are ready to put ALL the pieces together for the final experiment! There are going to be four main events, however only *one* will be picked at random for payment.

1) The coordinator will come around with a bag that contains a 50/50 mix of $0 and $80 '**blue bonus chips**' for the upcoming event.
2) Make a note of your '**blue bonus chip**' amount. This is what you could earn if the event happens AND if you also happen to be in the blue group.
3) The event will be described to you. Next, indicate on the **'Slider**' the probability you believe the event occurred. Your slider choice does not affect how many green gumballs the random gumball machine will have nor does it affect the chances of the **'main event'**.
4) You'll get '**Feedback**' three times from a random gremlin. Remember there is a 2/3 chance the feedback is true. You can choose to use this information if you want to reassess the probability by indicating this on the slider after each '**Feedback**'.
5) Steps 1 to 4 are repeated for each of the four events.
   *After making all of your slider choices:*
6) The coordinator will come with two bags.
   i) The color bag contains 50/50 mix of blue and red chips. The chip you draw determines if your payment group is red or blue. If it is red, the slider choice (1-4) is indicated on the chip.
   ii) The event bag contains an equal amount of Event #1, #2, #3 and #4 chips. The number on the chip determines what event will be paid. Suppose you picked the chip for Event #1.
      a. IF draw RED: The chip indicates the slider choice. A gumball machine is filled with a random number of green gumballs. Based on your slider choice, ${3,10,20} is wagered on gumball machine or Event #1, as we practiced.
      b. IF draw BLUE: The outcome of Event #1 is revealed. If the event occurred you earn $20 + the amount on your event #1 bonus chip, $80 or $0. If the event did not occur you just earn the $20.

*After your payment is determined, we will reveal the outcomes of the other three events. This is for your information only, and it does not affect your payment.*

**Important Notes:**

- The procedures that will occur today have been approved by the University Committee on Activities Involving Human Subjects (UCAIHS). This experiment complies with UCAIHS requirements (HS# 10-8117), in particular, not to engage in any deception or misinformation about the probabilities presented today.
  (i) When you encounter random chance off the computer (e.g. when drawing chips from the bag) we make every effort to ensure that this is transparent and legitimate. If we state there is a 50-50 chance of drawing a particular chip, we will have at least one participant verify that this is indeed the case. (*any participant may ask to verify the bag contents before the draws begin*)
  (ii) When you encounter random chance on the computer (e.g. drawing a gumball from a hypothetical machine) the computer has been programmed to perform the randomization exactly as is stated in this experiment. For example, if you are told that there are 30 green gumballs and 70 black, the computer is programmed to randomly select a green gumball with exactly 30 chances out of 100.

- Before moving forward to the next main event, the computer will wait for everyone to finish the current event. There is no advantage to finishing quickly, as you will end up waiting for other participants.

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