"Struck by Lightning" Supplementary Materials

Group exercise about "utility functions"

1. As a group, discuss appropriate utility values for the following events, on a scale where seeing a pretty good movie is +10. [You may either have one utility function for the entire group (if you all agree), or separate utility functions for each group member (if you do not agree), but be sure to DISCUSS the values as a group. Also, note that "having to pay $x" will probably have negative utility; it means that you would agree to buy an item for $x if and only if that item's positive utility was more than this negative utility.] (a) Eating a delicious meal; (b) Going on a pleasant three-hour cruise on Lake Ontario; (c) Getting a bad cold for three days; (d) Having to pay $1; (e) Having to pay $10; (f) Having to pay $100.

2. Based solely on the utility values from the previous question, decide whether or not you would accept each of the following offers: (i) Paying $1 for a delicious meal; (ii) Paying $10 for a delicious meal; (iii) Paying $100 for a delicious meal; (iv) Paying $10 for a pleasant three-hour cruise on Lake Ontario; (v) Paying $100 for a pleasant three-hour cruise on Lake Ontario; (vi) Getting a delicious meal, for free, in exchange for contracting a bad cold for three days. (vii) Getting a pleasant three-hour cruise on Lake Ontario, for free, in exchange for contracting a bad cold for three days.

3. Decide whether or not you would accept the following offers involving randomness, again based on your utility functions. (i) Paying $10 to have probability 50% of having a delicious meal; (ii) Paying $1 to have probability 50% of having a delicious meal; (iii) Paying $1 to have probability 1% of having a delicious meal; (iv) Having a delicious meal, in exchange for having probability 50% of having to pay $10; (v) Having a delicious meal, in exchange for having probability 50% of having to pay $100; (vi) Having a delicious meal, in exchange for having probability 1% of having to pay $100.

4. Suppose each of Alice, Betty, Cathy, and Doris are considering whether to go out for dinner at a fancy restaurant, *Chez Louis*, across town. This restaurant offers dinners for $20, which are delicious with probability 90%, otherwise so-so with probability 10%. Furthermore, there is a 25% chance of getting temporarily stuck in traffic on the way to the restaurant (but still getting to eat when they arrive).

(a) Suppose Alice assigns utility +20 to eating a delicious meal, +10 to eating a so-so meal, −10 to paying $20, and −20 to being stuck in traffic. Should Alice go to dinner at *Chez Louis*?

(b) Suppose Betty assigns utility +40 to eating a delicious meal, −10 to eating a so-so meal, −10 to paying $20, and −50 to being stuck in traffic. Should Betty go to dinner at *Chez Louis*?

(c) Suppose Cathy assigns utility +20 to eating a delicious meal, +10 to eating a

so-so meal, -20 to paying \$20, and -20 to being stuck in traffic. Should Cathy go to dinner at *Chez Louis*?

(d) Suppose Doris assigns utility $+25$ to eating a delicious meal, $+10$ to eating a so-so meal, -20 to paying \$20, and -14 to being stuck in traffic. Should Doris go to dinner at *Chez Louis*?

5. Based on the utility functions assigned in Question 4, come up with a one-sentence description of the likes and dislikes and preferences of each of Alice, Betty, Cathy, and Doris. (You don't have to analyse their entire personalities, just describe their attitudes towards meals and money and traffic.)

6. Determine an appropriate utility function for each student in your group, for each of the items discussed at the beginning of Question 4.

7. Based solely on the utility function from the previous question, determine whether each student in your group would or would not decide to go out to dinner at *Chez Louis*, under the assumptions of Question 4.

8. Suppose someone offered you, for a \$100 fee, one chance in a billion of winning one trillion dollars.

(a) On average, how much would you win or lose from this offer?

(b) Would you accept the offer? Why or why not?

(c) How is your answer in part (b) related to utility functions?

9. Make up your own example of a difficult life choice, that could perhaps be solved using utility functions. (If there is time, we might have other groups try to make the decision using their own utility functions.)