Behavioral Economics - Autumn 2022

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Homework 1

Due Friday 4th November

Question 1 1. Consider the model of rational attention and discrimination we discussed in class (Lecture 6, Bounded Rationality 5). To start with, I want you to fill in some blanks. Formalize and prove the following two statements we made on the slides

Theorem 1 *In Cherry Picking markets, the 'worse' group gets less attention, and rational attention hurts the 'worse' group*

Theorem 2 *In Lemon Dropping markets, the 'worse' group gets more attention, and rational attention hurts the 'worse' group*

2. In the version of the model we presented in class, it was assumed that the decision maker had to choose information that came it the form of normal signals. Let's explore whether this was key for their conclusions. Instead, let us consider the case in which the DM is free to choose any information structure, with costs that are linear in mutual information. First, lets look at the cherry picking market. Assume that $q_A \sim N(-1,1)$ and $q_B \sim N(-0.5,1)$, and that the marginal cost of information is 0.1. Using the approach from Matejka and McKay, write down a statement for the conditional probability of choosing to hire as a function of the state and the unconditional probability of choosing to hire in each case.
3. As far as I know, we can't solve for the unconditional probabilities analytically However, you can use a version of the Blahut Arimoto algorithm to do so. Have a go at this (notice, you will have to find a way to numerically integrate the expression above with respect to the normal distribution, but that should be fairly easy to do)

4. Compare the solutions you have for q_A and q_B. Does the Locally Invariant Posteriors property apply here? If not, why not?

5. Using the results from above, can you come up with values $q_1 < q_2$ such that, for mean prior beliefs below q_1 and above q_2 no information is gathered

6. To what extent do the conclusions from part 1 go through in this new set up?

Question 2 Download the CSV file Data_for_HW_1.csv from the website (ask me if you would prefer the data in another format). This data contains the records from an experiment in which subjects each faced 50 repetitions of each of 4 questions. In each case there were four equally likely states (labeled 1, 2, 5 and 6), and the subject had to choose between two actions. The collection of acts used across the 4 questions is summarized in the following table

Action	Payoff in State 1	Payoff in State 2	Payoff in State 3	Payoff in State 4
10	1	0	10	0
11	0	1	0	10
12	10	0	1	0
13	0	10	0	1
14	1	0	1	0
15	0	1	0	1
16	10	0	10	0
17	0	10	0	10

And the following table summarizes the acts available in each question

Question ID	Act 1	Act 2
8	10	11
9	12	13
10	14	15
11	16	17

In the data file each line represents a single trial (i.e. a single repetition of a question asked to a particular subject). User ID the identifier of the subject, question ID is the question number, chosen action is the id number of the chosen action and state is the id of the state on that trial

1. Assume that the payoffs are in utility units. Derive necessary and sufficient conditions for behavior in this experiment to be consistent with rational inattention with any arbitrary cost function (i.e. the NIAS and NIAC conditions). Perform these tests using the aggregate data from the experiment. Describe what type of statistical tests you have used.
2. Repeat the above exercise for the rational inattention model with Shannon costs
3. Are the above tests valid it the payoffs are in monetary units, not utility units? What about if there is heterogeneity in costs across different individuals?

Question 3 [A mini research project - you can work in groups for this question if you like] In class we spent some time thinking about the consideration set model of Masatlioglou et al [2012]. The identifying assumption in that model was that if x was not in the consideration set in some choice set then its removal would not affect the consideration set. As we said, there are some good things and bad things about this assumption. Come up with an alternative assumption on how consideration sets work and get as far as you can in axiomatizing the resulting model (ideally don't just steal an idea from another already published paper). Generally, you will be able to make progress if you (a) identify what behavior means that an alternative was in the consideration set in some choice set A, (b) use this to derive revealed preference information and (c) write an axiom that either explicitly or implicitly guarantees that this revealed preference information is well behaved. Use your results to sketch out an experiment that would allow you to differentiate between your model and that of Masatlioglou et al. (If you prefer, you can work in the world of stochastic choice a la Manzini and Mariotti)