

DMUU Assignment 1 – Method Review

Assignment 1: Method Review

You will review one short neuroeconomics study: what it measures, how, and what it can and cannot conclude. The assignment links the paper to the self-study material of Weeks 1–3.

Paper: Plassmann, H., O'Doherty, J., & Rangel, A. (2007). Orbitofrontal cortex encodes willingness to pay in everyday economic transactions. *Journal of Neuroscience*, 27(37), 9984–9988. [Open access](#) (full version.) **Make sure to use annotated version provided on Moodle.**

Before you start: complete the Week 3 self-study (BDM auction, willingness to pay/accept; fMRI videos). The assignment assumes you know what BDM and WTP are.

Academic integrity – read this before you start

This assignment tests your own reading and reasoning. You may discuss the paper with classmates, but all written answers must be your own. No AI tools or language models may be used at any stage. Part 5 asks you to list the resources you used.

- **Allowed:** discussing the paper and the course material with classmates; asking questions in class or on the Moodle forum.
- **Not allowed:** sharing, copying or jointly writing answers; using AI tools or language models (e.g. ChatGPT, Claude, Copilot) for any part of the assignment, including the quiz.
- **Declaration:** your PDF must end with the signed declaration in Part 5. Without it, the submission is not graded.
- **Consequences:** a submission that breaks these rules fails. Suspected cases are handled under the University of Geneva's rules on plagiarism and cheating.

Time expected	About 3 hours: 1 hour reading, 2 hours for the questions (time per part is given below)
Length	About 900 words in total; keep to the word limit per question
Full pass	Submitted on Moodle by Monday 5 October 2026, 12:00
Half pass	Submitted between Monday 12:00 and Tuesday 6 October, 10:00
No credit	After Tuesday 6 October, 10:00
File	PDF, named <code>LastName_FirstName_Assignment1.pdf</code>

How to pass

The assignment is pass/fail. You pass if you:

1. attempt **all five parts (Part 1 on Moodle, Parts 2–5 in your PDF)**, and
2. meet the threshold in **at least three of Parts 1–4** (thresholds are stated at the start of each part).

We look for accurate reading and clear reasoning, not polished prose. Short, precise answers are better than long ones.

What we check, and what you check

Pass/fail works both ways: you need NOT polish every answer, and we will not correct every answer. Graders check only whether the pass criteria are met and stop once they are, so you will not receive comments on individual answers.

After the final cutoff (Tuesday 10:00) we publish an answer guide on Moodle (after class). Compare your answers with it yourself. If something is unclear, ask in class or on the Moodle forum.

Citing course material

Each question in Part 2 names the course material to draw on; you do not need to cite it again. In Parts 3 and 4, name any course material you use, e.g. (*Week 3 fMRI video*). Cite anything from outside the course in full.

Guided reading (about 1 hour)

Use the annotated version of the paper on Moodle ([Plassmann_2007_annotated.pdf](#)):

- **Grey** sections: skip. A short note on each tells you what it contains.
- **Orange bar ("read carefully")**: the Task section, Figure 1 and the free-bid vs. forced-bid design. This is the core of the paper; take about 20 minutes for it.
- **Everything else**: read normally. The comparison with Knutson et al. (2007) is optional.

You do not need to understand every sentence. Ignore brain coordinates (x, y, z) and statistical details beyond " $p < 0.001$, uncorrected".

Terms you will meet

Term	Meaning
WTP	Willingness to pay: the most a person would give up for an item
BDM auction	Becker–DeGroot–Marschak mechanism: you bid, a random price is drawn; you buy at that price only if your bid is at least as high
BOLD	Blood-oxygen-level-dependent signal, what fMRI records
Voxel	A small 3D cube of brain tissue; the unit of an fMRI image
Parametric modulator	A trial-by-trial variable (here: the bid) used to ask whether brain activity rises or falls with it
Group (second-level) analysis	Testing whether an effect found in each person holds on average across all participants
mOFC	Medial orbitofrontal cortex (locate it yourself for Question 2.5)
DLPFC	Dorsolateral prefrontal cortex (locate it yourself for Question 2.5)
vmPFC	Ventromedial prefrontal cortex (locate it yourself for Question 2.5)

Answer template

Part 1 is a Moodle quiz. For Parts 2–5, copy this template into your own document and answer below each question.

Part 1 – Method review card

About 15 minutes. **Complete this part as a quiz on Moodle** (7 multiple-choice questions, one attempt, graded automatically). Threshold: at least 5 of 7 correct. The quiz covers the research question, the construct, the behavioral and neural proxies, the method families, the design and the main result.

Part 2 – Tracing back to Weeks 1–3

About 45 minutes (10–15 minutes per question). Threshold: at least 3 of 4 answers that address the question and draw on the named course material. At most 80 words each.

2.1 Uncertainty (*Week 1: Meder, Le Lec & Osman, 2013, and the lecture's uncertainty ladder*) The authors chose familiar foods to remove uncertainty from the WTP computation. Yet the design deliberately adds randomness in two places. Identify both. Where on the uncertainty ladder does the participant's situation sit, and why does the design need this randomness?

2.2 Value in economics (*Week 2 self-study: Historical Development of Utility Theory; the five-term table*) (a) Which of the five terms (value/utility, gain, reward, wealth) does WTP measure here, and why not the others? (b) Is a bid in this study revealed preference in Samuelson's sense? What is similar to, and different from, simply observing someone's choices?

2.3 Value in psychology (*Week 2 self-study: Psychology's History of Value*) Participants fasted for 4 hours before the experiment. Which researcher from the psychology history would see this as the key manipulation, and why? What does it imply for the economic assumption of stable preferences? What would you expect if participants had just eaten?

2.4 Measuring the brain (*Week 3 self-study: fMRI videos and brain-navigation site*) (a) What does the BOLD signal measure, and why is it an indirect measure of neural activity? (b) (c) Name one thing EEG would have gained and one thing it would have lost in this study.

2.5 Navigating brain structures Go onto the brain-navigation site. For each of the structures listed below, do the following:

- rotate / zoom until the structure is visible
- use the annotate feature (the pen icon) and place the marker on the structure
- use the snapshot feature (camera icon) and take a snapshot of the structure with the marker
- download the snapshot and include it as your answer to this question

Here are the structures to locate. **Include one image per region.**

- right OFC
- left DLPFC
- vmPFC
- ventral striatum
- dorsal striatum
- (optional bonus structure) right anterior insula (you may have to consult other sources for this one to figure out where it is)

Part 3 – Critique

About 45 minutes (15 minutes per question). *Threshold: at least 2 of 3 answers with a correct explanation and a plausible, reasoned point. At most 100 words each.*

3.1 The elicitation. The authors state that bidding your true WTP is the best strategy. Explain why in your own words, using a numerical example different from the one in the paper. Then name one assumption or design feature this depends on, and describe a situation in which it could fail.

3.2 The neural inference. The authors worry that brain activity when a food appears might reflect variables correlated with WTP, such as anticipated taste. (a) Explain how the free-bid and forced-bid trials address this. (b) Name one alternative interpretation of the mOFC result that the design does *not* rule out, and explain why.

3.3 Levels and individuals. At which of Marr's levels does the paper make its main claim, and which level does it leave open? The result is a group-level analysis of 19 people. What does it allow you to say about the mOFC of any single participant? Link your answer to the height analogy from Week 1.

Part 4 – Checking claims

About 20 minutes. *Threshold: at least 2 of 3 ratings that are defensible and justified with reference to the study. Two sentences per headline.*

Rate each headline as **supported**, **partly supported** or **not supported** by this study, and justify your rating.

Headline	Rating	Justification (2 sentences)
A. "Scientists find the brain's price tag"		
B. "Your OFC decides what you buy"		
C. "Hungry brains value snacks differently"		

Part 5 – Self-report

Similar to Part 1, refer to Moodle to complete Part 5.

You must complete this part to record your full submission and have your work eligible for grading.