Tips for reading Anderson et al., 2016

Note this paper is in a slightly different format. Instead of an abstract and an introduction there is just a summary section that's a combination of the two. Allow me to translate!

SimpleWriter Summary (in the –mostly*—top 1000 most commonly used English words).

Learning that a certain thing you see is a sign that you will probably get something that you really really want because it is really really good causes you to pay more attention to the sign-thing than other things. These sign-things that mean that you will probably get something really good make you pay attention to them even when you are trying not to or trying to pay attention to something else. A brain chemical called "dopamine" helps you learn that the sign things mean good things will happen when it works in a part of the brain called the "ventral striatum." This brain part works more when you are trying to get things you want. But we don't know how dopamine in the striatum works when you keep on paying attention to the sign-things you have learned mean you will get good things, even when they don't mean you'll get good things any more. We already knew that the striatum works more when you are paying attention to good-sign-things. But we didn't know what brain chemicals are doing in this part of the brain when you are paying attention to good-sign-things.

We looked at what dopamine does by taking pictures of the brain using something called "PET" that looks to see if there is more or less dopamine in brain. We show that when people knew that they would not get really good things, how much each person still payed attention to the sign things that used to mean really good things (but don't any more), had to do with how much dopamine they had in parts of the striatum such as the right "caudate" and the back of the "putamen." These findings show for the first time that dopamine in the striatum has to do with paying more attention to good-sign-things even when we are trying to pay attention to something else. They also help us understand what might be different for people who pay more attention to good-sign-things a lot, and so may let themselves be caught up in going after things we really like when they are very bad for us. And also they show us that taking brain pictures with PET is a good way of looking at brain chemicals in grown up people who are not sick.

*Except words in quotes. Also, "Chemical" is not in the top 1000 but I could not think of a simpler word.

Glossary

DA: *Dopamine*. A neuromodulator (brain chemical) that is central to reward circuitry and plays a key role in addiction. DA activity is associated with wanting and seeking (rather than getting), with your expectations of reward, and with reward prediction error (For example, once you have learned that a certain cue predicts a reward, neurons that produce DA fire when you see the cue and expect a reward but don't get it).

[^{11}C] Raclopride . 11 carbon raclopride. This is a *tracer* used in PET imaging. Raclopride (without the 11 carbon) is a DA receptor antagonist. It attaches itself to specific types of dopamine receptor (D2 and D3 receptors, described below), and using it allows you to measure

activity at those receptors and overall dopamine availability. 11 carbon is a radioactive isotope that allows you to label the raclopride so you can see it in the brain. One reason you don't see a lot of PET studies is they require you to be injected with this radioactive tracer. Although the way it was explained to me is that it isn't really any more radiation than eating a year's worth of bananas. When you measure raclopride binding twice in two different PET scans, you can interpret the difference between the scans as a difference in DA release between Scan 1 and Scan 2.

D2 & D3 receptors. There are at least 5 kinds of DA receptors. Both D2 and D3 receptors belong to the D2-like family of receptors. Now, DA is complicated and what each type of receptor does depends on where it is. But a quick and dirty take on these D2-like receptors is that they play an important role in neural pathways in the striatum that allow you to select one response from a number of possible responses.

TIPS FOR READING

For this paper, try to answer the following questions:
Summary: Be able to describe the context, the specific question, and the question in context as outlined below (and translated above!).
Results

- How did the training task create associations with reward? (you may need to refer to the Methods for this)
- How did the test task measure attentional capture by reward? (you may need to refer to the Methods for this too)
- How did they use the task in two different scans to measure individual differences in DA release related to attentional capture by reward?
- How did they look at the relationship between DA release and performance on the visual search task?
- What were the main results illustrated in Figures 2 and 3?

Discussion

- What additional roles for striatal dopamine do the authors describe?
- How do they link their findings to previous findings of attention to drug cues? What is the relationship they describe between DA release and craving?
- What connection do they make between normal "value-biased attention" and addiction?
- How do the individual differences they observed give us insight into what makes people vulnerable to addiction?

Methods Don't worry about these. The only bits you are responsible for are those that help you understand the training and test tasks.

As usual, try to answer all of these standard questions (some of which are of course covered by the questions above).

- **Context.** What is the "big picture" context of the present research? That is, what is it about the brain/mind that compelled these researchers to carry out the present study?
- **Specific Question.** What was/were the specific question(s) addressed in the research?
- **Question in Context.** Based on what is already known from past empirical research, how does that leave an open question that is addressed in this study? What is the main hypothesis, if there is one?
    - What were the independent (IV) and dependent (DV) variables?
    - Who were the participants and how many were there?
    - What were the stimuli?
    - What were the instructions for participants?
    - Stimulus presentation: What did they see, when, for how long, and in what order?
    - What were the results in order of importance and relevance to initial question(s)?
- What were the conclusions that the authors claim are most directly implied by the results and most relevant to the questions at hand, in order of importance? How do these of results speak to the hypotheses and research question? That is, connect the results to the hypotheses.
- Do you think the evidence fully supports the authors' claims? If not why? If so how? Give reasons.
- Identify any methodological flaws. Again support your claims.
- Synthesize what the findings tell us about how the mind/brain works in relation to course readings and *class discussions.* Think of at least one broad follow-up question that would lead to greater understanding of this area of research