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Writing the Discussion for a Science Research Paper

https://youtu.be/8A9XUbjEQ6Q

Writing the Discussion for your paper is often considered the most difficult part. But don't worry too much. You've been reading up on all the papers in the field already in the preparation phase of the project … right?

Anyways, the Discussion section serves to inform the reader about the contribution of your results to the scientific understanding of the field. Your readers are most likely interested in different aspects of your findings. You offer several points of entry to thinking about the significance of your work. In order to do that, you need to be aware of the current state of the field at different levels of detail, and fit your findings into that context.

Structure:

First, you do those who skim over a paper the favor of giving a brief **introduction to the discussion**. This is done in the first paragraph that serves as a brief reminder about your own research approach, the results, and the main conclusion.

The main body of the Discussion is, well, **the actual discussion**. Begin the discussion at the narrow scope of your study. Then, each paragraph highlights a different essential consequence of your result, moving from the narrow scope to the big picture.

Finally, **your conclusion**: How should the novel information update the reader's thinking? Which is the next pressing question?

In my video I use the following paper as an example:

Eckmeier, D, Shea, SD (2014). Noradrenergic Plasticity of Olfactory Sensory Neuron Inputs to the Main Olfactory Bulb.

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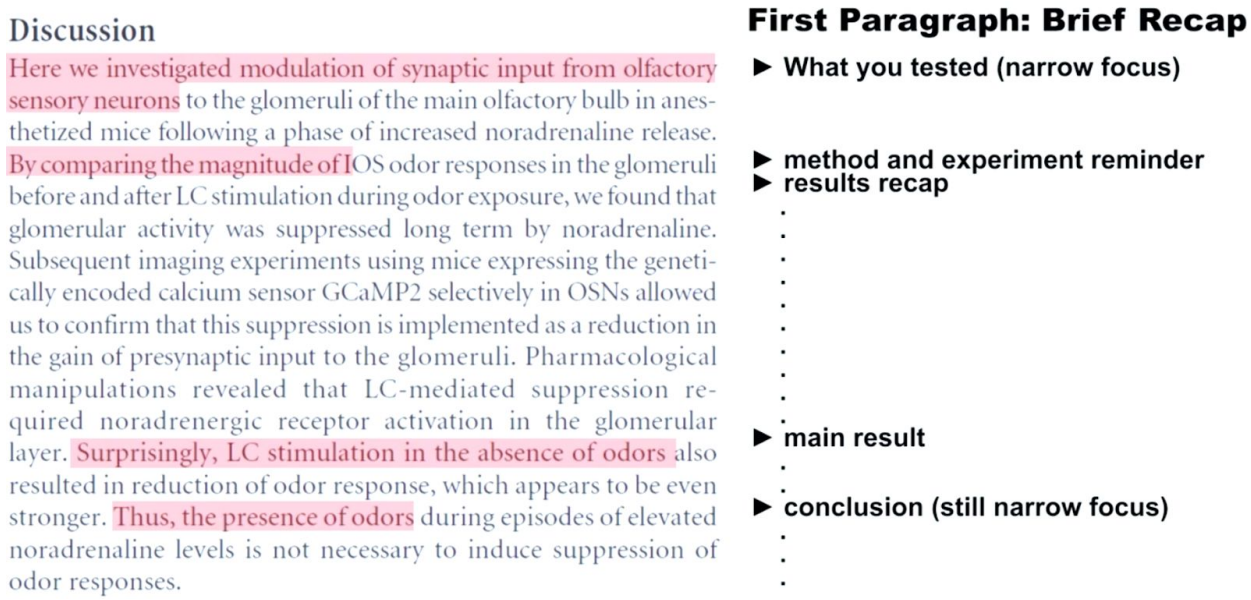
Example:

In my study, we focused on how the synapse that connects the nose to the brain changes some properties when the neuromodulator noradrenaline is present. I opted to not explicitly formulating our research question, but I combined information about the question, the approach, as well as the methods in the first two sentences. I then follow with those results that are most important to the conclusions. I do not mention every single control experiment. Then I point out the exciting part of the result ("Surprisingly,…"), and I give the first conclusion, but only in the very narrow scope at which I did my experiment.



Discussion

Here we investigated modulation of synaptic input from olfactory sensory neurons to the glomeruli of the main olfactory bulb in anesthetized mice following a phase of increased noradrenaline release. By comparing the magnitude of IOS odor responses in the glomeruli before and after LC stimulation during odor exposure, we found that glomerular activity was suppressed long term by noradrenaline. Subsequent imaging experiments using mice expressing the genetically encoded calcium sensor GCaMP2 selectively in OSNs allowed us to confirm that this suppression is implemented as a reduction in the gain of presynaptic input to the glomeruli. Pharmacological manipulations revealed that LC-mediated suppression required noradrenergic receptor activation in the glomerular layer. Surprisingly, LC stimulation in the absence of odors also resulted in reduction of odor response, which appears to be even stronger. Thus, the presence of odors during episodes of elevated noradrenaline levels is not necessary to induce suppression of odor responses.

In the following paragraph, I discussed the reasons why we were surprised by the result. I cite relevant papers that also focused on this specific area of the brain. Ther had made us think that the effects we found would maybe not be that striking at that particular synapse. Only one paper in the literature showed a small effect.

In the third paragraph, I accepted the result and introduce the relevant research done on the same local network. Specifically, I mention that most of the work was done on a different pair of neurons one step further into the network.

Then I begin widening the scope of the discussion. First I talk about network effects of my findings for memory formation. Then, I update the current knowledge about memory formation in the olfactory bulb with my findings.

In the last paragraph, I discuss my findings in the general context of behaviors that depend on olfactory memory formation.

And I finish the paper with my conclusions and I leave an open question by restating the most counter-intuitive finding:

"*We, therefore, argue that there is strong evidence that LC-mediated plasticity in the olfactory bulb constitutes an important mechanism for arousal to facilitate odor memory formation.* ***Surprisingly****, these memories seem to affect even the initial detection of a stimulus by altering the signal as early as in the receptor neurons.*"