

Dopamine System, Craving & Pursuit Explained | Dr. Andrew Huberman

So let's think about dopamine peaks and baselines And let's remember that for every peak there's a trough What do I mean by that Well when you have a wave you also have the bottom of the wave When you have a mountain you have the bottom of the mountain When we think about dopamine peaks and dopamine baselines we have to include that trough because that trough that is the level of dopamine below baseline really dictates whether or not you are going to feel motivated to pursue something or not So I'm gonna give you a visual in your mind The visual in your mind is an increase in dopamine that's triggered by your desire for something and really could be your desire for anything if you're hungry and you're thinking about I really want a sandwich I really wanna let's think what sandwich would I want right now Really nice roast beef sandwich on sourdough with a slice of Swiss tomatoes slice of pickle here I'm describing the sandwich that I would want So if you're hungry and you're thinking about that dopamine starts rising This is crucially important to understand dopamine is not just released when we get the reward When we get the thing that we're pursuing dopamine is released in anticipation of what we want That increase in dopamine is by no happenstance No mistake relates also to our propensity and desire to move Remember earlier I told you there's a separate circuit of dopamine that triggers movement and that when it's depleted is causing things like deficits and movement related to Parkinson's or other movement disorders Well that's not pure coincidence That's because desire and the need to move in order to pursue and reach goals are one and the same process So if I desire a sandwich or I desire a cup of coffee or I desire some water When I'm thirsty there's an increase in dopamine that we could call a little mini peak in dopamine But then here's the key thing very soon after I realized my desire for something that peak that was caused by the desire comes down and drops below baseline below the level of dopamine that it was prior to even thinking about the sandwich or the coffee or the glass of water And it's that drop below baseline that triggers my desire to go out and find that sandwich that coffee that water or that blank insert whatever it is that you happen to desire action or substance of any kind or person et cetera So that drop below baseline is fundamental to the whole process And that drop below baseline was triggered by the preceding peak So let's say that I desire a sandwich

there's an increase in dopamine then very quickly it comes down below baseline just a little bit Now I'm in pursuit of the sandwich I'm looking for where I can get that sandwich I can order it perhaps to be delivered I can go out and find it Now is the stage in which I have to think about what are the different stimuli that is the things in my environment that signal whether or not I'm likely to get that sandwich or not And so for instance if I were to go to my phone and order food on an app or walk down the street and see the sign for a deli that's a cue that I'm likely to relieve that drop in dopamine and get not just back to baseline but that I'll get a peak in dopamine And indeed that's what happens if I find that deli I go into the deli they're open they're making the sandwich that I want they make my sandwich and great I get that sandwich and that sandwich will have some degree of inherent reward to it some degree of um my liking it or not liking it So let's say I like it It's not the best sandwich I've ever had But all I'm doing is comparing my desire for that sandwich to the sandwich that I actually got and ate And chances are it's going to relieve that craving meaning it will take that dopamine that had fallen below baseline up up back to baseline And if I like the sandwich it's going to indeed increase that dopamine again to another peak Now if I love the sandwich like it's the most delicious thing that I've ever tasted in my entire life Well then I'll get a big peak in dopamine when I consume that reward However chances are that sandwich is more or less as I expect it to be which is pretty good I'll eat it and I'm fine What do I mean by fine Well there's a concept called reward prediction error reward prediction error says that the dopamine that it is experience that is that's released from the VTA and nucleus accumbens is going to be of a certain value and that value is going to be compared to the desire and expectation of what I thought I was going to get So if you take what you actually got minus what you expected that's reward prediction error So if the sandwich is basically what I expected to get fine dopamine comes down basically to a baseline level That's pretty standard for me and is basically the baseline level I had before I ever thought about the sandwich at all If the sandwich completely surprises me and is completely amazing just an amazing sandwich Well then the level of dopamine that I experience when I consume that sandwich is going to be even greater and it's going to be that minus what I expected So there it's a bigger reward prediction error in the direction of higher peak by consuming the sandwich And then of course there's the other possibility which is the deli's closed or the sandwich they make me is lousy or it doesn't taste good or something happened in the consuming of that sandwich That just makes a

bad experience In which case if we take that reward experienced minus reward predicted from the initial craving well then it's going to be less than what I expected And therefore the baseline drops below where it was prior to even desiring the sandwich OK So all of this might seem a little bit complicated but it's all very simple desire for things increases dopamine But then our level of dopamine drops below baseline and it's that drop below baseline that triggers the motivation to bring that dopamine level back up by going and pursuing the thing that you wanted in the first place Now of course as this is happening you're not conscious of your dopamine levels you experience this as context dependent craving and pursuit because remember the prefrontal cortex is involved in context setting and craving and pursuit because it relates to action and movement which is one of the general features of the dopamine system So you can start to see how this is a beautifully designed system And you can also see how it's a perfect system for desire and pursuit of anything not just sandwiches as I'm giving you in this somewhat trivial but everyday and therefore applicable example