

Rachel Genn

Might regret be a roadblock to reverie?

Amanda Ravetz (AR): Our next speaker is Rachel Genn, she works at Manchester Met where some of us have come from, where I'm from, and Rachel used to be a neuroscientist and then she told me to say, "but she's okay now"! [Laughter] She's a novelist now. Rachel, I'm going to just leave it there and you start.

Rachel Genn (RG): Thank you very much, Amanda and Tim [Ingold] and Tilo for inviting me here to speak today and bring together some of the things that I am interested in, in both my practice and my research.

Scientists would say that you shouldn't bring an anecdote to a data fight but try and stop me! I'm going to start with recounting a personal experience that fed into what, at the time, was also a focus of my research.

Back when I was studying the dopaminergic system and its modulation of addictive processes, I was also a recidivist smoker and for about 30 years, I'd been trying to stop. I found that I could be very good for very long periods of time and when I wasn't addicted to the smoking anymore, the nicotine, I would find myself longing for the longing, I seemed to be really missing the extreme wanting that addiction can bring about.

So I started to think whether the anticipation of the regret that I would feel if I thought of returning to smoking, was just too strenuous to bear and anything was better than that. I also thought, as I was finding out more and more about where these things occurred in the brain, whether regret itself could become addictive.

Always having been a reader and more or less always having been a writer, I do look to literature to bring together thought and feeling in a way that science probably can't and one particular metaphor from Dostoyevsky, his *Notes From the Underground*, from the narrator, completely chimed with me. "I feel a certain hidden, morbid, nasty little pleasure in the acute awareness that I have once again committed something vile that day and I would gnaw and gnaw at myself until the bitterness would finally begin to turn into a kind of shameful, damnable sweetness and in the end, into a definite positive pleasure, yes, a pleasure, I stand by that".

And so what I did was I created a pretend institution (THE NATIONAL FACILITY FOR THE REGULATION OF REGRET) where I could follow-up my transgressive hunches, where science wouldn't let me ask the questions so I went into my own institution to do that. What I was looking at was the role of dopamine in addiction and what had happened was there had been a divergence while I was doing my PhD, where the systems in the brain that were responsible for hedonic evaluation of substances (LIKING), had been pulled apart from a more general motivational system (INCLUDING WANTING) in which dopamine was the main neurotransmitter involved.

And so, what had been confounded for many years, (WANTING and LIKING) came from very early neuroscience experiments where rats, for instance, would administer electrical stimulation to circuits of the dopaminergic system and this was seen as primary evidence that they enjoyed what was happening to them. Only years later were these separable systems of incentive value and seeking pulled apart and I was involved in delineating the pharmacology of that.

So, what we had now was the possibility of manipulating wanting and liking separately and wanting what we no longer like, often leads to regret. For this reason, I became very interested in the nature of regret, how it unfolded in the brain, what the cognitive layout of that was, so I started to look into counterfactual thought, thinking of other possible realities, and where in the brain, regret might be occurring.

I'm going to point toward a part of a Frost poem, from *West Running Brook*, to show that the area in which regret seems to have its seat, the orbito-frontal cortex, was somewhere very phylogenetically late, it's not like in the reptilian brain, controlling basic and innate responses, but is more frontal, higher, and more human some might say.

This is from Robert Frost's poem, "The universal cataract of death that spends to nothingness and unresisted say by some strange resistance in itself, not just as swerving but a throwing back, as if regret were in it and were sacred. It has this throwing backwards on itself so that the fall of most of it is always raising a little, sending up a little, it is this backwards motion towards a source, against the stream, that we most see ourselves in, it is most us".

Regret is seen here as an emotion that can go against our flow, impede us, but epitomises us just the same.

So more and more I was thinking of metaphors as heuristic devices, as things that could have predictive fertility outside of science and I wanted to explore the feeling of knowing that poetic language could give us that science cannot quite engender.

Here is a diagram of what is happening -where in the brain activity occurs with regards to regret. Regret means that we have to know that we had our chance and we blew it, regret is different to other cognitive emotions like relief and guilt and shame, in that agency has everything to do with regret, it's our fault, if we'd have chosen a different path, we wouldn't be in this situation.

Patients with damage to the orbito-frontal cortex can still experience disappointment, guilt, but they cannot use the information about what they have done to predict future consequences, they can no longer regret. Not surprisingly then, the orbital frontal cortex is implicated in reward, computation, learning and decision making, it's an integrating nucleus for the afferent and efferent information underlying rewarding circumstances and hyper appetitive situations like addiction.

Decision-making is affected as the addictive career progresses and so there's no surprise that addicts get what is termed a myopia for future consequences.

What I was very interested to find out was that reductions in activity in a portion of the frontal cortex-the medial prefrontal cortex was associated with decreased self-referential processing, so reflection such as regret, was shown to associate with negative activity in this area. So, what I wondered here was whether perhaps there was a way in which regret and flow were having to fight for neural resources, if two were to occur at once.

So, I've talked with Amanda about this a little bit, what the relationship between flow and ways to get into flow, and the role of intrinsic motivation, how we can get ourselves to that place if it indeed is a place, where we want to be as creators and artists, writers.

One of the things that came up while I was reading an excellent paper, namely "The Emerging Neuroscience of Intrinsic Motivation: A New Frontier in Self-Determination Research (Di Domenico and Ryan, 2017) was that autonomy does not seem to be an essential core property of flow, it's not really mentioned within this paper, but it seemed to me that autonomy might be the bridge that takes us from a flow state into a reverie state, this might be the bridge, this might be the place, the conduit, however you want to see it, that could push us to that "other" place where things are different, difficult to describe, not particularly earthly.

I look again to poetry, to fortify this idea of autonomy when it comes to getting to the place of reverie, this is by Rachel Boast, in her brilliant collection, *Void Studies* and it's called *Reverdie*, which is a kind of typical poem celebrating the coming of spring I think, or new growth.

"Climbing over the gate into a garden / for residents only or so it says/ being the perfect place to notice / a green thought gaining ground / from underneath the

dreams / I bring with me, which seem to have / more reality than can be accounted for / I hold the key to this privacy / to pursue once again the magical study / of the happiness nothing escapes”, which to me seems like possibly a term with which you could describe reverie—the magical study of the happiness nothing escapes.

One of the things that Paul said this morning about the difference between proximal and distal computations with regard to flow and reverie, seems to me be embodied in the way that I am trying to think about these differences because I often appeal to metaphors of travel and distance of energy too. This is not a revelation but I do try to describe to myself, what it is that is sacred about reverie and it seems to me that with autonomy as a bridge, we can power our own flight if you like, and it is once we lose those self-judgements and the hedonic evaluation of what we are doing, as Isak Dinesen said, when we approach the work without hope or despair. Perhaps it's then that we finally have lift-off, perhaps when we are intrinsically motivated to follow questions, to elicit novelty from the world, perhaps it is when we do this rather than searching for knowledge and conclusions, that we can have such lift-off.

I was talking this morning at breakfast about “lifting off” and then being held in the safety of an orbit. Now this metaphor gets even more ridiculous, so bear with me for a second.

So we have powered ourselves by our own intrinsic motivation, we have got ourselves, based on exploration, play, we have reached an a plane or perhaps an atmosphere where we no longer need to pedal our bicycle, we've dropped our emotional baggage, we've jettisoned our fuel tanks and now we're in orbit.

Once in orbit, I have the feeling, my own experience as a writer, that we then become receptive to other energies, that we no longer have to rely on just ourselves and I would be interested to know how you feel about that proposition, during questions after the talk.

If we get to flow from intrinsic motivation, from flow perhaps we can get to reverie. It remains debatable that they are truly separable. However, I'm extremely interested to know, like Paul was talking about earlier, the entry and exit points of these states and what can enable and inhibit this? So one of the things that I think regret can do is motivate as well as inhibit these states and transitions.

I realise that this is ridiculously complicated, so here's a diagram to show you whereabouts regret is occurring. These are the original circuits, the mesolimbic circuits where the rats would administer the electrical stimulation, that identified these circuits as important for the mediation of reward, but instead of sitting around in a sated, happy, full-up replete state, what happened when the animals would administer these stimulations was they would search out novelty, they would start exploring their environment and pay particular attention to new things.

So what I started to look at was the prefrontal cortex and its sub-sections such as the orbito-frontal cortex, and whether they were active during this intrinsic motivation or seeking. And I discovered that in the maintenance and the regulation of motivation, the area where regret occurs is also instrumental, so you can see that since those early experiments, the examination of what dopamine is responsible for has become extremely sophisticated. There are many levels of dopaminergic activation in a number of separable circuits, perhaps acting in serial and parallel, and areas that modulate self-referential processing such as regret could overlap with those that mediate components of intrinsic motivation.

Of course, I can't answer any of the questions right now about where exactly this might be happening but what I think it would very interesting to do is, is to look at it from both an art practitioner and a science researcher's point of view simultaneously.

So this is my life, that's where I live. I am constantly looking from fact to fiction and the way that these speak to each other, to see what I can find that is new or what I could not find with just one or the other. The idea of “knowledge as becoming” is extremely important to me and I'm going to end on something I just wrote very quickly

on the train yesterday, about in actual fact, being pulled out of reverie because it's something that I think, if we inhabit spaces of concentration, we can all relate to.

Once I leave reverie or I'm pulled from it as someone shouts "Mummy" upstairs, I have the sense of one system immediately shutting down, an abrupt end to a game spoiled by whoever issued that call. My curiosity's thwarted, my game is ruined and I feel the indignation -an almost overwhelming petulance- that I have not felt since being in a nursery school. It's as if some kind of childhood framework has been activated or energised and now the plug has been pulled- no fun.

Whoever has pulled me from orbit to earth has made me heavy and fretful and I look to pounce on the intruder's least crime to punish them it's as much as I can do to not kick even my knee-high intruders in the shins. I wonder if I want to promote my own regret.

There's another system that's powered, it feels to me, by air rather than electricity that immediately shuts down and this system deflates gracefully. It's in the lingering power of this that I can burn things on the stove or almost crash the car or not be listening to the child for a long time.

It remains, going down and down, a ghostly, a spectral manifestation of what me and the work have been up to, what we've shared, how far we got, what of it has become me and what of me has become it and as the air goes out of it, it whispers or sighs a melancholic reminder, "What efforts must be made before we can get there again?"

So I hope that that gives you some kind of insight into how my personal experience and the metaphors that become salient to me as a practitioner and as a researcher, lead to a perpetual refreshing of my perceptions of what I experience with regards flow and reverie and how that is in dialogue with what I know of the science behind it.

AR: Thank you.