

Pleasure And Pain Modeled With Math

Post by “waterholic” of December 2, 2023 at 8:20 AM

This post may appear a bit Platonic or Aristotelian in nature, but please indulge me, there is no intention of arriving at a universal "magic" formula here. I was prompted by the long and confusing discussion originated by Cicero, who was incidentally the reason I started to read Epicurus. Someone as pompous and unappealing as Cicero going to such lengths to criticise seemingly sensible ideas? It was worth a read.

[Cassius, Joshua](#) and others as always did a remarkable job of going through Cicero's arguments and debunking them. Keeping the mental image of all the moving parts in these arguments, however, is a challenge. How do we reconcile the following statements:

- the state of no pain is the absolute pleasure
- pain and pleasure cannot be mixed
- even at rest and without intense stimuli we can feel pleasure
- weak pain can be endured, intense pain is not permanent (there is limit to absolute pain).

It has always been easier for me to express such ideas with formulae that are more precise than words. To be clear, these are not "natural laws" , but rather a helpful model to understand ideas for those who prefer communication in numbers.

To start with, any sensation is a source for pleasure and pain, let's denote these PL and -PN (PL, -PN). Assuming a theoretical unit of measurement, a scoop of icecream could be for instance (1, -0.1) - that is 1 unit of pleasure due to taste and -0.1 unit of pain in teeth. At any moment, we experience (or recall) many stimuli: we breath, watch, hear, all our senses work. Therefore, not experiencing pleasure (or pain) would be virtually impossible (back to Cicero!).

The question is, how are those pleasure and pain units converted to the overall sense of wellbeing? An example model would be this:

$$f = \arctan \left(\left| \frac{\text{pleasure}}{\text{pain}} \right| \right)$$

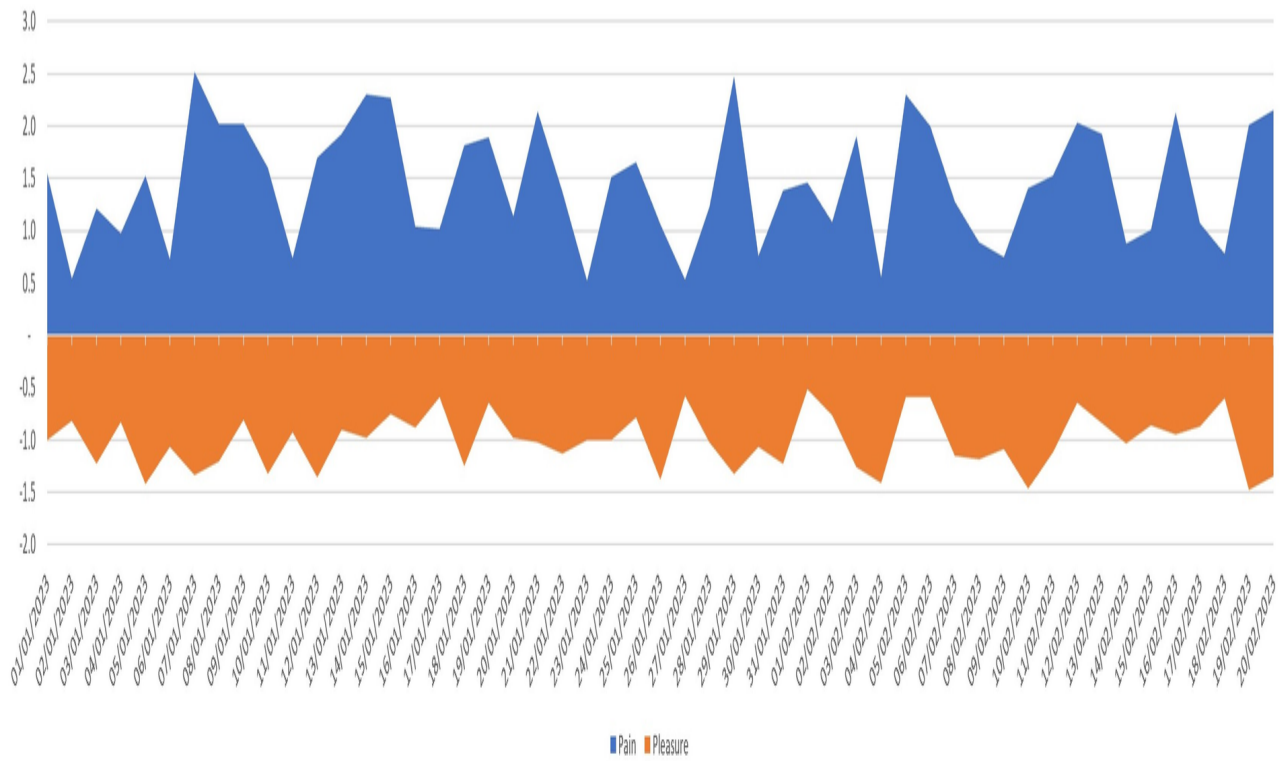
I have used this formula to incorporate the limits to our wellbeing: removing 100% of pain is impossible, but removing 99.99999% of pain will result in the maximum of pleasure irrespective of how much actual pleasure stimuli you receive at that moment. Here is how your wellbeing is mapped depending on pleasure and pain:

		Pain Stimuli											
		0.00 -	0.10 -	0.35 -	0.60 -	0.85 -	1.10 -	1,000.00 -	10,000.00 -	100,000.00 -	1,000,000.00 -	10,000,000.00 -	100,000,000.00 -
Pleasure stimuli	0.50	1.5708	1.3734	0.9601	0.6947	0.5317	0.4266	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000
	0.75	1.5708	1.4382	1.1342	0.8961	0.7230	0.5984	0.0007	0.0001	0.0000	0.0000	0.0000	0.0000
	1.50	1.5708	1.5042	1.3416	1.1903	1.0552	0.9380	0.0015	0.0001	0.0000	0.0000	0.0000	0.0000
	1.75	1.5708	1.5137	1.3734	1.2405	1.1186	1.0096	0.0017	0.0002	0.0000	0.0000	0.0000	0.0000
	2.50	1.5708	1.5308	1.4317	1.3353	1.2431	1.1563	0.0025	0.0002	0.0000	0.0000	0.0000	0.0000
	2.75	1.5708	1.5344	1.4442	1.3560	1.2710	1.1903	0.0027	0.0003	0.0000	0.0000	0.0000	0.0000
	3.50	1.5708	1.5422	1.4711	1.4010	1.3326	1.2663	0.0035	0.0003	0.0000	0.0000	0.0000	0.0000
	3.75	1.5708	1.5441	1.4777	1.4121	1.3479	1.2855	0.0037	0.0004	0.0000	0.0000	0.0000	0.0000
	4.50	1.5708	1.5486	1.4932	1.4382	1.3841	1.3311	0.0045	0.0004	0.0000	0.0000	0.0000	0.0000
	4.75	1.5708	1.5497	1.4972	1.4451	1.3937	1.3432	0.0047	0.0005	0.0000	0.0000	0.0000	0.0000
	5.00	1.5708	1.5508	1.5009	1.4514	1.4024	1.3542	0.0050	0.0005	0.0000	0.0000	0.0000	0.0000
	5.25	1.5708	1.5518	1.5042	1.4570	1.4103	1.3643	0.0052	0.0005	0.0001	0.0000	0.0000	0.0000
	5.50	1.5708	1.5526	1.5072	1.4621	1.4175	1.3734	0.0055	0.0005	0.0001	0.0000	0.0000	0.0000
	1,000.00	1.5708	1.5707	1.5704	1.5702	1.5699	1.5697	0.7854	0.0997	0.0100	0.0010	0.0001	0.0000
	10,000.00	1.5708	1.5708	1.5708	1.5707	1.5707	1.5707	1.4711	0.7854	0.0997	0.0100	0.0010	0.0001
	100,000.00	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5608	1.4711	0.7854	0.0997	0.0100	0.0010
	1,000,000.00	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5698	1.5608	1.4711	0.7854	0.0997	0.0100
	10,000,000.00	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5707	1.5698	1.5608	1.4711	0.7854	0.0997
100,000,000.00	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5707	1.5698	1.5608	1.4711	0.7854	
1,000,000,000.00	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5707	1.5698	1.5608	1.4711	
10,000,000,000.00	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5708	1.5707	1.5698	1.5608	

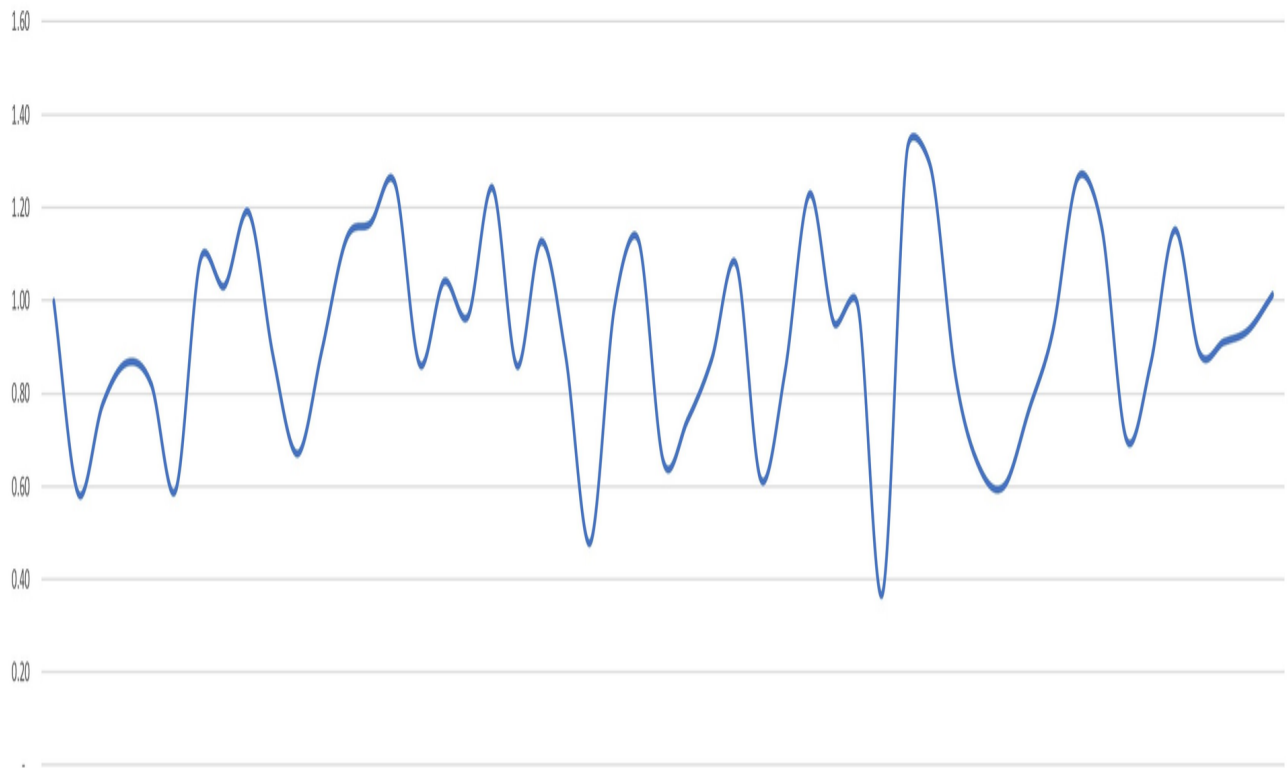
The middle white area is our daily life. When pain is brought down to the minimum (close to 0) we experience maximum pleasure, no matter how much pleasure stimuli we actually receive at that moment. Finally, extreme pain brings the wellbeing to 0, but that's the limit. Incidentally, in this example our maximum pleasure is defined by $\pi/2$ (yes, that Pi of Archimedes).

Here is how our daily life would look like in terms of pleasure/pain stimuli and our overall wellbeing:

Pain + Pleasure Stimuli over time



How we feel



Once again, this is just a model of the way I understand Epicurus for the moment. Any thoughts on whether I am missing something?