Aside from the mind wrenching pain it casts upon PhD students, especially those in fields of fundamental sciences, to write a Valorization chapter; Aside from the fundamentally deceptive crap they jot down in order to appease the requirement, stuff they don’t really mean, believe, can justify or even know; Aside from the benefits to society if –instead– these students were out in the sunshine smiling at everyone and dancing in the streets because they were excused from having to write a Valorization chapter. In order to Valorize Valorization, we might want to make sure these 160.000 or so euros are not better spent on healthcare, education, helping refugees, planting trees, or saving white Rhino.

Yes, these are only rough calculations, and yes I am sketching a caricature that lacks some nuance perhaps. But are we really sure that what we are doing for the benefit of society, benefits society? And that what we’re doing to make a profit makes a profit? I would cautiously suggest a Valorization panel to valorize the Valorization (a meta-Valorization panel if you will) just to make sure.

As an aside: The meaning of the word ‘valorization’ as used here at our University is altered somewhat from its generally accustomed usage in the English language. Of course, this is to cover its new meaning of creating value from knowledge. So I imagine a not-so-distant future in which diaspora from our University end up in foreign places that are not yet accustomed to this alteration. At a few, perhaps many, occasions the word will be dropped, and initially these diaspora will look like dunces. Then, the rest of the world might catch on, and all creativity and spontaneity will be sucked from science until she’s left deflated and unsatisfied. Humans: the only ones who seek knowledge, purely for the sake of knowledge. This, to my mind, is what we have to look forward to when each and every budding scientist is forced to write a valorization paragraph – brownie points with the government, and all our alumni looking like dunces, en route to slay science.
A single neuron perspective

Imagine: you are a single neuron, a spiny stellate cell for example. Yes. Imagine being a spiny stellate cell – it will help you slip into character with less effort. OK. You are an awesome mighty spiny stellate cell, and you live somewhere amidst early sensory cortex, though you – of course – are blissfully unaware of this fact. You spike sometimes, that’s your job. You gobble up some glucose, you hang with some astrocytes, and you listen to a great many other neurons and the tales they found worthy of relating to you. You listen carefully and you consider the evidence. You’re on the job. What is the likelihood that what the others are spiking on about is actually happening? Yes? No? What should you do? A threshold is reached and you just do it, you spike. POW. Damn that felt right, a bit exhausting, you need a quick recharge, maybe a smoke.

Then I ask you: “Single spiny stellate cell, how is your spiking justified? What value is created by your knowledge?” You might reflect and realize you have no clue, you just do your thing because you love doing it, and you sink into a deep depression realizing that if you died tomorrow the brain would go on as usual without as much as a blip. Your value is essentially zero. Of course, if all neurons were eliminated the story would be different. Altogether, the neurons in all their complexity decide whether to watch one more video of a cat jumping into Many Too Small Boxes¹ or to continue writing this darned chapter. But quite frankly, the brain is complex as shit, and trying to figure out what the value is of each individual neuron borders on madness.

Yet, this is what brain scientists do, for years on end. Entire lives are dedicated to this mad pursuit just because we can. What we learn incrementally and veer off track, and by the end of it we might all prove to be wrong. Now, as a single scientist I sit somewhere amidst other scientists studying sensory cortex, for the most part blissfully unaware of the other sciences. I publish sometimes, that’s my job. I gobble up some of Bandito’s soups, and hang with some students. I go to conferences and listen to a great many other scientists

¹ https://en.wikipedia.org/wiki/Maru_%28cat%29
and the tales they found worthy of relating to me. I listen carefully and you consider the evidence. I’m on the job.

If we want someone to be able to tell my value, or how my knowledge can create value, we might want to consider training an army of scientist-scientists, to study us for years on end, dedicate entire lives. Because, quite frankly, the brain sciences are complex as shit.

So. Just let the single neuron spike, as he cannot earnestly answer my question. When forced to, he might try to Obey and Please; he might give you likelihoods of nearby events, he might confabulate those from the faraway brain. If he is detecting an orientation in his receptive field he might say that it is part of a junction, that is part of a letter, that is part of a word, that is part of a sentence, that is part of a story that has some kind of value or meaning. That sentence could be part of an important document stating once and for all the future of mankind – a resolve to end all hunger, war, inequality, suffering. We would like that, because wishful thinking of the hopeless naiveté seem to reign supreme. But you know what? The orientation might not be part of a letter at all! It might be part of some obscene graffiti inside a dirty subway cart, or part of what you see written on your face in magic marker after you wake up from an accidental nap amongst your college mates. The point: there are infinite degrees of freedom here. As a single spiny stellate cell jammed in some obscure visual pathway only coding for the far periphery of space you might feel like you have quite the overview of what is going on, but darned, what kind of a clue do you have really? – I imagine that’s what particle physicist feel like all the time.
How my research will create world peace

Reading valorization chapters of other recent graduates can prove inspiring. Shiny crystal balls, held up to the light. You know what? My research can create world peace and happiness for all!

Scenario 1. The media will pick up my research, and the misguided scientific writing in the popular press mightly impresses everyone. So much so, that I am offered a position in Government. In this position, I manage to grab full power, aided by the army, and I drastically change the monetary system, curb needless (consumer) spending, talk mindfully to the other Leaders in Government, and execute many more such interventions. World peace!

Scenario 2. My code – which as a postdoc I will of course share publically to increase my chances of finding a faculty position – will go viral. Its popularity results in its becoming integrated into new software everywhere, and I become rich and buy a helicopter. However, the code is so buggy that these new products all break down. The consequences are reminiscent the anticipated destruction from Y2K – and even worse! The world falls into total turmoil, and people can no longer rip each other to shreds on Internet forums. Altogether we build a new society from the roots up. World peace!

Scenario 3. One day, my paper on biased memory for visual orientation lands on the desk of a brilliant young researcher studying zebra fish. Reading the paper she gets so bored that she falls asleep, hitting her head on the desk very hard. Water splashes out of the fish tank, onto some papers, staining the ink. Upon awakening, the brilliant young researcher grabs her papers and runs off to a meeting. A dreamy colleague suddenly notices the stain and is reminded of this mega virus she studied a while back. A sudden vision overwhelms her, and back in the lab she uncovers a mega virus of great therapeutic potential. She ends up curing her colleague’s concussion, and virtually every other mental illness within her lifetime. World peace!
Scenario 4. Some giant insight of great philosophical value and importance occurs (see Figure 1). An immense tolerance settles in like a soft summer breeze. World peace!

Figure 1. 'nough said

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Nik Papageorgiou – The Upturned Microscope

A cautionary tale of monster bugs

The following section is a cautionary tale for all those researchers out there whose work, like mine, depends critically on adequate coding skills. And whose work, like mine, may or may not ultimately result in world peace. My troubles came from writing some serious bugs into my experimental code, which I want to relate here in some detail. Specifically, there have been three that haunted me at night. While each bug is unique, and the variety of bugs that one can write into code seemingly endless, here follow three lessons, of bugs
not to repeat. (1) When you start using a pc to run experiments from, and when that pc – for some inexplicable reason – only wants to run your code the first time you run it after opening Matlab, MAKE SURE TO USE A RANDOM SEED. Computers are deterministic, and without a random seed (based on the clock for example) the machine will give you ‘random’ numbers that are identical every single time you restart your Matlab session. OK, good. (2) Don’t overly complicate things by rotating the positions of your stimuli on every trial, it doesn’t really matter that you want your vector of random orientations to move along with the location you probe your target at. If you have planted your seed atop your code just let the random numbers be and don’t mess with them, or else… (Figure 2).

*Figure 2.* Ninety-nine bugs in my code at this point, ninety-nine bugs in my code. Prepare to frown, rotate back around, ninety-eight bugs in my code at this point.

And last but not least (3) try to avoid separating your code into two chunks the day before your first scan. So what, your code doesn’t run on the much slower experimental machine, fix that. Don’t port the part generating your stimuli to another script to run on a faster machine but *leave the random seed outside of the run loop where it is needed!*

How random is life? Not random enough when you’re writing code.
In all earnest

All joking aside – do the sciences have an immediate and foreseeable value? With respect to applied sciences; yes of course. Might advances to the benefit of society or for profit be achieved based on work done in the fundamental sciences? Absolutely, though I imagine purely by accident and in unforeseen manners. Might having PhD graduates write Valorization chapters into their theses create some kind of value (besides the shame they feel over those last couple of pages hidden in there following the real fruits of their hard labor over the past however-many years)? In very specific cases, sure, one could see how it might. Can young scientists foresee the future, or predict a chain of causality of two, three, or thousands of links into the future? Most of the time, no, most of the time we seem to be dealing with something rather entropic and chaotic. When a butterfly flaps its wings over the Atlantic… We can of course force PhD students to indulge in visions of a potential self-importance and bathe in delusions of grandeur on our way to turning a profit. Hell, maybe even my work really matters as a portion of humanity’s collective knowledge, and one day it will make me rich. But let’s not forget how small we really are, how single-neuron-small, how cog-in-a-ginormous-wheel small. If we want our science to keep creating ‘lucky accidents’ that we can all benefit from – penicillin, electricity – it needs room for such accidents; room for aimless venturing down unknown paths; for true discovery; for seeking knowledge purely for the sake of knowledge.