Principia

The Philosophical Journal
Of Prince Alfred College
Volume 11 2022

Editor's Foreword and Preface

The 2022 Philosophy Journal is a combination of fantastic work put together by PAC students of philosophy, and Theory of Knowledge. While it has not been published for a while, it seems like a perfect opportunity for the re-introduction of such a wonderful journal, especially coming out of the COVID-19 pandemic, and with the development of Year 10 Philosophy as a recently added subject. Despite a lack of committee, this year's edition is still strong, as there are brilliant essays by current students, and some recently left, particularly by Archie McEwen, and Dylan Holland. Even though there are not many articles in the journal as it stands, hopefully it shall serve as a launching point for the production and growth of future editions, to further enrich academic life at PAC.

George Bartley, General Secretary and Chairman of the 2022 Philosophy Journal

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Curated Articles from Student Submissions

George Bartley- What is the relationship between visual illusions and our consciousness?

The idea of consciousness is difficult to grasp in a philosophical sense. Broadly speaking, there is two schools of thought on consciousness. One, dualism, asserting that consciousness is separate from the physical form, and the other, materialism, being that consciousness is intrinsically linked to the brain (Abovich 2014). It is certainly interesting to consider- can there be a consciousness without a brain? Does it need physical form? We assume it is involved with neurons, but perhaps it is due to something else. Say consciousness does need the brain, then what parts of the brain does it require? Are the brain and the mind different? Some sources claim that the brain is physical while the mind is not made up of any cells, which is indeed quite confusing (*Important Difference Between Brain and Mind* n.d.). A common point of reference is that of a computer, which has hardware, the physical parts such as the keyboard, and software, such as the applications on the computer. One argument is that the brain represents the hardware, the physical aspect, and the mind is the software (Ross 2016). If the idea that our mind is not a physical object is taken to be the case though, does this mean we have a conscious mind for a short period after 'death'? This is the sort of consideration that makes duality complicated to grasp.

For the sake of simplicity, I shall use the materialist point of view, that consciousness is linked to the brain, and I shall use the idea that the brain and mind constitute the same physical and mental object, however it is important to note that the mind and consciousness being one and the same is not necessarily true. Upon observing the world, the vivid description our human brains, and according to a materialist perspective, consciousness, generates is logically distinct from reality in its true state. It is fundamentally a framework for our world, through which we can experience it depending on how we interpret it. In terms of sight, just because we cannot see

something, does not mean it is not there, and just because we do not see the true form of an object does not mean that what we see is all there is to the object. This is because it is likely more evolutionary favourable- if we were to see reality as it supposedly is according to modern science and philosophy, then it could be more challenging to engage with it in the physical realm. But does it matter that it does not fully express reality? Does it diminish our experience? Take colours. Scientifically speaking, colours are merely an illusion created by our brains to distinguish between different wavelengths of light. We can't smell them, or hear them, or taste them and yet we consciously experience them through sight because that is the best way for the brain to express the world. It does not matter that they don't express reality, rather it matters that they simply give us a good view of the world.

However, confusingly, this image can be incorrect even within its own parameters.

A simple consideration involves where the brain interprets a two-dimensional image in multiple forms. When we observe objects around us, they will not always be as obvious as, say, a tree drawn on a piece of paper is to interpret. With the tree, the visual detectors in our eyes relay the message to our brain, and we understand that it is a tree. But when the image becomes more complicated with different potential forms, it becomes harder to decipher, and the brain cannot consider all perspectives simultaneously (Adamovic n.d.). Take the simple example of a cube. From a two-dimensional drawing, there is two possible ways the cube can be arranged, and the brain cannot see both at the same time.
Why is this important? Our conscious mind cannot visualise ambiguity and opts for the option with the greatest simplicity. Theoretically, in the case of the cube, our brain should be able to see both variations at the same time, but because of the brain's inability to do so, it holds a fluid state between the two options. Even more fascinatingly, it is very challenging to not see a three-dimensional cube when observing the diagram, despite it being a two-dimensional drawing. The brain wants to create the best possible description of the world around it, and in doing so creates a system that can occasionally be misleading. This indicates that while the brain, and hence human consciousness, is aware of its' surroundings, it is not able to interpret the information presented as well as it perhaps could do. The discoveries of limitations based on stability may eventually provide insight into how consciousness functions, which as of now remains unfound. Once we realise that amongst the limitations of human consciousness, one could be the requirement of stability, another question logically follows. Can we be sure that this is a limitation? Is it even likely that it is a limitation? In the above example about a three-dimensional cube, we are fairly certain that the cube is two-dimensional. But we can never be certain as there may be other limitations to our conscious perception, cause us to misjudge our own misjudgement. Perhaps it does not matter either way. We can still act as though those appeared misjudgements are limitations when we interact with the physical world, as long as we meta-cognitively understand the limitations to even our perception of our own limitations.

When I first started riding a bike around my town, I noticed that I would perceive the various visual stimuli around me in different ways. I would ride in a very particular direction, always passing certain signs and I would notice that it would be harder to read the words on certain signs in my peripheral vision than others, due to their length. This to me seemed relatively obvious that the larger number of letters would

require more mental energy, however what I found interesting was that on occasion I even found it challenging to determine the number of letters in such longer words. I assumed it was once again just due to the number of letters, but that is not the whole explanation. Recently, I discovered that it is due to an effect called crowding, whereby when objects are near other objects it becomes hard to distinguish between them (Sayim & Taylor 2020). The human brain desires simplicity, and here there is not just the length, but spatial complexity. This becomes confusing because it is not just letters that are being distinguished, but electromagnetic signals, making it infinitely more complex. With crowding, there is an interesting point to consider. Would AI encounter the same problem? It would certainly be on a smaller scale, but would it occur at all? When we take a photo, we remain with the same bias towards crowding, meaning we may never be able to find out whether it does occur, but it is intriguing, nonetheless. If AI was to encounter the same problem, it would be due to perception, but if it did not, then it would be to the limitations of consciousness alone, which would be vital to understanding consciousness through its clear need to have simplicity.

Another idea involving motion is that of the waterfall effect. When we directly view certain objects, we don't expect our perception of them to be influenced by other objects, especially when they are stationary. We logically assume that our perception of a stationary pencil on a desk would be that it is not moving. Yet, this is not always the case. Approximately 2000 years ago, the famous philosopher Aristotle was watching pebbles beneath flowing water, observing over time that the pebbles next to the water appeared to be in motion, when they were in fact not so (Nikolova, Wade & Conversation n.d.). The reason it is called the waterfall effect is because the same occurs with a waterfall: if you observe it for long enough, the external features separate from the waterfall, such as rocks, may appear to move. Here, our perception of one object is influenced by our previous experience with a separate object. Investigating further we find the interesting consideration about whether our perception in this case is conscious or unconscious. This is where science of the brain, neuroscience, and philosophy overlap once again. Upon observing, in this case, where the water repeatedly flows down the waterfall, our brains become accustomed to it, and begins to adapt to the visual stimuli (Singer n.d.). The adaption comes in the form of direction, as the activated neurons are detectors for the water moving downwards, which gradually tires them over time (Nikolova, Wade & Conversation n.d.). Once the external stimuli is changed to the stationary rocks, those downward electrical signals have become so accustomed to the prior stimuli that they don't respond as much, and thus the signals for the direction up become more prevalent. Does this matter? It matters because the brain is acting consciously not unconsciously. The brain, in trying to create the best possible picture of its surroundings, accidentally misleads itself.

If the human mind, and human sight, is inherently restricted, then it is very likely it cannot hold an objective perception of the world. Philosophically, there is some logical considerations that follow. Take one limitation as the mental requirement to create the best possible framework, as mentioned in the third paragraph. Will we be able to find out if our "best possible framework" is the best it can be? Potentially, amongst the possible frameworks for the human mind, there may be some that are more useful than our current version, but will we be able to work this out? AI

provides a way to do so, but we cannot know that the framework which that uses may have limitations more significant than our own. Is there even a "best" framework? Take sight- is there a framework that limits possible restrictions more than others? We believe that some creatures such as flies have better sight than us, but this is not certain, they may face worse limitations in their vision in ways we cannot perceive. Coming to the limitations of other minds (and sight), can we ever know them? We are able to make generalizations about our brains through observation and logical reasoning, but how far do the limitations of a sample size in terms of say need for stability and simplicity represent that of the human species? Extending this further, how different are the experiences of the 'normal' limitations for those with what we, as society, believe to have 'bad' problems such as those who have colour-blindness, or some other disorder, and will we ever find out? These are all questions which have no clear answer as of yet, however with time there could be some.

Ultimately, while we do not know what consciousness truly is, and how it relates to vision, through investigating its' limitations we may be able to create a better understanding of how it works. From the ideas of the reliance of the human brain on simplicity, and stability, we can conclude that the brain makes certain choices to focus on some pieces of information as opposed to others, which is vitally important for understanding the conscious mind as it provides a backbone for why certain actions occur against seemingly normal logic. Through comparison and contrast to similar, or different limitations across both the human and different animal species, we can deeper our understanding of this fascinating concept. The acquisition of knowledge is significant for the human race to help us develop, and an understanding of the limitations of our consciousness may aid that pursuit, or even save lives by better understanding those with neurological disorders.

Ruben Japp- The development of technology in the modern world

Technology is developing ever more rapidly. As the days and years progress, there is always news of new inventions and developments, and there are many benefits that technology has brought that people point to in defense of this. But, while these supposedly positive changes are being brought about, what is the downside? Is the march towards technological perfection going to bring about a great deal of negative side-effects? This article will explore the hypothetical future of technology.

Where does our desire for technology come from? A common saying is, 'necessity is the mother of all invention.' An initial necessity to farm, hunt, and defend is the cause for much early invention. But as tools increased efficiency, nomadic people started settlements, which became hubs of human ingenuity, where people, released from duties of food production, could set their brains to technology. Well, what did this new technology do? It increased efficiency even more. This cycle has repeated itself over and over again throughout history. New inventions made old obsolete. So, at its heart, is the reason for innovation convenience and laziness? There seems to be no real and visible 'necessity' to much of the new technology today, but much of it appears to be for the sake of increased convenience and efficiency.

Along with this continual updating and removal of old technology and its replacement with new technology, out of 'convenience' will man remove himself from every process eventually too? How can the human race, who are inherently less efficient than machines, hold this concept of efficiency so close to our hearts? Countless professions have been lost to technology. How can man do this to his fellow man, for the sake of efficiency? For all humans are inefficient. The only logical path that this reasoning can follow is the eventual extraction of human effort in literally everything. Machines and technology will run all processes, and there will be no human input or effort required to operate the systems that keep ourselves in existence. What a sorry existence that will be! There will be no expertise, no pride in work, no satisfaction in the product, and our descendants will know nothing of the toil we put in to get joy from our labor. Only out of hard work can a feeling of accomplishment come. The people under this reality, 'freed' of work, will not experience and appreciate this feeling, and we might anticipate that the people of that time will be reduced to animals, searching for meaning in the meaningless pursuit of material pleasure.

What would our ancestors think about us today? Even for a basic necessity of the food on our table, we couldn't describe the process that it went through to get there. This shows that humans have already been removed from so many processes. Lots of the knowledge that comes from an intimacy with certain professions has disappeared. So, what if we were to be removed from them all? There would be no people capable of doing anything. It would be more worthwhile to acknowledge that humans are always going to be inefficient and realize that a pursuit of technological perfection at the expense of our humanity would be detrimental.

At the present moment, we have seen the way in which computers have taken over many actions. Computers are now used in most areas of most industries. However, we are now in a place where it would be impossible for any company that uses computers to ever stop, because the efficiency gained by having computer systems would be lost, rendering them uncompetitive. So now, all companies are locked into having computers. And it doesn't stop there. Better, faster computers are adopted by businesses, and it becomes a race for increased productivity through faster adoption of new technologies. While there is probably a personal cost to this constant demand for greater speed, no one can back down because it would almost certainly mean business failure. Man has become caught in the spiral of technological reliance, and there seems to be no way out, even if we wanted to.

Also, do we even want the kind of technology to exist, that has the capacity to take over all human function? Following the logic of the increased demand for efficiency to the extreme example of an eventual complete replacement of people by technology in all processes, that would have huge negative effects. On top of the kind of lives that people would be living at that time, with no purpose or satisfaction, the kind of technology that could actually accomplish that is most definitely very frightening. There are many examples in art of what this kind of future is imagined to be like. There is a good chance that it will be far worse than presently imaginable. With some sort of machine 'agency' a likely component of this future technology, this reality would be a frightening shift in power away from humans. While often classed as a science-fiction trope, the machines could indeed take over.

Another facet is the actual effect of the technology on us and our minds. Technology addiction is quickly becoming a very serious problem among today's youth. The present generation of kids, those who have been most greatly affected by this, will experience great difficulty in life as a result. (But, in their defense, who can blame them? Whoever thought it would be a good idea to give kids free reign on the internet and video games?) From a childhood of computer addiction, with instant access to anything on the internet, a variety of problems can arise. Shortened attention spans, reduced concentration, constant over-stimulation reducing the brain's emotion and pleasure receptors, and an inability to put effort into school and life due to the internet's constant rewarding of laziness, are all issues that can be seen. These are the downsides that the constant instant gratification of today's internet brings. Many kids will grow up and be completely unsuited to the world, and with the regret of having wasted their youth attempting to find joy on a computer. And this could only get worse. Following the trends of current technological advancements, who knows what the next generation will endure.

Who among us says to himself: 'I can't wait for my grandkids to be addicted to watching videos in virtual reality twenty-four hours a day.' It is almost as if, silenced by an unwritten truth that technology must always be improved and developed, we accept that the situation must get worse for some sort of end-goal of technological perfection. But this is an impossible goal, and at the human cost that has already been witnessed, how can it possibly continue to be supported?

The reliance on technology is a strange occurrence. As humanity invents improved technology, it will slowly become more widespread, until suddenly, it becomes almost a necessity. Take automobiles. Initially a convenience, they are now almost indispensable. Same with things like mobile phones, personal computers, and a whole host of other technological developments. How will people themselves be affected by this? When will technological proficiency become a requirement for participation in mainstream society? Has it already? As each new development becomes widespread, and more and more people subscribe to its usage, what of those who do not? People today without cars, phones and computers can be said to be at a disadvantage in the modern world compared to their technology-having counterparts. Human society almost demands the adoption of the new technology. Will life become increasingly difficult in the modern world for those without?

We must stop and think about this pursuit of technology, and the cost it may have on us. We are likely to be dead and gone before the worst of it, but do we want a future like the one described above? Will we continue to embrace and adopt every new technological infrastructure at the expense of the future generations? Or should we quit while we are ahead?

Tianyu Sun – Recommendations to a Younger Person on the use of Information Technology

Don't believe everything you see. No technology has an inbuilt truth filter, and there won't always be context. Anyone is free to put anything out there, even if it's wrong, or distorted, and if you don't take the time to consider this possibility, it'll result in gullibility. Especially in regard to large, life-threatening or otherwise impactful

things, try to remember that just because people are speaking to you through technology, they aren't some otherworldly deity, they're ordinary people just like you. People who make mistakes, pull pranks, and try to mess with others for fun sometimes. Even with more heavily regulated sources, such as TV or radio, it's not really a question of how credible your information is, it's a question of how much you can pay to put it on. Lies that pay well fare better than truths than don't.

Don't follow apparent majorities. Technology functions to bring the world closer together, to allow larger groups of people to gather in one place. The human brain evolved in a world where individuals had to interact with 20-30 others on a day-to-day basis, and this means that you're fundamentally unprepared for large groups of people. Dealing with these groups is a skill that must be learned, and learned quickly, lest you fall into certain traps. Technology allows vast swathes of people with common opinions to come together, from all ends of the earth, and can result in what seems like an unstoppable majority. However, this is usually an illusion. The world population is verging on 8 billion. Making allowances for war, poverty, and disinterest, there's around 5 billion people in that who have access to some sort of technology. If anything remotely close to the majority of people believed in something, you would know. Numbers that would be considered incredibly large in everyday life are the crumbs of the crumbs of the world, so even when a group seems overwhelmingly large, consider that it may instead be disappointingly small.

Remember the positive side of things. You're most likely to get a majority of your knowledge from some form of media. Be it TV, radio, newspapers, or the internet. All of these share the common trait of being centred around attention. Newspapers make money for each copy sold. TV channels and radio programs only sell advertising space if they're popular, and websites have to juggle both advertisers and viewers to make their money. All this has resulted in a media cycle that is in a 24/7 competition for human attention, and since humans notice and remember negative things more than positive things, the vast majority of serious, real-world media is focused on everything wrong with the world. Plane crashes, rampant poverty, political scandals. Every form of media is biased towards the large negatives, and this can result in a thoroughly depressing worldview. Especially in times of crisis, it's important to remember that the small, unnoteworthy, everyday victories can outweigh the large, flashy losses.

Create your own hierarchy of reliability. The hierarchy of reliability refers to each person's individual ranking of how reliable different sources are. Labelling everything under the massive, almost catch-all term "technology" seems to imply that all forms of technology are about equal, and shouldn't be ranked in any definite order, but this notion is incorrect. Different people have different views on what sources are reliable, and you will have to build your own hierarchy as our current technology evolves and new technologies are introduced, but a good starting point is considering accountability. Focus on what incentive your source has to present the truth. A random webpage on the internet has almost no incentive, it gets the clicks, shows the ads, then disappears. A news organisation with millions of repeat followers has a much larger incentive to tell the truth, namely that these followers will likely abandon them if they tell a falsehood. Building and maintaining your own mental hierarchy will help you to identify trustworthy sources and know who to listen to in cases of conflict.

Don't let technology distort your view of the world. Using technology to acquire knowledge raises an issue with the idea of truth. Obviously, it is desirable for the knowledge acquired to be true, but the very meaning of what it means to be true can be called into question. You might say that, at the most basic level, the world before your eyes is what is true. Technology is just a way to communicate ideas and benefits that you might not be able to see directly. When you read a news story about a new restaurant in Paris, you want to get an idea of what you *would* experience, *if* you were actually in Paris standing at the doors. However, technology can alter that ideal. Take the case of the microscope. Two cups of water, identical to the human eye, one of which is contaminated with E. Coli. Using a microscope here might help in the practical sense of finding out which cup is safe to drink, but it's dangerous to start thinking of the world in the microscope, with tiny wiggling lifeforms, as a "true" sense of the world. The same applies to molecular structures, astronomical photographs, and even to maps of the world. While useful, they're not necessarily "true" under the common definition.

Year 10 Philosophy Essays

Archie McEwen 10MOO – *Why are the central political ideals of modern democracy: freedom and justice – often in tension with each other?*

German Philosopher Friedrich Nietzsche defined freedom as "the will to be responsible for ourselves." He concisely suggests that control over one's self allows complete access to freedom. I have noted this explanation, although not by any means a legal nor modern definition, because it immediately shows an underlining contradiction to many views of what justice is. Under extremely different circumstances, former Chief Justice of Victoria Marilyn Warren suggests that justice is "the application of the rule of law without fear or favour, affection or ill-will." Note here, one's responsibly is governed by the rule of law in the society they reside within as opposed to one's self outlined in Nietzsche's understanding of freedom. Here, our first key conflict has been raised between the central political ideals of modern democracy, being the balance between free will and legal justice. I will further be arguing that the prioritisation of liberty over social equity by Libertarians suggests that in some cases one must be forcefully prioritised, for example as seen through the Covid-19 pandemic.

Firstly, in cases of legal question, it is not always possible to uphold complete self-will and freedom. The second amendment of the American constitution states that, "The right of people to keep and bear arms shall not be infringed." Under the Australian constitution, guns and other such weapons are restricted to those with permits and licenses. It can be seen that Australia upholds what has been democratically voted as the just decision against arms by compromising the free-will that the American constitution supposedly supports. Here, by banning the common

use of arms, we can see the clear conflict between legally supporting what is just and allowing personal liberty. There are times where a constitution must place significant emphasis on the safety of a society by reducing the freedom of the individual, and while it can be argued that the actions banned are usually unethical, and therefore there is no question that personal liberty should be overruled, this still means personal freedom is being restricted. Contrastingly, it is also possible to argue the opposite; justice is a way to uphold and promote social, religious, and political freedom. This can be justified through the case study of the Nuremberg trials, in which twelve former Nazi members were handed the death sentence for "crimes against humanity," among other charges. The central crime in question was the oppression and murders primarily focused on Jewish people, and therefore by trying these criminals, it can be seen that the rule of law practised in the International Military Tribunal court promoted the freedom of Jewish religion, therefore providing a justified counter argument to the suggestion that justice at times hinders personal freedom. Despite the justification offered for both contentions, I think it is entirely possible to conclude that there will always be cases where the values of justice and freedom are mutually exclusive, therefore providing a key source of tension between the two.

Moreover, it can be seen that further tension arrives through the ideological prioritisation of one ideal over the other. It is widely supported by Libertarians that freedom is the most important value of life and should be treated with utmost safety and respect. Lord Acton states on this that, "Liberty is the highest political end." This raises multiple issues. The very fact that is has been acknowledged that freedom must be prioritised suggests that a balance is not possible, one ideal must reign over the other. In certain cases, freedom lacks emphasis on equity between income and wealth while justice sorts to address this issue. Much like the 'Laissez Faire' style of government, freedom promotes individuality and relies on one to gain, maintain, and control their own wealth. Notice the lack of address to inherent issues such as the poverty cycle. Indian Professor S. Subramanian emphasises this by describing equity as a "principle that must privilege the preference of the more disadvantaged." He then contrasts this with his explanation of liberty, suggesting that the "underlying principle is that liberty requires personal choices to be collectively respected." If, as mentioned previously, liberty is prioritised as the 'highest political end,' does this perhaps suggest that issues of equality may be ignored or undervalued by strongly viewed libertarians or those who prioritise freedom? If freedom is found simply through the societal acceptance of one's views and choices, then it is very possible for people to be entirely free while still seeking legal, ethical, and of course political justice. If so, the prioritisation of freedom over justice instead of the possibility of balance does not appear to be a just premise, outlining a further conflict between the two political ideals.

To summarise, although extremely interconnected and with definitions not vastly far from one other, it is possible to analyse and outline the key tensions between two central political ideals; freedom and justice. Foremost, it has been highlighted that there are many cases in which the law must infringe on one's personal rights to

provide safety to a community or society, which has been explained through the example of Australia's opposition to America's Second Amendment. Despite this, it is also possible to raise the argument that law and justice uphold freedom, which I have addressed through the case study of the Nuremberg trials. Although this argument does not outline any tension, I have included it to show how law does not infringe on personal rights in all cases. I have finally outlined the potential for freedom and justice to become mutually exclusive if one is prioritised over the other. This raises issues of equality which may be ignored if liberty is placed so highly above ethical and political justice. Ultimately, due to the conflicts that have been outlined above, it must be said that it would be almost impossible to create complete and true harmony between these two ideals, and therefore a question must be raised about which is more valuable within society.

Lachlan Croser- A critical appraisal of Karl Marx's general views

Carl Marx was a German philosopher born in 1818 who is famous for his critical views on capitalism and his further solutions. His philosophy's (commonly known as Marxism) have been extremely influential throughout the history of modern society. However, his views are stereotypically frowned upon due to their complete failure when in real world application. Despite this Marxism poses reasonable ideas and solutions to the issues surrounding capitalist society but yet seems unachievable due to several unconsidered factors especially surrounding that of human nature.

Marx strongly believed that our view and relationship with private property was the primary source of social injustice and the creation of a capitalist society. Capitalist society was made up of two distinct classes the bourgeoisie and the proletariat. The bourgeoisie were the business owners while the proletariat where the working class. Marx explained that a capitalist society relied on the constant exploitation of the proletariat. He believed that private property/ possession created self-interest and hence should be distributed equally among citizens depending on individual need, thus creating the basis of communism.
Marx believed that the conveyer belt like systems used within industrialised capitalist society, directly opposes the natural desires of human nature to fully produce products in a creative way fulfilling the communities and one's own satisfaction. Marx once stated, "religion was the opium of the masses", used to suppress the emotions of the exploited working class, overwhelming them with pleasing illusions that benefits the oppressors. Members of a subordinate class also suffer from false consciousness, their perception of the social relations around them becomes systematically obscured and their realities of subordination and exploitation are then naturalised.

Marx's ideas lead to the theories and practice of communism. Communism aims to remove class from society by making all property and wealth community owned. He believed this would heal the division between class and ensure a positive future. Marx hypothesised that as more and more of the proletariats were pushed into poverty they would eventually rise up against the bourgeoisie. He then thought that socialists would convince the workforce that production designed for the human needs was better than simply for profit and further persuade the proletariats to overthrow the system. Marx believed that after this violent revolution there would be a phase called

"dictatorship of the proletariat" which would have a purely working-class government elected to overview the economy. They would create laws making all property communal and ensure the design of manufacturing goods would match the requirements of the people. Marx's collaborator Engels stated that the government would eventually become unnecessary and simply "wither away" and only then would a true communist society be achieved. Marx thought that this transition from capitalism to communism was inevitable because of material conditions which encompassed his scientific theory of historical materialism.

Marx's overall ideas surrounding the distribution of property to heal class injustice are reasonable. This is because as a human's state of mind is reflective of their state of government, so when one lives in a capitalist society their major goals are that of self-concern and thus their ideal motive is obtaining property and power. Marx correctly identified that this is the primary source of friction in contemporary society, as property is a finite entity. Marx's idea of socialism, though admirable in a perfect world, may be unattainable due to the pre inscribed capitalist and egoist mindset of people. This would never let communism succeed. According to Marx's theory of historical materialism, communism must always fall after capitalism (which according to history is wrong). Marx's theory to transfer into a socialist society involves making all private property communally owned. This however would inevitably require the taking away of private property from the wealthier and distributing it among the poor. This means the introduction of communism would only work in favour of the poor and the working-class, implying that the working class would be stealing from the rich. Morally this indicates further injustice as even if it was voted, the majority would always be in favour of the working class, purely due to the relative number difference. The stealing of property would further distance the social gap between the classes as the bourgeoisie would inherently hate the proletariat for taking their power and wealth. Similarly, to this Marx's complete disregard for the irrationality and revenge hungry side of human nature led to the events like the genocide of Cambodia. The cause of this was both their Prime Minister Pol Pots, skewed interpretation of Marxism and Marx's disregard of revenge in human nature. After the civil war Pol Pot and his communist party came to power. Following Marx's ideas, they had overthrown the bourgeoisie and had created a proletariat government to control the economy. However due to Pol Pot's distinct hatred for the upper class because of the oppression they have caused to the proletariat, along with his misguided view of Marxism he decided to kill anyone that resembled bourgeoisie characteristics. Coherently the managing of the economy took to collectivisation of farming products which lead to widespread starvation. Marx and Engels hypotheses that the proletariat government would just "wither away" is completely ignorant of the human's self-egoism. Similar to that of the situation of Stalinist Russia, one with such power will inherently strive to obtain more wealth and private property and thus want to maintain the power creating utilitarian dictatorship. Overall opposing Marx's prediction which relied on an ideal human to give up their power for a common goal. Finally, within a socialist society where everyone would have the same benefit there would be no original motivation for effort. Marx did not account for the fact that one transferring into communism would still have a capitalist and egoist state of mind meaning if there was no profit drive to work, their overall rationality would lead them to do nothing. This would obviously cause tension within society and create an unstable economy. Overall to avoid this a government would have to be put into place to punish those

who did not work . This would re-create the inevitable cycle of capitalism which, was rightly said by Marx to be caused by the selfish desire for private property.

Overall, it can be seen that Marx's view although reasonable, only works in a theoretical context rather than in the application of real life. This is because for Marx's ideals to succeed all of society would have to work together for the common goal of communism. This however can be concluded to be impossible as the inherent self-egoism of human nature inevitably causes the war over private property otherwise known as capitalism. The ignorance of this factor exposes several parts of Marx's plan which rely on his idealistic view of human nature. However due to human's inherent self-concern this mistake brings upon communism's downfall. So overall, Marxism was likely to have appealed to the masses for its simplistic and idealistic solutions to the problems of modern life, rather than it being an in depth or realistic resolution to the issues of capitalism.

TOK Essays from 2021

"We are rarely completely certain, but we are frequently certain enough." Discuss this statement with reference to two areas of knowledge. -Kevin Li

Certainty can be defined as people's belief that knowledge is either true or wrong, even though knowledge is rarely either completely true or false. In practice, when we say we are certain about something, we usually mean that it is "beyond a reasonable doubt", in other words, "we are certain enough". When you know something then what you claim to know must not only be true but you must believe it to be true. While the term 'truth' is an objective requirement for knowledge, belief is a subjective requirement for it. In that case, certainty can be as much a state of mind as an objective measure of knowledge itself. Certainty can be based on how convinced we are of the validity or accuracy of knowledge rather than its actual validity or accuracy, which means we can be very certain but also completely wrong at the same time. In this essay, I will discuss the topic claim with reference to Mathematics and the Natural Sciences.

We are more likely to be certain about Mathematics rather than other areas of knowledge. This is because the main way of knowing in Mathematics is deductive reason which is based on logic rather than personal interpretations or empirical conclusions. For example, when we try to prove why the sum of an even number and an odd number is odd, we assume that the even number is 2a and the odd number is

2a+1 based on the basic axiom for determining the parity of numbers, so the sum of the two numbers is 2a+ (2a+1) according to the definition of addition, which can be written as 4a+1. In this case, 4a can be written as 2×2a which is even according to the definition of even number. Therefore, according to the definition of odd number and following deductive logic, the sum of one odd number and one even number is necessarily odd. However, because of the nature of mathematics, mathematics is absolutely true only to the extent that the axioms allow it to be absolutely true; as the conclusion of a deductive reasoning or logic can be true "only if all the premises set out in the inductive study are true and the conditions are clear." Take the example mentioned above where the sum of an odd number and an even number must be odd, if the fundamental axiom such as the definition of even number and odd number, or the axiom of addition is incorrect, the prove will not be correct. However, we can never know if the axioms themselves are true, because unlike theorems which can be proved using previous theorems or axioms, axioms rest on the validity of human observation or some people may argue that we are just simply unable to proof an axiom as axioms are considered to be self-evidently true, and "all attempts to form the mathematical system must begin with a set of axioms."

Sometimes we make decisions without being completely certain. To further elaborate on that, if everyone at the time believes it to be true, people are more likely to believe what most people believe. Up until the 19th century, geometry rested largely on the ten axioms of Euclid. These axioms were generally assumed to be true, being self-evident to common sense. However, later, the ten axioms of Euclid have been proved to be not sufficient to prove all of the theorems he claimed to prove. This shows the influence of herd mentality on people's decision making. In that case, people's decision making is not only based on their degree of certainty of the knowledge, but also rely on psychological factors.

Science relies on empirical evidence and verifiable explanations. By using multiple sources of evidence from experiments and observations as the basis for conclusions, science seeks to build reliable knowledge and provide scientific explanations that people can use to better understand the world around them and inform their decisions. From a popular perspective,
one of the key reasons why we might think scientific knowledge is certain that uses a methodology for acquiring knowledge in accordance with objective principles. In daily life, we often use "unscientific" or "not objective" as the evaluation criteria for statement without thinking, because we realize that the subjective interpretation of things often distorts the facts and covers up the essence of things. In another words, we trust in science because we have faith in the way of examining scientific results as it's a collective and cumulative process of assessing evidence that leads to increasingly accurate and trustworthy information. For example, Newton's universal law of gravity is a scientific theory considered as reliable, which has been tested thousands of times by different people. Hence, people's confidence in science is partly based on psychological factors and partly based on the actual reliability of the knowledge. However, no scientist can claim one hundred percent certainty about their theories regardless of the quantity or quality of their supporting evidence because of the limitation of inductive reasoning. In Hume's words: "instances of

which we have had no experience resemble those of which we have had experience". To further elaborate on that, we can never know if there will be new evidence being found which might challenge the existing knowledge. Although we are never certain about a theory, we are certain enough as long as we know how uncertain the results are by factoring in things like margins of error, tolerances of the results and so on to define the extent of any uncertainty. When I wrote my IB physics IA, I was not completely certain about my results of the effectiveness of drag force on a moving object, partially because of the flaws in my own designed research method (I was the person who shot the light ball, there is still a human factor in the experiment), partially because lack of experimental sample data reduced my confidence in terms of the accuracy of my concluded result. However, I am certain enough about this result as my error analysis suggest that even my result is unlikely to be completely correct, it is within a reasonable range of errors. In that case, I am not completely certain but certain enough about my result.

Also, I think science is not about proving that it is "true", it is about proving that it "still applies" to the real-life situation. We can only be certain enough about theory which has its own practical meaning. Einstein's theory of relativity showed Newton's law of gravity to be limited, but it was more abstract and of less practical significance than Newton's law. So, like Newton's universal law of gravity, although we are not certain about the theory, the degree of certainty between two theories is different. Therefore, if considering the degree of certainty, we are never certain but certain enough as it is a state of mind based on its real-life application rather than the truth. Additionally, in that case we do not need to be completely certain about the knowledge to make decisions as long as our understanding of the knowledge still apply the real-life situation. In fact, Newton's universal law of gravity has been proved limited (It had several problems that proved to be incomplete, such as the prediction based on Newton's universal law of gravity is only half as much deflection of light under gravity as observed. This may suggest certain errors exist in the law),so we are actually not completely certain about the actual correctness of the theory, but the law of gravity still applies to a lot in terms of space science and that is the reason why countries are able to send manned rockets to the moon. We are more likely to be certain enough about the knowledge that has well-functioning real-life applications.

Therefore, it seems that the statement that we are unlikely to be completely certain about knowledge, but frequently be certain enough is mostly true. In mathematics, we are certain about the knowledge based on deductive logic. However, we are less likely to be certain about the actual correctness of the axioms and hence we can only be certain enough but less likely to be completely certain. For science, we are unlikely to be completely certain but more likely to be certain enough due to the calculation of uncertainty. Besides from all of that, in some cases we do not need to be certain to make decisions, hence our actions are not really determined by the degree of certainty.

To produce knowledge just observe and then write down what you observe. Discuss the effectiveness of this strategy in two areas of knowledge.- George Atmadja-Sharp

In the modern world and in historic times, knowledge has often been gained and assimilated through observing events and recording what is seen. However, the effectiveness of this strategy as a way to produce knowledge can vary quite significantly, and it can be seen as both discerning and limited in its ability to create knowledge. Science and art are areas of knowledge (AOKs) that produce knowledge in largely different ways. By investigating an AOK that deals with the natural world and subjective facts, or an AOK that deals with interpretation and human emotion, we can examine the effectiveness of recording observations as a way to produce knowledge.

Before an exploration into the effectiveness of observation as a way to produce knowledge, we must first establish what an "effective strategy" is. An effective strategy varies depending on the AOK and the type of knowledge that is produced will also differ. In the AOK of science, effective strategies produce knowledge that are able to develop further understanding of a certain concept. This is usually done through extensive testing and experimentation, with observation often playing a large role in helping scientists confirm their ideas. The scientific method demonstrates this, as it relies on experimentation and then an observation of results, with scientists analysing those results to draw different conclusions. A famous example of this is Rutherford's gold foil experiment, through which he was able to figure out the structure of an atom. Through a structured testing process and an observation of results, Rutherford was able to make a significant discovery for modern science. The credibility of scientific research is often based on how experiments are carried out and how coherent the testing and observation is, thus dictating the effectiveness of the strategy. On the other hand, art as an AOK would largely, in comparison to science, have vastly different strategies that would be deemed "effective" in order to produce knowledge. Often art is analysed thoroughly in an effort to produce knowledge, as it cannot be subjected to experimentation like scientific concepts can be. Art is generally seen to be a much more subjective area of knowledge, as often conclusions made from it are personal to individual people. An example of this can be seen in the analysis of *The Arnolfini Portrait* (1434). An analysis of the painting can be seen to give an understanding as to its creation and the techniques used in its making, yet the meaning behind the painting remains controversial and heavily debated about. This aptly demonstrates the subjective nature of art as an AOK and how observation of events can mean different types of knowledge being produced. Therefore, it can be seen that the effectiveness of observation as a strategy for producing knowledge in science and art must be taken separately, as their inherent nature differs too much to be compared to each other.

However, to investigate the effectiveness of observation as a strategy to produce knowledge, we must try to understand how deep of an understanding an observation of events is able to give to a person. An observation of events can give varying levels of understanding, depending on what is being observed and what is trying to be understood. Again, it can be seen that different AOKs have different standards and varying requirements for observation to be an effective strategy for producing knowledge. In science, often it is not enough for an event to be simply observed in

order to gain a deep understanding of what is happening. For example, doing an acid-base titration will initiate a stark colour change in the solution that is being examined, which indicates that the acid and base have neutralised each other. Whilst the colour change shows the scientist that the neutralisation has taken place, it does not explain why the colour change happens, nor how neutralisation works. The mere observation of the change in colour is not enough to provide the scientist with a deep understanding of the science and concepts at play within the titration, meaning that further testing and experimentation is needed in order to develop and produce knowledge. Contrastingly, art often only requires observation in order for the artist to be able to draw conclusions from the work of art. An example of this can be seen in the painting *The Lovers* by René Magritte. By just observing the painting, artists are able to analyse it and draw different meaning out of it. However, it must be noted that art is regularly an inherently subjective AOK, meaning that what knowledge people gain out of it is often not shared knowledge. In a wider context, this means that the production of knowledge within art cannot always be seen as being similar to the production of knowledge in science, which is repeatedly put towards an ever-expanding bank of shared knowledge. The knowledge seen in art is often subject to a person's individual interpretation of the work, meaning that observing a piece of art can be enough to be an effective enough strategy to give a deep understanding of what they have observed.

Despite knowledge being able to be produced upon solely observing an event, it is usually the case that people rely upon already existing shared knowledge in order to be able to draw new conclusions when observing events. Shared knowledge here acts as a way for people to be able to approach new knowledge and aids them in coming to new conclusions. Although the nuances in each AOK still exist, the role of shared knowledge is much more similar in each AOK when compared to the differences discussed before. In science, experimentation and observation is usually done with a goal or an idea of what should happen. Experiments are often used to confirm the predictions of scientists and to be able to verify the concept at play. An example of this can be seen in burning copper sulfate to produce green fire. The explanation regarding this phenomenon contains several concepts working together to produce the green fire, such as excited electrons and the absorption spectrum. Whilst scientists have created this idea themselves, it is the testing and observation of it happening that allows them to confirm their theory. The role of shared knowledge can be seen again in the development of a COVID-19 vaccine. Shared knowledge regarding vaccines and drug development, as well as information surrounding the COVID-19 virus and its characteristics all contribute towards the development of a successful vaccine. Whilst the success and effects of it take longer to observe, it demonstrates the prominent use of shared knowledge when observing the effects of new research and concepts. Art can also be seen as having existing shared knowledge play a prominent role in producing knowledge by observing events. The concept of Western music theory is the most commonly used vehicle to analyse pieces of music. Experienced musicians can often make conclusions about things such as chord changes, pitch intervals, dynamics, etc. purely by listening and observing the music. Although most people can describe what they are listening to in a rudimentary and basic way, the concept of Western music theory allows these descriptions to be put into more concrete terms that any person with that knowledge can use and learn from. Although not all music is based off of Western music theory, the concept of it allows music that does conform to its standards to be analysed in a meaningful way based off of

observation, meaning that new conclusions can be drawn as a result. However, the use of existing shared knowledge is not as inherently necessary to be able to connect and learn from music and is not as important as it is in science.

Observation as a way to produce knowledge has varying degrees of effectiveness, particularly in different AOKs. Art is often able to be analysed to a deep level using only observation, with conclusions being able to be drawn. However, the inherently personal and interpretive nature of art means that shared knowledge plays much less of a role in being able to observe and understand art. Science, on the other hand, uses observation more so as a method of verification and confirmation of ideas. Existing shared knowledge is often heavily relied upon to be able to draw conclusions, with observation usually being an effective method of producing knowledge on the basis that a concept is being tested or confirmed. Observation as a way of producing knowledge has its strengths and limitations, which are often dependent on what events are being analysed and the nature of the knowledge concerned.

"Areas of knowledge always rely on a systematic process of trial and error to aid the production of knowledge." Discuss this claim with reference to two areas of knowledge. – Hyun Kang

Systematic trial and error is a commonly applied method of approaching investigations that are not readily answerable by established knowledge claims. As such, it may aid in the production of knowledge in various areas of knowledge (AOKs). For the purposes of examining this essay question, what qualifies 'systematic' will be defined as an application that is exhaustive of certain possibilities or independent variables in a manner seemingly appropriate to produce knowledge. This would mean that 'systematic' variables would have some inter-relevance or correspondence in the AOK. To explore whether or not such systematic trial error always holds utility in the production of knowledge, I will examine two significant AOKs: the natural sciences then mathematics.

Firstly, there is the question of whether or not it is possible to make categorical claims about AOK's use of systematic trial and error in knowledge production, which could lead to arriving at conclusions about whether or not systematic trial and error is always involved. To determine this, the natural sciences as an AOK can be examined. It seems a reasonable assumption that the natural sciences rely heavily on trial and error. This is inherent in the nature of scientific knowledge, which seems to be constantly shifting onto new ideas and theories. This seems largely a consequence of the method of hypothesis and experimentation, as this method means that science lends itself to constant reevaluation and revelations. Hypotheses, which are the assertion of likely ideas, are formulated by methods of induction, and hence incorporates a dimension of trial and error. While it seems logically sound that the process of arriving at hypotheses does not necessarily extend to being systematic, the process by which knowledge is created from these hypotheses arguably is systematic. This is because if an experiment complements a hypothesis, then the experiment is systematically repeated by titrating the quantity of independent variables to a satisfactory extent in order to develop generalised knowledge claims about the hypothesis. This is evident in scientific knowledge development in many real-life scenarios. For example, such hypothesis-experimentation method aligns with research within the development of the COVID-19 vaccine. This involved implementation of established vaccination techniques, including attenuated vaccines and alternate pathogens (Department of Health, 2021). This

made the process both systematically exhaustive as well as trial and error, as there was no consolidative proof that their methods would work for the coronavirus specifically. Overall, it seems that AOKs involving testing methods of hypothesising and experimenting, which could extend beyond the natural sciences to the human sciences, tend to have a reliance on systematic trial and error.

However, there can be cases where such repetitive exhaustion of the independent variable cannot be done. This is because not all knowledge makes claims about things that are readily testable. An example of this within the natural sciences is Robert Mulliken's claim about atomic energy levels having electron orbitals, which are defined as areas of electron density (UCI, 2020). This is despite not being able to micrograph such orbitals, or having any indisputable evidence for their physical existence. Rather, by observing the behavioral tendencies of atoms and electrons, Mulliken propsed a theory to explain such electron behaviour. Arguably, his development of the current model of orbitals employed dimensions of trial and error, as there wasn't apparent scientific foreground to develop his theory. This suggests the development of the claim partly relied on aspects of intuition as ways of knowing, which is characteristic of trial and error. However, he failed to employ any systematic exhaustion to arrive at a knowledge claim, as there was no exhaustive trialling possible for the independent variable. This is because there is no variability in the behaviour of specific orbitals, nor are they directly accessible.

Moreover, it can be questioned whether or not trial and error plays a role in the knowledge production in other domains of science, such as observational science. An example of an observational science is ecology. By nature of it being observational, knowledge in ecology is oftentimes not characterised by cause and effect facilitated by a controllable independent variable.

Hence, it may not be suitable for trial and error, as the implementation of variability is taken away. For instance, Darwin's discovery of the Galapagos Finches led to the knowledge claim about natural selection and evolution. While it could be argued that there is a dimension of systematic exhaustion in the sheer variety of finch species presented to Darwin, these were purely observed, and was not an application of systematic error by Darwin. Consequently, the knowledge claim came about as a result of observation only. Overall, it could be said that some AOKs are less implicated by the tendency to rely on systematic trial and error due to the inflexibility or inaccessibility of the objects of investigation. In the context of the sciences, such objects would be experimental independent variables. Notably, another AOK that is susceptible to such inflexibilities or inaccessibility is history, where primary sources to produce historical knowledge are often unattainable.

For a more comprehensive evaluation of the essay question, the examination will be extended to AOKs that derive information by means beyond empirical modes of inquiry. For example, mathematics could be assumed to be largely reliant on logical proof rather than on empirical evidence. This can be attributed to the fact that mathematics operates on a foundation of axioms. Mathematical knowledge cannot defy these axioms, as they are guiding principles for proving and producing mathematical knowledge. Thus, it seems to follow that for the most part, the production of mathematical knowledge is independent of forms of trial and error, given that its progression is often self-evident, and predominantly lends itself to logic and reasoning as ways of knowing. This statement could be even further consolidated when regarding pure mathematics, which disregards any implications from external factors that may involve dimensions of trial and error. For example, in my Year 11 mathematics trial exam, the solution process of a particular question involved the need to

multiply three, four and two. I did not need to trial any other variables to deduce the answer of twenty-four as there is no dimension of trial and error due to its logical self-evidence, let alone any necessity for systematic proof that extends beyond multiplication. Thus, the fact that mathematics is founded on axioms that have mostly linear progressions seems to a large extent negate the need for systematic trial and error. This can be generalised by saying AOKs that rely on reasoned coherence, perhaps via independent or abstract foundational knowledge systems, tend not to rely as heavily on systematic trial and error.

Naturally, there are exceptions to this, even within pure mathematics. Much like the natural sciences, there are examples in pure mathematics using the method of induction to arrive at knowledge claims. A profound case of this is Euclid's proof by induction for infinite primes. Arguably, the dimension of trial and error within this is given in the supposition at the beginning of any mathematical induction (Alfeld, 1996). In this case, this is in Euclid's request for the supposition "that there are an infinite number of primes". This is much like a mathematical equivalent for a scientific hypothesis. Then, Euclid applies a general formula for primes and non-prime numbers, and by generating a formula for the sum of all primes and non-primes, which is inherently exhaustive and hence systematic, he arrives at the conclusion that there are infinite primes.

Moreover, it is worth contrasting applied mathematics to pure mathematics. By nature of applied maths involving external applications, it undermines the tendency of pure maths to be self-evident. This is due to external factors that may call upon empirical modes of inquiry, which, as mentioned previously, may require exhaustive trial and error if there are readily controllable variables. This became clear to me during my EE process, where I found that the mathematical model I used to imitate stock trajectories was not very applicable, as the parameters in the equation failed to reflect real-world stock dynamism. Consequently, model was constantly refined, until finally I was forced to develop a new equation by trialling a series of relevant parameters, hence having used systematic trial and error. Therefore, AOKs using belief systems that predominantly calls upon logic as a way of knowing, such as mathematics, can evidently still incorporate systematic trial and error. This is typically when directly employing a method similar to the scientific hypothesis-experiment such as induction, or when involving an external application, typically one involving empirical inquiry, which could necessitate the variability of independent variables.

Overall, the usefulness of trial and error is apparent in many AOKs. This was primarily evident within AOKs including empirical modes of inquiry, such as experimental natural sciences and applied maths. However, AOKs relying on reasoned coherence, such as pure maths, still employed systematic trial and error sometimes to produce knowledge. A common trait amongst these disciplines of AOKs appears to be the ability to manipulate the subjects of the knowledge claim, such as independent variables or a defined number set. Contrastingly, investigations that defied systematic trial and error had rather inaccessible and uncontrollable subjects of inquiry, which often relegated the ways of knowing to simple observation and perception, which largely denied possibility for trial and error. While it is clear that AOKs do not always rely on systematic trial and error to aid production of knowledge, the potential application in AOKs such as pure maths has implications for mathematicians and investigators alike to call upon such trial and error in their methods of research.

To produce knowledge just observe and then write down what you observe. Discuss the effectiveness of this strategy in two areas of knowledge. – Dylan Holland

The development of knowledge is of course the aim of all the Areas of Knowledge. A key part of the production of knowledge is undoubtedly the observation of the natural world that surrounds us. The method of merely observing the happenings of the world around us is appealing in its simplicity. Merely, write down what happens and knowledge is produced. However, two key areas of knowledge, Mathematics and Natural Sciences provide compelling counterexamples to this claim and suggest the many issues with such an observational method. Firstly, intuitive knowledge can be questionable in its veracity and certainty. Secondly, observational knowledge can be wrong especially in the judgement of mathematical patterns in the real world. Thirdly, there is a tendency to ignore the limitations of the inductive method when using such a method and to assume that the knowledge produced is certain. Finally, some knowledge is impossible to develop through merely observational methods.

The argument around merely observing the world and deducing facts and knowledge from these observations is highly steeped in intuitive knowledge. There are some results in mathematics which would seem to be obvious and intuitive merely from observing the world which surrounds us and writing down observations thereof. These are mainly basic facts about arithmetic like, 2+2=4, observable from merely adding sticks together then counting the sum of the sticks afterwards. However, even this seeming intuition about mathematics relies on a conceptual understanding of the basic enumerative qualities of our system. Regardless, most people would not claim that knowledge about mathematics can be derived merely from observations as that would be absurd. How is one to deduce merely by watching nature, that the derivative of x^2 is $2x$. However, there are some facts, derived from mathematics about the natural world which are counterintuitive. An example of this came in the field of probability in the form of the famous Monty Hall problem. Originally posed as a game show question, the problem is seemingly opposite to common sense as dozens of readers wrote in to say when it was posed in the “Ask Marilyn” column in Parade magazine in 1990 (Vos Savant, 1990). The Monty Hall problem goes thus; you are in a game show and the host offers you three doors to choose from. Behind one of the doors is a car and behind the other two are goats. You pick a door and then, from the other two doors, the host opens one to reveal a goat. You are then offered the chance to pick a door again from the two remaining doors. Do you change your pick? The intuitive answer is that it doesn’t matter but surprisingly, changing your pick improves the odds of getting the car. The reason is that the first pick has odds of 1 in 3 whereas the second pick, after a door is removed has odds of only 1 in 2. In fact, in numerical simulations, the probability was found to correlate closely to the predicted probability and rigorous mathematical proof proves that you should change your pick. Thus, the intuitive, and hence observationally based view is wrong. A more direct example of where observation can be proven wrong is the Parthenon (Figure 1). To the untrained eye, the columns of the Parthenon are perfectly square and parallel with right angles and rectangle throughout the temple. However, there are almost no right angles or parallel lines in the temple for a simple reason; parallel and perpendicular lines don’t look parallel and perpendicular. Even the seemingly horizontal base is not in fact horizontal, or even straight. The base is a curve with the centre higher than the outermost points (Leonard, 2018). In fact, even after writing an architecture assignment on the Parthenon, I did not realise that it was not just a triumph of ancient engineering but also a huge optical illusion. That, even

upon prolonged examination of the structure and its architecture, I was not able to perceive the non-rectilinear shape of the building suggests the fallibility not only of my senses but in a broader sense, an error with the assumption the knowledge can be accumulated merely observing the world. From a geometric perspective however, precise measurements show the deviation from a rectilinear shape and from how it is perceived by millions of people each year. Ultimately then, there is an issue both with a general stance which gives a disproportionate value to intuitive knowledge about the world as well as one which places undue value upon the senses, both topics which suggest the impracticality and the insufficiency of such an observationally based method of acquiring knowledge.

The natural sciences would seem a more natural fit for an observationally based method of knowledge acquisition and indeed, a cursory viewing provides such likely apocryphal imagery as Newton relaxing under a tree whilst an apple falls upon his head leading to a kind of epiphany about the nature of gravity. Even if such empirical evidence is often a key part of science, science takes great pains to distinguish itself from such idle observation. Almost all key scientific findings must be backed up by repeatable and statistically significant data from experiments and measurements. Science also strives to make qualified claims which are supportable by evidence. Newton, before publishing his magnum opus, worked for at least ten years on the issues of mechanics and gravitation, with both empirical and mathematical development of his initial idea (almost certainly developed without any fruits, apples or otherwise, involved). The natural sciences rely on inductive logic; the logic that generalities can be determined from specifics caused by the generality. The issue with inductive logic is that, since only a finite number of cases can be studied, the veracity of an idea can only be strongly supported, never proven or show to always be true. An example of this is my journey to school. Each morning, we drive the same route to school and, since we live in the Adelaide hills and hence leave early to arrive on time, there are always very few cars on the roads. On one of the junctions of our route in the hills, we make a turn and there had never been anyone else there in the two or three years I can remember. Last week however, I was driving and, as I check left before turning right, I saw to my amazement another car. I of course stopped but this illustrates the issues with an inductive method of knowledge acquisition. I had ‘tested’ the system many hundreds of times with the same result but last week there was a different result. Had I decided that the hundreds of observations of the behaviour had constituted a proof that no one ever had or ever would drive there at that time, I would probably have pulled directly into another car. These issues with the inductive method are carefully restricted in their influence through qualified statements and uncertainty testing amongst other methods by the natural sciences, something which is impossible to do merely by observing and writing down what I have observed. In fact, many other scientific achievements would be actually impossible to discover by merely observing the world. For example, the generalities and abstraction made by physics in order to have applicable theories which govern the modern world and modern technology need a more complex understanding of causality and significance than could be gained by merely observing events occurring and writing your observations down. such an example comes with the behaviour of light when passed through two adjacent apertures, the double slit experiment. Usually this experiment is given as evidence of the wavelike behaviour of light since there are characteristic diffraction patterns of constructive and destructive interference, behaviour only exhibited by waves, but, when the light passing through the apertures is observed to be behaving as a particle, the diffraction patterns are not observed. This behaviour is literally impossible to observe in ones day to day life or indeed to ‘see’ in the traditional sense. However, as well as being an extraordinary result, it also provides evidence for the theory of wave particle duality which is vital for our current understanding of the universe. Ultimately then, whilst it may seem that

the natural sciences may be conducive to the approach of writing down what you see in your life, the knowledge produced using the natural sciences is very different from that kind of knowledge and cannot be readily or at all reproduced using such a technique for knowledge acquisition. Further, reliance upon such a method can produce uncertain knowledge without the knowledge about the uncertainty of the produced knowledge and hence without any understanding of the importance and the role of the produced knowledge.

The method of merely writing down what we see may appeal due to its simplicity and the idea that anyone can do it, but it has several key limitations. In the field of mathematics, such an approach can produce intuitive results which seem true but which can be shown to be the opposite and an overreliance upon such an observationally based method of knowledge development can result in insufficient and incorrect knowledge acquisition. The natural sciences, whilst more closely resembling the observational method described previously differ significantly from this method and the usage of merely such an observationally based method without appropriate analysis of the qualified claims made by such a method can result in uncertain knowledge, without the knowledge about that uncertainty, as well as incorrect claims. Further, some knowledge is impossible to acquire with such a method and must be found with more precise and accurate apparatus than merely observation permits. Ultimately then, such an idea is dangerous because it promotes the idea that knowledge need not be qualified and can be developed by anyone. In our current age, such unqualified claims need to be viewed with great suspicion, due to their suspect certainty, veracity, and applicability.

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