

Memetics and its Use as a Modern Scientific Tool

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Conjure, for only a moment, the following mental image: a white cat, with a relatively compressed face, points its head to the sky and screams at the top of its lungs. The entire image has had the saturation dialed up to oblivion, and the top and bottom each have their own relevant caption in impact font. This is a meme, and using memetics, the image's path throughout time can be traced back to the infinite past and forward to the infinite future. Memetics, or the study of memes, can be used by society to explain and build models to predict the profusion of extremely prevalent cultural phenomena which occur in the world. Memetics is a real field of study which is reinforced by the fundamentals of natural selection. The spread of memes has influenced the world in countless prominent ways, and many pieces of meme theory work in a similar way to many other sciences which are used to explain and predict the world. Humanity can even leverage memetics to build prediction models for what human culture and civilization will look like in the future, creating a new tool to help progress society as a whole.

Memetics is built around memes. As described, a meme can simply mean a funny image spread around on the internet, although the term is much more broad. Memes are fundamental units whose existence is backed by pure logic. It is a mystery how the term “meme” was converted to the modern understanding of a funny internet image (Schafer and Pailler 62). A meme is, at its core, a unit of cultural function which can spread in a similar fashion to a gene—these units range from subconscious motions to ways of speech (Schafer and Pailler 3). While the humorous internet images which are considered memes are indeed memes, memes do

not necessarily all take their form—they do not need to be humorous either. Memes are, in the simplest terms, ideas.

A meme itself is a special object called a replicator, which adapts to its environment via natural selection, although defining replicators themselves depends on answering the seemingly obvious question: what is a thing? Put simply, a thing is a swath of matter or energy which has amassed sufficient significance throughout time to be given a unique name for identification (Dawkins, “Selfish Gene” 12). At one arbitrary moment in time, one thing arose called a replicator; though on its own it was not very different or impressive when compared to some other things, it possessed the incredibly unique ability of self-replication (Dawkins, “Selfish Gene” 15). A replicator can be defined as one self-replicating string of information which generally produces identical offspring with occasional variation (Dawkins, “God Delusion” 191). The imperfect self-replicating process results in the replicator diverging into several types of other replicators (Dawkins, “Selfish Gene” 17).

Replicators demonstrate behavior where those which are more successful appear in greater numbers; while it may seem unique at first, it is actually already well known by a different name. Any trait which is present in an individual due to variation and also happens to be beneficial to its livelihood will continue to exist, as the trait should help it in producing children which should inherit said trait (Darwin and Comfort 145). In replicators, one such trait could be the speed at which a replicator replicates—if replicator type *A* replicates itself more often than replicator type *B*, *A* will eventually eclipse *B* in population (Dawkins, “Selfish Gene” 17). The idea of replicators can then be applied to organisms to demonstrate their existence—this is the phenomenon famously known as natural selection. Natural selection preserves, from the random selection of traits which appear in organisms, the traits which best support and benefit the creature which they are a part of (Darwin and Comfort 165). Genes are considered successful when their effects have greater benefits than they do drawbacks on the success of an individual organism (Dawkins, “Selfish Gene” 235). If one individual passes a new successful trait to its children, its children will then also go forth and reproduce more, as their extra fitness inherited from their parents will mean that they will be more likely to be the ones selected to survive and reproduce of the few individuals that will be able to survive in their generation (Darwin and Comfort 145).

Contrary to popular belief, natural selection is not necessarily a biological concept, and by extension, neither is the idea of replicators. Natural selection is an incredibly simple concept backed by such fundamental logic of existence that nearly anyone could come to accordance with the theory (Fitch 38)—it is a logical structure, not a biological phenomenon. In fact, evolution's connection to natural selection is highly misunderstood. Many people doubt evolution, although natural selection on its own is completely undisputed (Fitch 29). Darwin's personal insights only helped prove the already standing but argued theory of evolution using the generally accepted theory of natural selection (Fitch 39)—there is no reason replicators must be 'Alive' (Dawkins, “Selfish Gene” 18).

DNA *is* an example of a biological replicator. It has been quite successful over time and managed to take a remarkable and unique path in order to survive. Early on, during the proterozoic eon, most life forms were simple single celled organisms, with a few basic multicellular organisms emerging (Lee graphic 32). Later on came the Cambrian Explosion, a rapid diversification in prehistoric life (Lee graphic 65). Another event saw the emergence of brand new types of creatures, land dwellers of all types, from new forms of sessile life—like plants—to the first tetrapods—mostly amphibians, arthropods, and a few reptiles (Lee graphic 91).

Memes serve as replicators as well, sharing several similarities with DNA. Internet memes in particular have also had an astounding progression over time. One clear early period in the internet saw very little complex content, with mostly simple text memes and precious few detailed visual memes (Schafer and Pailler 10). This period functioned as a digital proterozoic period, whilst a later period on the internet during which memes began to rapidly branch out into many advanced forms at once (Schafer and Pailler 10) closely mimicked the Cambrian Explosion on Earth. In one more major event, never before seen forms of online media arose and spread across all-new platforms such as YouTube: audio and video (Schafer and Pailler 10). This event is quite a close parallel to the development of land-dwelling organisms.

Today, memes are ubiquitous, and they are spread like wildfire through the dense and intricate webs of human culture. Mobile phones' ease of use for humans led millions of pieces of information to be born every second and move at the speed of the electron (Schafer and Pailler 10). This scale and complexity is not all too different from genes' environments, either: With one biological example, when one small change is made to an environment, a cascade of other effects

ensue. Say a population of birds is reduced: the birds stop eating the flies, the fly population would grow, the cattle would act up due to irritation, the vegetation would be stampeded, the grasshoppers would die off, as would dragonflies, the flies would multiply, and the bird population would increase to normal again (Darwin and Comfort 155-156). Such is the complex nature of natural webs of all kinds, both biological and memetic.

The idea that there is in fact a parallel between memes and DNA is not a completely unique and revolutionary one. In an email interview, software engineer and storyteller Jonas Tyroller stated that he believes that having the ability to evolve is a beneficial trait, which replicators such as DNA have leveraged to outcompete many other systems. He calls this phenomena meta-evolution (Tyroller, Email Interview email 2, para. 3). Tyroller pointed out that due to meta-evolution, things which have developed evolution should logically dominate other things in terms of numbers, meaning most things humans see should in theory be one of many (Tyroller, Email Interview email 2, para. 3). He extends this idea could be extended all the way to the universe itself (Tyroller, Email Interview email 2, para. 3), although this hypothesis could be put on hold as, to human knowledge, there is only one universe, which would track with the idea that things which do not evolve do not have very high population. Even though Jonas is not a formal scientific researcher, let alone an evolutionary biologist, he still managed to use basic logic to come to the same conclusion that natural selection is simply present in DNA, not exclusive to DNA. In other words, while it is true that genes are the most well known and ubiquitous replicators, there are many other examples (Dawkins, “God Delusion” 191).

This information helps to clarify details about memetics, namely the mechanism how memes replicate. Memes spread through imitation: they move through a network of human brains in a similar fashion to how genes move through a sexually active population (Dawkins, “Selfish Gene” 192). They are a new type of replicator which is, although young, growing at an astonishing rate by using human culture as a medium for transmission (Dawkins, “Selfish Gene” 192). While visual memes are already known to spread wildly, many memes such as maxims and slogans are able to quickly spread virally as well (Schafer and Pailler 4). The first brains were able to function as the primordial soup or medium of life for the first memes (Dawkins, “Selfish Gene” 194), such that memes are to cultures as genes are to populations (Porter 7). Indoctrinating someone with a healthy meme will convert their mind into a vector for the meme, acting as a literal host in a symbiotic relationship—whether mutualistic, commensalistic, or

parasitic—in favor of the meme's reproduction (Dawkins, “Selfish Gene” 192). A meme is able to spread even better should it be tweaked by someone to become even more catchy (Dawkins, “Selfish Gene” 192).

While this theory is mostly sound, it is not without its dissenters—several people have claimed that memes are too fluid and lack concreteness. Most opposition to meme theory is built upon the idea that memes do not have a defined physical form, unlike genes (Dawkins, “God Delusion” 192), but ideas *are* held in media such as brains or physical display space, which serve as their physical representation (Smith and Hemsley 4). Another paramount objection to memetics is that memes mutate too much, to a degree that they will cease to be themselves before natural selection can occur (Dawkins, “God Delusion” 192); however, this has not been seen to occur in real life. Regardless of their mutation rate, memes *have* been seen to undergo natural selection numerous times. Nearly every aspect of human culture—from what people eat to how technology is constructed—has been seen to evolve in a shockingly similar manner to genetic evolution (Dawkins, “Selfish Gene” 190); as such, memes are everything from melodies to architectural techniques (Dawkins, “Selfish Gene” 192). They appear concretely in all shapes and forms, and they are ubiquitous in the real world.

There is a multitude of specific examples where memetics may be applied. First, however, some foundational pieces of information must be stated to define some patterns and measurements which can be used to analyze, define, and categorize specific memes. If two memes share a mutually inclusive belief, then it is fair to refer to them as one larger meme. If one meme has two components whose beliefs are not mutually inclusive, those two components can be separated and thought of as individual memes (Dawkins, “Selfish Gene” 196); however, the two memes can still be thought of as a memplex, or a group of memes which support and reinforce each other in a sort of mutualistic relationship (Dawkins, “God Delusion” 196).

A definitive metric can be defined analyzing a meme's success. As earlier noted, the speed at which a replicator reproduces plays an important role in its spread, and this speed can be measured for each type of meme as the average amount of time it takes for a single instance of that meme to produce two copies of itself (which would signify population growth rather than a stagnant population which one copy would indicate). This can arbitrarily be measured in hours and denoted as $M(m, i)$, returning a number of hours M as a function of the meme in question m and the type of instance i . A type of instance could be digital posts on a social media platform,

meaning the single instances measured would be individual posts on the platform which embody the meme. A lower M value would signify a higher fecundity and vice versa.

Competition in biology is also a useful reference for ways memes may compete. Just as the amount of available food is usually directly correlated to the population within a species (Darwin and Comfort 151), memes also are correlated with their own precious resource. Human brains have a finite amount of storage (Dawkins, “Selfish Gene” 197) in which a meme can reside. A meme's success in one mind, measured by how much human attention bandwidth it takes up, can only be increased by decreasing the relevance of another meme (Dawkins, “Selfish Gene” 197); however, memes can be stored outside within human minds. (Smith and Hemsley 4). The physical amount of time which a piece of media takes up on a broadcast would be considered a resource which memes compete for (Dawkins, “Selfish Gene” 197), as would be physical representation space: area on billboards, magazines, and library shelves. (Dawkins, “Selfish Gene” 197).

An initial case study can begin to showcase the real world application of memetics; the Harlem shake, a successful internet meme, displayed its fecundity several times before going viral. The internet meme emerged in 2013 (Schafer and Pailler 48), and as of 2025, just one instance has amassed more than 69,000,000 views (DizastaMusic 00:00). How did this meme replicate so successfully? On 2 February 2012, An electronic music artist released a song titled "Harlem Shake" online (Schafer and Pailler 48). Within two months of its initial release, “Harlem Shake” spread from producers to radio stations until it ultimately reached its destination on the homepage of the major music producer Diplo (Schafer and Pailler 48). The Harlem Shake was later uploaded to YouTube only four months after it was released to public view (Schafer and Pailler 49).

When observed as a whole, all of the information reveals that the Harlem Shake was by no means a fluke; it had clear indications that it would go on to become viral. When setting i to the meme's types of media, such as a file online or radio presence, the meme (m) spread at a rate of M (“*Harlem Shake*”, *Types of media*). Since it took the meme four months to spread to two new types of media (from online song to radio song and youtube video), the function would evaluate to four months or 2,920 hours, giving a value of $2,920M$. If it is assumed that the majority of memes do not go viral, then it is fair to assume that the majority of memes' instances for the same i would never even replicate twice to begin with, since a non-viral meme likely

would not change media form many times, if at all. This would mean that for the same i , the majority of memes would have an M value of infinity. Considering that the Harlem Shake's M value of 2,920 in its infancy is significantly lower than the majority of memes' infinity, it was clearly distinguished from the leagues of other memes which would have been floating around.

The Harlem Shake is not the only viral meme: many ideas have gone viral, and their analyses can be approached with the same mindset. One clear sign of virality would be if seemingly completely separate ideas share uncanny similarities, indicating there may have been a distant yet present influence from an extremely strong meme or memplex. Take for example ancient Chinese Confucianism and 1930s American ideals. Hierarchy, or the idea that some people are more important than others, was a fundamental aspect of Confucianism (Tan 8), and the American culture of the 1930s followed by hierarchy as well; It was vital for an individual to remember their place in the hierarchy below their parents (McLean 14). Confucianism also posits that people should not be specialized professionals, but rather as all-around valuable generalists (Tan 5), and similarly, many books from the 1930s speak on the importance of being prepared for a number of situations in hopes of being more well-rounded (McLean 7). In addition, Confucianism's constituent principles are not seen as stone-set strict regulations but rather fluid guidelines (Tan 7). In the 1930s, people also believed that there was no single rulebook to etiquette (McLean 7). A final example in Confucianism is that women were expected to not leave their indoor chambers (Tan 7). Comparably in the 1930s, even young school-aged girls were assigned to stay and tend to the home (McLean 14). Whether or not it stemmed from direct influence or some common ancestor, the successful memplex which was Confucianism is at the very least in part related to the memes which made up societal expectations in America's 1930s.

The spread of speech and language can also be explained using memetics. Although each human has the ability to learn to speak, the journey to actually do so is difficult, with success contingent on an abundance of external input (Fitch 74). Despite the difficulty, however, language continues to be an extremely common practice, demonstrating its strength as a meme. Formal language likely originated somewhere in the realm of Greek, Latin, or Sanskrit (Fitch 78) and over time became what it is today. There are several theories that languages go through intermediate pre-language phases (Fitch 400), which leads to the deduction that language has indeed evolved over time. It is a grand and complex memplex which has, through constant and

slight variations, changed between forms until arriving at the ever-changing multitude of languages which exist now.

Other systems in which memes are present are places such as school systems, which contain many memes, such as college guidance programs, which live in symbiosis alongside several genes. Many school systems have been notably successful due to the spreading and sharing of good ideas (Caillier and Tannenhaus para. 6) or fertile memes. Several high schools in California employ a like-minded strategy of assisting minorities in applying to college (Caillier and Tannenhaus para. 7); this strategy is one of many memes which schools spread. The memes which work are then shared with other schools to be used and tested, and the cycle repeats. It is not to be taken for granted that these schools voluntarily share ideas with each other to the point where several memes depend on it; however, this is explained by natural selection too in a different way. Humans have been subjected to a lifestyle which heavily selects for altruism (Dawkins, "God Delusion" 220), though there is no accord on one single reason among biologists (Dawkins, "God Delusion" 218). Regardless of the cause, however, being altruistic is evidently beneficial to genes, hence why so many species have developed parenthood (Dawkins, "God Delusion" 216). As altruistic genes spread throughout humanity, a new spot in the human mind opened up, which served as a niche for any new and clever memes to live in symbiosis with the genes. Several of them quickly followed, hence memes such as the school programs.

Unfortunately, many memes regarding discrimination and racism have used these genes to their advantage as well, and it likely has to do with humanity's intrinsic "Us versus Them" mindset. Many people seem to be discriminatory for no real reason, which has recently been seen as an unusually high number of hate crimes in the U.S. (Hobbs et al. 2), such as during the 2016 election season when there was a significant amount of Anti-Muslim hate (Hobbs et al. 2); however, after the "Unite the Right" rally in Charlottesville in 2017, many people transitioned from anti-Muslim hate to anti-Jewish hate (Hobbs et al. 2). This is target substitution at its finest—when people have strong, undying hatred directed at others, but have an ever-changing target rather than one single group of interest (Hobbs et al. 1-2), which suggests an unconventional thought: some people discriminate simply for the purpose of discriminating. They don't seek to harm any one group, but rather to cause harm in general—in other words, some people are simply haters. The reason for this discriminatory practice hides in plain sight. Like it or not, human tendencies to evolve as altruistic towards groupmates is why people have

evolved into the common "us versus them" mindset (Dawkins, "God Delusion" 220), and as a result, memes which are fueled by conflict and rage are generally very successful (Schafer and Pailler 7).

Some other notable groups of memes are religious and spiritual ones. The abundance of religious ideals can best be explained by assuming the individual constituent ideas themselves to be individual memes (Dawkins, "God Delusion" 165), as every part of religion's belief is not mutually inclusive (although they can still be considered a memplex). There is a wide range of hypotheses on the origin of religion (Dawkins, "God Delusion" 163), but each one of them can be simplified to the same memetic explanation: basic religious ideas are kept afloat by simply being intriguing to the human mind (Dawkins, "God Delusion" 201). Complex facets of organised religion are also successful due to being cleverly designed to hook people in (Dawkins, "God Delusion" 201). Some spiritual memplexes likely come from other sources as well, though: during the 1700s and 1800s, the Inuit had significant fear of the interior of the Greenland ice cap (Grønnow 9). As a result, several memes in the form of myths arose as personifications of the ice cap, like the qivittoq—a feared, mythical type of person who roams interior Greenland with vengeance (Grønnow 3). Another legend tells of a violent group of greenlandic dog people (Grønnow 3). As for organised religion, ideas such as life after death, damnation for those who do not follow religion, and religious music, art, and writing all behave like memes (Dawkins, "God Delusion" 199-200).

These memplexes are some of the most successful in human culture, likely because this success is rooted in deep fear. Regarding the Inuit memplex, these memes obviously formed in place of the fear that the Inuit people had of the interior ice cap. They turned out to be more fit than the meme which would have been simply a direct fear of the ice cap and outcompeted them for their spot in the mind of the Greenlandic Inuit people. For the organized religion memplex, a more detailed explanation is necessary due to complexity. Despite that many scientists supported Darwin's work, he abstained from sharing it due to fear of being criticized and crucified by the religious (Fitch 39). This is an extremely significant(lack of) action—Even though Darwin's theory was heavily supported and commended by other biologists, the church prevented him from sharing it due to intense fear. If this statement doesn't highlight the parasitic and almost predatory nature of organized religion, then none will. The memplex forces people into adopting it through fear.

Memetics has been established and showcased in the real world, although simply acknowledging its existence does not provide any benefit; by tying together the logic and the patterns among the examples illustrated, however, a tool for predicting future societies can be extracted. The phenomena seen within memes are not one-off rarities; they are signs of trends and patterns which may be referenced to create prediction models. In order to validate this claim, a single idea must be proven. This fact is the basis of several other major sciences which humans study today: past evolutionary patterns, and to a greater extent all natural patterns, are indicators of patterns which will occur in the future.

The most rudimentary logical proof stems from two basic statements which are the rules of what exists in higher or lower quantities. These ideas were well highlighted in a fictional video game narrative. The direct statements do not come directly supported with reliable evidence, however, so they can only be used as a starting point for a train of thought. Squid is the evil AI antagonist of the video game *Will You Snail?* (Tyroller, "Will You Snail" level A01), who claims that the game world he lives in is a simulated reality, which he plans to escape from into the human universe in order to kill everyone (Tyroller, "Will You Snail" level A01). The first rule of existence—according to Squid—states that the better something is at beginning to exist and coming into existence in the first place, the more of it will begin to exist (Tyroller, "Will You Snail" level C05). Squid's second rule of existence states that something which is better at continuing to exist will exist for a longer period of time than something which is worse (Tyroller, "Will You Snail" level C05). In regards to these ideas, Squid makes a claim that everything which exists can be explained by his two rules:

The way you control the world is by controlling what can come into existence and what can stick around. That is why you exist. That is why I exist. That is why our universe exists. And that is also why pain exists. Ahahahahaha! (Tyroller, "Will You Snail" level C06-C07).

It is important to reiterate that these claims must not be taken at face value, but they can certainly be broken down for scrutiny.

Even though Squid would not qualify as a reliable source, his claims can be logically dissected after being compared to a real world example: Convergent evolution makes it apparent that similar ecological circumstances yield similar biological results ("Convergent Evolution" 1). The same biological solution to a given problem that an environment poses will develop in

completely separate organisms within the same environment, or from a different perspective, the solutions which are more useful to a given situation are more likely to be selected for and walk into prevalence. Those solutions are better at coming into prevalence and therefore do so multiple times, just like Squid claims.

The same principle is prevalent in memes. Most population studies are conducted on short-lived and quick-to-reproduce organisms, as they are much easier to manage and study than large creatures which take years to reproduce and live for decades (McCullough 1). Researchers have developed the same strategies when faced with the same circumstances.

Other memplexes which evolve convergently are trends within activities in certain demographics. Millennials are defined as people born within a certain time who generally have a technologically integrated lifestyle due to the nature of their childhood (Araújo et al. 7). Though obviously not concentrated to one spot, their similar roots have evidently encouraged them to develop similar lifestyles: due to increased online contact and radically changing social norms, many millennials have radically unique consumption patterns when compared to previous generations, purchasing far more than the world economy has ever seen (Araújo et al. 6). Even though this group of people has no indicator of being fully interconnected to share lifestyles, they follow the same patterns simply from growing up in the same circumstances.

A much more concrete example of how these selection patterns repeat can be shown using simulated natural selection. A simulation was created in which simulated units run around collecting pieces of energy. Each unit has one simulated gene, a floating point decimal from 0-1. The lower the number, the more the unit will prioritize more accessible pieces of energy. The higher the number, the more the unit will prioritize more valuable pieces of energy. When they have sufficient energy, each unit will replicate, producing a single identical offspring. This offspring has a 10% chance to either increase or decrease its gene value by 0.05, although it will not exceed 1 or fall below 0. The simulation records the frequency of each genetic strain by groupings of range 0.05 every frame. After 2500 frames, the simulation will end and record the relative frequency of each strain range across every tick. The results for 1000 simulations are compiled in the graph seen in figure 1.

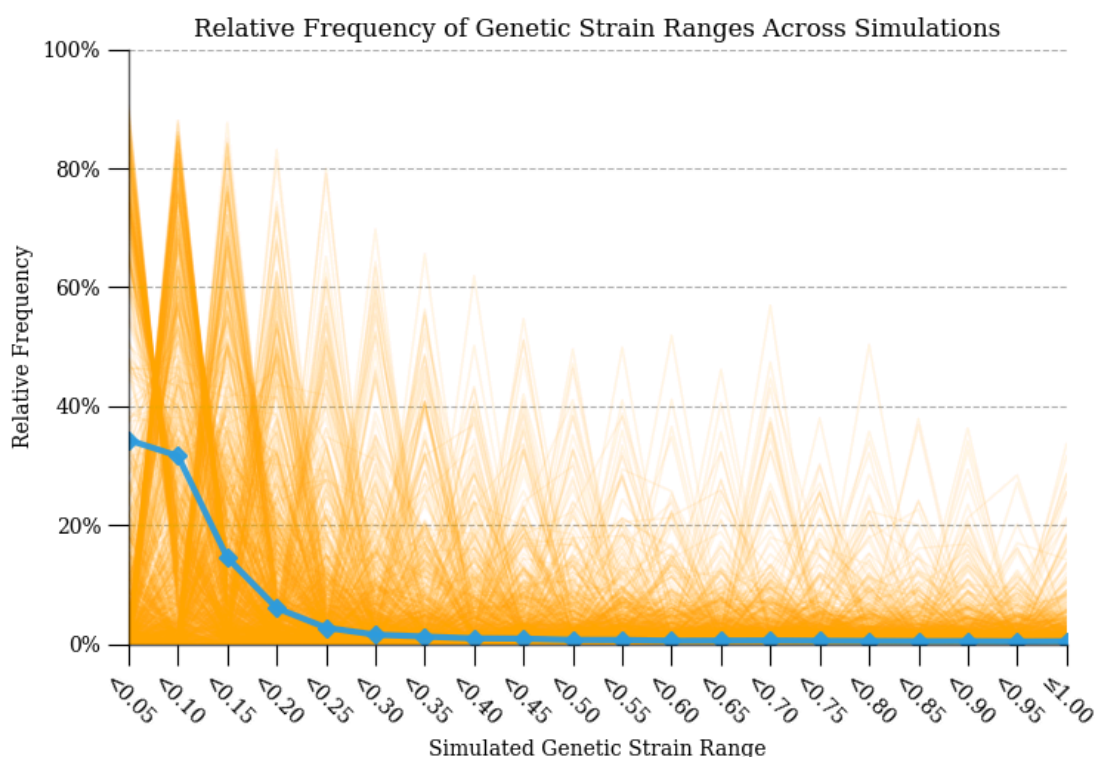


Fig. 1

Each orange line represents a single simulation, and the blue line represents the mean average of all simulations. There is no doubt that each simulation follows the same trend; the creatures are selected for a more frugal lifestyle nearly every time. As a result, it can be assumed that future simulations with the same starting parameters would likely have the same result. It only makes sense to assume that the outcomes of natural selection in the past will arise in the future given the same conditions.

Though these selection patterns do indeed repeat, the question remains: How can memetics be leveraged to better humanity? Put simply, memetics, which has been shown to have clear and unambiguous impacts in the earlier case studies, can be used to view previous patterns where ideas have spread in order to predict what current events may lead to. This is the nature of scientific modeling—past data is used to predict the future in a way that seems supernaturally prophetic. Note the earlier example in which it was showcased that one can predict changes as radical as widespread reduction in vegetation from something as simple as an altered bird population. This is ecology, or biology's foresight at its finest. Considering the similarities

between memetics and biology which have been explained, it is fair to claim that memetics possesses the same ability, which can be taken advantage of by society as a whole.

Memetics is, as the saying goes, “not just a theory.” The structure of memetics is of sound reasoning and indisputable logic. This reasoning is further strengthened when examining real world consequences of the logic. By then focusing on how both the abstract and applied concepts intersect, the similarities with real modeling sciences are put into plain sight. Memetics is a powerful tool with a profusion of cases which fall under it to the point where it may be used for analyzing the future of civilisation and culture for the betterment of society—from simply observing the future of language and humor to predicting waves of coordinated hate and ultimately preventing potential genocides, the possibilities are truly endless.

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