Evolution and Democracy: Political Ecology and its Scientific Justification of Democracy

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Introduction

In the short span of a few centuries the scientific way of regarding the world around and within us has become ubiquitous. One particular branch of the sciences – that of evolutionary biology – has had a marked effect during the 20th century on our understanding of the living world. And perhaps the most stirring implication of the results and insights yielded by the research in this field is that mankind is just as much part of nature as any other living thing, implying that mankind finds its origins in the same source as all the rest of the living world. This is of course in stark contrast with traditional conceptions of the magical or divine providence of man, as can be seen in many cultures the world over. Historically speaking man has always been considered special among all other things in the natural world.

The view that mankind originates from common ancestors with other organisms has provided us with many benefits, such as the many fruitful avenues of research in the field of genetics, but at the same time it is often also associated with a certain sense of loss. Particularly in the context of ethics, man has traditionally had an exalted status as a rational agent – elevated above all the rest of the selfish and brutish natural order – a special status which is often attributed to the presence of culture (in particular in its fundamental manifestations such as our humanitarian values).
This raises the question whether human culture is actually something that transcends nature in the first place. After all, if humans originate from the same source as all other forms of life, doesn't that make human culture one of the many manifestations of the natural realm? According to philosophers such as Richard Dawkins, Daniel Dennett and Philip Kitcher this is indeed the case. This means that the phenomenon of human culture might very well behave much in the same way as other living things, and be subjected to the same dynamics of the laws of nature.
Much like Dawkins and Dennett, I do not believe that the aforementioned sense of loss is justified, because a biological conception of mankind does not necessarily have to lead us down the path of determinism, nor does it have to translate itself into the ethical doctrines of Social Darwinism or the sociobiological paradigm. Even though our faculties of consciousness and reasoning might find their wellspring in evolution, that does not exclude the possibility of reflection and deliberation.

It is within this area of inquiry that this paper is situated. The aim of this paper then is to extend the line of reasoning of the aforementioned philosophers from the domain of human culture in general into the domain of politics specifically. In other words, we ask to what extent the scientific insights of evolutionary biology can be applied to the ethical domain of politics.

I intend to do this in a twofold manner. In the first of the two parts of this paper I will introduce what essentially constitutes a new way of looking at politics – an alternative framework – which is different from most traditional perspectives in political philosophy. It depends on the pragmatism of science and the insights of evolutionary biology, instead of on rationalism, thought experiments (think Rawls) or pre-established ethical values.
In the second part of this paper I will pose the central research question of this paper, which is the question whether a scientific justification can be provided on the basis of said framework – one that is not dependent on aforementioned thought experiments or pre-established values. The political theory of Karl Popper will serve as the blueprint for this justification, and will be utilized to draw up an analogy between evolutionary dynamics and the means of democratic social engineering. In this sense, Popper

provides us with a 'shortcut' into the discussion, as we build upon his groundwork on the subject. Next I will introduce some modifications to Popper's justification in terms of its underlying suppositions with the help of Philip Kitcher's thesis on the original function of ethics, so as to provide a instrumental justification of democracy.

One might ask what the added value is of a scientific justification for democracy in contrast to those that have already been provided by others. Popper's justification of democracy depends on objective reasoning, and ultimately upon humanitarian values. But the reality of life is that not everyone shares his western humanitarian values, whereas from a pragmatical or scientific perspective, those people might still prefer and/or benefit from the democratic system without subscribing to the exact same humanitarian values or demands for reasons/rationality (for example adherents of non-western religions and emotivists).
In the framework that I will propose, these humanitarian values and demands for rationality are simply part of the content of the system and no longer an essential part of the foundation and justification of the system. In this way the group of people to whom democracy would be an acceptable/palatable system is potentially broadened in a substantial way i.e. to subscribe to the system does not necessarily imply that one has to subscribe to traditionally western values at the same time. In this way I believe that my thesis can provide legitimacy to democracies that may subscribe to different normative values than traditional western ones, but at the same time utilize the democratic system for the benefits it can provide.
In other words, I believe a scientific justification of democracy could make the democratic system a more inclusive proposition by reducing unnecessary normative demands for its adoption, and at the same time perhaps provide a modicum of renewed faith for those who might doubt the merits of our own western form of democracy.
Whether I have achieved this aim, I leave for the reader to decide.

Part I

Introduction

The first order of this thesis is to explain as succinctly as possible – but without any vital omissions – the fundamentals of the neo-Darwinian synthesis of evolutionary theory. Doing so is essential to understanding the further content of this paper, but at the same time it poses a challenge: one has to explain the bare minimum of a thoroughly broad research field without doing it the injustice of oversimplifying, while at the same time – for the sake of brevity – only treating those (sub)topics which are relevant leading up to the political content of this paper.

I've attempted to meet this challenge by choosing the literature thoughtfully. This assignment has been greatly facilitated by utilizing Richard Dawkins' work *The Selfish Gene*. It is briefly put, essentially a resume of the neo-Darwinian synthesis (mainly incorporating the work of John Maynard Smith, Robert Trivers, William Hamilton and Robert Axelrod among others) to which he has added some of his own novel insights, the whole of which is still very much current to this day. In light of the – perhaps in the end – subservient role that this scientific subject plays in the wider political context of this paper, it would be impossible to dive deeply in the fundamental research of the aforementioned scientists individually. In that regard, Dawkins' work has proven to be an incomparable boon to the writing of my thesis. At the same time it is in *The Selfish Gene* that Dawkins himself has introduced the idea of the *meme*, which is arguably the driving force behind the core idea of my thesis.

The concept of the meme will be central to the framework that I will propose – which I will work towards as the conclusion of part I – as it enables us to view the real dynamics of politics in a new light, and at the same time provide us with a potential avenue for a novel justification of democracy – which I will work towards in part II of this paper.

A short history of life and evolution

From the perspective of evolutionary biology, perhaps the most important idea which is expressed in *The Selfish Gene* is that of the gene-centered view of evolution and the associated distinction between replicators and vehicles. To explain this distinction, a short and superficial excursion into the history of life itself is needed. The following narrative is more or less accepted throughout the scientific community, and it will not be a subject under contention in this paper.

At some point in the past, before there was any life on the planet, through more or less random combinations and reconfiguration of chemical elements, simple molecules were being formed. At some point further in time, among these molecules, an exceedingly exceptional one must have been formed which can be regarded as the first replicator[1]: It had the property of being able to create copies of itself. This particular replicator was by no means anywhere nearly as complex as 'modern' DNA for example. The important thing though, is that this replicator was able to make copies of itself.

For any replicator and its copies to endure in the long run, they must favor stability. Three factors are of importance when it comes to stability of replicators: longevity (how long a single instance of the replicator lasts), fecundity (how quickly and prolifically the replicator replicates itself) and copying fidelity (how accurately it copies itself)[2].

It is important to note that on the one hand "nothing actually 'wants' to evolve."[3] But on the other hand however, no copying process is ever perfect. Sooner or later an error will creep into any copying

1 Richard Dawkins, *The Selfish Gene*. New York (Oxford University Press) 2006. Hereinafter abbreviated as 'TSG', p.15
2 TSG 18
3 TSG 18

process and produce an altered version of the replicator. Chances are that the resultant mutant replicator will differ from the original with regard to the three aforementioned factors, and this might possibly yield a more successful replicator: it might be a more robust entity capable of maintaining structural integrity for longer, it might reproduce itself more quickly in greater numbers and it might copy itself with less chances of copying errors (i.e. producing faulty/unstable copies). The inevitable consequence of such beneficial mutations is that the new mutant replicator will yield more copies of itself in the long run than its predecessor.

Any given replicator will continue to create copies of itself, given enough time and resources. Sooner or later however, any given replication process will run into inevitable limits, it cannot continue indefinitely without obstruction. The earliest of replicators would sooner or later have run out of available building blocks in their vicinity, or run into the boundaries of a limited space. Such circumstances of scarcity will have given rise to the first instances of competition between replicators. In those circumstances replicators which score better than other types on the three aspects of stability will inevitably start to occur more frequently within the general population, in the competition for basic building blocks.

Here we have laid out very simply the two core dynamics of the process of evolution, namely variation and selection of replicators. Self-replicating entities make copies of themselves through imperfect processes yielding mutant offspring which in turn have differential chances of survival and reproduction, depending on the environmental conditions which are imposed on them. For example, any replicator that depends on the presence of building block 'A' in its direct environment for its replication process will do better (i.e. yield more copies of itself, i.e. be more successful) in an environment that is rich in building block 'A', instead of building block 'B'. One of the core insights here is that the measure of success of any given replicator depends directly on its environment. And the environment in this context is to be understood in the widest possible sense, encompassing both the inorganic and organic domains (including weather, temperature, atmospheric pressure, all flora and fauna etc.).

At a certain point in evolutionary history when the populations of the first replicators reached the limitations of their environment, be it through physical constraints or scarcity of building materials, a mutant replicator with a specific attribute would have overcome those limitations through other means. Any given replicator that is capable of assimilating other replicators (i.e. disintegrating and reintegrating its building blocks into itself) would be more successful in such conditions than those that lack this possibility. Thus began the first basic instance of an evolutionary arms race; for a replicator to maintain longevity, it has to maintain its structural integrity in the presence of aggressive replicators by developing defensive countermeasures.

At this point one might notice the attributed awareness in the above example. It is important to note however, that replicators do not actually 'develop' any of their characteristics consciously in an effort to adapt to their environment. To continue with the above example: in the presence of cannibalistic replicators a strain that develops defensive countermeasures through a random mutation will be more successful within such a population than copies that lack such an attribute. Such a strain will then come to dominate the population. In hindsight it would seem that the variant developed such an attribute intentionally, but this is not the case. This change came about through the process of blind variation and environmental selection. Evolution knows no foresight, and does not operate teleologically, it is not goal-oriented. Rather, a plethora of variations are spawned of which only a few will turn out to be viable and successful in hindsight. The successful variants eventually come to dominate a population while the unsuccessful ones simply go extinct. Even though the evolutionary process does not possess foresight, the most obvious and concise way of describing these processes is often as if it does actually have this attribute of intentionality. For example, it is common to explain certain characteristics of

organisms as if they have been developed with a certain goal in mind, i.e. predatory mammals developed incisors to tear the flesh of their prey. I shall elaborate on this 'intentional stance' as a way of describing the evolutionary process later on.
Now let us return to our cursory history of life on earth and fast-forward in evolutionary time. Under the influence of scarcity of resources and the hostile environment including the pressure of competition with others, the replicators start to develop increasingly complex ways of ensuring their own survival. This process leads to replicators developing what Dawkins calls 'survival machines'. These are essentially containers, or vehicles for the replicators to aid them in survival and replication. An early form of a vehicle would have been a simple membrane, later on it would include a cell wall, while even later these vehicles developed into the complex survival machines which are the organisms that are alive today.
One particular type of replicator – DNA – which is common to all living things, utilizes these increasingly complex vehicles that make up all of the living natural world around us. This brings us to the conclusion of the cursory overview of how DNA-based life came about.

The gene-centered view of evolution and selfishness
The last step of the foregoing overview has lead us to the introduction of the gene-centered view of evolution, which is at this time the more or less universally accepted paradigm among evolutionary scientists (the validity of which shall not be part of the discussion in this paper). The core of this idea can be summarized as follows. First off, hereditary information can only be passed on from one generation to another through genes, and not through acquired characteristics which are accumulated during the lifetime of the organism[4]. Second, all living things can essentially be described as vehicles for self-replicating DNA of which the actual self replicating entity is not the species as a whole – as was commonly believed before the research done in the the 1960's by evolutionary biologists such as Maynard Smith and Hamilton – but the gene itself. In other words, this implies that group selection theories are not in accordance with what we currently know about heredity.
This is where the 'selfishness' in the title of Dawkins' book comes in. The logical argument goes as follows: If any given replicator would gain an attribute through random variation which would instill it with a propensity for altruistic behaviour (i.e. behaviour that directly or indirectly increases the chances of survival of the recipient in favor of the chances of survival of the giver), it would not be very successful in the long run, simply because the strategy would perform worse in a population where a selfish version of the replicator is also present. In this scenario the selfish variant gets help from altruistic variants – increasing its odds of survival – while it doesn't give any help to others. Such a variant will outperform the self-sacrificing variant and will come to dominate the population eventually. The simple conclusion is that from an evolutionary perspective, selfishness will always outperform pure altruism, and therefore the latter cannot possibly exist in the long run.[5] This sort of selfishness is not only relevant in the behaviour of the individual in contrast to the group, but also on the genetic level itself, as individual genes can be in competition for the same slot on a given chromosome.[6] However, the distinction between the levels of selection of the gene and that of the individual is not entirely relevant for the discussion in this paper. For now it suffices to say that most of the evolutionary dynamics which are relevant for us play out their effects on the level of the individual organism.

4 Current thinking about this is more nuanced as can be seen in the field of epigenetics which studies the heredity of information outside of the DNA sequence. However for the sake of brevity and regarding the purpose of this paper I will not delve into this further.
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Introducing cooperation, reciprocal altruism, and game theory

As explained earlier, replicators are being selected in relation to their environment. How 'fit' any given replicator is depends as much on its environment as does on its own constitution. In the case of multiple genes competing for the same slot on a chromosome, the environment – i.e. the genetic climate[7] – includes other genes. Dawkins describes this genetic climate as follows:

> "As far as a gene is concerned, its alleles are its deadly rivals, but other genes are just a part of its environment, comparable to temperature, food, predators, or companions. The effect of the gene depends on its environment, and this includes other genes. Sometimes a gene has one effect in the presence of a particular other gene, and a completely different effect in the presence of another set of companion genes. The whole set of genes in a body constitutes a kind of genetic climate or background, modifying and influencing the effects of any particular gene."[8]

In more general terms, competitors are as much part of the environment as any other factor. In the case of genes within a given organism this means that they are to a large part selected on the basis of how well they cooperate with other genes. For example: for the synthesis of a fully functioning nose or eye, many different genes have to work in unison in extraordinarily complex interactions to eventually form such an organ. Now for instance if a single gene would be responsible for a faulty component in the lens of an eye, the whole organ would be rendered useless and hamper the chances of survival and reproduction for the vehicle and therefore also that of the replicator. In the sense of 'a chain is only as strong as its weakest link', genes are selected on the basis of how well they cooperate with other genes in their environment.

How does all the above apply to the level of the vehicle? If selfishness is a logical necessity, how do we explain the fact that many organisms display evidently altruistic behaviour toward others, for instance those belonging to the same group or toward their own offspring? Before the research done in the 60's that was mentioned earlier, answers to these questions were provided in terms of group selection theories. Any beneficial evolutionary adaptations were explained in terms of 'for the good of the species'. These theories however fall prey to the issue of selfishness: in a hypothetical species full of altruists a selfish variant (which through random mutation will sooner of later show up) would be more successful than the norm, and would come to dominate the population eventually. In other words, a truly altruistic species is an impossibility. Cooperation and altruism have to be explained with the selfishness of the gene (and by extension, the individual) in mind.

This can be done by introducing the concept of reciprocal altruism and subsequently by introducing the insights won in the field of game theory. Reciprocal altruism is essentially a form of cooperation that is mutually beneficial. In this form of cooperation both parties benefit from cooperating, it is a win-win-situation essentially. But how does one arrive at such an arrangement when the participants are inherently selfish? The field of game theory can provide answers to such questions.

The *prisoner's dilemma* is a standard example of a basic game that illustrates the point of difficulty that has to be overcome when establishing a relation of mutual cooperation between organisms. In short the prisoner's dilemma boils down to a game between two agents – who are isolated from each other – both having to make a choice between betraying the other and remaining silent (i.e. defecting and cooperating) toward a prosecutor in a hypothetical court case. There are four possible outcomes: both betray, both remain silent, prisoner A remains silent while B betrays and vice versa. If they both betray each other, each of them has to serve two years in prison. If either one betrays and the other remains

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silent, the defector will go free and the other will have to serve three years. If both remain silent (i.e. cooperate) both will serve only a year in prison (which is the best possible outcome in terms of total sentence served). The point of the example is to illustrate that from the perspective of the the rational self-interested individual, betrayal is the only logical choice whereas cooperation would actually be the optimal scenario[9].
In the natural world many of the interactions between individual organisms belonging to the same species mirror this relation. The way to overcome the pitfalls of selfishness is to play an iterated version of the prisoner's dilemma in which the participants remember the strategy of their fellow players and act accordingly. If one can infer through prior experience that the opposite player is likely to cooperate rather than defect, it becomes advantageous (still from a selfish perspective, not motivated by the interest of the group) to cooperate as well – given that the opposite player will cease to cooperate as soon as the first one does. When at some point during evolutionary history animals gained the faculty of memory along with the ability to recognize specific individuals it became possible for them to play these iterated games, and reap the benefits of reciprocal altruism.
Additionally, in the evolution of primates and the human species in particular, a proclivity to what Philip Kitcher calls psychological altruism (the ability to empathize and anticipate the needs of others through the functioning of mirror neurons) has very likely been an exceptional catalyst in the development of the capacity for increasingly complex modes of cooperation and ultimately the possibility of cultural evolution.

There are many more ways that game theory can be applied to the relations of competition and cooperation in the natural world – be it within a given species or between different ones – which can explain how these relations came to be and how they remain in a natural balance.
Another telling example of a game-theoretical model is one introduced by John Maynard Smith[10], which he has utilized to explain the concept of the *Evolutionarily Stable Strategy:* Suppose there is a species that has two different strategies for engaging in combat with one another, namely 'hawk' and 'dove'. Strategy in this context means a pre-programmed routine for behaviour, governed by certain fixed configurations of brain patterns originating from the development of the individual as a manifestation of its genetic makeup (this in contrast to conscious strategizing as done by humans). The hawk strategy consists in an aggressive strategy of commitment to unrestrained fighting during encounters with other individuals. The dove strategy consists in aggressive posturing initially, but if the opponent does not show signs of giving up, the dove will flee. Now if two hawks encounter each other, a fight will follow that will likely result in serious injury (or death) for either or both participants. If two doves encounter each other, a posturing match will ensue until either one gives up and backs down, the result of which is just some wasted time for the loser. If a hawk meets a dove the result is that the dove will quickly back down, resulting in a quick win for the hawk and relatively little time loss for the dove.
Like in the prisoner's dilemma example, there is a certain expected outcome in terms of utility for all the permutations of different strategies encountering each other, but where the outcome in the prisoner's dilemma was measured in terms of the years of sentence served, the utility of each outcome in the current example is measured in abstract points.
The example starts off with a population of solely doves. In the posturing matches that ensue, the eventual winner accrues 50 points for claiming the resource in dispute. The loser is penalized with -10 points for wasting time, as is the winner. The average payout of the engagement – given that either side is equally likely to win – is therefore the average of 40 and -10, which is +15. But then, through a

9 Seeing as betrayal will either net you 0 or 2 years, while remaining silent will net you either 1 or 3 years of prison.
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random mutation, a hawk strategy arises within the population. A hawk always wins from a dove, so the payout of every engagement of the hawk will be 50 points, meaning that this variant will do very well in the population and consequently will reproduce itself rapidly. Now if the population would only include hawks, the points would tally very differently. When two hawks meet, a real fight will occur: one will be the winner for 50 points, but the loser is very likely to incur significant injuries and thus will be penalized -100 points. The median payout in a population of hawks will therefore be -25. Suppose that a dove enters such a population. It will lose all the fights it is in, netting 0 points, and consequently it's average yield will be 0, which is still a lot better than the median payout of a hawk in such a population! A dove would do very well in a population of only hawks, and thus will reproduce more rapidly. If hawks do very well in a population of solely doves, and vice versa, one might expect a continuous oscillation between the numbers of doves and hawks within the population, but in reality there is a stable ratio of doves to hawks (which turns out to be 5/12 doves to 7/12 hawks). At this stable ratio the average payout for hawks is equal to that of doves (which turns out to be 6,25 points), meaning that neither of the two will have an advantage in the long term and they will therefore reproduce at the same rate.
When such a stable point is reached within a population it is called an evolutionarily stable strategy[11], or 'ESS' for short:

> "An evolutionarily stable strategy or ESS is defined as a strategy which, if most members of a population adopt it, cannot be bettered by an alternative strategy. It is a subtle and important idea. Another way of putting it is to say that the best strategy for an individual depends on what the majority of the population are doing. Since the rest of the population consists of individuals, each one trying to maximize his *own* success, the only strategy that persists will be one which, once evolved, cannot be bettered by any deviant individual. Following a major environmental change there may be a brief period of evolutionary instability perhaps even oscillation in the population. But once an ESS is achieved it will stay: selection will penalize deviation from it."[12]

It is important to make the following two notes with regard to the hawk/dove example. The example is of course a model, and as such it is far too abstract and reductionist to be representative of what actually tends to happen in nature. In reality a broad spectrum of alternative and more complex strategies to the hawk and dove might arise and coexist within an ESS in the same population. Moreover, the example treated the alternative strategies as belonging to distinct individuals, whereas specific individuals within a given population of a species in nature are more likely to utilize an array of different strategies instead of just one. A particular individual in the above example might subsequently display hawkish behaviour in seven of the twelve engagements, and dovish behaviour in the remaining five in a randomized manner. Such a diversified strategy can also yield an ESS.
Another important note to make is that an ESS is distinctly different from an optimum. Following the above example it is easy to make the mistake that it is a description of group selection at work, seeing as the population as a whole tends to adopt a certain strategy or mix of strategies. But in reality the ESS is reached through a (unconscious) cost-benefit-analysis made by individuals, not the group in its entirety. As quoted earlier, any deviation from the ESS will be penalized, i.e. it is costly and therefore sub optimal for the individual to adopt an alternative strategy. If there was such a thing as group selection at work, it would yield a very different result from the ESS. From the perspective of the group as a whole the best option in the example would be for everyone to behave as a dove, as it would yield a median payoff of 15 points per engagement, instead of the 6,25 in the ESS. This would however require a coordinated group effort, a conspiracy of doves as Dawkins calls it. In reality such a conspiracy would be very vulnerable to hawkish subversion and would eventually reach an ESS, seeing

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as selfish behaviour is rewarded and group coordination is absent. This does not however mean that group coordination is not a possibility. In many social species cooperation on the group level is present, but these species all tend to have social solutions to what is essentially the 'free rider problem'. Errant behaviour is punished by the other group members for example. Evolution tends to favor the free riders on the short term, but the balance of strategies within a species will eventually reach an ESS, where any deviation from it is punished, in other words it is a situation wherein there is no longer the possibility of a free ride (or even a 'lighter ride' for that matter).

What the concept of the ESS illustrates, is that from a selfish perspective a particular balance can be found on the level of the group, and patterns that resemble an organized whole can emerge. Game theoretical games in the vein of the hawk/dove example are being played in countless of places in nature, including those being played out between different species. This includes the relations between hunter and prey, host and parasite, symbiotic relations, and rival competitors for resources. In the words of Dawkins:

> "Maynard Smith's concept of the ESS will enable us, for the first time, to see clearly how a collection of independent selfish entities can come to resemble a single organized whole. I think this will be true not only of social organizations within species, but also of 'ecosystems' and 'communities' consisting of many species. In the long term, I expect the ESS concept to revolutionize the science of ecology."[13]

Within these aforementioned varieties of different relations every individual included in the game has its own selfish interests, and in the process of reaching such an ESS these individuals make a (in most cases presumably unconscious) complex cost-benefit-analysis on what strategy to adopt. The ones that do this the best (by random luck, not conscious foresight) tend to survive and procreate more successfully than others and thus affirming that particular cost-benefit-analysis regarding strategies to adopt, within the population. Every gene and every replicator is actually doing this same thing in the broadest sense (i.e. not only in the context of behaviour and strategy) within the evolutionary struggle, this is what Dawkins hints at with 'ecosystems' and 'communities' in the above quote. The accumulated information within the DNA of any given species is essentially the aggregate of successful iterated cost-benefit-analyses. In the process of evolution the variants that (by accident) find the path of least resistance (i.e. make the most optimal cost-benefit-analysis) tend to do the best.

Now to recapitulate: selfishness drives replicators, be it among kin or competitors. The strategies that replicators employ toward their friends and foes are the result of complex and iterated cost-benefit-analyses. The strategies and behaviours within the multifarious and complex relationships that exist between organisms tend to settle into Evolutionarily Stable Strategies – given that there are no major external disturbances – wherein a particular mix of strategies lies in a robust balance. The population that has arrived at an ESS – as a whole – might look as though it is a single self-regulating unit, but this is just an illusion which is created at the level of the gene.

A bold and far-reaching hypothesis which I will discuss later on is that democracy as a form of state government is actually an ESS. This is an extension of sorts, of the line of argument that Dawkins mentioned in the last quote, that 'ecosystems' and 'communities' can also resemble a single organized whole by settling into an ESS.
But how does one get from the genetically encoded behavioural patterns within the biological domain into the domain of politics and conscious intentional agency? The pivotal concept that makes this

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transition (reservedly and tentatively) possible is that of the *meme*.

Memes and cultural evolution

Variation, replication and selection on the basis of differential 'fitness' are the three fundamental dynamics of the algorithmic process that is evolution.[14] Most of what we associate with evolution relates to the evolution of the replicator DNA, i.e. all living things. However, as we saw earlier, life started from very humble beginnings before DNA even existed. As long as there is a replicator that exhibits variation, and there is an environment that exercises selective pressure, these two factors will yield a differential rate of survival and reproduction among replicators and will therefore complete the feedback loop which is called evolution. The nature of the replicator itself is irrelevant to this conclusion. In other words, the process of evolution – because of it's algorithmic nature – is substrate neutral, as Dawkins points out:

> "What after all, is so special about genes? The answer is that they are replicators. The laws of physics are supposed to be true all over the accessible universe."[15]

According to Dawkins along with Daniel Dennett, the thing that sets apart the human species from the rest of the natural world can essentially be summed up with the term 'culture'.[16] However, many things within the domain of culture can be described as demonstrating the hallmarks of evolution, prime examples of this being language, science, technology, the economy and perhaps law and even politics as well. Language – the prime medium of culture – evolves in the sense that new words emerge, and old words fall into oblivion. The same goes for rules of grammar, dialects and even complete languages. Separate languages have evolved from common ancestral ones, and lineages can be traced in a similar fashion as in biological evolutionary history. Science is essentially the constant emergence and extinction of hypotheses, of which the end result seems to be a mounting progress of knowledge. Something similar can be said of technology, which can be characterized as a constant iteration of improving variants. Sometimes this happens steadily, at other times in big leaps, much like in the domain of biological evolution. Within the free market economy, fitness is measured in terms of supply and demand, scarcity, and the ratio of cost and benefit. These are essentially the same relations as exist within biological evolution. Variants of all manner of goods and services are competing with each other in the arena of the free market, struggling for survival and success. Some products and services thrive, while others go extinct – be it from existing for a niche that is no longer sustainable, or by being replaced by a superior variant (i.e. because of the economic climate or by direct competition respectively, analogous to nature). Law has evolved over the course of history as well. It is a long way from Magna Carta to our modern constitutions but the latter would not have been possible without the long process that was initiated by the former. In the same vein it is a long way from prehistoric tribal rule to our modern supranational governmental institutions, but again, the latter would not be possible without the humble beginnings and the subsequent evolution over a long period of time.
Suffice to say that there is a plethora of examples and analogies to illustrate the following point:

> "Cultural transmission is analogous to genetic transmission in that, although basically conservative, it can give rise to a form of evolution... Language seems to 'evolve' by non-genetic means, and at a rate which is orders of magnitude faster than genetic evolution."[17]

14 Daniel C. Dennett, *Darwin's Dangerous Idea*. New York (Simon & Schuster) 1995. Hereinafter abbreviated as 'DDI' p.343
15 TSG 191
16 TSG 189, DDI 338
17 TSG 189

Dawkins goes on to a more universal – albeit tentative – conclusion:

> "I think that a new kind of replicator has recently emerged on this very planet. It is staring us in the face. It is still in its infancy, still drifting clumsily about in its primeval soup, but already it is achieving evolutionary change at a rate that leaves the old gene panting far behind."[18]

The primeval soup that Dawkins refers to is the soup of human culture. And 'meme' is the name that he introduces for the idea of the unit of cultural transmission, in the same way that a gene is the unit of genetic transmission. Instead of leaping from body to body like the gene, the meme leaps from brain to brain. In other words: the vehicle for this replicator is the brain. If an idea catches on – i.e. it leaps from one brain to the other – it can be said to propagate itself, and in doing so memes are constantly passed on in – inevitably – altered form (the process of variation).

> "When you plant a fertile meme in my mind you literally parasitize my brain, turning it into a vehicle for the meme's propagation in just the way that a virus may parasitize the genetic mechanism of a host cell. And this isn't just a way of talking – the meme for, say "belief in life after death" is actually realized physically, millions of times over, as a structure in the nervous systems of individual men the world over."[19]

The same factors for success – longevity, fecundity and fidelity – can be applied to memes as well. And like the selfish genes, memes too are in competition with each other[20], as Dennet points out:

> "Minds are in limited supply, and each mind has a limited capacity for memes, and hence there is a considerable competition among memes for entry into as many minds as possible. This competition is the major selective force in the infosphere, and, just as in the biosphere, the challenge has been met with great ingenuity... Like a mindless virus, a meme's prospects depend on its design – not its "internal" design, whatever that might be, but the design it shows the world, its phenotype, the way it affects things in its environment. The things in its environment are minds and other memes."[21]

In other words, the success of a meme depends on its environment made up of minds (including the memes that are already present there) and other memes (including the physical manifestations of memes in various media). To illustrate: the meme for totalitarian communism would probably not do well in the mind of a libertarian or within a western democracy. Likewise the meme for free speech would not see much success within the environment of a totalitarian regime.
Another similarity is that memes – like genes – are (among other factors of course) selected on the basis of how well they cooperate with other memes. Memes too, tend to cluster into co-adapted meme complexes where multitudes of symbiotic, mutually supportive memes have evolved in concert to cooperate within a complex system. When Dawkins refers to memes as parasites, it needs to be stated that this can refer to either malignant parasites as well as a benign symbionts,[22] and everything in between.
In some cases a set of memes that has become so tightly linked together that it can be treated as a single meme. An example of such a co-adapted meme complex would be a religion. A particular religion can consists of innumerable concepts in many different areas such as stories and narratives, moral codes, religious texts, rituals, clothing, architecture etc. which together form a coherent system. In the same

18 TSG 192
19 TSG 192
20 TSG 197, DDI 349
21 DDI 349
22 TSG 323

way our modern western democratic societies are co-adapted meme complexes, wherein ideas (i.e. memes) such as the freedom of speech, freedom of thought, toleration of cultural and ethnic differences, but also the free market and democratic elections are all part of the same meme-complex. Dawkins speculates that such meme-complexes tend to form evolutionarily stable sets:

> "I conjecture that co-adapted meme-complexes evolve in the same kind of way as co-adapted gene complexes. Selection favours memes that exploit their cultural environment to their own advantage. This cultural environment consists of other memes which are also being selected. The meme pool therefore comes to have the attributes of an evolutionarily stable set, which new memes find it hard to invade."[23]

Dennett's universal design space, the intentional stance and adaptationism

According to Dennett – much like Dawkins – genetic and memetic evolution essentially belong to the same domain of designedness, instead of being strictly separate. Dennet calls this domain the universal design space, and it is made up of all theoretically possible configurations of the DNA molecule (i.e. biological design) and all theoretically possible human made artifacts combined, the aggregate of all conceivable designed things.

This raises the following question: in what sense are the biological products of evolution 'designed'? To answer this question I shall elaborate on the cost-benefit-analyses that were introduced earlier in the context of the choice between different strategies in game theory. When we think about human designed artifacts – for instance a car – we can analyze it in terms of its functional parts and ask what the function is of any of the particular parts it is made up of. The engine is for propulsion, the steering wheel is for altering direction and the airbags are there for the safety of the passengers, just to name a few examples. One can safely assume that each of these parts is the result of a reasoned design development, meaning that the designer had particular goals in mind for each part and also the aim to strive for a certain level of optimality (i.e. making multiple cost-benefit-analyses) in reaching those goals. Dennett calls the adoption of this assumption the 'intentional stance'.[24]

According to Dennett, the same stance can be used when analyzing biological artifacts – in fact he claims that it the only possible way to go about it. When analyzing a bird for instance, we can rather easily determine what the function of some of the various parts are: wings are for flying, the beak is for eating and the eyes for surveying the environment, quite simply put. When the intentional stance is applied to the biological domain it is referred to as 'adaptationism'[25]. Adaptationism regards the evolutionary process as an iterative (albeit blind) design process wherein the products of the process can be viewed as solutions to 'problems' posed by the environment. In other words, in this sense an organism can be said to have been designed by its environment, through the process of variation and selection. And in this process – just like in human designed artifacts – a certain level of optimality is to be expected.

The psychologist Richard Gregory once said that "life is a systematic reversal of entropy."[26] What he very likely meant by this is is that in general – in accordance with the second law of thermodynamics – everything in the universe is in a state of gradual decline into disorder and dissipation of energy, whereas life is a reversal (at least locally and temporarily) of this process. Any reversal of entropy is bound to cost energy in one form or another, because in essence it constitutes going against the natural course of things. Creating order out of chaos when the global trend is towards the latter, is a path marked by resistance. Proof of this can be found in any living organism: it takes energy (i.e. there's a cost) to keep a body intact, it takes nutrition to grow and replace cells. And the amount of energy that is

23 TSG 199
24 DDI 229
25 DDI 238
26 DDI 69

needed to maintain the integrity of any given organism depends to a large part on the environment. The core of the story is this: for any replicator, cost will always be an issue due to the laws of physics[27]. This is what Dawkins alluded to in the quote mentioned on page 7; the laws of physics are the same throughout the universe and it affects any replicator – independent of the medium. If cost is always an issue, then any replicator that expends the least amount of energy to achieve the same results compared to its competitors is bound to have an evolutionary advantage, and thus will be more successful in the long run. This is how we can claim in hindsight that any particular successful replicator has made the correct cost-benefit-analysis, it has 'chosen' the path of least resistance. In this sense there is a certain level op optimality to be expected in the same way as in conscious human design.
In some cases this path of least resistance is so compelling that there is no real alternative, it is quite simply the only possible solution given the circumstances. Dennett calls these cases 'forced moves'[28]. A few examples Dennet mentions would be that all organisms have more or less definite boundaries (i.e. a skin, exoskeleton etc.) to maintain integrity, another one is that all marine animals have hydrodynamically streamlined bodies to move around in water efficiently. In the same vein of the question whether democracy as a regime is an ESS, one could wonder whether democracy can be said to be a 'forced move' in the domain of cultural evolution.

The extended phenotype, the difference between biological and human design and the role of human consciousness

With the matter of designedness in the biological domain elucidated we return again to Dennett's assertion that cultural evolution is not only the extension of biological evolution through other means, but the two domains actually belong to the same domain of the universal design space.
Human culture is an example of what Dawkins calls the extended phenotype[29]. Like a beaver's dam or a spider's web, it is not just a mere product of the phenotype, but an integral part of it,[30] and as such it engenders effects in its surroundings. To illustrate: human culture has a profound effect on the natural environment, a straightforward example being agriculture. Another more complex example is the advent of the mass utilization of fossil fuels made possible by the invention of the combustion engine. This in turn has produced all kinds of effects to the biological sphere which are being researched by scientists and consequently being discussed in politics so that eventually an intervention of sorts may affect the environment and ameliorate the perceived problems. The memetic sphere directly affects the biological sphere (and vice versa) in such a multitude of ways that it's arguably impossible to regard the two separately.
There is however a marked difference between biological and cultural artifacts. Biological evolution happens (simply put) through a process of blind variation and selection without foresight, whereas cultural evolution tends to happen through instances of conscious design. The combination of consciousness and culture allows humans to move through design space much more rapidly than anything in the blind biological domain. Moreover it has allowed us a certain amount of play or leeway in relation to our genetic foundation. Our genes influence our behaviour through the development of the nervous system, but when it comes to actual moment-to-moment decisionmaking it is our nervous system (including our brain) that is the policymaker[31]. Dawkins succinctly explains the benefits and the ultimate implications of conscious foresight as follows:

27 DDI 128
28 DDI 128
29 TSG 238
30 DDI 366
31 TSG 60

> "We have at least the mental equipment to foster our long-term selfish interests rather than merely our short-term selfish interests. We can see the long-term benefits of participating in a 'conspiracy of doves', and we can sit down together to discuss ways of making the conspiracy work. We have the power to defy the selfish genes of our birth and, if necessary, the selfish memes of our indoctrination. We can even discuss ways of deliberately cultivating and nurturing pure, disinterested altruism – something that has no place in nature, something that has never existed before in the whole history of the world. We are built as gene machines and cultured as meme machines, but we have the power to turn against our creators. We, alone on earth, can rebel against the tyranny of the selfish replicators."[32]

As Dawkins understands it our physical make up is the product of the genetic evolutionary process and our cultural evolution an extension of this. But as conscious agents with the faculty of free will, we can oversee the history of our origin and detach us from it. Dennett would agree with this position in broad terms but he adds an explanation of how he thinks human intentionality likely came about through the basic algorithmic processes of evolution. According to him the complete evolutionary history of humankind is essentially the stacking of increasingly subtle and complex algorithmic subroutines upon subroutines. At first these were the same behavioural instincts for survival and procreation as for any other animal. According to Dennett consciousness must at some point have emerged along with increased brain capacity to allow our species to create internal simulations of the external world, in other words to predict how our actions and environment will turn out before we act. With the subsequent addition of language and the conceptual framework it provides our brains have essentially been handed a toolbox of steadily increasing subroutines in the multifarious forms of culture – including the ability to reflect upon our biological origins and constitution – allocating us 'real' intentionality and a certain autonomy, self-control and self-determination in relation to our genes:

> "...your selfish genes can be seen to be the original *source* of your intentionality – and hence of every meaning you can ever contemplate or conjure up – even though you can then transcend your genes, using your experience, and in particular the culture you imbibe, to build an almost entirely independent (or "transcendent") locus of meaning on the base your genes have provided... It follows from the truth of Darwinism that you and I are Mother Nature's artifacts, but our intentionality is none the less real for being an effect of millions of years of mindless, algorithmic R and D instead of a gift from on high."[33]

Whether these interpretations of human agency, free will and intentionality are actually the case, and whether they are deterministic phenomena or not, is not a subject to be treated in this paper. Whether these matters can be settled or not, is ultimately beside the point for my main thesis and I believe that the framework that I shall shortly propose is entirely congenial to any interpretations of the subject matter above. Whether deterministic or not, memes are things in the real world, especially external ones as they are recorded in any physical and digital media such as books, films, the internet, etc. Whether or not internal memes can be located in physical neurological patterns is also not a question that needs to be settled to reach my conclusions. What exactly happens inside brains or in the mind during conscious deliberation does not have to be definitively settled to assume that human beings can become conscious of, and reflect upon the ideas and biases that are present in their mind, be it explicitly on the foreground or implicitly in the background. And it is these ideas, these memes – by which we are parasitized in a sense, both shaping thought as well as being a possible object of it – together with our brains or consciousness (depending on the interpretation of the above that you prefer) that make up the arena that the rest of this paper will take place in. When it comes to ethical discussions within the arena of competition of these memes, Dennett describes the core dynamic as follows:

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32 TSG 200
33 DDI 426

> "With our strictly limited capacity for attention, the problem faced by others who want us to consider their favorite considerations is essentially a problem of advertising – of attracting the attention of the well-intentioned. This competition between memes is the same problem whether we view it in the wide-scale arena of politics or in the close-up arena of personal deliberation. The role of the traditional formulae of ethical discussion as directors of attention, or shapers of habits of moral imagination, as meta-memes *par excellence,* is thus a subject deserving further scrutiny."[34]

Here we have what is essentially a description of what is happening when we try to convince one another of our points of view in ethical – and by extension political – discussion. It is a confrontation between the meme-complexes held by the transmitter and the receiver so to say. In the context of ethical and political discussions, the nature of these meme complexes can for example either be religious, philosophical/rational or pertaining to humanistic values etc. This is what Dennett refers to in the quote above. The role of "traditional formulae of ethical discussion" plays out within this arena of competing memes and meme-complexes as well.
In this confrontation the memes sent by the transmitter are trying to invade the 'attention' (brain/consciousness etc.) of the receiver, and the chances of success are dependent not only of the nature of the meme sent, but as much on the nature of the memetic environment of the receiver, in other words on how habitable the environment of the receiver is for the meme being transmitted. The meme for the moral obligation to procreate for example falls in much more fertile ground in a person populated/parasitized by traditional Christian morals than someone who is heavily populated by memes pertaining to concerns regarding the environment (i.e. global warming, overpopulation etc.). The confrontation can go very smoothly in one case, and in another the meme-complexes on the receiving end will prove to be a barrier of resistance against the parasite. The language used here might imply that this happens outside the range of conscious agency, whereas in reality sometimes this clash will play out on a subconscious level, while at other times it will play out in a conscious and/or rational manner. In both cases however – whether it unfolds consciously or subconsciously – resistance is a factor in the exchange. And as we concluded earlier in the context of cost-benefit-analyses, cost is always a factor. In host-parasite relations within the biological domain there is a factor called the economic cost of resisting[35], and this same cost of resisting plays a big role in the context of the host-parasite relation that exists between brains and memes.
When for instance any given meme is trying to invade a relatively hostile environment, the resistance that it encounters might manifest itself as cognitive dissonance in the receiving host when this confrontation plays out on the subconscious level. Whereas when the confrontation unfolds on the conscious level, the receiver might deliberate reasonably and consciously about why he or she does not accept or believe the particular meme that this person is confronted with. Regardless of whether we adopt the position of Dawkins or Dennett on the matter of human intentionality/agency, the cost of resistance is a relevant factor in the memetic domain as well, and I shall elaborate on its use shortly.

Political Ecology

We now have the essential elements of the framework of Political Ecology that I wish to propose. The concept of cultural evolution through the differential survival of memes must also be applicable to the political sphere, after all ethics and politics are part of what constitutes culture. The next order is the

34 DDI 510. Note Dennett's explicit reference to the 'arena of politics'.

35 TSG 250. Simply put, the cost of resistance in the biological domain is the energy investment that a host has to pay to root out a parasite. In many cases – from a cost-benefit viewpoint – it is not efficient for the host to resist, as the cost of resistance might be higher than the benefits gained by ousting the parasite. Such an asymmetry can often be attributed to an asymmetrical cost of failure. The parasite is fighting for its life, whereas the host might only incur a slight penalty by letting the parasite live.

crux of this first part of the paper, which is to apply this framework to the political domain, and to make a tentative analysis of politics using this framework of evolutionary concepts.
First a brief resume of what the framework consists of:

- Politics is to be understood as the arena of political ideas i.e. memes and meme-complexes competing for the attention of brains, where memes are replicated with variations/mutations and are selected against the memetic background of the prevailing political conceptions and opinions, both on a systemic level as well as on the individual level – where the dynamics on the systemic level are essentially the aggregate of everything that happens on the level of the individual. This arena encapsulated all domains of cultural life, both public and private, and should be understood in the broadest sense, not merely as the domain of the practice of political institutions.
- The memes and meme-complexes that constitute this political climate affect and manifest themselves through human behaviour in a multitude of ways, including political action.
- Sometimes this happens subconsciously, at other times consciously. In the case of the latter, we can relate to these memes and the behaviour that they illicit in a free way, in the sense that there is room for conscious analysis and deliberation, which is not tied down to the domain of our genetic origin.

From this viewpoint we can analyze what politicians, partisans and – to a certain extent – political philosophers are essentially doing: simply put they are engaging in the activity of spreading memes into the political environment with the purpose of populating/parasitizing receptive vehicles, affecting their behaviour to a certain extent and potentially proliferating these memes to further recipients.
This sort of epidemiologic approach to the dynamics of the political sphere provides – I contend – a much more realistic viewpoint on actual political practice than current ideal theories which assume (to some degree at least) that humans beings always operate as unprejudiced, rational and logical thinkers. In reality political ideas are not only weighed in terms of their own merit, but always in relation to the memetic background climate (i.e. prevailing ethical and political opinions) against which it is selected. No matter how convincing an idea or a line of reasoning is made out to be to a hypothetical agent, if it does not fall into fertile ground it will not be successful.

I believe that the framework of Political Ecology can potentially yield many interesting new insights when applied to specific political matters, however applying the framework to specific cases is not the purpose of this paper. Nonetheless I've chosen to include one, because I believe it to be of particular value at this time.
The framework can for example make sense of the dynamics of political manipulation (for example populism or 'fake news') through the use of the concept of the economic cost of resistance. As explained earlier, there is a cost-benefit analysis to be made when it comes to detecting subversive memes. This paradigm is already used, at least implicitly, by all sorts of political lobbies and other groups with special interest in certain political outcomes. It has been widely publicized that different forms of social media have been utilized very strategically to influence the outcomes of elections, such as the last elections for the president of the United States and the vote for the Brexit referendum to name the most prominent examples. Insights gained on the intersection of 'big data' analytics and neuroscience have been utilized to target voters individually and automatically with memes catering specifically to the perceived memetic climate of the receiver. Why is it that some people fall for fake news while others don't? The answer might well lie in the concept of the economic cost of resistance.

To detect subversive memes one needs to invest a certain amount of mental attention to the activity, and different individuals have differential surpluses of mental attention they are willing (or perhaps able) to invest in the detection. In the same vein we can say that not everyone is willing to invest energy into forming a political opinion.
What this example attempts to show is that it is relatively easy to manipulate the masses if one researches what kind of internal memetic climate the individuals have and then injects suitable memes into their personalized media streams. In this particular case an epidemiologic approach shows a very different image than a traditional political paradigm.

As said, the application of the framework is not the aim of this paper. Rather, the proposed framework also opens up the possibility to provide a naturalistic justification for democracy. To see whether it can be used in a normative sense – in contrast to the descriptive sense developed so far – will be the order of business for the remainder of this paper.

Part II

Introduction

After introducing the concept of cultural evolution and my proposed framework of evolutionary political practice – which for lack of a better term I have named the theory of Political Ecology – the other main aim of this paper is to pursue the question whether we can provide a scientific justification for democracy from the perspective of Political Ecology. An ancillary question in this task will be the inquiry whether democracy constitutes an Evolutionary Stable Strategy.

I believe that the core to answering the matter of a possible scientific justification is already present in *The Open Society and Its Enemies,* one of the major works of Sir Karl Popper, which is why I will follow in his footsteps and see how far I can take his thesis before I deviate and suggest my own amendments to it in line with what we have so far discussed. Richard Dawkins already noted a marked analogy made by Popper, which will become relevant in this paper:

> "The analogy between cultural and genetic evolution has frequently been pointed out, sometimes in the context of quite unnecessary mystical overtones. The analogy between scientific progress and genetic evolution by natural selection has been illuminated especially by Sir Karl Popper."[36]

Popper saw that science progressed in a very similar fashion to the evolutionary process. Though, from the perspective of cultural evolution in the broader sense, the progress of science is simply one of its many manifestations. Popper's predilection for the sciences prompted him to make a case for applying the scientific method to the political domain. I however assert that he does not merely apply the scientific method to the political domain, but that what he describes is actually an application of the evolutionary process itself. Where Popper founds his political theories on a faith in reason and humanitarianism, I aim to provide a scientific justification for them through an analogy with the evolutionary process. Showing an analogy however is not sufficient to justify a normative conclusion, such as an endorsement for the democratic system. To overcome the naturalistic fallacy (the claim that 'one cannot derive an ought from an is') I will utilize Philip Kitcher's thesis on the original function of ethics and thereby provide a pragmatic/instrumental justification for Popper's methods.

The Closed and Open Societies

Popper starts off his book with a treatment of Plato's political doctrines which in his view hinge upon the central theme of arresting all societal change. While the universe and everything in it is perpetually in motion, societal changes in particular cause a severe strain on the members of society, which ought to be alleviated according to Plato by enforcing strict rules. Popper's characterization of Plato's ideal society serves the role of a prime example of a totalitarian state, to which all other totalitarian states can be compared. The core of this characterization is the totalitarian attitude against egalitarianism, individualism, freedom and reasonableness (in short it's anti-humanitarianism).

Popper continues by making a distinction between the open and closed societies which is pivotal in his thesis. Principally he equates the closed society to tribalism and the open society to humanitarianism. The most important aspect of any closed society is the...

> "... magical or irrational attitude towards the customs of social life, and the corresponding rigidity of these customs... Its main element is the lack of distinction between the customary or conventional regularities of social

36 TSG 190

> life and the regularities found in 'nature'; and this often goes together with the belief that both are enforced by a supernatural will."[37]

Popper continues on the same page:

> "When I speak of the rigidity of tribalism I do not mean that no changes can occur in the tribal ways of life. I mean rather that the comparatively infrequent changes have the character of religious conversions or revulsions, or of the introduction of new magical taboos. They are not based upon a rational attempt to improve social conditions."[38]

In short the closed or tribal society can be characterized as magical or irrational (as far as the ethical domain is concerned) and collectivist.
The pre-Socratic philosophers introduce the concept of rational reflection for the first time (in a way) in society, which tended to shake up the order of the tribal society. The question of which form of government is the best starts to become a matter which is discussed in terms of rational decisions and their corresponding consequences instead of the terms of an unquestionable supernatural order of things. At the same time the locus of responsibility within society shifts from the group to the individual as individuals become confronted with ethical questions of personal responsibility, where previously the ethical dimension of societal life was more or less unambiguous due to tribal dogmatism.[39]
In contrast to the closed society, the open society can be characterized as rational, reasonable and individualistic (in the sense that there is room for personal freedom and responsibility). Apart from this difference in fundamental character, the open and closed societies also have very contrasting methodologies for governing, which will be discussed in the next section. So far Popper has only defined the fundamental character of the open society, but later on, his use of the term comes to include the institutions which we identify with our modern western societies – those that are built upon the precepts of reasonableness and freedom, such as modern science, democracy and the free market.

Utopian and piecemeal social engineering

Perhaps even more important (at least for the purposes of this paper) than the distinction between the closed and open society is the corresponding distinction that Popper makes between the Utopian and piecemeal methods of social engineering respectively. He uses the term social engineering in contrast to the attitude of historicist philosophies (in his book Popper mainly criticizes Marx and Hegel on this point, however the subject of historicism will not be included in the scope of this paper), to emphasize the fact that he believes that history is not the predictable result of historical or sociological laws but the result of human agency and intervention. In actuality the historicists would utilize social engineering as well, but with a very different aim, which was to facilitate and accelerate the inevitable course of history plotted out by their theories on historical and sociological laws. Popper labels Utopian social engineering as dangerous, and piecemeal engineering as the only truly rational form of social engineering:[40]

> "The Utopian approach may be described as follows. Any rational action must have a certain aim. It is rational in

37 Karl Popper, *The Open Society and Its Enemies*. Abingdon (Routledge) 2011. Hereinafter abbreviated as 'TOS' p.164
38 TOS 164
39 I highly recommend Julian Jaynes', *The Origin of Consciousness in the Breakdown of the Bicameral Mind.* Boston (Mariner Books) 1990, for a provocative thesis on how this shift might have occurred. Although his book served as one of the many inspirations for this paper, and I believe his thesis is compatible with Popper's and mine, I will not delve into this rabbithole any further for the sake of brevity.
40 TOS 147

> the same degree as it pursues its aim consciously and consistently, and as it determines its mean according to this end. To choose the end is therefore the first thing we have to do if we wish to act rationally; and we must be careful to determine our real or ultimate ends, from which we must distinguish clearly those intermediate or partial ends which actually are only means, or steps on the way, to the ultimate end. If we neglect this distinction, then we must also neglect to ask whether these partial ends are likely to promote the ultimate end, and accordingly, we must fail to act rationally. These principles, if applied to the realm of political activity, demand that we must determine our ultimate political aim, or the Ideal State, before taking any practical action."[41]

In contrast, the essence of Piecemeal social engineering is described as follows:

> "It is an approach which I think to be methodologically sound. The politician who adopts this method may or may not have a blueprint of society before his mind, he may or may not hope that mankind will one day realize an ideal state, and achieve happiness and perfection on earth. But he will be aware that perfection, if at all attainable is far distant, and that every generation of men, and therefore also the living, have a claim; perhaps not so much a claim to be made happy, for there are no institutional means of making a man happy, but a claim not to be made unhappy, where it can be avoided. They have a claim to be given all possible help, if they suffer. The piecemeal engineer will, accordingly, adopt the method of searching for, and fighting against, the greatest and most urgent evils of society, rather than searching for, and fighting for, its greatest ultimate good."[42]

As we can see, one of the defining differences between the two lies in the stance taken towards ultimate ends. Utopian engineering is fundamentally teleological, whereas piecemeal engineering is open-ended and revisable. Popper does define a kind of ultimate end for piecemeal engineering in the form of the 'fight against social evils', but it is actually more of a working-imperative rather than a real end goal. It is interesting however to keep Popper's provisional purpose for the open society in mind, as it will become relevant again when I endeavor to provide a new justification for democracy.
The second point of distinction is that of revisability. Popper explicitly mentions (on multiple occasions) that the concept of piecemeal engineering is based on the scientific method. He explains that the spirit of science is criticism[43], and that piecemeal engineering entails the introduction of the scientific method into politics,[44] *in concreto* as a readiness to learn from mistakes through trial and error. Popper makes a case for piecemeal experimentation with social technologies (i.e. social institutions), analogous to what Philip Kitcher calls 'experiments of living'[45] (following John Stuart Mill), when he describes the dynamics of cultural evolution. The experimentation with social technologies will provide us with much needed experience in this domain. This strong demand of Popper for empirical data is also directly inspired by the scientific method.
Below I will enumerate Popper's main arguments[46] for piecemeal engineering and against Utopian engineering per aspect that he discusses.

• Popper argues that it is much easier for people to agree on the general imperative to combat social evils than it is for them to agree on a single Utopian ideal. Seeing as the conceptions of the good life can vary widely from one person to the next, any Utopian engineering must inevitably settle on a single vision by a single person (or perhaps a small group of very likeminded individuals). In any case, Utopian engineering needs a strong central authority that can compel the whole of society to conform to the vision obediently. However, dissension is inevitable due to the varying conceptions of the good

41 TOS 147-148
42 TOS 148
43 TOS 176
44 TOS 153
45 Philip Kitcher, *The Ethical Project.* Cambridge, MA (Hardvard University Press) 2014. Hereinafter abbreviated as 'TEP' p.107
46 TOS 149-157

life, and sooner or later any non-conformity to the vision must be oppressed, which – according to Popper – inevitably leads to totalitarianism or tyranny.

• Moreover, Popper claims that there are no rational means to arrive at a sort of blueprint for the perfect Utopian society. Rather, grand Utopian visions always find their source in metaphysical intuition or passion/emotion. By contrast piecemeal engineering demands the use of reason instead of passion and violence. With the lack of a concrete end goal there is room for the possibility of reaching a reasonable compromise, and by extension it leaves room for improvement via democratic methods.

• Another important aspect of the matter is the scope of the engineering projects. Popper asserts that the scope of Utopian engineering is much too broad. To arrange society according to an all encompassing blueprint is much too complicated to actually attempt. Apart from that, there are too many unknown factors in such a broad project to even judge the viability of such a blueprint in the first place. Along with the complexity and the presence of unknown factors, there is an incredible amount of risk associated with revolutions of such magnitude. The necessity to start off with a clean slate – which is inherent in most Utopian ideals according to Popper – as part of a social experiment is too radical in his eyes. Rather than risking the whole of society in an experiment, piecemeal engineering is much less risky as it involves blueprints for (parts of) a single social institution rather than for society as a whole. Also, piecemeal engineering doesn't suffer from the hypothetical nature of Utopian engineering: the experiments of the piecemeal method are small enough to actually implement in real society. This makes it possible to gather actual empirical data and experience on the subject, and allows rational (re)evaluation of the results of social experiments.
Here we see again the similarities with the scientific method and Popper's demand for experience and rational revision.

• The last aspect to consider is the factor of time and the differences between the two types of engineering in terms of the long term. Considering the radicality of Utopian engineering and the scope of the corresponding blueprints, it is impossible to implement these overnight. The first problem that props up is that any work in progress on the Utopian scale is bound to be accompanied with a tremendous amount of social discomfort during the building process. According to Popper any criticism needs to be discouraged or suppressed during this building process to avoid straying from the blueprints, which in turn – as mentioned earlier – leads onto the path of totalitarianism.
Another problem that Utopian engineering runs into is that of the suitable successor. Who can carry out the vision if the person who defined it is no longer present? The blueprints are of course still present, but how does one guarantee that the successor of the totalitarian leader is also a suitable leader? And if the new leader proves to be unsuitable, how does he get replaced by a suitable one? Utopian engineering cannot answer these question in a satisfactory manner in the eyes of Popper, whereas piecemeal engineering allows the use of democratic methods to solve the problems surrounding succession of leadership.
An ancillary problem to the previous one is that even if a suitable successor is found, how is it guaranteed that he will not change the blueprints? With time, change and new ideas and technologies will come up, and the only way to guarantee the fidelity of the blueprints is a strict dogmatic adherence to it, again leading onto the inevitable path of totalitarianism.

In short we might summarize the above points as follows. People have varying conceptions of the good life, and there is no way to determine a Utopia that will suit everyone's tastes. And even if a society settles on an end goal, totalitarian suppression is necessary to reach it. Furthermore Utopian

experiments are extremely dangerous – given that the whole of society is at stake – and are unlikely to ever come to fruition.

Popper's assumptions

Underlying Popper's explanation and evaluation of Utopian and piecemeal engineering are a few assumptions that are worth illuminating, not only because they play an important role in understanding Popper's motivation but also because I have adopted these assumptions as well in this paper.

The first one has already been mentioned, which is the diversity among people and their ideas (as inevitably engendered by cultural evolution). It is perhaps superfluous to state, but every individual has his own unique thoughts and preferences. Instead of seeing this as a potential source of trouble (as it may be perceived by Utopians), I will argue later on that it could well be the greatest strength of human kind.

Perhaps the most important assumption Popper makes is that people tend to overestimate their ability to predict the future, and are much worse at predicting the future of society than they would like to think. A large part of *The Open Society and Its Enemies* is dedicated to a critique on historicism because of this (which for the sake of brevity I shall not go into too deeply). His main line of attack against the concept of historical prophecy runs as follows: historians and philosophers (prime examples being Marx and Hegel) think that by studying history comprehensively it is possible to formulate scientific laws of history by which it is possible to predict our future, because history will always unfold in accordance with these laws (i.e. historical determinism). The role for citizens and politicians lies in a sort of midwifery in anticipation of the coming Utopia, in other words they are to submit to the course of history. Popper on the other hand claims (as do Dawkins and Dennett, as discussed in part I) that people have the power of foresight and planning and the ability to alter the world around us[47]. Due to the existence of human agency it is exceedingly difficult to predict the future of society, on account of the fact that it lies in our power to change it in advance. Popper deems the activity of formulating historical laws as unscientific and reiterates that there is a world of difference between scientific prediction and historical prophecy.[48] Moreover, Popper claims that the application of historical prophecy is often the domain of demagoguery and is used for political manipulation.

In addition to the claim of limited capabilities of people to predict the future of society, Popper also asserts that “hardly any social action ever produces precisely the results expected”.[49] And that:

> “It must be admitted that the structure of our social environment is man-made in a certain sense; that its institutions and traditions are neither the work of God nor of nature, but the results of human actions and decisions, and alterable by human actions and decisions. But this does not mean that they are all consciously designed, and explicable in terms of needs, hopes, or motives. On the contrary, even those which arise as the result of conscious and intentional human actions are, as a rule, *the indirect, the unintended and often the unwanted by-products of such actions.* 'Only a minority of social institutions are consciously designed, while the vast majority have just “grown”, as the undesigned results of human actions', as I have said before.”[50]

This assertion is mostly a criticism aimed at the school of psychologism that is prevalent in many strains of historicism, which asserts that all of society can be explained and predicted in terms of human psychology (of which sociobiology – which I mentioned earlier – is a variant). As I stated earlier, it is not my intention to enter the nature vs. nurture debate or the matter of whether what happens in the individuals brain, mind or consciousness is deterministic or not. I wish here only to

47 TOS 59
48 TOS xxxvii
49 TOS 153 This is of course to be expected within an evolving system.
50 TOS 305

elucidate Popper's starting point of the unpredictability of the social sphere.

In short we can perhaps best summarize the assumptions above as follows: the social sphere with all its unique individuals and their interactions resulting in social institutions and traditions is exceedingly complex, and any type of social engineering that does not accept these assumptions is bound to be mistaken.

The link between piecemeal engineering and democracy

Before I get into the comparison of piecemeal engineering and the process of evolution – which is the link between the first and second part of this paper – there is the link that Popper makes between piecemeal engineering and democracy that needs to be discussed.

As mentioned in the previous section, Popper asserts that (only) non-teleological social engineering leaves open the possibility of reaching a reasonable compromise[51] (which is needed because of the different conceptions of the good life). After all, if the end-goal is definite, there is no need for compromise and therefore also no need for deliberation. Seeing as democracy is *par excellence* the political system that allows for reasonable compromise and deliberation, piecemeal engineering and democracy go hand in hand.

Fundamental in this relationship is the faith in reason and humanitarianism which has been growing since the Great Generation of pre-Socratic philosophers[52], along the bumpy road of Christianity and into its current expression in our modern western civilization. And it is this faith in reason and humanitarianism that lies at the core of Popper's justification for the open society. And at the core of the open society lies the grand institution of democracy, which is why I decided to keep the focus of this paper on this particular aspect of the open society and leave the other cornerstones of it – mainly the institutions of modern science and the free market economy – in the background. The reason that democracy is so central to the open society is that it (and only it) secures the possibility of revision, which manifests itself as a self-corrective relation between citizens and their government. Popper explains this by first dividing all forms of government up into two distinct categories:

> "The first type consists of governments of which we can get rid without bloodshed – for example, by way of general elections; that is to say, the social institutions provide means by which the rulers may be dismissed by the ruled, and the social traditions ensure that these institutions will not easily be destroyed by those who are in power. The second type consists of governments which the ruled cannot get rid of except by way of a successful revolution – that is to say, in most cases, not at all. I suggest the term 'democracy' as a shorthand label for a government of the first type, and the term 'tyranny' or 'dictatorship' for the second."[53]

And a page later he continues:

> "Seen in this light, the theory of democracy is not based upon the principle that the majority should rule; rather, the various equalitarian methods of democratic control, such as general elections and representative government, are to be considered as no more than well-tried and, in the presence of a widespread traditional distrust of tyranny, always open to improvement, and even providing methods for their own improvement."[54]

In summary, as Popper defines it, only in a democracy is it possible to improve the system from within, including the replacement of the government itself (in other words without the necessity of having to

51 TOS 149
52 TOS 177
53 TOS 118
54 TOS 119

replace the whole system itself). And this is significant because of the nature of evolution including the inevitability of change as outlined in part I. No matter how uniform and repressing a given society and its rule is, change will inevitably come in the form of modification of extant cultural norms and changing conceptions of the good life. The recognition of this fact leads to the adoption of the non-teleological stance, which in turn justifies the demand for openness to criticism and revision through adoption of the democratic system.
In the end it is the concept of revisability which is decisive for democracy, and the justification for it depends on the non-teleological nature of it. As long as the revisability and the capacity for self-correction of a democracy stays intact it is of no consequence if politicians choose to base their positions on clear visions of their ideal society. As long as the teleological political 'content' stays within the democratic system (where it is contestable), instead of becoming an inherent function of the system itself (where it becomes tyrannical), there is no objection.

Objections to Popper's faith

Shortly, when I will attempt to substitute the role of Popper's faith in reason and humanitarianism in his line of reasoning, the question is raised of why this needs to be done in the first place.
First off, the objective of this paper is to attempt to provide a scientific/naturalistic justification for democracy, meaning that I will try to make as few assumptions as possible outside of the scientific paradigm. In other words, as few cultural, emotive and metaphysical assumptions as possible. Even though I fully agree with Popper on the importance of humanitarian values in our society and its historical development – concepts such as the respect and dignity for human life, the equal treatment regardless of race, color or creed and the advocacy of personal freedom – they are cultural artifacts that do not find their source in scientific discovery, but rather in ethics and its cultural evolution.
Popper's frequent references to the Greek conception of rationality shows he has no qualms about building on the ideal of man as the *animal rationale.* Indeed he continuously refers to the adoption of rationalism and humanitarianism as a 'faith', and even characterizes it (perhaps merely in passing) explicitly as a "religious movement"[55]. The adoption of faith in rationality thus requires a leap of faith, as does any moral position in his eyes. Popper characterizes the conundrum as follows:

> "The rationalist attitude is characterized by the importance it attaches to argument and experience. But neither logical argument nor experience can establish the rationalist attitude; for only those who are ready to consider argument or experience, and who have therefore adopted this attitude already, will be impressed by them. That is to say, a rationalist attitude must be first adopted if any argument or experience is to be effective, and it cannot therefore be based upon argument or experience."[56]

Popper proposes a 'critical rationalism' against an 'uncritical or comprehensive rationalism'[57], which allows for this single leap of faith, instead of disallowing it for not meeting the requirements of the more demanding variant (in terms of logical consistency).
Later on however, towards the end of his book Popper seems to withdraw to a certain extent on his quite stringent demand for rationality when he says:

> "I do not wish to be misunderstood. I feel no hostility towards religious mysticism (only towards a militant anti-rationalist intellectualism) and I should be the first to fight any attempt to oppress it. It is not I who advocate religious intolerance. But I claim that faith in reason, or rationalism, or humanitarianism, or humanism, has the same right as any other creed to contribute to an improvement of human affairs, and especially to the control of

55 TOS 402
56 TOS 436
57 TOS 435

international crime and the establishment of peace."[58]

This seems to be in contrast to his argument thus far, as earlier he disqualified any form of irrationalism (in the technical sense, as lacking in reasonableness) such as faith, intuition and passions/emotions[59] as potential guiding principles when it comes to politics. In the end Popper's position on the demands of rationalism remains somewhat ambiguous. However, it is clear that Popper adopts the principles of rationalism and humanitarianism with a leap of faith, and that rational arguments – mainly the rationalist attitude of the consideration for consequences – form the justification for the method of piecemeal engineering.

The link between Popper and the theory of evolution

Popper justified piecemeal social engineering through the faith in reasonableness/rationality and humanitarianism, and consequently justified democracy because it is the only system that allows room for the underlying values (freedom, equality etc.) of these terms thanks to its revisability (i.e. the possibility to disagree with and adjust the course which government has set).
I will proceed by following this same pattern of justification of: faith → piecemeal engineering → democracy, and replacing the faith in reason and humanitarianism by a scientific justification of piecemeal social engineering. The case I will be making is that Popper's description of piecemeal social engineering is an accurate description of how cultural evolution – as I have described it in part I – actually works and that the democratic system has internalized the dynamics of evolution (i.e. its various algorithmic processes).
The first order then in connecting evolutionary theory and Popper's theory is to make a comprehensive comparison between the two and see in what ways they are similar or even identical.

First off, perhaps the most obvious similarity is the non-teleological nature of both evolution and piecemeal engineering. The process of evolution does not have foresight, it simply operates on the simple algorithms of variation and selection without any end-goal in sight, especially when one considers it from the gene's point of view. Similarly piecemeal engineering is not directed toward a concrete end, but rather operates on a working-imperative of alleviating social evils.
Another main parallel between the two is the trial-and-error nature of both systems. Both systems allow for a certain measure of variation – in the evolutionary process this happens through imperfect copying mechanisms, while in the process of piecemeal engineering it is anchored by freedom of thought and speech (more on this later) and manifests itself in experiments in living as Mill put it succinctly. In both cases, it is that which works that will be preserved and that which does not, will fall by the wayside.
The question of what works and what doesn't, brings us to a third parallel namely the engineering nature of both processes. Popper – as should be obvious by now – uses the term 'engineering' liberally, as he considers political problems to be engineering problems in the sense that they demand a planned and focused human intervention.[60] When comparing the piecemeal method with the Utopian method he explains this parallel between the piecemeal method and mechanical engineering as follows:

58 TOS 460. As an interesting sidenote: this quote can in my view also serve as a telling example of how the activity of the political philosopher or politician appears in the context of the framework I have proposed. What Popper is essentially saying here is that the memes of 'faith in reason, or rationalism, or humanitarianism, or humanism' have a right to compete in the politicoethical arena as well. He is not thinking up a new meme, or modifying the content of the aforementioned memes, instead he is attempting to improve the background conditions for said memes by publishing these writings (i.e. ancillary memes to improve the chances of success of other memes).

59 TOS 149-151

60 There are many implicit examples of this, for example TOS 108

> "The Utopian engineer will of course claim that mechanical engineers sometimes plan even very complicated machinery as a whole, and that their blueprints may cover, and plan in advance, not only a certain kind of machinery, but even the whole factory which produces this machinery. My reply would be that the mechanical engineer can do all this because he has sufficient experience at his disposal, i.e. theories developed by trial and error. But this means that he can plan because he has made all kinds of mistakes already; or in other words, because he relies on experience which he has gained by applying piecemeal methods. His new machinery is the result of a great many small improvements... Similarly, his plan for the production of his machine incorporates a great number of experiences, namely, of piecemeal improvements made in older factories."[61]

When we recall the first part of this paper, we see that the above is more or less a carbon copy of the iterative evolutionary design process that happens within the unified design space as explained by Dennett. The process that Popper explains is a clear example of the evolutionary progress of technology within the cultural domain, where successful ideas are adopted and refined, and in turn might be displaced again by better ideas (analogous to how certain species in nature can displace others within a certain niche). Moreover, adaptationism considers the results of the evolutionary design process as solutions to problems posed by the environment, in a similar fashion to how Popper considers the results of piecemeal engineering as solutions to political engineering problems.
Continuing in the domain of the unified design space, we can also find an analogy to Popper's criticism on the wide scope of Utopian engineering and the risk involved with its radicality – which is perhaps best summarized in the sentence: "...it is not reasonable to assume that a complete reconstruction of our social world would lead at once to a workable system."[62]. Dennett explains an analogous situation concerning the scope of experimentation within the natural domain as follows:

> "*"Natura non facit saltus"* – nature does not make leaps – and this was one maxim that Darwin didn't just leave untouched; he provided enormous support for it. Large leaps sideways *in a fitness landscape* will almost never be to your benefit; wherever you currently find yourself, you are where you are because this has been a good region of Design Space for your ancestors – you are near the top of some peak or other in the space – so, the bigger the step you take (jumping randomly, of course), the more likely you are to jump off a cliff – into the low country in any case"[63]

Considering how complex the DNA is of modern organisms, and the accompanying demands on the accuracy of the copying mechanisms, any substantial genetic mutations are exceedingly unlikely to yield a viable organism. Very minor mutations by contrast are much likelier to yield viable offspring, because they build upon what has already proven successful (and only a fraction of these minor viable mutations might actually prove to be an improvement). One might assert that Popper's criticism on Utopian engineering is essentially the same, it is very risky to want to start with a clean slate and akin to throwing away the baby with the bathwater. However one could argue that Utopian engineering does not 'jump randomly' like Dennett says, but instead in an intentional manner. However, bearing in mind the complete lack of experience which Popper cites[64] that we have in the department of large-scale social engineering, accompanied by our lacking faculty of prediction within the social sphere, it might as well be random.
Lastly, within the context of the Utopian methodology it is not possible to provide a plausible explanation to how society came about in the first place, whereas the dynamics of piecemeal engineering – taking into account the unity of design space – are completely congenial with the hypotheses on the evolutionary emergence of society (see Kitcher's thesis later on in this paper).

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61 TOS 153
62 TOS 156-157
63 DDI 288
64 TOS 151

However this is not part of the justification for democracy that I am working towards, so I will not elaborate on this further.

Summarizing, we can see that the method of piecemeal engineering and the algorithms of evolution boil down to the same essence: a non-teleological iterative process of adaptation/revision characterized by the process of engineering – a summary which is consistent with the conjectures on the nature of the unified design space of biological and human artifacts as discussed in part I of this paper.
However clear the analogy seems to be, we still haven't answered the question why we ought to link normative judgments to this insight. An analogy is not yet a justification.

As a side note: The relationship between piecemeal engineering and Utopian engineering can perhaps most clearly and simply be summarized as the opposition of evolution versus revolution respectively. However, in the theory of Political Ecology that I proclaim (which includes the concept of cultural evolution) there is no categorical difference between the open and closed societies. There is merely a difference in content of the extant memetic sphere: a closed society is predominantly filled with memes that promote conservatism, collectivism, and faith in authority (be it societal or metaphysical), whereas an open society is characterized by the general presence of memes that promote rational thinking, freedom of speech and faith in humanitarian values. In between there is of course a multitude of possible hybrids, as can be expected in an evolving system.

Why did Popper not see the similarities?
Given all the (somewhat obvious) similarities of Popper's theory with evolutionary theory, I cannot help but wonder why he did not see the same connection. After all he mentions the theory of evolution quite a few times in his book, however he always does this in reference to historicism. To him the theory of evolution fell in the category of historical prophecy, and was therefore disqualified of any legitimacy in the political sphere. I believe strongly that this is based on a misinterpretation on Popper's part, mainly on the point of his outdated notion of group selectionism. He equates the organism with collectivism, whereas from the gene's eye point of view, the organism is characterized as an environment of competition. Popper of course wrote his book a few decades before any of the aforementioned new insights were available. This, I believe is the main reason that he himself did not entertain the idea of there being a correspondence between piecemeal engineering and evolution. Another compounding reason could very well be the presence of various unpalatable views on biology in the nazi party ideology, resulting in a (perhaps still lingering) allergy to any theory pertaining to the biological origin and ancestry of humanity.

A scientific justification and its problems
Popper paired his faith in reason and humanitarianism together with his observations that the social world is much too complex for humanity to analyze and predict in a holistic sense, to justify the use of piecemeal social engineering over the Utopian method. And the piecemeal method in turn provides the justification for democracy, it being the only form of government compatible with the piecemeal method and the spirit of criticism and rationality. Finally democracy provides the means to the provisional end of resolving social evils which is in line with the spirit of humanitarianism.
This constitutes the bare bones of Popper's line of reasoning from foundation to end. Now, if we want to provide a scientific justification for democracy along the lines set out by Popper, we have to replace the elements of faith within the line of reasoning with a scientific alternative. In other words, can the framework of Political Ecology substitute for Popper's faith? I believe it can.

My thesis will find the justification for piecemeal engineering – and by extension democratic form of government – in the extended theory of evolution as proposed in part I. But if (an irrational) faith in reason and humanitarianism is replaced by scientific knowledge, one has to ask what justifies the use of science in the first place? Does science really fare any better than Popper's faith? Doesn't science itself – as a rational discipline *par excellence* – demand the adoption of the rationalist attitude to begin with? If so, then what is the point of providing a scientific justification for piecemeal engineering in the first place?
Without intending to segue this paper into too many epistemological reflections, I will briefly address the issue and make clear my presuppositions and claim that the justification for science lies in a different source than the faith in reason which Popper advocates, and that Dennett, Kitcher, and even Popper himself would agree with the alternative proposed next.
The alternative which I have adopted as well, is essentially the notion that the justification for science lies in a pragmatic instrumentalism, rather than a form of rational foundationalism as Popper seems to adhere to. Indeed, science operates on the principles of rationality, but that does not entail that the entire discipline including the value of its results depends on how well and consistently the rules of logic have been applied. According to Dennett, Kitcher and (I argue) even Popper, the value and subsequent justification of science and scientific knowledge lies in the application of it, in other words in its concrete real-life results and consequences. Below I have quoted a few passages in which this attitude comes to light prominently in Popper's writings.

> *"*Practice is not the enemy of theoretical knowledge but the most valuable incentive to it. Though a certain amount of aloofness may be becoming to the scientist, there are many examples to show that it is not always important for a scientist to be thus disinterested. But it is important for him to remain in touch with reality, with practice, for those who overlook it have to pay by lapsing into scholasticism. Practical application of our findings is thus the means by which we may eliminate irrationalism from social science..."[65]

And:

> "...in our analysis of the uncritical version of rationalism, arguments cannot *determine* such a fundamental moral decision [Popper refers to the adoption of the rationalist attitude]. But this does not imply that our choice cannot be *helped* by any kind of argument whatever. On the contrary, whenever we are faced with a moral decision of a more abstract kind, it is most helpful to analyse carefully the consequences which are likely to result from the alternatives between which we have to choose. For only if we can visualize these consequences in a concrete and practical way, do we really know what our decision is about; otherwise we decide blindly."[66]

It is clear that the primacy in Popper's reasoning lies with the empirical consequences of actions, rather than an intellectualist conception of rationality.
Further down on the same page Popper qualifies these statements with an important remark:

> "... a rational analysis of the consequences of a decision does not make the decision rational; the consequences do not determine our decision; it is always we who decide. But an analysis of the concrete consequences, and their clear realization in what we call our 'imagination' makes the difference between a blind decision and a decision made with open eyes..."[67]

The first subject to discuss in this third quote is the claim that 'it is always we who decide'. As we saw in part I, Dawkins and Dennett agree with this statement and so do I. This presupposition is essential if

65 TOS 428
66 TOS 437-438
67 TOS 438

we want to defend the thesis put forward in this paper against the objections of social Darwinism and sociobiology: As long as we presuppose that people are free agents, any alleged ethical conclusion following from evolutionary science can be dismissed without qualification. On the other hand however, this poses a fundamental problem in overcoming the naturalistic fallacy (the claim that one cannot derive an 'ought' from an 'is'). As long as consciousness and free will are included in the equation one can always dismiss any conclusion and act exactly opposite to what is implied. It seems we find ourselves between the proverbial Scylla and Charybdis.
Does this mean then, that science can never be a factor in any ethical matters? Considering that the field of inquiry of science is the empirical world itself – i.e. the domain of pragmatic experience – this seems absurd to a certain extent, because ethical matters in particular are pragmatic matters *par excellence.* After all, the matter of ethics boils down to the question of how to *act.*
It is of course far too ambitious to expect to settle this debate as part of this paper, and I believe it is more appropriate to heed Popper's suggestion in the second quote at the top of this page and adjust my ambitions for the purposes of this paper from trying to 'determine' the matter to providing an argument to 'help' make the scientific justification of democracy more plausible as a possibility. A pragmatic approach will surely help in this endeavour.
The scientific justification of piecemeal engineering, which is itself justified by the merit of its practical implications has the advantage over Popper's line of justification in that it does not exclude anyone beforehand (i.e. people who base their ethical choices on faith or emotion) by making overly strict demands. Anyone who believes in the application of science, can adopt the conclusions in favor of democracy put forward in this paper which substantially broadens the base of people to whom democracy would be a justified form of government. Similarly it is of course not only the rational fundamentalists in the vein of Popper who benefit from the advantages of the democratic system, but also the religious and emotivists, and perhaps even some of those who prefer a tyranny for the wrong reasons so to say.

Reason and imagination

The aim here then is to not necessarily supplant the faith in reason, but perhaps provide it with a more solid foundation than the mere predicate of 'faith' – which incidentally fits right in with the theme of piecemeal engineering (seeing as I'm not outright rejecting it, but attempting to improve it).
This brings us to the second important aspect of the last quote on the previous page, which is the reference to the analysis of concrete consequences in our 'imagination'. Popper uses the word a few times nearing the end of his book and always in the context of the consideration of consequences, however he does not elaborate further on its exact content. Nevertheless it clearly is a fundamentally important and indispensable component of the rationalist attitude when it comes to the weighing of consequences. From the context in which he utilizes the word it is quite obvious that Popper means a form of intentional consciousness which comes into play when a person is engaged in deliberation. According to Dennett, the imaginative consciousness has most likely evolved as a form of simulation device which enabled the running of tests in an internalized version of the outside world so as to predict the consequences of actions before they are executed, yielding an enormous survival advantage.[68]
When approached from an empirical perspective it is clear that this sort of faculty of consciousness is supposedly present in all homo sapiens (at least to a certain extent) and consequently that this faculty was not 'invented' by the Greeks or adopted in a conventional manner at the moment when a demand for a 'faith in reason' was first proposed. This conventional conception of rationality is merely the first culturally codified manifestation of a naturally present faculty. In other words, the subject at hand is the

68 DDI 375

first successful meme of rationality of which the lineage has been traced back to the pre-Socratics by Popper in his book. I say “first successful” because other civilizations might have used a similar meme, but it has not reached us in an uninterrupted succession in the same fashion.
When we adopt the empirical stance, it is clear that everyone reasons to a certain extent – it's just something we do, and it is not exclusive to the hypothetical Popperian rationalist – even those who utilize faith, intuition or emotion as a guiding principle in ethical and political matters. Consider for example a religious person who bases their actions on religious moral codes. The adherence to religious laws or maxims is more often than not motivated by the perceived consequences of non-compliance: it might have consequences for them within their community or perhaps in the hereafter, or how they think they will be judged by a supreme being. Similarly, people who base their political choice on emotion such as anger can most likely point out the source of their anger, and point out a social policy that can possibly relieve that emotion as a consequence. Kitcher too claims that recent work in neuropsychology suggests that the opposition of 'cold' reason to ardent passion is highly problematic, and that emotions often play a directive role in ethical deliberation.[69] The only real difference between a bona fide rationalist and the above examples is the extent to how far down one is willing to regress in their demand for reasons. But sooner or later everyone has to face the finitude of the regression and accept some unfounded presuppositions. The dynamics of how these presuppositions proliferate is the playing field of Political Ecology. When we accept the claim that everyone reasons, the following question is: how did such a capacity come about?

Kitcher's contribution
While Dawkins and Dennett provide a theoretical framework in which cultural evolution takes place, Kitcher actually attempts to fill out that framework in a concrete sense by providing a hypothesis on how the concept of culture could have possibly first come about (with the emphasis on 'possibly') in our species and how it evolved into its current form.
Kitcher's thesis answers a few important questions for us. First, it provides – when taken together with Dennett's argument – an alternative conception of rationality that doesn't depend on any metaphysical assumptions. Secondly it provides a pragmatic/functionalist conception of ethics that provides us with a pragmatic justification for democracy which is so far still lacking in my thesis. At this point I still haven't provided a compelling reason to accept that the analogous nature of evolution and piecemeal engineering actually justifies the democratic method. An analogy – however evident it might be – is not a justification. Seeing as the proposed framework is the main topic of this paper rather than a concrete history of cultural evolution, I will try to present Kitcher's argument as briefly as possible. Our main interest lies in the conclusion that he reaches, however it is illustrative nonetheless to run through his reasoning.

Kitcher adopts a position which he calls 'pragmatic naturalism'[70], which is essentially the same position as I have adopted echoing Dawkins and Dennett. It entails the concept of cultural evolution and the thesis that the capacity for ethical deliberation is a result of evolution which started out as a functional adaptation. He presents a few different forms of altruism, of which we have reviewed the analogs in part I, but also introduces the concept of 'psychological altruism'[71] which is a form of altruism in agents who are able to recognize the impact of their actions on the situation of others.[72] The psychology of

69 TEP 78-79
70 TEP 3
71 TEP 19 Whether or not this constitutes a form of true altruism need not concern us for it has no implications for the final conclusion, however Kitcher claims that it encompasses more than straightforward self-interest.
72 TEP 20

these agents is such that their desires are influenced by their perception of the needs and wants of other agents. When others are present, these agents tend to act differently from when they are solitary. These needs and wants can include such things as the emotions, intentions, and even the hopes and beliefs of others. Kitcher claims that the key factor in the development of psychological altruism in our ancestors lies in the emergence of mirror neurons[73], which allow the perceptions and sensations of other animals' behaviour and expressions to activate the same neurons in the observer as in the displayer (i.e. the origin and rudimentary form of what we call empathy).
This capacity for psychological altruism – among many other cognitive faculties – allowed our pre-ethical ancestors to 'invent' ethics.[74] In other words it allowed for the more complex and iterated variants of game-theoretical games (as discussed in part I) to be played, seeing as one needs to be able to recognize the other as a potential partner for cooperation in such a game before one can actually engage in games of reciprocal altruism.[75] Another fundamentally important step in the evolution of ethics was the acquisition of language,[76] which made it possible to preempt social ruptures through communication,[77] and eventually provided our ancestors with the devices for normative guidance – which is what we think of as ethical practice.
Kitcher goes on to explain the concept of cultural evolution as the constant invention and refinement of social technologies (such as division of labour, private property, trade, etc.) through the ever varying 'experiments of living' coupled with Darwinian cultural selection. I will not delve into this deeper, as much of it has already been explained, and the specific details of Kitcher's "how possibly" story need not concern us with regard to his conclusions.

The next order of business for Kitcher is the question whether the evolution of ethics is a matter of 'mere change' or if it can be understood as progressing in a meaningful way, such as through the discovery of (new) ethical truths or the accumulation of (ethical) knowledge.[78] Kitcher dismisses both of these notions of progress, but does not acknowledge the 'mere change' view either as there are some definite cases of ethical progress in his view. Some examples Kitcher examines such as the process of the emancipation of the role of women in western society make a good case for this notion of progress. It could be regarded as an increase of factual knowledge, as it came to light that under different conditions of socialization, women wanted things traditionally denied to them.[79] Examining the cases of the abolishment of slavery and the acceptance of homosexuality lead to the same conclusion, as prevailing opinions on normality and respectability shift. However, the concept of ethical progress remains difficult to determine as there is no objective measure and it is often a case of subjective opinion. After all, our appraisal of our moral codes is to a large extent the product of our ambient and developmental environment according to Kitcher[80] (in other words, dependent on the particular memetic sphere we live in). Rather, he characterizes ethical progress as a form of 'sleepwalking':

> "Human beings, individually and collectively, stumble along, sometimes responding to the difficulties of their social lives, sometimes feeling confined by the ethical codes they inherit, and consequently modifying those codes."[81]

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74 TEP 35
75 TEP 58
76 TEP 68
77 TEP 68
78 TEP 138
79 TEP 153
80 TEP 199
81 TEP 204-205

This characterization of 'stumbling sleepwalkers' has much in common with Popper's views on our lacking predictive faculties and our social institutes often being the unintentional byproduct of intentional actions.
According to Kitcher, the only tenable notion of progress – one which escapes the 'mere change view', which is a strict demand if we want to reach any normative conclusion – is a functionalist account which he compares with progress in the technological domain:

> "Progress with respect to these artifacts, and in the domain of technology generally, is readily understood as functional refinement. We start with a function to be fulfilled and an initial device that does the job. From first success descends a sequence of improvements..."[82]

Kitcher goes on to explain that biologists and physicians routinely discuss the functions of organs, bodily systems, cells and molecules in the same way,[83] after which he explains what is essentially the adaptationist point of view which we already introduced with Dennett in part I. This leads him to describe his general thesis on ethics in the following way:

> "Given this general view of functions and functional refinement, I propose that socially embedded normative guidance is a social technology responding to the problem background confronting our first full human ancestors."[84]

According to Kitcher this problem background changes constantly (recall the start of part II where we discussed Plato's attempt at arresting change), "generating new functions for ethics to serve, and hence new modes of functional refinement."[85] The previous considerations lead Kitcher to what he believes is the original function of ethics, which is the remedying of altruism failures[86] (note the similarity with Popper's notion of the provisional aim of piecemeal engineering which was the solving of social evils) – in particular altruism failures provoking social conflict[87] – which are caused by a problem background he describes as follows:

> "The tensions and fragilities of hominid (and chimpanzee) social life arise from the limited altruism of the participants. Altruism failures lead to conflict, to pain inflicted, to rough discipline, and lengthy peacemaking. To the extent altruism failures can be avoided, life goes more smoothly, with increased opportunities for cooperation and, consequently greater mutual benefits. Group members satisfy more of their desires and protest less. The first ethicists did not recognize themselves as responding to the problem of altruism failure – they simply wanted relief from social instability."[88]

Kitcher goes on by exploring the many ways in which functional generation and the refinement of the original function of ethics may take shape, and how it has actually played out in our more recent history, but for the intents of this paper we need not delve into that.
The final piece in this summary of Kitcher's thesis is the observation that we as a species have not (yet) transcended the original function of ethics[89]. Testament to this fact are the innumerable social conflicts

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83 TEP 219
84 TEP 221
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87 TEP 223
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and struggles that still exist around the world and the necessary presence of social structures to ameliorate them. Other more positive clues can be found in the continued increase of globalization and urbanization: The ever increasing complexity and nuance of the ethical apparatus we employ has enabled us to increase the scope (in number and density) of our society and its cities dramatically over the last few centuries.

Now, does Kitcher's account of cultural evolution and ethical progress allow us to overcome the naturalistic fallacy? As we recall, just because evolution and piecemeal engineering are analogous it does not necessarily mean that we need to adopt the latter method, given the existence of human agency. But if we accept that the evolutionary function of ethics is to remedy altruism failures, we have grounds to choose the piecemeal method – and by extension the democratic method – over the Utopian one on the basis of Popper's thesis. According to Kitcher, actual historical examples of ethical progress in the form of functional refinement always reveal that the premises for the modifications are partly normative and partly factual, where particular judgments and general principles exist in a reflective equilibrium.[90] The pragmatic approach to ethical progress exchanges the fundamental notion of ethical truth for ethical progress,[91] which has the consequence of sidestepping the criticism of the naturalistic fallacy. Whether or not the ethical framework is logically consistent is secondary to the matter whether the changes it undergoes fulfill its original function which is to resolve altruism failures:

> "Once ethics is viewed as a social technology, directed at particular functions, recognizable facts about how those functions can better be served can be adduced in inference justifying ethical novelties. The mystery that worried Hume disappears."[92]

How then does Popper's proposition of piecemeal social engineering – and by extension, the democratic form of government – fulfill the original function of ethics as described by Kitcher? Broadly speaking we can conclude with Popper (and Kitcher[93]) that dictatorships and other totalitarian forms of government constitute massive altruism failures because of their necessarily suppressive nature. More specifically we can return to part of our earlier enumeration of the downsides of Utopian engineering:

Totalitarian forms of government do not account for the presence of the inevitably evolving conceptions of the good life. Due to the progress of time and the unavoidable nature of cultural evolution, dissension is bound to come up sooner or later. In a totalitarian state any dissension is to be repressed – potentially with violence – because it is the only way for the system to deal with diverging opinions. The necessary permanent and widespread suppression constitutes a broad range of altruism failures toward the dissenting individuals, whereas democracies can absorb this dissension to a large extent and allow diverging voices to participate in the political process which will result in less altruism failures compared to the former.

Moreover, the revolutionary/clean slate approach to social engineering which Totalitarian governments tend to employ brings with it many risks. Societies are generally exceedingly complex conglomerations of systems with many unknown factors, and when it is subjected to radical interventions in the form of totalitarian social experiments, the chances of social upheaval are tremendous. It can for example possibly endanger the integrity of the financial system, of the industrial or agricultural complex, and of the military and police just to name a few examples. Failures of any of these societal subsystems could result in the collapse of the economy and financial system, failing law enforcement resulting in

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anarchy, and widespread hunger and/or worse. Suffice to say that such disastrous circumstances would engender a multitude of altruism failures. The chances of widespread failure of institutions is much smaller in a democracy due to the employment of the piecemeal method.
Democracy – by merit of its revisability – does in fact do justice to the ever changing conceptions of the good life of individuals (be it through societal or technological change), and the complexity of our social sphere. Additionally it is the only system that allows the dismissal of the government without bloodshed. According to Popper it is "the only known device by which we can try to protect ourselves against the misuse of political power"[94] and the institution that was designed for "preventing even bad rulers from doing too much damage."[95] In other words, it is the system that is the most suitable, and best equipped to deal with altruism failures.
Regarding the scientific justification of democracy, we can provide a very succinct summary as follows: By adopting a pragmatic, instrumental stance we can pose the question as to what the original evolutionary function of ethics is and subsequently conclude that the democratic system with its method of piecemeal engineering is the most conducive to this function.

Democracy as an ESS

Now that the justification has been provided, it is time to return to the ancillary question underlying this paper. The answer to the question whether the democratic system constitutes an ESS is not a necessary component of providing the scientific justification for democracy, however in my view these two matters are highly correlated.
It is my contention that democracy possesses a higher order stability – in evolutionary terms – because it is dynamic in the sense that it allows for a mix of strategies and therefore the possibility of arriving at an equilibrium, compared to other static forms of government with only one available strategy as directed from above (be it in the metaphysical or dictatorial sense). The democratic system can find this balance over and over again in the presence of continually changing circumstances. Underlying the self-corrective balance of the ESS, and the revisability of the democratic system are essentially the same dynamics, which can be regarded as corroborative evidence of the analogy between evolution and democracy as demonstrated in this paper, and the viability of Political Ecology as a model.
As change is ever-present, progressiveness is a necessity. Even for the most adamant conservative, it is relevant to the extent that maintaining a theoretical status-quo exactly as it is requires a conception of how to adapt to the ever changing world in order to maintain it. Therefore the ability to adapt is the most fundamental value that is demanded of any political system.
How does the democratic system fulfill this demand for revisability?
With a scientific substantiation of democracy we can no longer appeal to the universal values of rationality and humanitarianism that Popper advocated. The dynamics that enable the evolutionary process within the democratic system which form the bare necessity for its continued functioning are now warranted through a scientific justification. With this move Popper's substantive conception of democracy has been exchanged for an instrumental one.
What then are the functional demands of this piece of social technology keeping in mind the analogous nature of evolutionary theory? The answer is quite simple: the system needs to performs the basic function of progress through trial and error as Popper explained in his method of piecemeal engineering without the system itself being toppled over. This means that the basic algorithms of the evolutionary process of variation and selection need to be guaranteed within the system.
In a democracy variation is secured through freedom, after all, to perform new experiments of living freedom of thought is needed to enable the imagination to engender new solutions to the ever changing

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social problem background. Freedom of speech is needed to propagate these ideas in society so it can be seen whether the idea has any merit in the minds of the wider populace. 'Good ideas' will fall into the fertile grounds of favourably inclined minds while 'bad' ideas will fail to gain traction. This is one aspect of the function of selection. A properly functioning government is also needed as a mediator when the differing conceptions of the good life and the subsequent experiments of living are in functional conflict (as Kitcher calls it) with each other. Free elections and the possibility to dismiss a government are needed to make sure that the criteria which are applied by the government are a reflection of the prevailing meme complexes in wider society. These prevailing meme-complexes together with the functional government in which they are reflected form the guarantee for the function of selection.
These conceptions of variation and selection are in a sense the engine of the evolutionary process, but there is one more aspect necessary to incorporate them in a viable system.

A final recommendation[96]
Freedom and its ever necessary counterpart tolerance need to be constrained to a certain extent. Popper formulates this necessity in his now famous *paradox of tolerance:* "unlimited tolerance must lead to the disappearance of tolerance."[97] In the context of this paper, this can be transposed to the demand that any anti-democratic thought intent on toppling the democratic system ought not to be tolerated. If we claim that the system proposed in this paper is justified because of its functionality, any means to protect its continued functioning as a self-correcting system, is justified to be included within the system itself. Popper formulates this principle as part of a longer list of demands concerning the functions of a democracy, two of which remain very much relevant in the conception of democracy put forward in this paper:

> "3. A consistent democratic constitution should exclude only one type of change in the legal system, namely a change which would endanger its democratic character."[98]

> "7. Democracy provides an invaluable battle-ground for any reasonable reform, since it permits reform without violence. But if the preservation of democracy is not made the first consideration in any particular battle fought out on this battle-ground, then the latent anti-democratic tendencies which are always present … may bring about a breakdown of democracy. If an understanding of these principles is not yet developed, its development must be fought for. The opposite policy may prove fatal; it may bring about the loss of the most important battle, the battle for democracy itself."[99]

Further on Popper formulates how democracy ought to be defended:

> "The defence of democracy must consist in making anti-democratic experiments too costly for those who try them; much more costly than a democratic compromise."[100]

This I believe is more or less the exact attitude that is necessary to enable the delineation of democracy as an Evolutionary Stable Strategy. Popper's formulation is strikingly similar to how we defined an ESS in part I, especially the underlying cost-benefit analysis for the deviant strategy. Democracy constitutes

96 For a much more thorough and complete treatment of this final subject I recommend Bastiaan Rijpkema's *Weerbare Democratie, De Grenzen van Democratische Tolerantie*. Amsterdam (Uitgeverij Nieuw Amsterdam) 2016, to which I owe the concept of democracy as self-correction.
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98 TOS 368
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a broad mix of strategies which, as long as they are all in agreement on the principle of tolerance (i.e. any particular strategy does well against any other strategy that accepts the principle of tolerance, i.e. the tolerant strategy does well against itself, which is the hallmark of an ESS) and intolerance toward strategies directed against the system itself, will make it more or less impossible to being invaded by such anti-democratic strategies.

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