

The Second Replicator

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Summary

This paper sets out the theory of memetic evolution. It postulates that for higher animals there are two replicators in operation: genes controlling the evolution of physical form and instincts, and memes controlling the development of skills and behaviours. It further asserts that, just as Richard Dawkins described life-forms as the survival vehicles for genes, communities of animals are the survival vehicles for memes.

Humans have the unique ability to transmit memes by methods other than imitation. As a result, they have developed many different types of community, each with its own meme sets. The success story of human evolution is a consequence of increasingly specialised communities, each competing for their own niche in society. With the development of the internet and the mobile phone, memetic evolution is accelerating; as a result, the balance of competition between communities is changing and this in turn creates new evolutionary challenges.

Definition of a meme

Billions of years of genetic evolution have determined human instincts and physical characteristics. In the *Selfish Gene*, Dawkins identified a second evolutionary process at work, the development of skills and behaviours through the transmission of ideas, or as he called them memes. He imagined memes as ideas that could be copied from one brain to another. To quote Dawkins:

Examples of memes are tunes, catch-phrases, clothes fashions, ways of making pots or building arches. Just as genes propagate themselves in the gene pool by leaping from body to body via sperms or eggs, so memes propagate in the meme pool by leaping from brain to brain via a process which, in the broad sense, can be called imitation.

These transmitted memes result in animal behaviour being replicated across generations. In other parlance, memes are responsible for behaviour that is induced by nurture, rather than nature.

We know memes exist in the brain. We know they allow higher animals to express specific behaviour or skills. We know higher animals can use their senses to observe other animals' behaviour and reproduce the same action. We know little, however, of the physical form of memes and little of how they function in the brain. Fortunately, we don't need to know how the process of storage and replication of ideas works in the brain to make progress in understanding memetic evolution. It is sufficient to observe that higher animals can replicate behaviours and accept that the mental processes are unknown. Memes are defined in this paper as ideas shared between individuals which allow them to exhibit common behaviour, deploy specialist skills and hold common beliefs. I shall call groups of individuals sharing the same memes, a community.

Evolutionary Mechanism

In evolutionary terms a replicator is anything that can be copied from one life-form to another that satisfies three criteria: it must be capable of being copied reasonably faithfully; it must be susceptible to change over a period of time, and it must confer an evolutionary advantage. Both genes and memes fulfil these criteria.

In *The Selfish Gene*, Richard Dawkins sets out the argument that all life-forms are survival mechanisms for their genes. Life-forms have finite lives but genes can survive indefinitely. Evolution is a battle between survival mechanisms. Those genes that provide the code for the best survival mechanisms in a particular environment will have the best chance of success. Dawkins uses the word vehicle for the gene-containing life-form.

In the memetic evolutionary process there is a different vehicle, a community of animals. Memetic evolution works in parallel to genetic evolution. Communities of animals create and copy memes. Successful communities will thrive and propagate their memes; the memes of failed communities will die out.

Chimpanzees have three levels of competition that affect their evolution: the genetic, the individual and the band. On the lowest level many genes are competing with rival genes and cooperating with synergistic genes to produce a successful chimpanzee. Success in evolutionary terms is measured by the number of replications. On the next level, individual chimpanzees are both competing and cooperating with members of their band. Their evolutionary aim is to improve their overall status and, as a result, to enhance their mating prospects and the success of their offspring. On the highest level, bands compete against other bands for the best feeding grounds. Success at the top two levels depends both on the genetic health of the band's members and the robustness of its memes. Just as individual chimpanzees are survival mechanisms for their genes, bands are survival mechanisms for their memes. This concept of multilevel evolutionary competition with two replicators should be true for all animals that are territorial and live in large groups.

Although the principle of survival of the fittest operates for both genetic and memetic evolution, the characteristics of the processes involved are quite different:

- Whereas genes can only be transmitted by sexual reproduction, memes can be transmitted in many ways, particularly in humans e.g., by speech or by writing.
- Genes can only be transmitted from parents to children. Memes can be transmitted between unrelated communities.
- Genes can be physically identified and their chemical expression can be analysed. Memes on the other hand cannot be measured and they are only physically present as a configuration of neurons in the brain. We only know of their presence by the behaviours and skills they engender.
- Favourable memetic mutations occur more frequently than genetic mutations. As a result, memetic evolution is much more rapid.

- Each human has only one set of genes but has several different meme sets derived from each of the communities that he/she belongs to.

Genes and memes have co-evolved. Gene development enabled meme development; the genetic evolution of the brain was necessary for humans to converse using language. Similarly, some memes could not be fully exploited without genetic change; as an example, tolerance to lactose in milk developed after humans had discovered how to domesticate cattle.

Gene and meme development is also independent. The custom of Roman Catholic priests to remain celibate clearly inhibits any genetic development of catholic priests but the custom has survived for centuries. Similarly, autism, a genetically determined condition, has survived despite the resultant limitation in communicative skills. Memes, however, have the advantage of being able to tap into genetically based instincts to arouse individual and communal feelings. Feelings of beauty can be gained by looking at a picture, feelings of joy can be felt by singing and dancing and, most importantly for humans, feelings of kinship can be aroused by identifying an individual as one of us.

The only method of meme transmission mentioned by Dawkins was imitation. The basic reason why the human species has been so successful is that, unlike other animals, they have the ability to communicate memes by speech. The rate of memetic evolution is clearly dependent on the speed and accuracy of communication. For hunter–gatherers the maximum speed of communication was only as fast as they could move from place to place. In practice memes took a very long time to spread from band to band and onward across continents. As human society became more technically competent, other methods of communicating memes were developed, including writing, printing, arithmetic and education. For the early hunter–gatherers the standard of living changed little over 10,000 years. Around 5000 years elapsed between the development of agriculture and the first written records. Since the Industrial Revolution, 250 years ago, the pace of evolutionary change has increased dramatically. With the development of the mobile phone and the internet the speed of human advance has accelerated again.

Community evolution

Memetic evolution changes human culture and much of the development of memetic theory has been carried forward by studies in cultural evolution. For example, Mark Pagel in *Wired for Culture* develops the idea of meme vehicles in explaining the development of human co-operation and community interaction. This paper however concentrates on the evolution of communities rather than culture. Whereas chimpanzees live in just one type of community, the band, humans have evolved many different types of specialised communities. Each of these communities fulfils its own separate niche role in the complicated multi-level structure of human society. Just as there are different species and genera of life-forms, there are different species and genera of communities, each perpetuating the memes which allow them to play specific roles in society. Examples of different community-species are football teams, Christian religions and schools. The equivalent community-genera would be sports teams, religions, and educational institutions. For example, Arsenal football team competes with other teams in the community-species ‘football teams’ and competes to attract spectators from other sports teams in the community-genus ‘sports teams’.

Each community-species has 3 defining types of memes: skilful, competitive and political-cultural. Its skilful memes define its niche role. For example, consider the community-species of bakers who have the role of converting flour into bread. All bakers have a technical expertise in procuring flour, cultivating yeast, preparing the dough and cooking the bread. They have a large stock of recipes and baking experience to call on. Bakers only emerged as a species-community when humans started living in towns away from their farms.

Competitive memes concern the way communities compete with each other. This is the critical evolutionary process. Competitive behaviour between bands of territorial animals often involves violence. Chimpanzees maintain exclusive feeding rights to their own territory by ambushing individuals from an opposing band and maiming or killing them.

Human hunter-gatherer bands were also territorial. The weapons available allowed violence to become more prevalent and lethal. *Homo sapiens* became the first animal on Earth to kill members of its species in large numbers. 10 to 20% of humans suffered a violent death in hunter-gatherer times. Right up to modern times war and violence have always been the ultimate decider of the success and survival of communities. Tribes, states and empires all fought each other as a matter of course. Great military leaders were and still are glorified.

Today, happily the human race has learned to compete in other less destructive ways. Much pent-up youthful aggression is released on the sports field. New governments are now often elected rather than instituting a military coup d'état. The most important form of competition is economic. With the coming of the industrial revolution, a new sort of community-genus was formed, an industrial enterprise or limited company. Companies raised capital, invested their money in a business opportunity and endeavoured to pay a dividend to their shareholders. Those that prospered could raise more money and grow. Those that could not pay their debts ceased to exist. Competition between companies was a classic case of survival of the fittest. In advance of Darwin's idea of 'natural selection', the Scottish political economist Adam Smith identified the 'invisible hand to promote an end which was no part of his intention'.

Political-cultural memes define the underlying conventions and assumptions that define how individuals, communities and state organisations relate to each other and how power is exercised. They are the crucial interactions that maintain the cohesion of the community. They are a combination of the shared values of a community, often expressed in a religion or a philosophy of life, and the conventions of administration. In a modern state political-cultural memes include shared beliefs, individual rights and responsibilities, social conventions, the way commerce is managed, the administration of the law and the organisation of government.

In mediaeval times the combination of feudalism and religion defined the political culture of a country. Four broad political cultures were dominant in Eurasia: Catholic monarchies, Confucian empires, Islamic sultanates/emirates and Hindu kingdoms. Since that time, following the gradual acceptance of the scientific approach, people have become less superstitious and more accepting of secular reasoning. The dominant political culture in the wealthiest countries in the world, sometimes called 'western democracy', now includes the encouragement of trade and industry, a democratic style of government, an aversion to discrimination and an acceptance of individual rights.

Societies

Our hunter-gatherer ancestors lived in a society which had three nested community-genera, the family, the band and the broader community of bands; each had its distinct sets of memes. All human community-genera have evolved from these three original meme vehicles.

Families were responsible for training most of the band's technological memes. Communal activities in the band were arranged by common agreement and peer pressure was the principle means of maintaining discipline. Skills in warfare were learnt at the band level. The band-community all spoke the same dialect; this allowed community members to share ideas and information. Communities of bands met regularly for trade, to arrange marriages and to participate at seasonal festivals. Bands also cooperated in armed conflict against other band-communities. This band interaction enabled the band-community to share the same cultural memes; they had similar dress, rituals and shared stories and superstitious beliefs.

As technology improved and human population increased, new community-genera evolved and the structure of society changed. Only one of these communities had the principle power to coerce its members into action. Bands were the key coercive force in hunter-gatherer society; bands would evolve into tribes, chiefdoms, kingdoms, constitutional monarchies and republics. Other community-genera operated at one of three levels: above, below or at a level with the community that represents the key coercive force in society.

At the level between the family and the band which I have called the co-operative level, new types of community-genera came into existence, these included specialist trades, merchants, educational establishments, armies, health services and many others. One of the most important was class. It is important to realise that each community competes and co-operates to enhance its status in society. From the time of the tribal chiefdoms to the present day, there has always been a privileged class who is trying to maintain and exploit their position of power.

Class community-genera often have no organisational leadership. The concept that communities can compete without a functioning leadership needs explanation. It seems that, if individuals in a community have common backgrounds and interests, their collective actions support the community as a whole. This is born out in our history. In pre-industrial times, the aristocracy, clergy, gentry, tradesmen and the poor, each had their own specific culture and interest. The same was true of the upper, middle and lower classes in Britain after the industrial revolution. Around about the time of the Second World War these classes operated in almost different worlds. They spoke differently, were educated separately, had different roles in society and rarely mixed socially.

Thomas Picketty, in his book *Capital in the Twenty First Century*, has shown that in the major countries of the world the period from 1950 to 1980 was the most egalitarian period in terms of income and wealth in at least the last two centuries. Indeed, it is probably the first time this level of equality had been achieved since the dawn of civilisation.

In my book, *Memes, Societies and Human Evolution* I have identified that, during human evolution, there have been eight basic types of society: hunter-gatherer, tribal, regional state, city state, empire, mediaeval, industrial and global-industrial. In figure 1 below I show the community-genera of the modern global-industrial society.

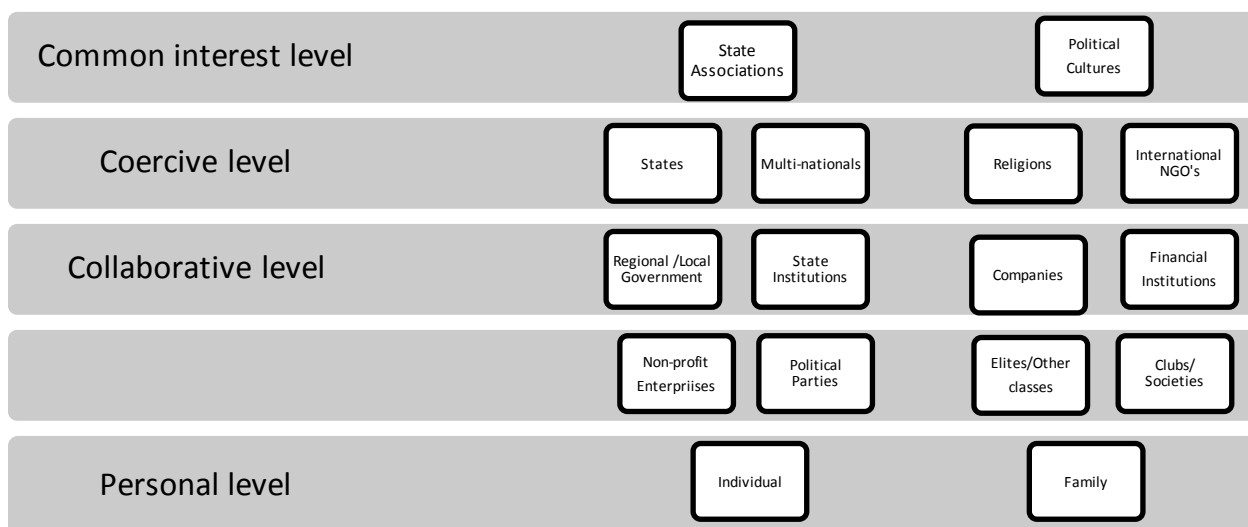


Figure 1 Community structure of the Global-Industrial Society

Above the coercive level, which I call the common interest level, there are state associations such as the UN and the EU. There are also communities of states sharing a common political culture, such as ‘western democracies’.

The significant feature of the global industrial society is that there are important community-genera at the coercive level. These are genera that are not controlled directly by any individual state. These include religions, multi-national companies and international NGO’s.

Multi-national companies are the organisations that have gained most from the internet and the growth of trade in the global-industrial society. They design the product to include all the latest technical innovations, source their raw materials internationally, manufacture their goods in the cheapest location, ensure quality by setting rigorous standards and market the product globally. The consumer across the globe benefits by receiving good quality products at affordable prices and, as owners of the brand, the expertise, power and profit of these multinationals continues to increase.

However, the power of multinationals has now grown to such an extent that they have become independent of the states that originally harboured them. They are free to invest in, operate from, or trade with whichever country suits their needs best. This has changed the balance of power between states and companies, and business elites and politicians, and has a major impact on the operations of democracy. With the coming of the global-industrial society, the evolutionary competitive paradigm that existed over the past two centuries has changed significantly. As a result the wealth gap between rich and poor nations has narrowed at the same time as the class divide between rich and poor has widened.

Conclusion

Human evolution is the result of both genetic and memetic changes. However, the spectacular success of *Homo sapiens* compared to other mammals is almost entirely due to the evolution of

memes. Humans live in a complicated world of competing communities all defined by their meme sets.

Occasionally new technological memes, such as the internet, drastically alter the way we all live. Now and then new types of community-genera, such as NGO's, evolve in response to a human need. Political-cultural memes are forever changing, as humans come to understand more of the world around them and a more rational view of the world emerges. However, the structure of society changes very rarely. Such a new structure has recently emerged with the global-industrial society. This brings with it a raft of new evolutionary challenges; the power of multi-nationals is one example; global warming is another.

The evolutionary process whereby each gene, individual and community of individuals competes and cooperates for its own benefit has created a species of animal that has dominated planet Earth. This same evolutionary process is now driving *Homo sapiens* towards an ecological catastrophe due to global warming. Evolution is blind and has no inbuilt mechanism for taking precautions against dangers that are decades away. Just as other animals, we are bound to an ongoing struggle for survival in evolutionary competition. To solve the issue requires coordinated global action, but there is no world organisation in place that can force change and our current organisations have limited scope for cooperating to resolve long-term issues. We have the technical knowledge to overcome global warming. The crucial issue is how to circumvent evolution, overcome our competitive instincts and cooperate for the good of the whole species.

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At the first lecture I attended here Peter Westbroek asked the question 'How do you integrate human civilisation into natural sciences?'. Or put it another way, how does Big history provide the tools that allow historians to research how evolution affected the modern story of human civilisation?

I am going offer a way forward, because, just as with other animals, evolution must be the main driving force for human development. All the triumphs of human civilisation are the result of an evolutionary process which is born out of a battle for survival of the fittest. It is not, however, the same battle as outlined by Charles Darwin in the *Origin of Species*. It involves the struggle for survival by human communities. I shall argue that, just as Dawkins saw life-forms as the vehicle of replication of genes, so human communities are the vehicles of a second replicator, memes. I shall argue that inter-community competition enabled humans to develop new memes for technologies, laws, weapons, science, religions, systems of organisation and all the other characteristics of human society.

[] Memes are ideas shared between individuals which allow them to exhibit common behaviour, deploy specialist skills and hold common beliefs. It was Dawkins who first mentioned memes in his book the *Selfish Gene*. He observed that memes or ideas could be considered as evolutionary replicators just like genes. They can be copied from generation to generation, mutate and confer an evolutionary advantage.

They are amazing things. We know higher animals can use their senses to observe other animals' behaviour and reproduce the same action. Memes must be the result of activity in an animal's brain. We know nothing however, of the physical form of memes and little of how they function. However, just as Darwin didn't know of the existence of DNA when he proposed the theory of evolution, we don't need to know how the process of capture, storage and replication of ideas works in the brain to advance the study of memetics.

Since Dawkins published the *Selfish Gene*, studies in memetics appear to have stalled. Far too much emphasis has been placed on the effect of memes on the individual. Memes have been considered as viruses in the human brain. However, in my opinion, this misses the point. The essence of memes is that they are shared between individuals. It is communities that store memes and preserve them for future generations. [] In the language Dawkins used in the *Selfish Gene*, communities are the vehicles of memes. Successful communities

will thrive and propagate their memes; the memes of failed communities will die out.

Just as genetic evolution has resulted in the creation of new species, memetic evolution has resulted in the creation of new forms of communities. [] The human story is one of the creation of new, larger and more specialised communities. Chimpanzees live in just one type of community, the band. Our hunter-gatherer ancestors lived in a society which had three nested types of community, the family, the band and the broader community of bands. All the many types of community we have today: religions, states, companies etc. have evolved from these three original meme vehicles.

In fact, just as there are different species of life-forms, there are different species of communities, each perpetuating the memes which allow them to play specific roles in society. Examples of different community-species are football teams, Christian religions and schools. Just as species can be grouped into genera, so can community-species be grouped into community-genera. The equivalent community-genera would be sports teams, religions, and educational institutions.

[] Each community-species has 3 defining types of memes: skilful, competitive and politico-cultural. Its skilful memes define its niche role. As simple example of skilful memes occurs in the community-species of bakers who have the role of converting flour into bread. All bakers have a technical expertise in procuring flour, cultivating yeast, preparing the dough and cooking the bread. They have a large stock of recipes and baking experience to call on. Bakers only emerged as a species-community when humans started living in towns away from their farms.

Competitive memes are the second type of meme that define a community. These concern the way communities compete with each other. This is the critical evolutionary process. Our hunter-gatherer ancestors were territorial and competed violently. Armed with clubs, bows and arrows and spears, *Homo sapiens* became the first animal on Earth to kill members of its species in large numbers. 10 to 20% of humans suffered a violent death in hunter-gatherer times. Right up to modern times war and violence have always been the ultimate decider of the success and survival of communities. Tribes, states and empires all fought each other as a matter of course. Great military leaders were and still are glorified.

Today, happily the human race has learned to compete in other less destructive ways. Much pent-up youthful aggression is released on the sports field. New governments are now often elected rather than instituting a military coup d'état. The most important form of competition is economic. With the coming of the industrial revolution, a new sort of community-genus was formed, an industrial enterprise or limited company. Companies raised capital, invested their money in a business opportunity and endeavoured to pay a dividend to their shareholders. Those that prospered could raise more money and grow. Those that could not pay their debts ceased to exist. Competition between companies was a classic case of survival of the fittest. Since companies were formed the rate of development of technological memes has accelerated dramatically. In advance of Darwin's idea of 'natural selection', the Scottish political economist Adam Smith had already identified the 'invisible hand to promote an end which was no part of his intention'.

Political-cultural memes are the third type of meme that define a community. These are the underlying conventions and assumptions that define how individuals and communities relate to each other and how power is exercised. They are the crucial interactions that maintain the cohesion of the community. They are a combination of the shared values of a community, often expressed in a religion or a philosophy of life, and the conventions of administration. In a modern state, its political-cultural memes include shared beliefs, individual rights and responsibilities, social conventions, the way commerce is managed, the administration of the law and the organisation of government.

The development of political cultures has been critical in the human story. They have allowed large numbers of humans to interact in a collaborative fashion. In mediaeval times the combination of feudalism and religion defined the political culture of a country. Just four broad political cultures were dominant in Eurasia: Catholic monarchies, Confucian empires, Islamic sultanates/emirates and Hindu kingdoms. Since that time, following the gradual acceptance of the scientific approach, people have become less superstitious and more accepting of secular reasoning. The dominant political culture in the wealthiest countries in the world, sometimes called 'western democracy', now includes the encouragement of trade and industry, a democratic style of government, an aversion to discrimination and an acceptance of individual rights.

There are many differences between genetic and memetic evolution but one of the strangest is the fact that each human has only one set of genes but has several different meme sets derived from each of the communities that he/she belongs to. This has allowed humans to live in a complicated multi-level world of interacting communities that I call a society. [] In my book, *Memes, Societies and Human Evolution* I have identified that, during human evolution, there have been eight basic types of society: hunter-gatherer, tribal, regional state, city state, empire, mediaeval, industrial and global- industrial.

All of these societies have different types of communities interacting in different ways. [] Hunter-gatherer societies were the simplest. Different types of memes were held in different community-genera. Broadly speaking families were responsible for training most of the band's skilful memes. Competitive and organisational memes were developed at band level. Band communities all spoke the same dialect and held the bands main cultural memes. As technology improved and human population increased, meme development became more specialised, new community-genera evolved and the structure of society changed.

In all societies there is one principle community that has the power to coerce its members into action. Bands were the key coercive force in hunter-gatherer society. They maintained discipline by peer pressure, with the ultimate threat of expulsion from the band which was life threatening. Bands would evolve into tribes, chiefdoms, kingdoms, constitutional monarchies and republics all of which retained control in different ways. All other community-genera operate at one of three levels: above, below or at a level with the community that represents the key coercive force in society. []

At the level below the coercive level, which I have called the collaborative level, new types of community-genera came into existence, these included specialist trades, merchants, educational establishments, armies, health services and many others. One of the most important was class. It is important to realise that each community competes and co-operates to enhance its status in society. From the time of the tribal chiefdoms to the present day, there has always been a privileged class who is trying to maintain and exploit their position of power.

Class community-genera often have no organisational leadership. The concept that communities can compete without a functioning leadership needs explanation. It seems that, if individuals in a community have common backgrounds and interests, their collective actions support the community as a whole. This is born out in our history. In pre-industrial times, the aristocracy, clergy, gentry, tradesmen and the poor, each had their own specific culture and interest. The same was true of the upper, middle and lower classes in Britain after the industrial revolution. Around about the time of the Second World War these classes operated in almost different worlds. They spoke differently, were educated separately, had different roles in society and rarely mixed socially.

[] I show here the structure of the modern global industrial society. You see immediately the increased complexity. Above the coercive level, which I call the common interest level, there are state associations such as the UN and the EU. There are also communities of states sharing a common political culture, such as 'western democracies'.

The significant feature of the global industrial society is that there are important community-genera at the coercive level which are not controlled directly by any individual state. These include religions, multi-national companies and international NGO's.

Multi-national companies are the organisations that have gained most from the internet and the growth of trade in the global-industrial society. They design the product to include all the latest technical innovations, source their raw materials internationally, manufacture their goods in the cheapest location, ensure quality by setting rigorous standards and market the product globally. The consumer across the globe benefits by receiving good quality products at affordable prices and, as owners of the brand, the expertise, power and profit of these multinationals continues to increase.

[] However, the power of multinationals has now grown to such an extent that they have become independent of the states that originally harboured them. As George W. Bush said nobody tells those guys what to do. Multinationals are free to invest in, operate from, or trade with whichever country suits their needs best. This has changed the balance of power between states and companies, and business elites and politicians, and has a major impact on the operations of democracy. With the coming of the global-industrial society, the evolutionary competitive paradigm that existed over the past two centuries

has changed significantly. While the gap between rich and poor countries has narrowed, the class divisions in society have widened.

This subject is important for us all. Just as other animals, humans are bound to an ongoing struggle for survival in evolutionary competition. With the advent of the internet and the mobile phone the rate of meme creation is accelerating, new types of communities are emerging and the competitive paradigm is rapidly changing. Evolution is happening now in front of our eyes. The coming of the global-industrial society brings a whole raft of new evolutionary challenges; the power of multi-nationals is one example; global warming is another. [] Evolution is blind and has no inbuilt mechanism for taking precautions against dangers that are decades away. To solve the issue of global warming requires coordinated global action, but there is no world organisation in place that can force change and our current organisations have limited scope for cooperating to resolve long-term issues. We have the technical knowledge to overcome global warming. The crucial issue is how to circumvent evolution, overcome our competitive instincts and cooperate for the good of the whole species

Ladies and gentlemen this is a big subject and twenty minutes is a very short time to get these ideas across. I come back to where I started. I believe memes are the second replicator and human civilisation is the product of co-evolution of genes and memes. I also believe that the human ability to communicate memes by speech explains the huge difference in the evolutionary path of humans compared to all other animals. Finally, I hope I've demonstrated that the human success story is the result of communities competing by developing increasingly specialised and effective meme sets.

I am not a scientist; I suspect these ideas are actually difficult to prove scientifically. They can, however, be tested by historians. We have a huge information base of written and archaeological history. Historians can shed new light on the human story by considering history from an evolutionary standpoint. This story is not only relevant to understand human progress up to now but also for all of our futures.

The second replicator

Roger Heppleston July 2016

How do you integrate human civilisation into natural sciences?

Peter Westbroek 15/07/16

Mememes are ideas shared between people



They allow them to:

- exhibit common behaviour
- deploy specialist skills
- hold common beliefs

Communities are the vehicles of memes



Successful communities will thrive and propagate their memes; the memes of failed communities will die out



Human evolution is the story of the evolution of different species of communities

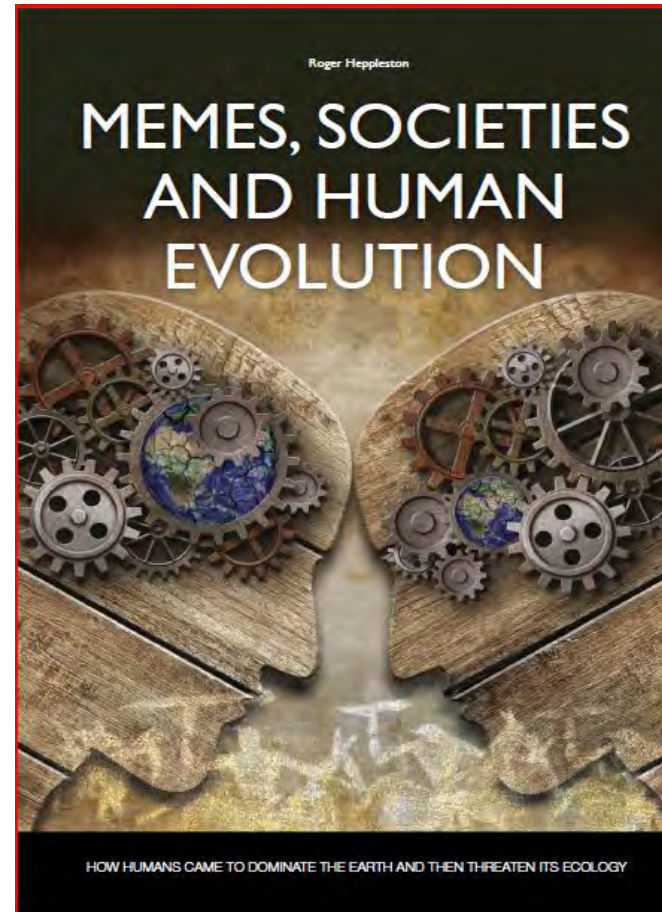


3 types of memes define a community

- ▶ Skillful
- ▶ Competitive
- ▶ Politico-cultural

In human history there have been 8 basic types of human society

- ▶ Hunter-gatherer
- ▶ Tribal
- ▶ Regional state
- ▶ City state
- ▶ Empire
- ▶ Mediaeval
- ▶ Industrial
- ▶ Global industrial



Hunter-gatherer society

Band-
community

Band

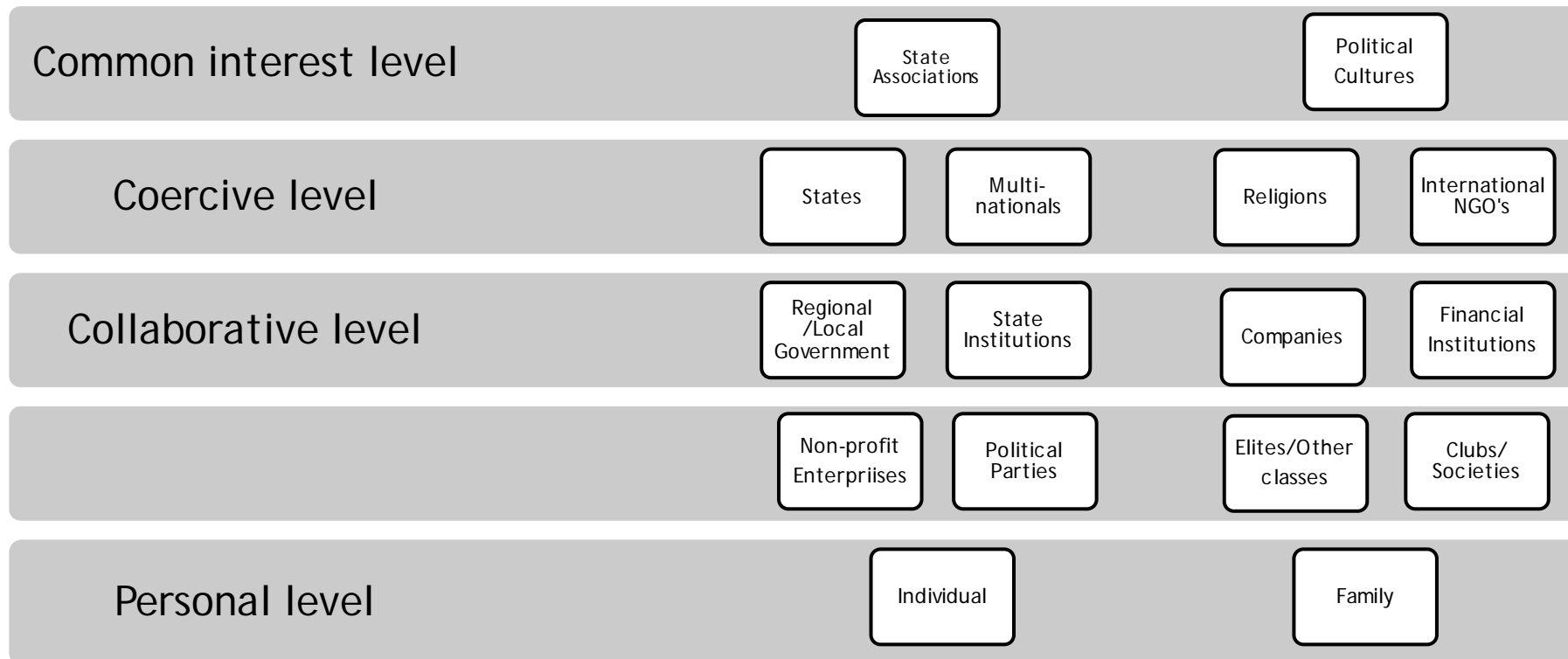
Family

Individual

Society Levels

- ▶ Common interest level
- ▶ Coercive level
- ▶ Collaborative level
- ▶ Personal level

Global industrial society



Multi-nationals have escaped state control



What can stop the human race from over-exploiting the Earth's resources?

