

The Cognitive Revolution



HARVARD MUSEUM OF NATURAL HISTORY: SKULLS & THE EVOLUTION OF HOMO SAPIENS (PHOTO CREDIT: CHRIS DEVERS)

This week's course continued with The Cognitive revolution. Lectures concentrated on the advances made by *Homo Sapiens* about 70,000 years ago which enabled them to conquer the world and drive all other human species to extinction. During this revolution, [Homo sapiens](#) developed a new and remarkable kind of language. We explored how this language was different from the languages of earlier human species and of other animals; what the advantages that *Homo sapiens* gained from this unique language were.

These are my course notes taken from [Dr. Yuval Noah Harari's](#) video lectures.

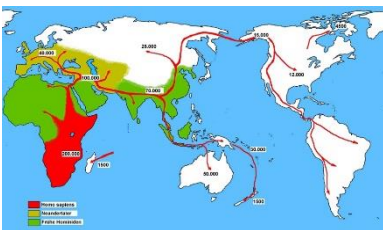


Evidence of changes

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[Homo sapiens](#), spread out of East Africa and settled throughout the entire world. They drove all the other human species to extinction, and became the most powerful animal and most important animal on planet earth. The secret of their success is not easy to pinpoint. *Homo Sapiens* had been around for much more than just 70,000 years but previously hadn't done anything special. Sapiens living in East Africa, about 100,000 years ago already looked just

like us. Their anatomy was equivalent and brains were the same as ours in both size and external shape. Yet, these archaic sapiens from a 100 to 120,000 years ago didn't produce any sophisticated tools or accomplish any special feats. They did not enjoy any marked advantage over the other human species around like the [Neanderthals](#), the [Erectus](#) or [Homo Denisova](#). Indeed, when some ancient sapiens migrated for the first time from the Middle East about 100,000 years ago, they were driven back by the local Neanderthal population. Remains of sapiens in various sizes were found in the Middle East, mainly around what is today Israel, Palestine, Jordan and Lebanon. These remains date from about 100,000 years ago and after some time they disappear. This leads most scientists to agree that sapiens made the first attempt to migrate from East Africa to towards the Middle East, about 100,000 years ago. The Neanderthals were better. They were more powerful, and more adapted to the environment. The sapiens disappeared from the Middle East and stayed only in East Africa. However, 30,000 years later, which is about 70,000 years ago, something amazing happened to Homo sapiens and they began doing very special things not only in East Africa but spreading from there and settling all over the world.



The spread of Homo Sapiens

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About 70,000 years ago some sapiens groups left Africa for a second time. They migrated from East Africa to the Arabian Peninsula in the Middle East. This time, they drove the Neanderthal and all the other human species, not only for the Middle East but from the face of the Earth. Within a remarkably short time, sapiens managed to settle not only the Middle East but also Europe, and Central Asia, and

South Asia, and East Asia. They reached China and Korea about 60,000 years ago. About 45,000 years ago sapiens did something even more remarkable. They crossed the open sea and landed in Australia, a continent to which no previous human species had managed to reach. They were also the first to reach America about 15,000 years ago. These were extraordinary achievements because in order to reach Australia, sapiens had to

somehow cross the ocean. In order to reach America, sapiens had to first to find out how to survive in the very, very cold arctic climate of Northern Siberia and Alaska, where temperatures drop to minus 50 degrees Celsius in winter. This is how sapiens reached America from Siberian Alaska. In order to settle all these places, Europe, Asia, Australia, America. Sapiens had to adapt very, very quickly, in evolutionary terms, to completely new ecological conditions. Sapiens were very well adapted to the warm climate of the African Savannah and to the other ecological conditions such as the animals, plants, geography, and topography. Within a few thousand years they adapted to complexly new conditions. Basically the same sapiens who lived for tens of thousands of years in East Africa were suddenly in Russia, India, New Guinea etc. This sudden spread all over the world and adaptation to completely new ecological conditions within a very, very short time is the first indication that something amazing was happening about 70,000 years ago.



New technologies



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The second indication that something truly amazing was happening to Homo sapiens about 70,000 years ago, was the appearance of new technologies. One of the most important technologies to start appearing around 70,000 years ago is probably boats and other kinds of sailing craft. Around 45,000 or 50,000 years ago, sapiens, reached the continent of Australia. This was a difficult thing to do because in order to reach Australia from Southeast Asia they had to cross the ocean separating the two. They couldn't know that Australia was waiting for them as no one had been there. Scholars estimate that around 45,000 to 50,000 years ago, Sapiens in Southeast Asia, in what is today Indonesia had already developed

some kind of sailing craft or boats or rafts and also began developing a sea faring society. This is how they reached Australia, and later on other islands, like Japan and Taiwan.

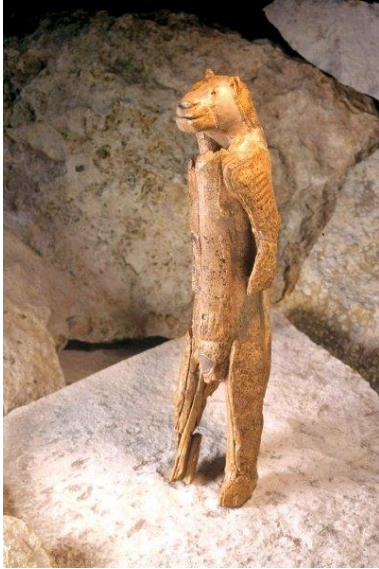
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Another very important invention, which we begin to see in archaeological records about 40, 50 thousand years ago, is the needle. This may not strike as you as a particularly revolutionary invention, but the needle was actually one of the most important inventions in the whole history of human kind. People were able to make all kinds of cloth even before the invention of the needle. Neanderthals, apparently also had some kind of clothing. They killed an animal and took the skin or fur and used it to warm themselves Once sapiens invented needles, they were able to start sewing and making all kinds of, of new things. New clothes especially thermal clothes were made from layers of fur inter spaced with layers of skin sewn close together with the help of needles. They could also start making boots and tents and other things. This was the key for the sapiens settlement of very cold areas like Siberia and Alaska. Even the Neanderthals who were very well adapted to living in ice age Europe were unable to move into Scandinavia or Northern Siberia because it was too cold for them.

Another interesting invention that sapiens made around that time is oil lamps. Small lamps made of stone or clay, in which they put animal fat and then lit. This is how they were able not only to crawl into all kinds of caves but also to produce magnificent art on the walls of the caves the famous cave paintings. Archaeologists have found the remains of a few of these oil lamps from 40 to 50,000 years ago. They were the key to this artistic revolution.

There were also constant developments of all technology like stone knives, spear points, hammers, and axes etc. Previously, up to about 70,000 years ago we find that people, Neanderthals, Erectus, and Sapiens had been making exactly the same tools for hundreds of thousands of years without change. From about 70,000 years ago onward we begin to see continuous change in the technology of things like spear points and knives.

Development of Imagination



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During the same period we also have the first evidence of art and jewellery. We find the first evidence of trade between different groups. We find the first evidence of complex societies comprising hundreds of people, and not just dozens of people. And we find the first evidence of religion. As an example look at this remarkable ivory statue made by sapiens in Germany about 30,000 years ago. The body is human whereas the head is the head of a lion or a lioness. This is one of the earliest pieces of evidence not only of art, but also for the ability of sapiens to imagine things that don't really exist. There weren't any lion men alive in Germany about 30,000 years ago. Lion men only existed only in the fertile imagination of sapiens. This is the first example we have of **figurative art**.

How can we account for this wave of new inventions, changes, and technological revolutions? How can we account for the sudden appearance of art and religion and the new political structures and perhaps, above all, how can we account for the quick spreading of sapiens over the entire world, the extinctions of the other human species and the settlement of new territories like Australia and America?

Most scholars believe that all these achievements were the result of a revolution in sapiens' cognitive abilities. Cognitive abilities are the abilities to communicate, to remember to learn, and to think. It seems that sapiens who lived 100,000 years ago in East Africa, may have looked exactly like us and had brains the same size and external shape as ours but they had very different, more limited, cognitive abilities. They could not talk and think like you and me. They talked and thought in a much more restricted and less sophisticated way. The people who drove the Neanderthals to extinction about 30,000 years ago and the people who settled the continent of Australia for the first time, and the people who carved the lion man statue, already talked and thought like you and me. They had their own language but the basic abilities of thinking and talking were the same.



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The appearance of new ways of talking and thinking, between about 70,000 years ago and about 30,000 years ago, is called **the cognitive revolution**. This is the first big revolution of history basically the revolution that started history. Prior to the cognitive revolution humans were no different from any other animal. They had biology and not history. History begins with the cognitive revolution. This revolution is difficult to explain. There was no big change in the body of sapiens or even any significant change in the size or in the external shape of the

sapiens brain. So how can we account for the fact that without any change that we can see there appeared amazing new cognitive abilities? Most scholars believe that there must have been some relatively small change in the internal structure of the brain that led to all the big revolutions in sapiens' abilities. Perhaps, this is just a theorist speculation. We don't have any firm evidence, but it's the best speculation we have. Perhaps there was some relatively small genetic mutation that caused two parts of the brain, which were previously separated to connect to each other that resulted in other new amazing cognitive abilities. Now, it's just a theory. We don't really know it for sure because there are no frozen brains from 50,000 years ago and 100,000 years ago that we can compare to each other. But it's the best theory we have at the present.

If we accept this theory how can we account for it? Why did this remarkable change happen to sapiens and not to Neanderthals or Denisovans or some other human species or even some other animal species? As far as we know it was pure chance that might have been the result of some tiny biological reaction in sapiens DNA that lead to the mutation. If this tiny biochemical reaction did not take place humans may have remained insignificant animals to this day or the world might have been governed by Neanderthals. We don't have a very clear theory

about what was the biological and the more logical factors that lead to the whole cognitive change. For understanding human history it is important to understand what changed in sapiens cognitive abilities.

The new language



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Human language is neither the only language nor the first language in the world. Almost all animals have some kind of language, even insects like bees and ants. They don't talk because they don't have mouths and vocal chords. They talk using chemicals to transmit information to one another about the whereabouts of food, flowers, or enemies and so forth. Whatever happened 70,000 years ago it was not the appearance of the first language.

There have been many vocal languages long before 70,000 years ago and [many animals today have vocal languages](#), which use sound and voice in order to communicate. A remarkable study has been made about the language of green monkeys. When scholars first began to study green monkeys, they thought that they were just shouting and making noises without any meaning to them. They recorded the different noises that green monkeys vocalized, and they analysed them on a computer. They saw different patterns to the noises that the green monkeys make. When they played them back to the monkeys, to see how the monkeys react they discovered that the green monkeys actually have words, or calls with distinct meanings. For example, one word or one call means "*careful, there is a lion*". The, the scientists discovered it because when they played back this particular call all the green monkeys who heard it became very frightened and started looking around and climbing trees. The scholars played a different call and all the monkeys still reacted in fear, but they looked upwards looking for something dangerous up in the sky. From this the scientists concluded that this different call, which to a human ear sounds exactly the same to the monkeys it sounds different, and it has a different meaning. Its meaning is, "*careful, there is an eagle*". So vocal ability and vocal language is not unique to sapiens.



CREDIT – WIKIMEDIA

[This article](#) from the BBC talks about the vocal abilities of putty nosed monkeys and bonobos as well as some other animals. It is very interesting.

It is also incorrect to say that the sapiens' language is the most sophisticated vocally. The top prize, the gold medal for vocal abilities in nature, does not go to sapiens. Whales and elephants have, in some respects, much more impressive vocal abilities than sapiens. Whales and elephants can communicate with one another for dozens of kilometers, and in the case of whales, even hundreds of kilometers in

the ocean with sound waves in very, very intricate patterns which scientists are still unable to understand today. Even more famously, we have parrots. A parrot can say anything Albert Einstein can say. So whatever is the advantage of Albert Einstein over a parrot, it's not in vocal ability. Hence it's unlikely that the new advantage of sapiens results simply from a change in vocal ability. It must be something else.

What is so special about our language?

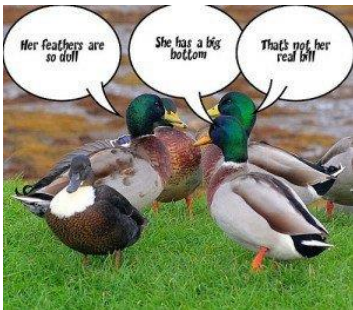
“There is a Lion by the River” Theory

The first answer is that our language is amazingly complex in the way that it can transmit information about the world. We can connect a limited number of sounds and signs in order to produce an infinite number of sentences, each with a distinct meaning. It's not the number of sounds we make that is important, but it's our ability to take a limited number of sounds and connect them into all kinds of sentences with different meanings. Sapiens can store and communicate a huge amount of information about the surrounding world. The green monkeys can tell one another “*careful there is a lion nearby*”, but that's about it. In contrast, a Sapien can also tell a story about the lion “I went to the river, and I saw there a lion tracking down a herd of bison”. Then all the different members of the tribe can put their heads together and discuss what to do. They can discuss all kinds of strategies about how to do it. Our language enables us to share a lot of information about the world.



Gossip Theory

A second theory agrees that the unique language of sapiens evolved as a means of sharing information about work, but this second theory emphasizes that the most important information that humans in general, and sapiens in particular, needed to convey to one another, is information about other humans. The second theory argues that our unique language evolved so that we could gossip. We tend to think about gossiping as a bad habit and as a relatively unimportant habit, but the fact is that gossip is extremely important and an extremely beneficial ability. Without gossip, it is very hard to live in a large group, and it is even harder to cooperate effectively with other people. Homo sapiens are social animals. Social cooperation is our key for survival and, and reproduction. If you want to stay alive, and to have children, it is not enough for individual men and women to know what's happening to lions and bison. It's much more important to know what is happening in the group. Who hates who, who is sleeping with who, who is cheating on who, who is honest or unreliable. If you go hunting, and a lion starts chasing you, you want to know who is likely to come to your assistance and who is likely to run away. If two people in your group start fighting and both ask for your assistance, you have to decide who of them you are going to help. In order to reach a decision who to help you need to know not only their individual characters, but also how they relate to one another and to other members of your group. In order to function in society, you need to have a staggering amount of information about your fellow group members. The amount of information that you need to obtain and to store in order to keep track of all the relationships is really huge. Scientists have calculated that in a group of 50 people, there are about 1,225 one on one relationships. There are also more complex relationships between three or four people.



We know from observing other apes like chimpanzees, baboons, and gorillas that they all show a very keen interest in social information, but they have trouble gossiping effectively. Due to the limitation of their language two chimpanzees can't gossip. If a chimpanzee sees two others fighting then he knows that this is happening now. If he doesn't see it nobody else can tell him what happened, because they can't gossip. It's thought that Neanderthals and Homo sapiens, 100,000 years ago before the cognitive revolution were keenly interested in social information about group members but, because of the limitations of their language, they could not gossip and this made it pretty difficult for them to live in large bands and to cooperate effectively with a large number of other individuals. The new sapiens language enabled sapiens to gossip and so to exchange information about what other people were doing, thinking and so forth. This gave them reliable information about other people in their society which meant they could start living in larger and larger groups. They could start developing tighter and more sophisticated ways of cooperating with other people.

This theory of language as mainly a means for gossip may sound like a joke, but there are numerous studies in all kinds of fields, psychology, sociology, even economics and biology, that support this idea. Even today, this is something that sociologists have studied deeply, - what people talk about today in the twenty-first century. Today, the majority of human communication in the world is gossip. Emails, phone calls, newspaper columns, TV shows, most of the information that you get is gossip, not necessarily about people you know, but

about leaders and film stars and so forth. From all the conversation topics in the world, the topic which is of greatest interest to people in all cultures, Americans, Chinese, Israelis and Palestinians all like to gossip, even professionals. [Gossip](#) usually focuses on wrongdoings of people, breaking the norms doing what they shouldn't do, because this is the main function of gossip. It serves as a kind of police, and it served this job tens of thousands of years ago when there were no police, gossip was the police and the court. People talked about other people breaking the norms or doing what they shouldn't do. People were frightened of breaking the rules of doing what they shouldn't do for fear that others would gossip about them, then nobody would like to be their friends and to cooperate with them. 50,000 years ago, if nobody wanted to cooperate with you, you were as good as dead.

Both the gossip theory and the “*there is a lion near the river*” theory, are valid. There is much truth in them, but together they give us only part of the answer to the questions of what is so special about our language and about our species. There is in fact something even more remarkable about sapiens language than the ability to transmit information about lions or to gossip about people.

Fictive Language and Shared Mythology



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The truly unique feature of our language is not its ability to transmit information about lions or about men. Rather, it's the ability to transmit information about things that don't exist at all. Legends, myth, gods, and religions appeared for the first time with the cognitive revolution. Many animals and many human species could previously also have said something like *careful, there is a lion* or, *careful, there is an eagle*. But, thanks to the cognitive revolution, Homo sapiens acquired the ability to say the lion is the guardian spirit of our tribe or there is a lion man spirit which is guarding our tribe. This ability to speak about fiction is the most unique feature of our

language. As far as we know, no other animals can speak about things that don't exist. This is why we can call sapiens' language a **fictive language**, a language which is able to speak about fiction. It's relatively easy to agree that only Homo sapiens can speak about things that don't really exist. You can never convince a monkey to give you a banana by promising him that after he dies, he will get to monkey heaven, and in monkey heaven, will get limitless bananas for the good deeds done during his lifetime. You can never convince any other animal to fall for this trick. Sapiens are the only animals in the world, in the animal kingdom, that can believe such stories.



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One would have thought that this is actually a disadvantage for sapiens, not an advantage. After all, fiction and all kinds of legends and myths can be dangerously misleading or destructive. If you go out of the forest looking for fairies and unicorns that don't really exist you seem to have less chance of survival than if you go out to the forest and you look for mushrooms and deer that you can gather and eat. Similarly, if you spend hours each day praying and dancing for a non-existent guardian spirit, aren't you just wasting precious time which you'd be better off spending foraging or having sex or doing something for your survival and reproduction? These are good

questions, but fictive language has not been a disadvantage but the most important advantage of sapiens over

other human species and over other animals. This fictive language is so important because it enables sapiens, not merely to imagine things individually, but it enables us to imagine things together, to imagine things collectively. This enables us to start weaving common legend and myth and stories such as the Biblical creation story or the dream time myth of Aboriginal Australians or the nationalist myth of model states. It is such myth that gave sapiens the unprecedented ability to cooperate flexibly in very large numbers and this is really the biggest key of all. The ability to cooperate flexibly with large numbers of individuals is what really made our specie masters of the world.

Cooperation in numbers

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There are other species of animals that know how to cooperate with large numbers of individuals. Thousands, even tens of thousands of ants can cooperate effectively in order to build a nest, guard it, find food, take care of the little ants etc. Ants and bees solved the problem of how to cooperate effectively with large numbers of individuals. However, ants and bees don't have much flexibility in the way in which they cooperate. Their cooperation is based on their genetic code, on their DNA. If there is a new challenge or opportunity, ants and bees will not be able to suddenly change the entire way in which the beehive or the ant nest functions in order to cope with the new threat or the new possibility. Other social animals, like chimpanzees, elephants, wolves and dolphins manage to solve this problem of flexibility and can cooperate in far more flexible ways than ants and bees. However although they solve the problem of flexibility, unlike ants and bees, they're unable to cooperate in very large numbers. They cooperate only in small numbers of individuals who know each other intimately. Because corporation in a chimpanzee band or in an elephant troop or in a wolf pack, it is based on intimate familiarity of all the band members. When a chimpanzee encounters a strange chimpanzee, they don't know how to cooperate well towards common purposes. Sapiens is the only animal that has managed to solve both of these problems simultaneously. Sapiens is the only animal that can cooperate in extremely flexible ways, even more flexible than chimpanzees with countless numbers of strangers, even more numerous than ants or bees. We cooperate in millions which is much more than ants can do and the flexibility of our cooperation, the flexibility of our social systems, political systems, and economic systems is much, much more than you can find in chimpanzees or wolves or elephants. This is why sapiens now rule, rule the world, whereas, ants just eats our leftovers and chimpanzees are locked in zoos and in research laboratories.



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In order to understand this unique sapiens ability, cooperating flexibility with large numbers of strangers, we first took a closer look at our chimpanzee cousins, how they behave, how they manage their, their affairs. Chimpanzees usually live in small troops of 30 to 60. They form close friendships with one another. They hunt things like small monkeys and small pigs together. They sometimes fight shoulder to shoulder against enemies like enemy chimpanzees or baboons, or cheetahs. The social structure within the chimpanzee troop usually tends to be hierarchical. The dominant member of the band, who is almost always a male, is called by scientists the **alpha male**. Other males and females exhibit their submission to the alpha male by bowing before

him while making grunting sounds. The alpha male usually strives to maintain social harmony within his troop when he sees two individuals fight he often intervenes and stops the violence and keeps the harmony. Less generously, the alpha male might monopolize particularly coveted pieces of food, like government taking taxes. He will take the best food and prevent lower ranking males from mating with the fertile females.

To become the alpha male - collaboration



BETA MALE EXAMINES HIS WOUNDS.
(PICTURE CREDIT – BROWN.EDU)

You gain the top position by forging an extensive coalition of supporters, both males and females from within the group. From observations in the last decade a relatively weak male managed to become the alpha male because a huge coalition of females preferred to back him against a much stronger (in muscles) rival. Ties between the coalition members are based on intimate daily contact. They hug each other, they touch, they kiss, they groom. They take fleas and ticks and all kinds of things from each other furs and do each other mutual favours. It is just a like politician, who before an election goes around shaking hands, making deals and kissing babies. Chimpanzees do the same thing when they want to become alpha male. They go around, they hug, and they kiss baby chimps. They make deals, I'll give you a banana in exchange and you will support me. They don't say it but they give food to their supporters and in exchange they expect that in confrontation these supporters will come and help them. The alpha male usually wins his position not because he's physically stronger but because he leads a large and stable coalition. When two males fight for the alpha position their supporters will often come and give them assistance. Coalitions dominate not only the struggle for the top alpha position, but also many other aspects of a chimpanzee's daily life. For instance, if a chimpanzee found a particularly coveted

piece of food it's more likely that he or she will share this food with close friends who are members of the same coalition than with a chimpanzee from a rival coalition. There are still good relations, most of the time, even between different coalitions, because the chimpanzees have to protect themselves against outside enemies. Within the group, you can clearly see who is friends with whom and who is in a more distant and colder relationship.

Transposed to humans – social instincts

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Similar patterns probably dominated the social lives of early humans, including archaic Homo sapiens. Humans just like chimps have social instincts that enable their ancestors to form friendships to establish hierarchies, to hunt together, to fight together. The social instincts of ancient humans were adapted only for small intimate groups. When the group grew too large, the social order destabilized and the group split. Even, for example, if a particularly fertile valley could feed say, 500 archaic sapiens, there was no way that so many strangers, could live together. Because even if there is enough food around, how could they agree? Who should be the leaders? Who should hunt where? Who should make the food? It's very complicated. After the cognitive revolution the ability to gossip began to help homo sapiens to forge larger and more stable groups. Gossip about the other group members is how you could establish a more stable hierarchy and know everybody, without spending 24 hours a day just watching the other people around. If something important happened, you would hear about it. Even gossip has its limits. You cannot gossip about millions of people. Sociological research has shown that the maximum natural size of a group which is bonded only by gossip is about 150 individuals.



Most people cannot know more than 100 individuals very well or gossip effectively about more than 150. This is why, even today, a critical threshold in human organizational abilities falls somewhere around this magical number of 150. Below this number, communities, businesses, social networks, and military units can maintain

order based mainly on intimate acquaintance between all the people involved and gossiping about each other. In small units there is no absolute need for regulations, formal ranks, titles and law books to keep order. A platoon of 30 soldiers for example can function very well just on the basis of intimate relations between all the soldiers. A well respected, experienced, sergeant, who everybody knows and likes, can exercise authority even over the captain. The captain will listen to the sergeant. In economics a small family business can survive and flourish without any need of a board of directors, a CEO, an accounting department, and all the law and regulations of how to conduct business. Once you cross the threshold of 150 individuals, it can no longer work on the basis of this informal arrangements, and intimate, knowledge. When small family businesses grow too large they face a crisis. If they can't reinvent themselves and start functioning in a much more formal hierarchical and rigid way, they will go bust.

How we developed larger groups.

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The secret that enabled sapiens to go beyond the 150 individuals mark and establish cities and kingdoms and empires and churches is fictive language. Large numbers of strangers can cooperate successfully by believing in common myth and stories and gods and so forth. If you examine any large-scale human corporation in the world, it can be a modern state or a medieval church or an ancient city or an archaic tribe thousands of years ago, you will find that all these kinds of large scale co-operations are rooted in common fictions, in stories that exist only in the collective imagination in human beings. Churches, for example, are huge organizations based, on common religious beliefs on common religious stories. Catholics, who never met before can go together on crusades or can pull funds and cooperate in order to build a hospital. Even though they never met, and they don't know each other, they both believe in a God that was incarnated and allowed himself to be crucified to redeem our sins, Jesus Christ. They both believe in heaven hell.



States are also rooted in common national myth. Two Japanese, who never met before, might nevertheless risk their lives to save one another because both of them believe in the existence of the Japanese nation, homeland, and flag. Business corporations are another example; they are rooted in common economic stories, common economic myth. Two employees of Google, who never met before can nevertheless join forces, combine their efforts to develop together a new game or a new website, simply because they both believe in the existence of Google, in the existence of the money Google is paying them for the job. Judicial systems are rooted in common legal myth. Two lawyers who never met before can nevertheless combine efforts to defend a complete stranger because they both believe in the existence of laws, of justice, and of human rights. However, none of these things exist outside the imaginary stories that people invent and tell one another. The fact is, as far as we know, there are no gods in the universe, there are no nations, there are no corporations, there is no money, there is no such thing as human rights, there are no laws, there is no justice anywhere outside the common imagination of us sapiens and the stories which we tell each other.

Development of societies.

Compare the development of our societies, to those of our chimpanzee cousins. Though Chimpanzees, they are very intelligent, they are very resourceful, yet they are almost never able to truly revolutionize their societies. There are two different species of chimpanzees, each with its own social system. One is called the Common Chimpanzees and the other is called Pygmy Chimpanzees or Bonobos. Common Chimpanzees have a genetic tendency to live in hierarchical groups of several dozen individuals always headed by an alpha male. Bonobos, also live in small groups of several dozen individuals but their societies are headed by an alliance of females and the males are less powerful. The different social structures reflect differences in their DNA. DNA is not the only factor; animal behaviour is also influenced by environmental factors and by the individual personalities and quirks of particular chimpanzees and bonobo's. Animals can develop and transmit completely new ways of behaviour. There is a famous story about Japanese macaque monkeys. In the 1950's, scholars wanted to study them on the island of Kushima in Japan. They lived in the forest and the scholars wanted to see them in the open, so they put sweet potatoes on the shore to lure the monkeys out of the forest into the open. The sweet potatoes were covered in sand, and it disturbed the monkeys. They tried to clean them in all kinds of ways, but it didn't work until one macaque monkey, a female, called Emu, found an ingenious method. She picked up a sweet potato, entered the water, and washed the sand from the sweet potato. At first only Emu knew this trick, but then other macaques, started imitate her. Even after Emu died young macaque monkeys were continuing to imitate the elders. Today 60 years or so after Emu's initial discovering, macaque monkeys on the island of Kushima still know how to wash not only sweet potatoes, but all kind of other stuff. Such things happen; animals can learn new tricks and pass them from one to the other without any need of changing the DNA. But these things are relatively rare, and more importantly, they usually happen only with relatively minor behaviours such as washing potatoes.



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The more basic social patterns do not change, unless there is a change in the DNA, or unless there is dramatic change in the environment. Female common chimpanzees cannot take lessons from their bonobo cousins and stage a feminist revolution. Male chimpanzees they cannot gather together in a constitutional assembly and declare that from this day onwards the office of alpha male is abolished and from now onwards all chimps must be treated as equals and enjoy equal rights in chimpanzee society. They can't do it. They can't stage such revolutions, because really significant, really dramatic changes in the social structure and behaviour of chimpanzees and bonobos and macaques and all other animals necessitate a change in DNA. For similar reasons, it is estimated by scholars that archaic humans did not initiate any social, political or cultural revolution. As far as we can tell, changes in social patterns, the invention of new technologies, or the settlement of new and alien habitats resulted either from genetic mutations or from new environmental conditions and pressures not from cultural initiative. This is why it took humans hundreds of thousands of years to make these changes in habitats or technology. Homo Erectus survived, one and a half million years and as far as we know their society and their technology remained exactly the same. There was no revolution in technology, and probably no revolution in society, or politics, either. In contrast, ever since the Cognitive Revolution sapiens have been able to change their behaviour quickly transmitting the new behaviours, new social patterns, to future generations, without any need of genetic or environmental change.

This was then fundamental to the sapiens' success in the world and to their advantage over other species. In a one on one brawl a Neanderthal would probably have defeated a sapiens. But, if a conflict erupted between hundreds of Neanderthals, and hundreds of Sapiens, Neanderthals didn't stand a chance because they could not cooperate with hundreds of strangers, whereas sapiens could. Without an ability to compose fiction the, Neanderthals were unable to cooperate effectively in large numbers and they could not adapt their society, their social behaviour to rapidly changing, conditions, and challenges. The inferior social skills of Neanderthals are manifested in trade and hunting and in other activities. Archaeologists, excavating ancient Neanderthal sites, have never found any evidence of trades between different Neanderthal bands. In contrast, archaeologists that

excavated sites of Homo sapiens from thirty and forty thousand years ago did find quite clear evidence for trade between different bands. Sites in the middle of the European continent archaeologists found [seashells](#) that originated in the Mediterranean coast or the Atlantic coast. In all likelihood, sapiens living in Hungary, 30,000 years ago, did not go by themselves all the way to the coast and come back with seashells. Rather, they traded with the neighbouring bands which traded with the fellow neighbours. If sapiens were able to trade in seashells they could also have traded in information thereby creating a much denser, and wider, network of knowledge about the world than the network of knowledge that served Neanderthals. Other differences between sapiens and Neanderthals are manifested in hunting techniques. We have clear evidence that sapiens



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could hunt, in very large bands whereas Neanderthals usually hunted just individually or in very small numbers. Sapiens could arrange dozens and even hundreds of people to go together on a hunting expedition. There is archaeological evidence of sapiens being able to surround large herds of animal from all sides and butcher them. 30,000 years ago they constructed sophisticated animal traps. They would spend days and weeks building fences, and digging ditches to block routes by which animals could escape. In one afternoon they could massacre dozens of animals gaining a lot of their flesh and fat and skins and bones. So these were unique hunting

techniques of sapiens, which were based on cooperation between a large number of individuals over quite a long time.

These abilities to cooperate with large numbers over a long time would have served sapiens, not only to successfully hunt herds of horses but also to confront Neanderthals. If Neanderthals, for example, got upset that sapiens were invading their territory and starting to slaughter all the horses and deers and conflict began then 50 Neanderthals were no match for 500 sapiens. The sapiens enjoyed not only the advantage of numbers, but also the advantage of being far more versatile and far more innovative. Even if the sapiens lost the first confrontation, they could quickly invent new ways, new tricks, new stratagems that would've enabled them to win another conflict.

Summary

We have three complementary theories.

First we have the theory about people being able to **share more information** about the outside world. To transmit larger quantities of information about lions and rivers and so forth, this was obviously very important for survival and reproduction. It enabled people to plan and to carry out all kinds of complex actions such as avoiding lion or hunting bison.

Secondly, we have the **Gossip Theory**. It says that another thing that happened was the ability to transmit large quantities of information about Sapiens and the social relationship between Sapiens. This was important, because it enabled sapiens to live in larger and more cohesive groups.

Thirdly we have the theory about fiction, and defective language. According to this theory, a very important ability is the ability to transmit large quantities of information about things that don't really exist at all, like tribal spirits or nations or limited liability companies or Gods or human rights. This ability was very important because first of all, it opened the way for cooperation between very large numbers of strangers and secondly, fictive language opened the way to the rapid innovation of social behaviour. Once social behaviours is governed by stories, you can start changing it very, very quickly, by changing the stories.



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The Cognitive Revolution, about 70,000 years ago, was thus the fundamental step, in the way for Homo sapiens to conquer the world and become the most important animal of the world. It is also the dividing line, between biology and history. Before the Cognitive Revolution, sapiens were basically just another kind of animal and not a very important animal and everything that happened to sapiens and to the other human species and everything they did, could be

explained using the same biological models and theories which we use to explain what chimpanzees and wolves and ants do. However, from the Cognitive Revolution onwards Biological models and explanations are no longer sufficient. We need also to start taking into account all kinds of stories and idea and religions. Otherwise we can't understand what sapiens are doing. We need to start constructing historical narratives and not just biological models to account for what our specie was doing and is still doing. For example in explaining the French Revolution biological facts and models about Homo sapiens are good to know it's good to know about the human body and human DNA. It's good to know the pressures that sapiens have to function under like finding food, and having enough oxygen, and wanting to have sex and things like that. But, even if you know perfectly well the biology of homo sapiens, you would still have a lot of difficulty explaining the French Revolution because as far as we know, the French Revolution did not result from any mutation, in the DNA of people in France in the late 18th century. It resulted from all kinds of social and cultural and political dynamics. Which in order to understand them properly you need to take into account not only DNA, and body. You also need to take into account the stories that people invent and believe. What is true of the French Revolution is true of events already 40 or 50,000 years ago. The people who carved the Stadel Lionmen, the people who drove the Neanderthal to extinction and the people who settled Australia already thought and felt like us. They had the same cognitive and mental abilities that we have. They were, as creative, and as imaginative as we are and they had the whole world open before them, with immense new opportunities opened up.