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Stenøien_evolution1_group1_being1

When we are talking about classical evolution, evolution occurs in the population, for the humans you can call it an ingroup, so the processes they are local, like in any other organism, any other plant, any other animal. The evolutionary process is within the local group. But then you have interaction with other groups and that is forming the evolutionary outcome.

Stenøien_evolution2_being2

Can evolution occur at the species level as a whole? When we are talking about adaptations, genetic evolution, they don't. Evolution proceeds through local adaptation and processes that are occurring regionally and locally and to a lesser extent at the species level as a whole. The species in itself is rarely a unit of evolution.

Stenøien_being3_question1

What is a species?

Stenøien_being4_question2_meaning1

Does a species have a meaning? Is it a real entity?

Stenøien_information1_communication1

Darwin thought of species as real entities, but he also had a pragmatic view on species and he realized that species are names we give to biological diversity, so that we can communicate about nature, and that is the most important aspect of species as a phenomenon, it enables us to communicate science and understand nature. But it is human made. We put names to variability we observe in nature, and we need those names, because otherwise nature does not make sense to us.

Stenøien_information2_system1

We need a universal system, we need a terminology, we need something everyone can agree upon.

Stenøien_information3_communication2

We need experts that say that this part of biological variability is something that we call this - we call it a species and we give it this name. And people tend to agree to that, because we all depend on those kinds of name giving.

Stenøien_evolution3_movement1

A species as an entity is the sum of all the local populations around. And evolution occurs within, and to some extent, between the populations - if you have gene flow between the populations, if you have migrants moving from this place to that place, that is an evolutionary process, but the species, nothing occurs there in itself. It is the sum of the processes on the local level.

Stenøien_evolution4_being5

I don't think that mutations have accumulated any faster - well some genes might evolve slow some genes might evolve fast, but overall I think that the evolutionary rate at the DNA level is more or less the same between the various hominid species. So I would guess that the average evolutionary rate at the DNA level for the homo erectus species is more or less the same as what we are experiencing.

Stenøien_evolution5_change1_culture1

The behavioural changes that we have encountered for the last 60-90.000 years is much more rapid than what you can observe in other species, and that is an extremely interesting question - what are the reasons for not only cultural development, but also rapid cultural development in our species?

Stenøien_consciousness1_culture2_intelligence1

There are many suggestions as to what is the basis for cultural development in itself, and you can talk about magic mutations - and people are searching for those magic mutations that can explain our cognitive rev-

olution, our self-consciousness, our unique mental abilities.

Stenøien_culture3_intelligence2_change2

It seems like we have the same genetic constitution and the same predispositions as other hominid species. So we started out with this rapid development, despite having more or less the same predispositions as other species. We don't know that for sure. But for the time being that seems to be the case. You can speculate that our cultural or cognitive revolution might be, at least also, the result of environmental changes that we encountered, that they perhaps did not encounter.

Stenøien_gravity1_force1_question3

What is gravity?

Stenøien_system1_evolution6

To me a closed system is a finite system. So it seems to me that evolution must occur within a finite system.

Stenøien_system2_evolution7_force2_being6

Evolution occurs in groups of living organisms and in the interaction between groups of living organisms. But in my head that is a closed system because there is a finite number of living organisms in the world, so you have evolution.. Okay! Maybe he thought of all kinds of evolution, because evolution does not only proceed in organic material, you also have evolution occurring in any self replicating system, whether you have life or not, so in that sense I'm sure evolution can be viewed as... I mean it's a force of nature.

Stenøien_force3

It's a force of nature!

Stenøien_information4_system3

There are several systems of information transfer, and in many organisms you have also other ways of transferring information besides the DNA. The DNA is, of course, the main system of information transfer, but then you have other alternative information systems - you have a whole field of epigenetics for instance, which is the study of information transfer attached to the DNA system in a way, very close connected to it, but still it is a different information system.

Stenøien_technology8_network1_information5_connection1_intelligens2

There are many dystopian stories about humans being attached to machines, and the most scary of those stories is of course that human beings are a part of a very advanced internet system and that the transfer of information can happen instantaneously between all humans everywhere from the central computer and of course we become the slaves of this central computer and that the artificial intelligence takes over and that's the end of us... I'm not very fascinated by those stories by a matter of fact.

Stenøien_technology9_communication4_evolution7

I think that we do observe that our technology enable us to communicate very efficiently and I'm sure that we will develop other means of more efficient communication etc., but how will that affect evolution? That's a tricky one.

Stenøien_culture3_information5_transfer1

In humans we also have culture as perhaps the main system for information transfer, not only across generations, but also between individuals within the same generation

Stenøien_culture4_information6_being25

Why do we have rapid development in human behaviour? The main answer to that question is of course our ability to transfer information very effectively through our culture.

Stenøien_change1_evolution6_being7

Not indirectly as we have done up to now, by changing the environment and thereby the living condition

for the humans, but directly going in and editing the genetic material in itself, that will be a tremendous revolution for us as a species.

Stenøien_technology1_evolution7

If we back up a step and talk about technology in itself, how does it affect evolution?

Stenøien_technology2_evolution8_reality1

What we probably will encounter in a very short time, namely that we have genetically manipulated humans. That is luckily still science fiction, but we are very close to that situation, and that will of course have tremendous impact on society all over the world.

Stenøien_evolution9_being8_change2

We will soon be in a situation where perhaps the most efficient and the fastest way of evolutionary change is the change we directly manipulate on ourselves.

Stenøien_being9_change3_evolution10

We are talking about much more profound genetic changes before we can call something a new species, but in theory, yes, we can create new species

Stenøien_being10

You can't find a definition that fits all biological life, there will always be exceptions, so you can't come up with a general rule as to how to define a species.

Stenøien_being11_technology3

The generation time of a cyborg will be much longer than what we encounter. It will be maybe infinite!

Stenøien_being12_evolution11_infant1

If you take survival and making babies out of the equation then we are perhaps talking about something else than evolution.

Stenøien_being13_culture4

Biological has something to do with the organic life. I think we should define life as something belonging to the organic part of the world.

Stenøien_evolution12_system5_being14

Evolution can occur everywhere. Evolution can occur in whatever system you are thinking about, as far as some assumptions are met in the system. But life should be per definition be part of the organic world.

Stenøien_technology4_being15

You can define machines as having similar processes as life, but life in the strict definition is something that occurs to... entities like us.

Stenøien_being16_question3

How is life defined?

Stenøien_being17_technology5

Life is defined, the official definition of life, includes that some metabolic processes must occur within a system, there must be self-replicating entities.. But I guess that metabolism is actually the most fundamental part of life definitions. So technically could you come up with a machine answering to all of those common definitions of life?

Stenøien_culture5

It's definitely part of nature

Stenøien_evolution12b_change4_economy1

I think you can explain many interesting phenomena in the inorganic world by using evolutionary terminology and understanding of processes from evolutionary biology. People are using evolutionary theories to understand economic development.

Stenøien_stories1_nothing1_connection1_meaning2

Story-telling is extraordinary important for our species, stories that are more than entertaining, stories that bind people together. Religious stories seem to do that job very, very well and are very good seeds for many good stories of phenomena you don't understand and phenomena that you don't have good vocabulary to approach. I think that the phenomena that we struggle with are very good starting points for those kind of stories that bind us together.

Stenøien_nothing2_consciousness2_time1_being22

I think that humans might have a sense of meaninglessness. I think that one of the really great disadvantages of cognitive abilities and self-consciousness is that you realize very clearly that your life will not last forever. The meaninglessness of life is much more obvious to a species that is able to reflect upon time in a way that we can. So in that sense I think we have an intuitive understanding of, if not nothingness, then at least meaninglessness.

Stenøien_nothing3_connection2_stories2

Phenomena that we struggle with are very good starting points for those kinds of stories that can bind us together.

Stenøien_nothing4_stories3_culture6_meaning3

If you are starting to consider meaninglessness as something important in your life, then most people will react to that by trying to fill the meaningless hole with some meaning and coming up with stories that can explain phenomena or that gives you some sort of meaning in life. That is a very central component to the development of religion and for our species that might have been an important driver for.. well in the end, for the development of culture.

Stenøien_culture7_connection3_being18_group2

Our biological success is founded on our abilities to work with other humans in groups, and that also affects, not only the evolution of other species that we influence through our cultures, but also ourselves.

Stenøien_connection4_communication1_information5_group4

The group is stronger if the individuals trust one another and if they have social bonds that enable them to act together.

Stenøien_change5_evolution13_information6_language1

You make changes in the DNA by, for instance, removing a base or adding a base or adding many bases or changing one base into another. So that is how the language is changed, and then there are different evolutionary processes that contribute to those chemical changes in the hereditary material.

Stenøien_being15_connection5_evolution14

We want to maintain life all across the evolutionary tree, so we are talking on behalf of the parasites and the fungi and the plants and the sharks and everyone when we say that we want to maintain biological diversity.

Stenøien_being19_change6_evolution15

We know from history that we can exterminate most of life and giving a number of tens of hundreds and millions of years, evolution of new life forms will occur. But within the timeframe that we are able to grasp, and that we are able to understand, the loss of biological diversity of today is a catastrophe, because it can't

be replaced in any, for us, meaningful timeframe.

Stenøien_being29

They are still organisms, they are still living beings.

Stenøien_culture8_technology6

So what is natural and what is not natural?

Stenøien_being20_culture8

Much of the planet is genetically modified by people, and they are real species in any definition of species that I know of.

Stenøien_change7_evolution15_being21

The changes of the DNA material in the micro organisms is happening in an enormous much faster rate than what we encounter in our hereditary material, because the generation time is so short.

Stenøien_change8_culture9_evolution16_movement2_group5

So how will evolutionary change occur in our species? That depends upon how our culture will evolve as well. If we are good at setting up borders preventing migrations and gene flows between groups, then those groups will genetically differentiate from one another.

Stenøien_culture10

What is the border there for natural and non-natural? You are not able to find it, it's impossible.

Stenøien_being23

The most common way of creating new species is that you block the transfer of genetic material, that you have some mating barriers.

Stenøien_system6_change9_connection5_time2

In theory you could imagine that strong law enforcements and strong barriers between groups would at some point lead to genetic differentiation. Or to put it in another way, genetic differentiation you will be able to observe within a short period of time, some hundreds years, but major genetic differentiation necessitates longer time periods.

Stenøien_time3_connection6_culture11

The problem is, first of all, what was the original wild nature? Secondly, do you want the original wild nature 5000 years ago? 50.000 years ago? 500.000 years ago? What is the border there? Between natural and non-natural? You are not able to find it. It's impossible!

Stenøien_culture11_being20_time3_change10

But I think that we should think broader, I think that we should realize that nature as we observe today is a very brief snapshot. Nature is a dynamic thing, it's changing all the time and we need to realize that humans are so extraordinary part of nature. We are natural entities.

Stenøien_consciousness3_soul1_being24

Is it possible to have a free will without invoking a God?

Stenøien_evolution17_system7_question4

What is the role of randomness in evolution? How does randomness and stochasticity operate together with deterministic processes, like natural selection, and how does the interplay between these forces form the evolutionary process?