

Cumulative culture in humans and great apes

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Recorded: 23/09/2013

Broadcast: 11/11/2013

Intro VO : *Welcome to the Ideas Lab Predictor Podcast from the University of Birmingham. In each edition we hear from an expert in a different field, who gives us insider information on key trends, upcoming events, and what they think the near future holds.*

Sam: So today we're with Dr Claudio Tennie who is a Birmingham Fellow here in the School of Psychology at the University of Birmingham. Hello Claudio.

Claudio: Hi.

Sam: So, can you tell us a bit about what you do at the university and what your research is in?

Claudio: Yes, so I've been recently appointed this Birmingham Fellowship position which means I can focus on research for quite a while before this turns into a lectureship and what I'm interested in is several topics. The main topic however is the evolution of cumulative culture and I study this by comparing the social learning abilities of great apes with the social learning abilities of humans and especially human children.

Sam: What is cumulative culture, just to sum it up in a few sentences?

Claudio: There are hundreds of definitions of culture out there. There is less definitions out there for cumulative culture but the one that I find most convincing and most useful is it's culture which is uninventable by any individual, by any naïve individual. So to give you an example, if you were raised on an island completely alone, you wouldn't come up with a laptop or with a biro pen even.

Sam: It's dependent on your environment, basically, the places where you're brought up?

Claudio: So cumulative culture therefore depends on culture. So cumulative culture is a more specialised form of culture. So culture would be the umbrella term here. Now culture is defined, like I said, in many ways but a useful definition is just to take the roots of culture, the basics of culture, because if we do so we can actually compare different species that have culture. So if you, for example, use a higher definition as it were for culture and you insist that you have to have language in order to have culture then you would exclude so many animals. So what we cultural researchers are doing is we are looking at culture in a much more minimal sense and so the definition that we use for culture is one where social learning plays some role. So you've got an individual A and an individual B and individual A does something and as a result of this behaviour, individual B also does something, usually similar. And then when that happens in the population we speak of culture. Now this is all good, this happens quite a lot and we know that this minimal form of culture is existent in many animal species – in rats, in birds and fish and great apes – so we find it everywhere nearly. But, the cumulative aspect of culture is much more rarer to find. In fact it is currently discussed whether or not any animal species other than humans actually have any cumulative culture at all.

Sam: So your research, a lot of your research is in young children and apes. So what's the difference there between their use of cumulative culture and how they think?

Claudio: OK, so I said earlier that one definition of cumulative culture has it that it produces some behaviour that is not inevitable by any individual. Now another aspect of this is that in order to learn something that you could not have invented on your own, you have to have at your disposal very high fidelity social learning mechanisms, OK, so any odd social learning mechanisms would not help you. So you have to have some social learning abilities that enable you to really copy something that you could not invent on your own. In order to do so you have to have social learning abilities such as imitation. Imitation now is interesting because in imitation you are copying not only the actual behaviour of somebody else, you're also copying the end result of this behaviour, you are maybe even tuning into the minds of others and understand what they want to achieve. So all of these things then cumulate in the social learning mechanism that we call imitation. And if you then use imitation you are unable to learn something - potentially anyway – to learn something that you could not invent on your own and this brings me to another aspect. So you can then ask but OK, so imitation enables you to learn something that you could not invent on your own. Does imitation enable you to learn cumulative culture? But it does not yet explain how cumulative culture, or this particular item of cumulative culture, came into existence in the first place. In order to understand how cumulative culture comes about we need to then look at the whole process of repeated learning events. So for example in our own history of our species, different cultures have developed cumulative culture, different types of cumulative culture independently from each other and the way that this worked was always that one generation used the basics that they learned from the previous generation and then added some things of their own and these were then later copied by the next generation and so on. And over time, only over time, this then leads to some innovations that no individual could completely reinvent from scratch. So what you have here is a historical process that then leads to some cumulative culture, as some end points, current end points.

Sam: So how do we actually physically test this?

Claudio: There are very many open questions regarding this whole process as well as the end products of cumulative culture. So for example, we currently do not have a good understanding of when humans are able to produce cumulative culture among themselves. In other words, at what age do human children gain the ability to produce cumulative culture among themselves? So that is an open question. Also it's an open question whether or not it really is only down to us humans having cumulative culture. We currently do not know if other species do show cumulative culture themselves. There is also an open question currently as to whether imitation is really a requirement for cumulative culture. This is especially down to work by Christine Caldwell in Stirling University and she has produced some data which is consistent with the view that other social learning mechanisms can also lead to cumulative culture. So this is also an open question but right now my main focus is to actually test whether or not great apes have cumulative culture and the way to test this is this; what I do is I take advantage of the definition that cumulative culture produces behaviour that is outside the inventive capacity of the individual and therefore I test individuals for re-discovery of these behaviours. So I test whether naïve individuals that have never seen these behaviours actually do reinvent these behaviours on their own, on the spot as it were.

Sam: Whether everyone would come up with the same idea in the same way without any influence?

Claudio: Yes. Take the example that if a human is raised on an island completely alone and completely naïve with regard to the culture as we know it and as present in modern humans, then he or she wouldn't come up with a laptop I said, right, or wouldn't come up with a mechanical clock or something like that. A lot of the artefacts around us wouldn't come up in naïve individuals.

Sam: So can you give us an example of what we might expect to learn about a great ape in the future that's sort of on the horizon of your studies?

Claudio: Yes, so one of the flagship examples of cumulative culture currently debated in great apes is the case of so-called 'brushed tool behaviour'. Chimpanzees in one particular area in Africa, they produce brushed tips to some tools, prior to their usage. What this means is that they chew on some sticks and this chewing then induces a frayed end, a brushy end, towards a stick. Actually this has been tested; this actually makes the tool more efficient in gathering insects which they then eat. The extra claim here is that they do so even before they start using the tool, which has got implications for future planning, etc, etc. However, for me it's most interesting because it has been proposed as the best current case for cumulative culture in great apes and thus it's an obvious case for me to test and I am currently, together with colleagues, in the process of testing that. So we provided great apes with some sticks that can be frayed in this way and see if they – the subjects are naïve subjects so they've never seen this fraying performed – if they come up with this fraying and if they thus produce these brushed tips on their own. Well, I can't really tell you what's happening there yet but watch this space and let's see what happens.

Sam: Fantastic, well that's something to look forward to at some time in the future. Dr Claudio Tennie, thank you very much.

Claudio: Thank you.

Outro VO : This podcast and others in the series are available on the Ideas Lab website: www.ideaslabuk.com (<http://www.ideaslabuk.com>). There's also information on the free support Ideas Lab has to offer to TV and radio producers, new media producers and journalists. The interviewer and producer for the Ideas Lab Predictor Podcast was Sam Walter.

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