Reconceptualizing Educational Research Methodology

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# Change at the Museum - The Knowledge Production of Human Evolution

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## Abstract

Museums today play an important role as a space for learning about science and the world. For this article, the phenomenon of human evolution is explored as an example of knowledge production about change. Empirical materials on exhibitions of human evolution were collected from visits to 25 historical and natural history museums.

The empirical materials are analyzed together with a posthuman version of evolutionary theory, with a focus on aspects of change. This is based on a post-anthropocentric and relational approach to human evolution and change. The analysis shows that (i) museums face an anthropocentric tension, (ii) evolutionary change is seen as both an inherent quality of the individual species and as an entanglement of humans and the natural environment, (iii) the notion of 'the first human' produces various and contentious versions of knowledges about evolutionary change.

Keywords: human evolution, natural history museums, posthumanism, change, knowledge production

## Introduction

Museums are institutions that attract visitors who want to learn, experience and educate themselves. In educational research, various studies of museums are made through concepts such as: informal learning, life-long learning, museum learning, *Bildung*, free-choice science education (Falk, 2001) or public pedagogy (Kridel, 2011; Yun Lee, 2011). Current studies on museum learning acknowledge the way in which visitors bring their own world into conversation with the exhibition's contents (Falk & Dierking, 2000). Accordingly, knowledge is not simply presented in museums, transmitted from exhibition to visitor. Rather, knowledge in this article is viewed as being *produced* in museums. Knowledge is not static but is produced through the entanglement of science, education, museum and society. This view of the production of knowledge is common in science and technology studies (STS), respectively, in posthuman theories.

In this article, the phenomenon of human evolution will be explored as an example of knowledge production about change. According to posthuman philosopher Elisabeth Grosz (2004, 2011), evolution means unfolding and it involves the materialization of change over time. Evolution is about constant self-overcoming, ongoing differentiation, and the inability *not* to change. In order to explore the knowledge production on human evolution, empirical materials were collected through visits to 25 museums in Europe, Asia and Oceania[1]. More specifically, exhibitions about human evolution were studied. The two main reasons for this interest in human evolution are shown below.

Firstly, current scientific knowledge of human evolution is being rapidly reshaped. The introduction of genomic research into the paleo-archaeological field has unearthed breakthrough research findings. The human genome was mapped in 2003 and the Neanderthal genome in 2010. Genomic research shows that early *Homo sapiens* interbred with Neanderthals, Denisovans and a few other archaic human species (Pääbo, 2014; Stringer, 2016). Further, archaeological explorations have unearthed several new species, both in Asia and in Africa (Sutikna et al., 2016; Berger et al., 2015). The above-mentioned findings are only a few examples demonstrating that the research field of human evolution is becoming increasingly complex. These changes in science offer new challenges regarding the way in which museums produce knowledge in relation to a field experiencing rapid change.

Secondly, there is a productive connection between human evolution and posthuman ideas. Knowledge of the human being is produced in relation to the binaries of animal/human, nature/culture and biology/history (Grosz, 2004; Braidotti, 2019; Frost, 2016). Human evolution is placed at the intersection of these binaries and is therefore a productive example when studying the human as a posthuman phenomenon. It also paves the way for interesting post-

1 The interest in human evolution stems from the author's background as a biology teacher. The fieldwork to museums were performed during designated research trips and private holidays. The project was financially supported for two years (2019-2021) by Konstfack, University of Arts, Crafts, and Design.

anthropocentric discussions of how knowledge is produced in science and society today.

The aim of this article is to explore the knowledge production on human evolution at museums, more specifically in relation to aspects of change. An analysis will be performed based on the empirical materials, a posthuman version of evolutionary theory informed by Grosz (2004, 2011) and Stephen J. Gould (1979, 1996), and Annemarie Mol's (2002, 2010) view on knowledge production based on versions and tensions. The article's contributions to educational research include (i) the exploration of knowledge production as an educational issue, and (ii) the investigation of the museum as an educational site.

The article continues with a discussion on how museums can be approached using posthuman theories. Then, a discussion of what 'knowledge production' means in this article, follows. The key concepts of evolution and change will then be discussed using a posthuman approach, followed by a methodological discussion on the empirical materials and the analysis. The second part of the article is dedicated to the analysis and a discussion in which the empirical materials and theory is read through each other.

## Museums, change and entanglements

Studies on natural history museums and studies with an educational interest in museums have had different theoretical positions; I will provide a few examples here. Eva Davidsson (2008) uses a sociocultural approach to learning in her science education thesis on science and technology centers. The results imply, among other things, that an experience-based approach to learning is the most common approach at the centers. Eva Insulander's thesis (2010) benefits from a design oriented multimodal approach in her study on meaning-making in historical museums, studying exhibitions along with visitors' experiences. In his book *Pasts Beyond Memory*, Tony Bennett (2004) studies natural history museums with an interest in postcolonialism and science and technology studies. He argues that evolution cannot be exhibited directly through the objects, but only in a particular "narrative ordering" (p. 162) of the relations between them. What separates my study from the above mentioned, and others in the field, is the foundation in posthuman theory. As will be apparent in the coming sections, this approach permeates the view on knowledge production, evolutionary theory and methodology.

A few studies have benefitted from a posthuman approach to museums. Museum researcher Fiona Cameron (2018) argues that natural history museums enable relationships between humans, non-humans, objects and technology through their exhibitions and collections. She localizes a few current issues with museums: "classification, the desire to represent the world, the objectification of things" (2015, p. 28) and turns to posthuman theory in order to work with these issues. In a case study of an exhibition artifact, she argues that the object was assembled and disassembled through "the bundles of material, technical, conceptual, ecological, social, and emotional components" (Cameron, 2018, p. 351). Ramesh Srinivasan and colleagues highlight two

approaches to museums: “the ‘object as specimen’ paradigm considers the museum object as a representation of a larger body of knowledge, while the ‘object as embedded’ paradigm presents the object as acting within a larger, dynamic cultural, and discursive system” (Srinivasan et al., 2010, p. 736). In this article, the ‘object as embedded’ paradigm is in focus as the posthuman approach aims to explore phenomena as entangled and continuously produced. Further, Christina MacRae and colleagues (2017) argue that posthuman research on museum education can offer a deeper understanding of the role of objects themselves, as well as facilitate an analysis that takes the entangled aspects of the museum into nuanced consideration. In these posthuman museum studies, there is an interest in museums as spaces in which knowledge is produced beyond human-centrism and object-centrism. They propose a critical engagement with the particular objects and the entanglements from which they emerge.

## Knowledge production and change

Educational research informed by posthuman theories understands knowledge and the world as being in constant change and being intrinsically entangled. Central posthuman theorists in the educational field are Karen Barad (2007), Rosi Braidotti (2019) and Gilles Deleuze (with Guattari 2004). Barad (2007) emphasizes how knowledge of the world and the world itself are entangled. Braidotti (2019) promotes a view on the posthuman subject as inevitably entangled with nature and technology. Deleuze and Guattari (2004) contribute with a view on the world in constant becoming; thus, change does not mean a linear transition from A to B, but as ongoing and continuous. Hence, the aspects of entanglement and continuous change are central in posthuman theory. The focus of posthuman educational research lies in disrupting simplified views on separated self-dependent students/teachers and objective neutral content, with the objective of exploring more complex educational relationalities, for example regarding how knowledge is produced. Theoretical work has explored a broader approach to education in which knowledge and learning are seen as being co-produced in complex entanglements, assemblages, and in relationality (Lenz Taguchi, 2010; Ceder, 2019a; Hasse, 2020). Knowledge is not only constructed in social interaction, but through sociomaterial engagements of the world (Fenwick & Edwards, 2010; Fenwick, Edwards & Sawchuk, 2011). Instead of focusing on change based on the individual student, I have in my previous work proposed a view on change as continuous, relational and post-anthropocentric (Ceder, 2019a, 2019b).

A posthuman aspect on entanglement and change also involves the view on knowledge production. This paper builds on a critique on science as the rational uncovering of a pre-existing world; rather scientific production is considered a social and contextualized process, what Sheila Jasanoff (2004) calls ‘the co-production of knowledge’. Scholars in the field of science and technology studies (STS) emphasize knowledge as being produced through the agency of both humans and non-humans (Latour, 2005; Mol, 2002). The world is in constant change and becoming with and through the entanglement of humans, the natural environment and technology. Similarly, posthuman knowledge is co-produced through this becoming of the world

(Barad, 2007; Braidotti, 2019). Hence, posthuman knowledge production is a process that is local and situated (Law & Mol, 2003; Haraway, 1988). Situated knowledges means that the knowledge should not be generalized or regarded as a representation of a fixed reality. Instead, viewing knowledge as situated means that it is also multiple, what Mol (2002, 2010) labels different *versions* of reality. Mol (2002) presents this approach as "a plea for attending to the various ways in which differences are handled in various sites and situations" (p. 116). Knowledge, then, is produced in different versions at different sites. As they do not always align, that creates *tensions*. How versions and tensions can be used as an analytical strategy will be explored in the methodology section below.

## Evolution and posthuman change

As discussed above, educational research usually views change as the learning of the individual, or the transition from one state to another. In posthuman educational research, change is situated and temporary, and in constant development. Evolutionary change is a kind of change which is slow, spanning generations, and continuous. Even though there are different scientific views on topics such as evolution, origin, and species[2], this article focuses on a posthuman discussion on change. For that reason, this article will engage with Grosz (2004, 2011) and Gould (1979, 1996); the former is a philosopher and the latter is a natural scientist. Even though they have different points of departure regarding evolutionary theory, they align in a few key positions that nuances and explicates aspects of change and evolution.

Charles Darwin, who wrote the original texts on evolutionary theory, has had a huge influence on the 20th century history of ideas, perhaps a greater influence than we usually credit. Gould (1979) states: "Before Copernicus and Newton, we thought we lived at the hub of the universe. Before Darwin, we thought that a benevolent God had created us. Before Freud, we imagined ourselves as rational creatures" (p. 267). Even if Darwin provided the history of ideas with comprehensive theories, Darwinism has since taken many forms. Grosz (2004, 2011) shows how Darwin's ideas also impacted philosophy, perhaps particularly on philosopher Henri Bergson who, in turn, influenced Gilles Deleuze, who is now a staple for posthuman theorists and researchers.

Grosz (2004) states that the term *evolution* is derived from the Latin word *evolvere*, meaning to unfold or roll out. Darwin actually avoided using the term *evolution* preferring the term *natural selection*, since at the time he published *On the Origin of the Species* in 1859, the concept of evolution meant progress towards a particular goal. Gould (1979) expands on Darwin's view: "Evolution is purposeless, non progressive, and materialistic" (p. 13). A common thread in both

[2] There is, for example a rich debate in the biological sciences on what counts as a species, involving aspects of ancestral lineage, genetics, family resemblance (morphology), property clusters and geographic isolation (Coyne & Orr, 2004; Turelli et al., 2001). There are also pluralist views in the biological sciences, for example, species pluralism (Ereshefsky, 1998).

Grosz's and Gould's views on evolution is their clear post-anthropocentric position. They both critique anthropocentric aspects and adaptations of Darwin's idea of man as the pinnacle of life on earth. Grosz reminds the reader of Darwin's argument that evolution is not a matter of difference in kind, but in degree. She argues that Darwin proposed a fundamental continuity between nature and culture: "… culture is not different in kind from nature. Culture is not the completion of an inherently incomplete nature (this is to attribute to man, to the human and to culture, the position of evolution's destiny…)" (Grosz, 2004, p. 91). Gould (1979) explains: "Indeed, I suggest that the true Darwinian spirit might salvage our depleted world by denying a favorite theme of Western arrogance. That we are meant to have control and dominion over the earth and its life because we are the loftiest product of a preordained process" (p. 12). Here, we see that the way evolutionary change can be theorized and modelled is deeply rooted in the way we view ourselves as a species. Our worldview is inevitably anthropocentric and often based on human exceptionalism which, exploring Gould and Grosz further, will be elaborated upon in the analyses.

Grosz (2004) sees the concept of evolution to be well suited to the view that evolution is constant differentiation through biological memory: "What evolves are not individuals or even species, which are forms of relative fixity or stability, but oscillations of difference" (p. 24). Here we can see Grosz's posthuman approach to evolution when she focuses on evolution as a process of continuous change. This approach is close to Gould's main argument in *Full House* (1996), in which he critiques a view of change that is focused on single individuals. He encourages the reader to think of evolutionary change in terms of whole systems expanding and contracting. However, even if both Grosz and Gould emphasize the systems, they do not disregard individuals but include them in their respective views of evolutionary change. Together with the ideas of philosopher Henri Bergson, Grosz explains that change can be understood with these two approaches. The first approach represents everchanging time that is an unstoppable, continuous and non-linear process. The second approach represents how time is materialized through particular objects, individuals and places. Thus, evolution can be both a continuous process changing over time *and* individual objects materialized at a particular time and place. Including both approaches on evolution creates a tension which is aligned with the analytical strategy of working with tensions, which will be discussed in the next section.

## Empirical materials and analysis

For this research project, I visited 25 museums from 2016 to 2020. Most of the museums were natural history museums, although a few of them were historical museums or other museums featuring some kind of evolutionary exhibition or content. The museums are primarily located in Europe and Asia (see Attachment 1 for details)[3]. The empirical materials produced from the visits to the museums comprised field notes, photographs and a few video recordings. As the purpose of

[3] For research on evolutionary museums in Australia and the United States, see Bennett (2004).

the visits was to focus on the knowledge production of human evolution in the exhibitions, aspects of museum architecture, visitors, exhibition design and museum staff became entangled with the materials. The approach of acknowledging entanglements relates to the posthuman interest of the article. The field notes grew lengthier and more focused for each visit. This was primarily because, parallel to the museum study, I educated myself further on the subject of human evolution reading popular science literature and watching movies, video lectures, and documentaries. The field notes also became richer as the analytical process began, for example, as the first publication on the project was produced (Ceder, 2018).

In posthuman research processes, the strategy is not about representation or classification. Instead, it acknowledges how the phenomenon is co-produced through the entanglement of the phenomenon and the researcher (Barad, 2007). The empirical materials and the theory were read through each other guided by the aim of the article. The analytical strategy was informed by the view on knowledge produced as different versions of reality and the tensions this involves (Mol, 2002, 2010). Mol (2010) explains: “Since they [the actors] are in tension they do not simply add up, but neither is there a debate with winners and losers (…) The point is not to purify the repertoire, but to enrich it. To add layers and possibilities” (p. 257). In this analysis, I worked with the materials at hand and the focus on change in order to localize the different versions on evolutionary change that was enacted in the museums. When these differed from each other, I localized this as tensions in the materials, and I then traced these tensions further in the materials. Mol (2002) argues that ”Tensions crystallize out into patterns of coexistence that tend to only gradually dissolve. (…) Even if stability is never reached, tensions are tamed” (p. 181).

I reviewed the field notes, read the literature by Gould and Grosz, and I studied the photographs from the exhibitions. In this process, I observed the knowledges and tensions that were enacted in relation to the materials. These observations were then sorted and made into components for the analysis. After reworking and rewriting the analysis a few times, it unfolded into three analytical sections. Barad (2007) emphasizes that an analysis requires close attention to detail. However, it is not intended to be attentive to *all* the details in each separate text. Rather, attention is focused on the connections between the analysis, the research objective and other materials. In line with this, Mol (2010) adds that “In this tradition, then, terms are not stripped clean until clarity is maximised. Rather than consistency, sensitivity is appreciated as a strength.” (p. 257). The ‘attention to detail’ that Barad talks about is, when combined with Mol, understood as being attentive to the versions and tensions that the empirical materials and the theory entail.

## Analysis and discussion

In the upcoming sections, three analysis sections will be presented. The first section discusses change in relation to the anthropocentric tension the museums face: one version enacts the human species among other animals and nature, while another version separates the human species from the rest of the exhibition. The analysis discusses the tension the different versions

entail and how they coexist. The second section looks at the tension of how evolutionary change is seen as both an inherent quality of the individual species and as an entanglement with the natural environment. The third section investigates the notion of 'the first human' and how it can be understood in relation to evolutionary change. This also involves a discussion on the tension around scientific and popularized versions of knowledge.

### *The anthropocentric tension*

In natural history museums, a common exhibition structure begins with the history of the earth, followed by simple life forms, plants, animals and, finally, human evolutionary history. The visitors follow the structure and experience the change from simple to complex life forms. This linearity is evident in several museums, for example, Shanghai Natural History Museum, which starts on the top floor with an astronomy section cleverly associated with the sky, moving down and passing dinosaurs, mammals and arriving at the human. The Hong Kong Museum of History[4] is following a similar logic. First, a description of the topology of Hong Kong (geology), then Hong Kong's specific ecosystems (biology) followed by a section on prehistoric humans in Hong Kong (paleoanthropology) and, finally, an exhibition on Chinese-Hong Kong culture over the last 1000 years (history). Each room in these museums and several other museums are strongly influenced by, or restricted to, the scientific disciplines. The human/animal dichotomy is often implicitly exhibited in museums strongly influenced by scientific disciplines presenting geological, biological and paleo-anthropological knowledge in different rooms. The museums which are producing their exhibitions in relation to the scientific disciplines also have similar versions on evolutionary change. I understand this as since they all relate to the same over-arching structure, the disciplines, there is an implicit co-ordination of versions between these museums.

In Hong Kong's exhibitions on their three ecosystems, "forest, freshwater and coastal", most animals from the region are present, except the human being. The human species are not exhibited next to the other animals in the Hong Kong ecosystems; rather, the life of the early human settlements in Hong Kong is exhibited as part of a cultural system that is featured in the anthropology section in the next room. It is common for the museums upholding the binaries of human/animal and nature/culture. The issue here is what this binary says about evolution as change. It draws attention to a linear story of change as progress from nature to culture; from animal to human. For Grosz and other posthuman thinkers, culture is not the culmination or the development of nature, nor should a separation between nature and culture be upheld. Grosz (2011) argues that Darwin proposes a fundamental continuity between nature and culture: "… culture is not different in kind from nature. Culture is not the completion of an inherently incomplete nature (this is to attribute to man, to the human and to culture, the position of evolution's destiny…)" (p. 91). Close at hand is Donna Haraway's discussion of the inseparability of

[4] The permanent exhibition at the Hong Kong Museum of History is currently being renovated (June 2020). I visited the museum in December 2016.

nature and culture and her concept of *natureculture* (Haraway, 2003). One museum that handles its content from a natureculture entanglement perspective is the Auckland Museum in New Zealand. The exhibition has minimal content on human evolution and draws on Maori traditions in their approach. The approach of natureculture can also be experienced at the Neanderthal Museum with its focus on a particular species at a particular location – the Neanderthal Valley outside Mettmann, Germany. This local focus allows the museum to cross scientific disciplines and exhibit the museum objects as nature-culture entanglements.

In one way, the museums' respective narrative ordering (Bennett, 2004) follows the earth's change over time. This could also be seen as presenting more inanimate objects and simple life forms first, increasing in complexity and ending with the human being. This idea is supported by one of the world's oldest natural history museums in Vienna, dating back to the mid-19$^{th}$ century. Research on the museum and its origin has shown that the idea at the time was to explicitly display the human as the crown of creation, with all other life forms ordered in a way leading up to the human species (Jovanovic-Kruspel, 2015). Considering the exhibitions included in this article, museums still take pride in human uniqueness. At the Natural History Museum in Vienna, the exhibition on human evolution includes poetic quotes on the walls. One of the quotes is from science writer Michael Shermer:

> We are a fluke of nature,
> a quirk of evolution,
> a glorious contingency

Museums are entangled in an anthropocentric tension between displaying the human as an animal and as a part of nature, but also as a unique species – glorious – and a fluke. All knowledge produced, inside and outside museums, by and/or for human beings, has an issue with anthropocentrism – a concept used to highlight how humans place themselves at the center of the world (Braidotti, 2019). The museums that target knowledge of the 'anthropos' itself are certainly no exception to this dilemma. Grosz (2011) argues that anthropocentrism is clearly visible in most Western thinking and philosophy, from the Greeks to post-structuralism: "Man must be understood as fundamentally different from and thus as other to the animal; an animal perhaps, but one with at least one added category – a rational animal, an upright animal, an embarrassed animal - that lifts it out of the categories of all other living beings and marks man's separateness, his distance, his movement beyond the animal" (p. 12). When reading this quote, I recalled the Finnish Museum of Natural History, in which one heading stated: "An animal named 'the human'". This summarizes the anthropocentric tension that museums face regarding the different versions of knowledge that are produced. One version enacts the human species among other animals while another version separates the human species from the rest of the exhibition. The different versions are not distributed between different museums. Instead, they can coexist at the same museum but usually in different sections of the exhibition (cf. Mol, 2010, p. 264). At the same time, the versions in museums influenced by the scientific disciplines are co-ordinated since they

all relate to the same over-arching structure.

### *Change as inherent quality and entanglement*

In this section I will discuss how knowledge on evolutionary change is produced as two different, albeit co-existing, versions in museums and the tension that involves. The first version is evolutionary change as an inherent quality in the individual species with reference to today's human beings. The second version is how evolutionary change is exhibited as an entanglement of human species and the natural environment.

In museums, change in human evolution is often exhibited as a consequence of an inherent quality in the human itself. For example, texts in the exhibition at the Museum of Natural Sciences in Brussels, which are accompanied with full body models, focus on defining specific species with particular contributions to human evolution, such as: "The only survivor", "Increasingly modern" and "Away from Africa". This way of highlighting or defining the contribution of the species relates to the way we see ourselves today. Grosz (2004) argues: "It is only retrospection that can determine what direction the paths of development, of evolution or transformation, have taken" (p. 90). This can be understood to mean that museums are exhibiting a backtracked version of human evolution based on the contemporary view of a definition of what we are today. Several exhibitions begin with a section on what it means to be a human being today. For example, the Museum of Evolution in Uppsala, Sweden, asks: "What makes us human?" with the reply: "our bodies, our brains, our language, our culture and our history". Other museums have definitions that correspond to some extent with the museum in Uppsala. The exhibition on human evolution in Shanghai Natural History Museum frames the contributions that each human species has made to human evolution in the following ways: *Australopithecus*: The 'Pioneer' of Walking Upright, *Homo erectus*: The Earliest User of Fire, *Homo habilis*: The Creator of Tools, Early *Homo sapiens*: The Founder of the Clan, and Late *Homo sapiens*: Us. The Shanghai exhibition provides minimal information on the natural environment of the times and places in which the species lived. When the exhibition presents fossils found locally in China, information on animal fossils uncovered at the same excavation sites is provided, but little or no additional information regarding climate or fauna. Hence, the view on change is produced as an inherent quality in an individual or a group, despite these definitions are produced – as Grosz puts it in the quote above – in retrospect.

A second version through which the knowledge on evolutionary change is produced is entangled with aspects of the natural environment. For example, the Finnish Museum of Natural History states in a heading: "Five degrees made all the difference!", discussing living conditions and their dependence on climate change from a Scandinavian perspective. I previously discussed the museum in Brussels as a version of change as an inherent quality. Interestingly, this is also one of the museums that shows a video displaying the entanglement of the human and the natural environment. The video shows a world map with the various human species originating in Africa and spreading all over the world from around seven million years ago until today. This video also shows how the natural environment changed over time with a focus on vegetation, such as

savannah and deep vegetation, and climate aspects such as the recurring Ice Ages. In the video, human evolution and the natural environment are shown together and are clearly linked as the human species adapt to the changes in the natural environment.

Hence, the same museum in Brussels produces two versions of approaching evolutionary change within the exhibitions which indicates a tension between the two. Mol (2010) states: "Tensions live on and gaps must be bridged, hence the need for 'co-ordination' (p. 264). The tension is here co-ordinated as the different versions coexist through being distributed between different sections of the exhibition. Therefore, the tension is not apparent for the visitors, but appears when studied more closely. Between museums, the tension of different versions is bridged, or co-ordinated, when museums are using similar exhibition content. For example, the video from Brussels can also be seen at Museon in The Hague and at the Neanderthal Museum in Mettmann.

Another example of when knowledge on evolutionary change is produced as entangled with aspects of the natural environment is the discussion on natural selection. Evolutionary change, or 'natural selection', as Darwin (1997) called it, comprises a number of stages. The first stage is an increased population in which more individuals are born than will survive. These individuals are varied. When circumstances change, there is a selection process in which the individuals whose


*Figure 1.* Showcase at the Neanderthal Museum explaining the four steps of natural selection. Photograph by author.

variation is more suited to the change will survive and have offspring that are better adapted to the natural environment. This is the process of natural selection.

Natural selection is rarely discussed in exhibitions on human evolution, with the Neanderthal Museum being an exception. In this context, it provides a version of human evolution as change with an emphasis on the changing natural environment. As a contrast, most exhibitions produce versions of change based on individuals changing – from pre-ape, to upright, to toolmaking to social organization. Viewed from the stages of natural selection, knowledge on how and why the changes from one stage to the next occurred are often excluded.

The tensions between the two versions of knowledge on evolutionary change – inherent quality or entangled with the natural environment – is also produced through the exhibition design. The

museum in Brussels has a conceptualized exhibition design with digital signs describing the qualities of each human species (see figure 1). The design concept is based on black walls, wooden material used in full body models and visual models, and information on digital touch screens. The design thus has a minimalistic appearance. The models are made non-realistic in an almost abstract way, perhaps indicating that the models are in fact reproductions. This exhibit design can be understood as avoiding producing knowledge on the human as entangled with the natural environment, as the design is abstract rather than realistic. For comparison, see figure 2 from Trento in Italy, exhibiting a realistic model with tools and jewelry for contextualization. The model is placed against a wallpaper with a print of a forest. This exhibit design can be understood as showing the individual as entangled with the natural environment. On the other hand, the exhibition in Brussels also included the video mentioned above showing how natural forces have

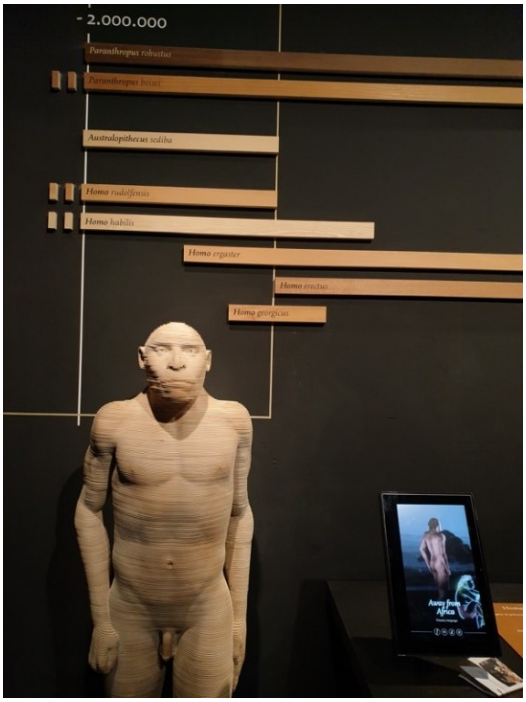


*Figure 2.* The use of black walls, wooden models and information on digital screens at the Museum of Natural Sciences in Brussels. Photograph by author.

*Figure 3.* Realistic reproduction of early *Homo sapiens* placed against a wallpaper with motive of a natural environment at the MUSE Science Museum in Trento, Italy. Photograph by author.

interacted with the development of the human.

To conclude, the two versions of evolutionary knowledge co-exist in different sections of the exhibition, thus the tension is never explicit for regular visitors. As we have seen, different version of human evolution with regard to change are produced in the museums. In this section we also saw that versions are co-ordinated between museums through sharing exhibition content.

### *Unfolding the first human*

This analysis section will discuss a few tensions that are enacted based on the use of the notion of

'the first human' in exhibitions: The museum in Brussels uses the heading "The first of all *Homo* species". The Natural History Museum in Stockholm uses "The first of our species". The example I will expand on here is from the Natural History Museum in Vienna. One wall contains a collection of human skulls beneath the heading: "Who was the first?". The definition of 'the first of our species' refers to who was the most "legitimate candidate" to be regarded as the first of the genus *Homo*[5]. The text on the wall concludes that it was with *Homo ergaster* that "all the criteria of the genus *Homo* were fulfilled". Being the first specifically means fulfilling the taxonomic criteria. At the museum in Vienna, the next text discusses *Homo* and *Australopithecus*: "Drawing a clear distinction between the two genera is problematic", followed by a discussion on how the first of the *Homo* genus are very varied. Thus, one section of the exhibition can be certain about taxonomy whereas in a different section, an exhibition will invite the visitor to problematize the taxonomic categorizations. Or in other words: two different versions are co-existing in the same exhibition, next to each other.

[5] 'Genus' is a taxonomic rank, which is a group of related species. Homo sapiens is the only surviving species of the genus Homo. Extinct species of the genus Homo include Homo neanderthalensis and Homo erectus. The famous Lucy belongs to the genus Australopithecus, of which all species were extinct or developed into any of the Homo species.


*Figure 4.* Wall poster "Who was the first?" with accompanying skull casts at the Natural History Museum in Vienna. Photograph by author.

The Neanderthal Museum uses the plural form, “The First Humans”, in its exhibition. This phrase refers to a couple of early members of the genus *Homo*, such as the toolmaker *Homo habilis* and the intelligent traveler *Homo erectus*. Consequently, the genus *Australopithecus* (which includes the famous *Lucy* of the species *Australopithecus afarensis*) that preceded the genus *Homo* is not seen here as part of the first, but as something before the first. However, in other parts of the exhibition, human species from the *Australopithecus* genus are included, producing a tension regarding what is human and what is not. In the section “Beginnings in Africa”, the same museum emphasizes two beginnings for humankind, both in Africa – the first being the separation of the human lineage and the chimpanzee/bonobo lineage – and the second being the development explained above related to the genus *Homo*. Hence, different versions of the first human, or the beginning of humankind, are produced. These versions differ between museums but can also co-exist in the same exhibition.

Each individual is the offspring of their parents, who are the result of their parents who, in turn, are the result of their parents, and so on. Human evolution also changes from one birth to the next, but simply on a larger scale – hundreds of thousands of births following each other. To separate the first from a long series of generations is to repeat a framework of knowledge that has been established in both our contemporary culture and in most religious belief systems. ‘Once

upon a time'; the Big Bang; Christianity's Adam and Eve; Norse mythology's Ask and Embla, to name a few. 'The first' is a mode of thinking that is so clearly reiterated in popular culture, the history of ideas, and in the creation myths of religion that we consider it completely logical. It provides an uncertain past with a certain answer. The knowledge that is produced aligns with other common ideas of change as occurring from a starting point to an end point. Grosz (2004) draws our attention to a view of evolutionary change as variations of differences: "There is no origin of species because there is no unity from which descent is derived" (p. 25). She states that Darwin rarely discussed the origin of species as a fixed category; rather, he was interested in descent as a continuous process (Grosz, 2004). After all, Darwin was seen as a threat to Christianity and this lack of a starting point was naturally seen as a critique of the creation myth (Gould, 1979).

As several museums are using popular notions such as "the first", they are implicitly co-ordinating the versions on human evolution with each other. Similarly, as museums are continuously referring to knowledge from the scientific community the different versions also align.

## Conclusion: Change at the museum

This article used posthuman thinking in order to follow the knowledge production on change as an educational, empirical and theoretical phenomenon in the exhibitions on human evolution. Knowledge production is a central issue in educational research and in this study museums were studied as educational institutions. Visiting all these museums opens up the possibility for exploring the different versions on evolutionary change in the exhibitions but also on the co-ordinations. The main parts of the exhibitions were co-ordinated with other museums, as museums continuously draw from knowledge in the scientific community, although the scientific community also produces different versions of human evolution, creating tensions and even conflicts (Pääbo, 2014; Stringer, 2016). Scientists share their versions in scientific journal and this openness affords that versions turn into tensions. The museums' versions are produced in a local space and with the purpose of education.

Different versions of knowledge on evolutionary change are produced in various exhibitions. The different versions produce a tension which is bridged, or co-ordinated, as I have manifested in different ways in the analysis. I will conclude this article by summarizing the main findings of the three analysis sections.

Museums, as educational knowledge producing institutions, are facing an anthropocentric tension. However, it is not a matter of one exhibition producing an anthropocentric version of evolutionary change and another museum producing a posthuman version. Instead, this is a tension where, on the one hand, museums exhibit humans among other animals and, on the other hand, they separate humans from the rest of the exhibition. The human/animal dichotomy is often implicitly exhibited in museums strongly influenced by scientific disciplines presenting geological, biological

and paleo-anthropological knowledge in different rooms. When several museums relate to the same over-arching structure, in this case the scientific disciplines, they tend to create similar versions of evolutionary change. In the analysis, I see this as an implicit or invisible co-ordination between museums.

The second analysis section discussed two versions of evolutionary change: (i) as an inherent quality in the individual species produced in retrospection with reference to today's human beings, and (ii) as an entanglement of human species and the natural environment. The tension involves how the two versions co-exist in different sections of the exhibition. Thus, the museums use the tension to produce a rich content for the visitors, while running the risk of appearing contradictory. In this section we also saw that versions are co-ordinated between museums through using the same exhibition content. In this case, the same, or very similar, videos were used in several exhibitions.

In the third analysis section the tensions on evolutionary change involved the notion of 'the first human', which is a popularized idea on evolutionary change with a single starting point. Other sections of the exhibitions produced other versions of evolutionary change, more in line with Grosz's (2004) view on evolution as continuity and "oscillations of difference" (p. 24). When museums are producing knowledge based on popular notions such as "the first", they are all relating to the same version, implicitly co-ordinating their versions on evolutionary change with each other.

To conclude, all these three tensions are saying something about knowledge production, which is a central issue of the educational sciences. An educational content, in this case evolutionary change, is not a singular phenomenon which is represented in a more or less correct way. Rather, Mol (2010) writes that "The point is not to purify the repertoire, but to enrich it. To add layers and possibilities" (p. 257). The aim with this article was to enrich the educational discussion about evolutionary change through exploring museums that focus on this issue. In so doing, I have hoped to add new layers to the academic discussions around museum education, knowledge production and evolutionary change. This involves exploring the tensions around how knowledge production is entangled with aspects of anthropocentrism, linearity, and human exceptionalism. These, and other posthuman concerns, continue to be pressing matters for the educational field.

## References

Ackermann, R. R., Mackay, A. & Arnold, M. L. (2016). The hybrid origin of "modern" humans. *Evolutionary Biology, 43*, 1–11. https://doi.org/10.1007/s11692-015-9348-1

Barad, K. (2007). *Meeting the universe halfway: quantum physics and the entanglement of matter and meaning.* Duke University Press. https://doi.org/10.1515/9780822388128

Bennett, T. (2004). *Pasts beyond memory: evolution, museums, colonialism*. Routledge. https://doi.org/10.4324/9780203647066

Berger, L. R., Hawks, J., de Ruiter, D. J., Churchill, S. E., Schmid, P., Delezene, L. K., et al. (2015). Homo

naledi, a new species of the genus Homo from the Dinaledi Chamber, South Africa. *eLife*, e09560. https://doi.org/10.7554/eLife.09560

Braidotti, R. (2019). *Posthuman knowledge.* Polity Press.

Cameron, F. (2018). Posthuman museum practices. In R. Braidotti & M. Hlavajova (Eds), *Posthuman Glossary*. Bloomsbury.

Cameron, F. (2015). Ecologizing experimentations: A method and manifesto for the post-human museum. In F. Cameron & B. Neilson (Eds.), *Climate change and museum futures* (16-33). Routledge https://doi.org/10.4324/9780203752975

Ceder, S. (2019a). *Towards a posthuman theory of educational relationality*. Routledge. https://doi.org/10.4324/9781351044196

Ceder, S. (2019b). Giant's kettles and Arctic childhoods. In P. Rautio & E. Stenvall (Eds.) *Social, material and political constructs of Arctic childhoods: An everyday life perspective*. Springer.

Ceder, S. (2018). March, tree, stream: The knowledge production of early human evolution. 創価大学教育学論集 [*Bulletin of Soka Educational Studies*], *70*, 409–425.

Coyne, J. A., & Orr, H. A. (1997). "Patterns of speciation in Drosophilia" revisited. *Evolution: International Journal of Organic Evolution, 51*(1), 295–303. https://doi.org/10.2307/2410984

Darwin, C. (1997). *Origin of species*. Wordsworth Editions Ltd.

Davidsson, E. (2008). *Different images of science: A study of how science is constituted in exhibitions* [Unpublished doctoral dissertation]. Malmö University.

Ereshefsky, M. (1998). Species Pluralism and Anti-Realism. *Philosophy of Science, 65*(1), 103-120. https://doi.org/10.1086/392628

Falk, J. H. (Ed.) (2001). *Free-choice science education: How we learn science outside of school*. Teachers College Press.

Falk, J. H. & Dierking, L. D. (2000). *Learning from museums: Visitor experiences and the making of meaning*. AltaMira Press.

Fenwick, T. J. & Edwards, R. (2010). *Actor-network theory in education*. Routledge. https://doi.org/10.4324/9780203849088

Fenwick, T. J., Edwards, R. & Sawchuk, P. (2011). *Emerging approaches to educational research: Tracing the sociomaterial*. Routledge.

Frost, S. (2016). *Biocultural creatures: Toward a new theory of the human*. Duke University Press. https://doi.org/10.1515/9780822374350

Gould, S. J. (1979). *Ever since Darwin. Reflections in natural history*. Norton.

Gould, S. J. (1996). *Full house: the spread of excellence from Plato to Darwin*. Harmony Books. https://doi.org/10.4159/harvard.9780674063396

Grosz, E. (2004). *The nick of time: Politics, evolution and the untimely.* Duke University Press. https://doi.org/10.1215/9780822386032

Grosz, E. A. (2011). *Becoming undone: Darwinian reflections on life, politics, and art*. Duke University Press. https://doi.org/10.1515/9780822394433

Haraway, D. (1988). Situated knowledges: The science question in feminism and the privilege of partial perspective. *Feminist Studies, 14*(3), 575-599. https://doi.org/10.2307/3178066

Haraway, D. (2003). *The companion species manifesto: Dogs, deople, and significant otherness*. Prickly Paradigm Press.

Hasse, C. (2020). *Posthumanist learning: What robots and cyborgs teach us about being ultra-social*. Routledge. https://doi.org/10.4324/9781315647661

Insulander, E. (2010). *Tinget, rummet, besökaren: Om meningsskapande på museum* [Unpublished doctoral dissertation]. Stockholm University.

Jasanoff, S. (Ed.) (2004). *States of knowledge: The co-production of science and the social order*. Routledge. https://doi.org/10.4324/9780203413845

Jovanovic-Kruspel, S. (2015). *Natural History Museum Vienna – A guide to the collections*. NHM Vienna.

Kridel, C. (2011). Places of memorialization – Forms of public pedagogy: The Museum of Education at University of South Carolina. In J.A. Sandlin, B.D. Schultz & J. Burdick (Eds.) (2011). *Handbook of Public Pedagogy: Education and learning beyond schooling*. Routledge.

Latour, B. (2005). *Reassembling the social: An introduction to actor-network theory*. Oxford University Press.

Lenz Taguchi, H. (2010). *Going Beyond the Theory/Practice Divide in Early Childhood Education: Introducing an intra-active pedagogy*. Routledge. https://doi.org/10.4324/9780203872956

MacRae, C., Hackett, A., Holmes, R. & Jones, L. (2018). Vibrancy, repetition and movement: posthuman theories for reconceptualising young children in museums, *Children's Geographies, 16*(5), 503-515. https://doi.org/10.1080/14733285.2017.1409884

Mol, A. (2002). *The body multiple: Ontology in medical practice*. Duke University Press. https://doi.org/10.1215/9780822384151

Mol, A. (2010). Actor-Network Theory: Sensitive terms and enduring tensions. *Kölner Zeitschrift für Soziologie und Sozialpsychologie, 50*, 253-269. https://hdl.handle.net/11245/1.330874

Pääbo, S. (2014). *Neanderthal man. In search of lost genomes*. Basic Books.

Srinivasan, R., Becvar, K., Boast, R., & Enote, J. (2010). Diverse knowledges and contact zones within the digital museum. *Science, Technology, & Human Values, 35*(5), 735-768. https://doi.org/10.1177/0162243909357755

Stringer, C. (2016). The origin and evolution of *Homo Sapiens*. *Philosophical Transactions Royal Society B*, *371*, 1–12. https://doi.org/10.1098/rstb.2015.0237

Sutikna, T., Tocheri, M. W., Morwood, M. J., Saptomo, E. Wahyu., Jatmiko, Due Awe, R., Wasisto, S., Westaway, K. E., Aubert , M., Li, B., Zhao, J., Storey, M., Alloway, B. V., Morley, M. W., Meijer, H. J.M., van den Bergh, G. D., Grün, R., Dosseto, A., Brumm, A., Jungers, W. L. & Roberts, R. G. (2016). Revised stratigraphy and chronology for Homo floresiensis at Liang Bua in Indonesia. *Nature, 532*(7599), 366–369. https://doi.org/10.1038/nature17179

Turelli, M., Barton, N. H., & Coyne, J. A. (2001). Theory and speciation. *Trends in ecology & evolution, 16*(7), 330–343. https://doi.org/10.1016/S0169-5347(01)02177-2

Yun Lee, L. (2011). Museums as 'dangerous' sites. In J.A. Sandlin, B.D. Schultz & J. Burdick (Eds.) (2011). *Handbook of Public Pedagogy: Education and learning beyond schooling*. Routledge.

## Attachment 1

List of museums in the order in which they became part of the empirical materials. The first museum on the list was visited in 2016 and the last four museums were visited in February 2020.

| Name | City | Country |
|---|---|---|
| Swedish Natural History Museum | Stockholm | Sweden |
| Hong Kong Museum of History | Hong Kong | Sweden |
| Fiji Museum | Suva | Fiji |
| Chhatrapati Shivaji Maharaj Vastu Sangrahalaya | Mumbai | India |
| Museum of Evolution | Uppsala | Sweden |
| Natural History Museum of Denmark | Copenhagen | Denmark |
| Musée de l'Homme | Paris | France |
| Natural History Museum | London | United Kingdom |
| National Museum of Nature and Science | Tokyo | Japan |
| Vietnam History Museum | Ho Chi Minh City | Vietnam |
| Gothenburg Natural History Museum | Gothenburg | Sweden |
| Chulalongkorn University Museum of Natural History | Bangkok | Thailand |
| Auckland Museum | Auckland | New Zeeland |
| Finnish Museum of Natural History | Helsinki | Finland |
| Museum of Anthropology and Ethnology | Florence | Italy |
| MUSE Science Museum | Trento | Italy |
| Shanghai Natural History Museum | Shanghai | China |
| Fangshan Tangshan Geopark Museum | Nanjing | China |
| Nanjing Ape Cave Scenic Area | Nanjing | China |
| Anhui Provincial Museum | Hefei | China |
| National Museum of Natural Science | Taichung | Taiwan |

| | | |
|---|---|---|
| Natural History Museum Vienna | Vienna | Austria |
| Neanderthal Museum | Mettmann | Germany |
| Museum of Natural Sciences | Brussels | Belgium |
| Museon | The Hague | The Netherlands |