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Introduction

Human Mind in Space and Time: Prolegomena to a Cognitive History

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Abstract

The last decades have seen a noticeable increase in cognitive science studies that have changed the understanding of human thinking. Its relevance for historical research cannot be overlooked any more. Cognitive history could be explained as the study of how humans in history used their cognitive abilities in order to understand the world around them and to orient themselves in it, but also how the world outside their bodies affected their way of thinking. In focus for this introductory chapter is the relationship between history and cognition, the human mind's interaction with the environment in time and space. The chapter discusses certain cognitive abilities in interaction with the environment, which can be studied in historical sources, namely: embodied mind, situated cognition, perception, distributed cognition, conceptual metaphors, categorization, intersubjectivity, and communication. These cognitive theories can give deeper understanding of how – and not only what – humans thought, and about the interaction between the human mind and the surrounding world. The most ambitious aim of such a cognitive history could be to inform the research on the cognitive evolution of the human mind.

Keywords: categorization, cognitive history, distributed cognition, embodied mind, history of science, metaphors, situated cognition.

Cognitive history relates to how humans in the past used their cognitive

abilities in order to understand the world around them and to orient themselves in it, and also how the world outside their bodies affected their way of thinking. The objective of this introduction is to analyse the theoretical basis for a cognitive approach to history, and to discuss some of the fundamental concepts of cognitive history that can provide new, complementary insights into how humans in history perceived their world as a result of an interaction between the mind and its environment. The argument is that cognitive history, as a complementary method, as an analytical tool combined with well-established theories and methods, can revitalize historical research, but also provide empirical historical data to the research on the bio-cultural coevolution of human cognition.

There are three steps towards a cognitive history. First, one has to lay the theoretical foundations for a cognitive approach to history, a new historical theory and method enlightened by cognitive science. If cognitive science is right in its claims concerning human thinking, then its theories should also be valid for human beings in history with whom modern humans share the same cognitive abilities. The second step would be to test the theories of cognitive science on the historical sources to ascertain whether they lead to new explanations and a deeper understanding of human cognitive creativity in history. These cognitive theories can open up the hidden thought processes of humans in the past, and let the historian come closer to an understanding of *how* humans thought, not just *what* they thought, and further study the interaction between the human mind and the surrounding world. The case studies should concern some crucial cognitive aspects of

human thinking, such as perception, metaphors, and categorization. The ambitious third step, in the long run, is to inform research on the cognitive evolution of the human mind. History can contribute to cognitive science and provide empirical historical data concerning how human cognition is a result of time, of history, personal and collective memories, and as a result of the human mind's interaction with its specific environment in time and space.

Identifying plausible theories for a cognitive history is not enough. These theories should also work, and have to be possible to implement on the historical sources. A new theory for historical research is of no use if it cannot show any new results, give new explanations, and enhance the understanding of the human past. Furthermore, this enterprise can contribute to the research on the evolution of cognition, and, as it were, connect the Palaeolithic human being with the postmodern by studying the cultural evolution and its impact on human cognition. In the following, after an outline of current research in cognitive humanities, this chapter discusses the challenges of space and time in history, to which a cognitive approach might be an answer. Thereafter, it will be further explained what kind of cognitive theories could be tested on the historical sources and could function as fundamental concepts for a cognitive history in order to study the interaction of mind and environment, and the bio-cultural coevolution of human cognition.

History and Cognition

The theories of cognitive science have lately begun to be utilized in the social sciences and the humanities, especially in linguistics, literary studies, archaeology, and also in religious studies.[1] There is research, for example, in cognitive linguistics, semantics, semiotics, and poetics – but to a lesser extant in cognitive history. However, the revolution in cognitive science, which has changed the understanding of human thinking, cannot be overlooked any more by historians. In order to avoid performing some kind of a layman's common sense approach toward human behaviour, entangled in ill-founded speculative musings, the historian can make use of what is currently known empirically and experimentally of human behaviour (Figure 1.1). Current cognitive theory for analyses of the past, could be one way of avoiding often mistaken preconceived common sense assumptions about human thinking and behaviour. A cognitive approach to history could present new, complementary historical explanations based on this new knowledge about human cognition, thanks to recent research in cognitive science. It was not possible to propose these kinds of historical explanations before the cognitive revolution in science. Cognitive theories of the embodied mind, situated cognition, distributed cognition, perception, conceptual metaphors, categories, intersubjectivity, etc., not only have great relevance for the understanding of modern humans, but also for humans in

[1] Dutton 2009; Zunshine 2010; Garratt 2016. For linguistics and literary studies, see Richardson & Steen 2002; Turner 2002; Boyd 2009; Brône & Vandaele 2009; Armstrong 2013; Cave 2015. For archaeology, see Mithen 1996; Mithen 2002; Renfrew, Frith & Malafouris 2009. And for cognitive studies on religion, see Boyer 1994; Geertz & Jensen 2011; Martin & Sørensen 2011; Tribble & Keene 2011; De Cruz & De Smedt 2015; Struck 2016. Two volumes have been published of *Journal of Cognitive Historiography* (Equinox Publishing), see https://journals.equinoxpub.com/index.php/JCH/index. See Eidinow & Martin 2014.

the past, for historical research.

Through knowledge of how humans generally function, one can acquire clues to a broader understanding of human needs and thoughts in history. It is human history and shared cognitive skills, that makes it possible for present-day newcomers to admire cave paintings from prehistoric times, marvel at the stories of the Old Testament, see the clarity in Plato's philosophy, be touched by Ovid's love poems. Humans in history can speak to us. It is possible to access, at least get a glimpse of the inner thoughts of dead minds. We can understand them across the millennia, through time and space. In that respect, cognitive history also takes note of what unites humans in history, the similarities, not only what distinguishes them. There are obvious differences between humans in history due to gender, ethnicity, culture, etc., but there is still something that makes it possible to transcend these real or constructed barriers. The Khoikhoi woman Saartjie Baartman in the beginning of the nineteenth century is possible to understand, contrary to what was believed by white European males of the time.[2] It is the one-dimensional sources that often impede a closer access to the past. Nevertheless, not everything in history concerns particularities and disparities – if it was, we would not be able to access human beings in history. We share something. There are trans-historical phenomena, almost human universals, such as the inevitabilities of life – that we are born, we eat, move, love, and die. The difference that could be found between present-day humans and those who lived in the past is not because of

[2] Holmes 2007; Crais & Scully 2009; Dunér [in press].

fundamental different cognitive capacities, but because we are situated in different times and spaces. Human beings in history are not some distant creatures different and alien to us, but once living, feeling and thinking individual humans similar to us.

As yet there are few comprehensive statements of what cognitive history can be, what its fundamental concepts are, and what kind of research should be undertaken in this field. The idea that cognitive science could inform historical analyses was noted in the 1990s by, among others, Nancy Nersessian.[3] In her terms, cognitive history of science "joins historical inquiry with those carried out in the sciences of cognition in order to explain the 'thinking practices' whereby 'scientists create, change and communicate their representations of nature'."[4] Quite a few researchers have seen the potential of a cognitive approach, not only to the history of science, but also to general history.[5] Cognitive history becomes a way of studying human creativity. Subrata Dasgupta proposes that "Cognitive history is a symbiosis of the methods and tools of historical and biographical investigation and the theories, models, and methods of cognitive science. Its aim is to understand and explain actual creative phenomena taken from the history of the creative tradition."[6] Some attempts have been made, mostly in the history of literature, to analyse reading and writing, for example by Mary Thomas Crane and Alan Richardson, but there are also a few examples in the history

[3] Nersessian 1992, pp. 4–7, 36–38; 1995, pp. 194–211; 2005; Lawson 1994, pp. 481–495.
[4] Nersessian 1995, p. 194.
[5] Gouwens 1998; Gooding 2000; Tweney 2001, pp. 141–173; Carruthers, Stich & Siegal 2002; Heintz 2004, pp. 391–408; Lawson 2004, pp. 1–5; Whitehouse 2005, pp. 307–318; Smail 2008; Dunér 2011, pp. 117–140; Heintz 2011; Sørensen 2011; Smail 2014; Asprem 2015; Dasgupta 2016; Sutton & Keene 2017.
[6] Dasgupta 2016, p. 65.

of science, including my own work on the conceptual metaphors of science, and a proposed enactive theory of scientific evolution that explains the emergence of science as resting on given cognitive abilities in *interaction* with a changing physical and cultural environment.[7] One reason why this cognitive-historical approach is not already one of the standard methods of historical research could be that it is a demanding enterprise. Not only are deep insights into the current research in cognitive science needed, but – perhaps even more important – excellent skills in the handicrafts of the historian are also required. This combination is rare. Cognitive scientists are not trained in historical empirical research, often lack contextual knowledge and philological skills, and historians have little or no insight into what is going on in cognitive science and other relevant fields outside the historical disciplines. Furthermore, a cognitive-historical analysis must show that this kind of approach reveals new knowledge about the past, provides new explanations that enhance the understanding of human ideas, thoughts, beliefs, and emotions in history.

Time and Space in History

Cognitive-historical theory can help inform about how human ideas are a result of an interaction between the mind, time, and space. A cognitive perspective can put history into a historical perspective, and thereby connect the past and the contemporary, hominid prehistory and human history. It can put history into an ecological context, with awareness of the impact of the

[7] For literature, reading, and writing, see Olson 1996; Crane 2000; Collins 2008; Richardson 2010. For history of science, see Netz 1999; Dunér 2004; Andersen, Barker & Chen 2006; Dunér 2013; Dunér 2014; Dunér 2016.

surrounding environment on living conditions. At the same time it can pinpoint the historicity of the human brain as an entity existing in history, formed by the temporality of human culture. The outcome of this cognitive approach can be historical research connected to, and reconciled with, the rest of the production of knowledge that occurs in other scientific disciplines.

The very core of the cognitive-historical approach is the view of humans as historical beings, shaped by their history, both their cultural and evolutionary history (see Sonesson's chapter in this volume). Thought is the result of history, of time, which has slowly evolved through evolution as a specific interaction between brain, environment, language, and culture.[8] A cognitive history of ideas strives to connect the past and the present. Human history could also be extended to include the human evolutionary past; the thoughts can be placed in humanity's "deep history".[9] But something has obviously happened between Palaeolithic times and Postmodernity. Human life and ideas have changed, but why? Historical change can, of course, hardly be explained by an underlying anatomical change of the human brain, or by societal factors alone, but has to do with a cultural change, which in turn has had an impact on human cognitive abilities. Modern, adult human cognition, as Michael Tomasello puts it, is not only a result of genetic events that have occurred over millions of years of evolutionary time, but also of cultural events that have occurred over many thousands of years of cultural history, and personal events in thousands of hours in

[8] Donald 1991; Donald 2001.
[9] Turner 2002, p. 18; Richardson & Steen 2002, pp. 3–4; Smail 2008; Shryock & Smail 2011.

ontogenetic time.[10] It is the development of culture that gave rise to the unique human material and symbolic artefacts, which in turn created a cultural niche that had an impact on human cognition. Historical studies thus have an important role by linking the early hominids with today's humans with regards to the understanding of the emergence of human thought and culture.

The importance of space in order to explain human society and culture has increasingly attracted the attention of many researchers, for example in environmental history and global history, in which there is an interest in spatial relationships, travel, contacts, trade, environmental changes, etc. – and it works – but what is lacking is an explanation of why space is important, why the context of the phenomenon in question is inevitable for a deeper understanding. An explanation of the mechanisms behind human spatial experience is needed. A cognitive approach to history might explain why the context and human spatial experience must be the cornerstones in historical analyses, and can, furthermore, provide complementary explanations for, and an understanding of, what happens in their minds when humans interact with the surrounding environment. This could be based on current research on situated and distributed cognition. Human beings are shaped by, but also shape, the space around them. Humans have adapted to certain environmental conditions, and have simultaneously also created their own natural and cultural habitats.

The challenge of historical research of today is to avoid being carried out

[10] Tomasello 1999, p. 216; 2005, pp. 203–217.

independently, isolated from the rest of the production of knowledge. The "lone wolf" model of research, a historian working in isolation, is probably not a successful strategy. Co-authored articles are, however, rather uncommon, especially in collaboration with non-historians and with perspectives from other fields. In order to explain the complexity of human behaviour in history, one needs nevertheless collaboration across the disciplinary borders. Instead of trying to become polymaths, researchers could combine their strengths and begin working together. As Dimitris Xygalatas urges, interdisciplinarity and collaboration, "are a *sine qua non* for Cognitive Historiography".[11] So far, historical research has incorporated perspectives from the social sciences, perhaps above all from economic and political theory and sociology, but very little from the sciences. A cognitive history also takes into account what happens in cognitive science, psychology, neurology, ecology, and evolutionary theory. If these disciplines are right in their assumptions, they should also be valid for historical humans. By bringing together knowledge from various kinds of research, one could come up with a more comprehensive description of the history of thought. When new data on human behaviour is acquired, this will also change the view of human beings. Keeping up with new findings gained from scientific approaches to the study of human nature is perhaps a question of survival for the humanities.[12] However, it is important to underline that this is *not* a reductionist approach: reducing thoughts in history to mere impulses in the brain would be naive and simplistic. Instead,

[11] Xygalatas 2014, p. 197.
[12] Xygalatas 2014, p. 193.

it is a way of binding human knowledge together, incorporating history into the family of sciences. At the same time, such historical research can provide important and necessary contributions, as well as new empirical data, to other scientific disciplines, not least, about how placement in different temporal and spatial environments influences human thinking and action. Cognitive science has focused on either modern contemporary humans, or the hominids before the rise of the species *Homo sapiens*. This has left a significant gap in the understanding of the evolution of cognition. Empirical historical research is needed to obtain the complete picture of human cognitive development, to fill in this gap between Palaeolithic times and Postmodernity. This overlapping is what a cognitive history strives for.

Fundamental Concepts of Cognitive History

Humans can be said to be bio-cultural living and thinking entities that are a result of the biological and cultural coevolution, with cognitive abilities evolved through the interaction between the mind and its environment. Before I discuss the theories involved in a cognitive-historical approach, I begin with an interactionist statement underlying such a perspective on history. If the human mind has evolved as an adaptation to particular challenges, such as reproduction and survival, that our ancestors faced during their evolution, then it follows that human thinking, the brain, is adapted to, first, the physical and biological environment, its special conditions and opportunities, that enabled humans to orient themselves in the landscape, to understand and interpret it, to interact with it, and

manipulate their environment. Second, the human brain is also then adapted to other brains of the human species, their thinking, and their culture, in order to understand the feelings, thoughts, motives, etc. in psychological and social interaction that is characteristic for human life. This constant interaction through the millennia between the mind, the environment, and culture, including the social interaction between minds, has led to what we are today. Thought is not merely a product of linguistic discourses, social conventions, and political ideologies, but concerns what it is to live as a human being of flesh and blood, living in a world in space and time. Through this location in space and time, the creature that became the modern human has gradually acquired increasingly more sophisticated abilities for dealing with and understanding its environment, using its abilities for spatial orientation, perception, categorization, conceptualizing, intersubjectivity, and communication. It is these cognitive abilities in interaction with the environment that are in focus for this cognitive-historical approach. There are a couple of cognitive theories that I think are especially crucial for historical research, and if we have good reasons to believe in them as valid theories for human cognition, these theories will have an impact on our understanding of humans in history. In the following I will take up some of these theories and explain their most common features. Even though we might not accept all the details and explanations of the theories, their most general propositions should be considered.

Embodied Mind. Humans think with the body, not just with the brain (Figure 1.2). The mind is not detached from the body. Human thinking, as

Francisco J. Varela, Evan Thompson, and Eleanor Rosch declared in their book *The Embodied Mind* from 1991, is associated with and structured by the body, the brain, and everyday conduct in the world.[13] Consciousness cannot be said to be something separate from the body and its experiences. Humans think in a certain way because human bodies are built in a certain way and are constrained by certain physical conditions evolved over millions of years. Humans therefore have cognitive limitations and opportunities that are a function of the body, the environment and the long history of interaction between them.

Situated Cognition. According to the theory of situated cognition human cognitive processes are not just inside the brain; humans also need the environment in order to think.[14] The brain not only needs the body, but also the surrounding world in order to function efficiently. In what Andy Clark and David Chalmers call "the extended mind", the environment has an active role in driving cognitive processes of the mind.[15] Thus, cognition emerges in the dynamic interplay between the brain, the body, and the world. Thinking and emotions are not just something internal, sealed by the skin of the human body, but are in some sense external, something that occurs in the encounter between the inner and the outer. In other words, the boundary between mind, body, and world dissolves. The agent both adapts to the world and changes the world. This change is not just pragmatic, according to Peter Gärdenfors, but also epistemic in order that the world

[13] Varela, Thompson & Rosch 1991; Lakoff & Johnson 1999, pp. 3, 7, 10; Lakoff & Núñez 2000; Krois et al. 2007; Thompson 2007; Garratt 2016.
[14] Clark 1997; Brinck 2007, pp. 407–431; Robbins & Aydede 2009.
[15] Clark & Chalmers 1998, pp. 7–19; Clark 2008.

becomes easier to adapt to.[16] During the evolution of human thinking, however, the mind has become less dependent on the situation here and now, and more detached from the current environment.[17] Human cognition depends on constraints in the surrounding culture and evolves in a dynamic interaction with the technological environment. Humans have travelled in space, through forests, deserts, rivers, and valleys. Throughout history, humans have developed methods to use and interact with the given conditions in the environment, which have both created opportunities and set limits, such as climate and natural resources. Humans have transformed the world around them so that it becomes easier to live in, but the world around them has also changed them (for the home as a cognitive artefact, see Åberg, Ahlberger, and Johnson's chapter in this volume). Spatial experience is important for thinking simply because the body is related to, and conditioned by, what it moves through, the air that is inhaled, the sounds that vibrate in the ear canal, the light in the eyes, what the fingers touch, what the tongue tastes, and what the nose smells. The experience of the world is a source from which consciousness can obtain nourishment (see Johnson and Eriksson's chapter in this volume). Thinking simply needs the outside world to function. Without a body, an environment, and things, human thought starves to death in its own solitude. Day and night, light and darkness, gravitation, landscape, and winds are part of human thinking. That means that an understanding of a historical situation, or idea in history, cannot just focus on the human mind itself, but must also involve the world

[16] Gärdenfors 2008a, p. 28; Wallin & de Léon 2008, p. 139.
[17] Gärdenfors 2006; Gärdenfors 2008c, p. 81.

around this consciousness. The context, which has intuitively been recognized as something that makes an idea more meaningful and understandable, can thus be explained by cognitive history. Context is, in fact, strictly necessary for the understanding of thoughts and ideas in history. That thinking is situated means that it is also context-dependent, cognitive activities cannot be separated from the situations in which they occur. Thought cannot be understood if it is isolated from the agent, the person who thinks, and the environment. The omission of the context makes the explanation of an idea incomplete and without meaning.

Perception. With the senses, the human mind receives impressions from the world (Figure 1.3). Human thinking beings collate and collect information from the outside world using the sight, hearing, and other senses. The sensory experiences of humans in history thus have an important function in cognitive history.[18] A first step would be to reconstruct the conditions of sensual experience. The challenge is to try to find the reflections in their eyes, the soundscapes, how their food tasted, how it smelled in the streets, how their bodies ached after a day following the plough. Next step would be to analyze their interpretations of their sensory input. That which the senses conveyed was interpreted by means of specific cognitive processes before it became reality. The human mind does not merely passively receive images and sounds from the surrounding world. Instead, the brain actively searches for patterns in what it receives from the senses, and interprets them through a process determined by both

[18] On the cultural history of the senses, see Howes 2005; Jay 2011; Toner et al. 2014; Hacke & Musselwhite 2017.

biological and cultural factors. Perception is not a neutral, objective, realistic recording of reality. The conceptual or epistemic vision implies an identification of what is seen, and it is done by applying concepts to the visual perceptions. Concepts affect what one sees, and if one has no concept of a phenomenon, it will be difficult to distinguish it among all the impressions. The world is distorted by the concepts, and the concepts distort the world. The fact that the interpretations of the perceptions are controlled and changed by the individuals' and their cultures' knowledge is particularly important for historical studies of cultural encounters, travels, and other experiences of landscapes and environments.[19] The interpretation of what humans see, the environment and nature around them, goes back to cognitive abilities such as memory and categorization. Their previous knowledge, their culture, preserved in tales, myths and religious beliefs, create meaning in what they are facing in the world around them.

Distributed Cognition. The theory of distributed cognition claims that the human mind uses its environment and tools for enhancing thinking, that humans place their ideas and memories in things around them.[20] Thinking occurs not only in the brain and the body, where the world around the consciousness constitutes a passive framework. Thoughts and memories are also placed and stored in the world, in things outside the head, in the landscape, in images, texts, and objects. Human brains use pens, books, calendars, maps, and equipment like external memory banks and processors. The thoughts flow into things where they are stored, to some extent

[19] Dunér & Sonesson 2016; Dunér [in press].
[20] Giere & Moffatt 2003, pp. 1–10.

changed, and can be shared with other humans. The soft tissues of the mind and the body have been destined for destruction in the natural cycle, but the thoughts have survived as signs and letters in the historical sources, materialized in things. Humans in history have passed on some of their world, their thoughts and experiences, to their descendants through books, documents, pictures, songs, buildings, in the material culture, in their bones. The material culture is thus an extension of human bodies and human minds, and is therefore an indispensable element in the understanding of the thoughts of a particular time.[21] The written relics, documents, writings, notes, books, pictures, which are the most important sources of historical research in order to access the thoughts of a time, can be understood as distributed cognition, or in Merlin Donald's term, as exograms.[22] Humans think with the help of books and pens. The great narrative in human history is that of how distributed cognition has become increasingly more complex, the increasing dependence on other minds.[23] The Palaeolithic hunter could make almost all his tools by himself and his knowledge was dependent on a small group of people. Gradually, humans became more and more dependent on a wider range of human knowledge, from the local community, to across the nation, to the global world. No one today can produce or understand on their own, for example, the technology in a computer, much less a state apparatus. Knowledge has been distributed to numerous individuals. There is in fact little one can do and think alone. The personal way of life and the private, personal thinking depend on others.

[21] See for example Malafouris 2013.
[22] Donald 2010.
[23] Cf. Donald 2008.

Conceptual Metaphors. Human cognitive capacities, especially concerning concept formation, can be explained as a kind of metaphorical extension of spatial reasoning, according to George Lakoff and Mark Johnson.[24] Abstract concepts relate to concrete, basic human experiences. Beyond human everyday experience, the basic concepts do not work any longer. In order to conceptualize non-ordinary phenomena or abstract ideas, conceptual metaphors are required. Metaphorical thinking in its broadest sense is to understand and experience something through something else, in order that a structure of a domain is transferred to another; from a source (sensorimotor domain) to a target (subjective experience) that simultaneously preserves the structure of the inference. In order to be useful, the concepts must not only be applicable to known cases; they should also be able to be generalized to new situations as well. Metaphors are like tools for dealing with the unknown. They transfer knowledge about the known to the unknown, from the familiar to the unfamiliar, from the visible to the invisible, from the mundane world, society, human life, technology, and crafts, to nature's inner structure, to the soul, and God. One could say that metaphorical thinking involves finding similarities between things, but also excluding differences, to generalize and abstract. Lakoff and Johnson have explained that many metaphors are based on a spatial orientation arising from the body's actions in the physical world.[25] Life is represented as a journey, time can be understood spatially as something that flows along a line or goes in a circle, intellectual influence as a physical force, wisdom as

[24] Lakoff & Johnson 1980.
[25] Lakoff and Johnson 1980, pp. 14, 17, 25, 30.

vision; thinking can be described in terms of movement, similarities as physical proximity, difficulties as burdens, and organizational structures as physical structures. The logic of these body-based "image schemas" is used in abstract thinking.[26]

It is important to stress that this is not primarily about linguistic, aesthetic metaphors, but *conceptual* metaphors. Metaphors should not just be considered as unscientific, uninteresting poetical decorations and pedagogical similes. I maintain, however, that, far from being ornaments, they are instead vital skills of the creative mind and scientific thinking, used to create visual analogies and abstract ideas. The human mind creates concepts of the invisible and unknown with the aid of the visible and known. Those few studies in metaphors that exist in science differ from a cognitive-historical approach that goes beyond the linguistic or aesthetic metaphors in order to find the underlying *conceptual* metaphors. Metaphors are thus not just ornamentation, but are an important part in the creative thinking in order to create abstract ideas. Therefore, they also provide valuable clues as to how scientists and political thinkers, but also peasant maids and farmhands, thought. Contemporary specific metaphors are culturally bound variations of fundamental metaphors derived from the human sensorimotor orientation.[27] The task is thus to study the trans-historical metaphors and their culture-specific expressions, trying to find some of the historical human beings' central metaphors by which they tried to create a consistent world view or a comprehensive understanding of their

[26] Lakoff & Johnson 1999, p. 36; Lakoff & Núñez 2000, p. 34.
[27] Cf. Danesi 1999, pp. 73 f., 78.

world and contemporaries. Analogies, visual models and thought experiments can be said to be particularly relevant in periods of radical conceptual change.

Categorization. Systematization, classification, regularities, and categories are necessary for interpretation of the world.[28] The human brain looks for boundaries, trying to find clusters, groups, performing a kind of cluster statistical analysis of the continuous. The mind creates order, rules the world and its surroundings with concepts, categories, names, and classes. By classifying and linking categories with each other, the human mind achieves a higher order in the chaos of reality. With the categorical perception the blurred transitions of reality become distinct compartments.[29] That which falls outside the categories escapes the sight. Categories, boundaries, and limitations are also learned and culture-dependent; they do not exactly reflect actual classes outside the mind, but rather arise in the encounter between human consciousness and the surroundings. Categorization is also about seeing similarities between things, similarities that are recognized as important and belong together. In other words, the categories determine what one sees and not sees. Classification is about the eternal human quest for order in chaos – a world in order is easier to live in than a chaotic world. Order is as integral a part of Western culture, declared Michel Foucault, as the *episteme* of the time.[30] But categorization is, as I would argue, something more than merely a social construction for political purposes, a lust for power; it can be anchored in an innate cognition.

[28] Lakoff 1990; Taylor 2003.
[29] Rosch 1975, pp. 192–233; Rosch 1978; Gärdenfors 2008b.
[30] Foucault 1966, p. 71.

New journeys to foreign continents – as well as explorations of the environment nearby, and the careful observations of the world and richer streams of specimens from around the world, necessitated a system to manage the new: an organization of the impressions, to categorize and classify, creating order out of chaos. With feverish activity, natural historians and philosophers of the scientific revolution gathered knowledge about the nature of things, everything – words, ideas, plants, and stones were systematized and placed in their proper pigeonholes. One major topic for a cognitive history is the categorization of reality, the categories of thought that arise in the encounter between human consciousness and the world. The classic way of understanding categories is to conceive the categories as being defined by the objectively given properties that are shared by all members within a category. It is the human informal "theory" of essences, that is, that one looks upon every thing as a kind of thing, that it belongs to a particular category, that all things have a collection of essential properties that make the things the sort of things they are, and that this essence is an inherent part of the thing. Important in the history of ideas for this kind of thinking is Aristotle's definition of "definition" in his *Posterior Analytics* from the fourth century BC in which he states that a list of properties are both necessary and sufficient for something to be the kind of thing it is, and from which all the properties of the thing are derived.[31]

How humans in different cultures and at different times categorized the world is central for cognitive-historical analyses. Throughout history

[31] Aristotle, *Posterior Analytics*, 2.3.90b30–31; Lakoff & Núñez 2000, p. 107.

humans have classified, created categories and hierarchies between concepts, objects, and phenomena, for example in dividing people into different races, ethnic groups, and classes, or, as discussed in the works of Claude Lévi-Strauss, Scott Atran, and others, animals and plants into kingdoms, genera, and species.[32] The categorization of nature, as in Carl Linnaeus's systematization and classification of plants and animals, presented for the first time in *Systema naturae* (1735), is a good example of the human ability to categorize things in interaction with the sensory experience of the surrounding environment (Figure 1.4). To categorize natural objects is a way of seeing dissimilarities and differences, but also similarities and affinities between species. In *Philosophia botanica* (1751) Linnaeus organizes this classification and categorization in an all-inclusive system; everything should be described, placed in boxes and named. Without order and categorization, one would be lost in a terrifying chaos. The Linnaean classification system provided a path, a common thread to follow. "Ariadne's thread in botany is the system, without which chaos will rule", reads an aphorism of Linnaeus in *Fundamenta botanica* (1736).[33]

Their categorization of reality in the early modern period was based on the underlying metaphor that *categories are containers.* The concepts could be placed in different, clearly separable containers. By handling their experiences with the help of objects and substances, they could categorize and group them, quantify, and reason about them. An understanding of the classifying human mind is to a large extent about finding these underlying

[32] Lévi-Strauss 1962; Atran 1990; Berlin 1992; Atran & Medin 2008.
[33] Linnaeus 1736, § 156.

cognitive intentions, to discover the "boxes" or categories they divided the world into. This is dependent on their experiences, beliefs, perceptions, movements in space, and the culture around them, but also of conceptual metaphors and mental images. The task for a cognitive historian is to explore *how* humans in different ways have categorized things at different times and in different cultures, how categories change, how they were re-categorized, and how the various categorization systems contradicted each other. By studying the categorization in historical sources, the historian could access the thinking and the inner beliefs of a time.

Intersubjectivity. The sharing and representing of others' mentality, intersubjectivity, is another important part of human inner worlds.[34] Empathy, the representation of other human beings' emotions, motives, intentions and desires, bodily expressions, beliefs, and knowledge, are impossible without a rich inner world: well-developed cognitive skills enable the human thinking beings, in their minds, to simulate and imagine things that not are right in front of them. Cooperation about detached goals requires advanced coordination of the inner worlds of individuals. It is often difficult to comprehend the complexity of other cultures, both those that are in history and in geography, or to recognize the differences between the cultures and ethnic groups encountered.[35] Humans commonly tend to dehumanize the other, to apprehend complex cultures as "primitive" cultures. This is precisely due to the cognitive challenges of human thought, such as intersubjectivity, empathy, and coordination of human inner worlds.

[34] Thompson 2001; Zlatev 2008.
[35] Dunér [in press].

In order to understand human socialization through history, the historian needs to delve into the socio-cognitive skills and capacities that make it possible.

Communication. Generally speaking, communication could be described as an attempt, through a medium, to transfer mental images from one consciousness to another. Language has an evolutionary history and has evolved due to its enhancement of communication between humans, used for describing the world around them, but perhaps more importantly as a social interplay: to express feelings, for socializing and creating bonds, etc. (on language, see Allwood's chapter in this volume). The coevolution of language and cognition is one of the big questions for science, an evolution that has resulted in a capacity to deal with non-existent things.[36] With language, humans can talk about things that do not exist, that are not in front of them in time and space (Figure 1.5). Language, following John Taylor, can be understood as a set of resources that are available to the language user for the symbolization of thought, and for the communication of these symbolizations.[37] The symbol is a detached representation and refers to the inner world, in contrast to the signal that refers to something in the outer environment. Symbols are conventional signs, or arbitrary as Ferdinand de Saussure called them, dependent on culture.[38] Therefore it is often difficult, which has been shown by Yuri Lotman and in various studies in cultural semiotics, to understand the symbols of other cultures that require a deep

[36] Christiansen & Kirby 1997; Deacon 1997; Tomasello 2008; Sinha 2009.
[37] Taylor 2002, p. 30.
[38] Saussure 1916.

knowledge of the culture in question.[39] Quite often communication problems arise in relation to the historical material. Misconceptions are common in cultural encounters due to different human lifeworlds, cultural backgrounds, previous knowledge, and experience. The culture-bound and environment-specific concepts, symbols, categories, etc., differ and complicate the understanding of the historical material. A key to human thinking in history, how humans arrived at their ideas, is how they communicated, read and wrote, their symbols and metaphors, how they interpreted texts, and tried to find meaning in them that could be useful in their own thinking.

This list of cognitive theories was not meant to be exhaustive. Other theories and cognitive abilities can also be tested, such as memory, causality, narration, emotions, and sociogenesis. Emotions would be particularly important to study, not just as a cultural phenomenon, but also as a way of interpreting the world, making decisions, and also in what is called "rational" thinking, as Antonio Damasio argues.[40] Emotions are an effective way to choose between various alternatives, a faster track to a decision, to an intuitive choice that can lead to a conscious act, but they also have significance for choosing between different choices in creative processes, like that of the arts and science.

Empirical Research in History

[39] Lotman 1990; Sonesson 2000, pp. 537–559; Sonesson 2004, pp. 153–173; Cabak Rédei 2007, pp. 2, 7, 70; Dunér & Sonesson 2016.
[40] Damasio 1994; On the history of emotions, see for example Reddy 2009; Rosenwein 2010; Boddice 2018; Rosenwein & Cristiani 2018.

The theories mentioned above could be tested on the historical material. What are needed are specific research topics, historical material, events, and ideas, sources on which these cognitive theories could be implemented. The question is: What did humans in history think when they walked in the countryside, looked about them, heard, and felt, or sat with a book open before them? They received perceptions of the world, things and the world crowded into their minds, they created internal images and memories of what they saw, they interpreted what their senses received; they created order, oriented themselves in a chaotic world. Each individual had their own world as he or she had their own experience, but this personality interacted with the world around it, with the landscape, objects and the surrounding culture and its history, and other inner worlds. Assuming that the theories of cognitive science are well-grounded, and say something important about the human mind in general, they should also be valid for the historical individual. It should be possible to test them against the discoveries which empirical historical research can generate. This is the challenge for cognitive history. Traces of these thought processes are stored in the historical remains, in the material culture, in images and texts. Cognitive history is, therefore, based on empirical research to gain access to how humans in history behaved and tried to understand their specific surroundings, their time, and their culture. Cognitive history aims to give incremental contributions to the empirical knowledge of the world and human behaviour in the past. After reading thousands of pages hidden in the labyrinths of the archives and libraries, and with an insight into human

cognitive conditions, the historian might be able to ask new questions, and provide new explanations of human thought.

The long history of encounters between consciousness and its environment has given rise to different cognitive tools to manage the world. The main idea is that the problem-solving strategies in, for example, philosophy, science, and technology are not radically different from other human activities, but can be viewed as sophisticated, refined versions of everyday thought processes in interaction with a specific spatial and temporal environment. Not infrequently, deduction and induction have been identified as the most important and distinctive characteristics of what is called science, but as I argue, these are not the only significant thought processes of the mind; instead, there is a larger set of ordinary cognitive tools that are frequently used in what is described as scientific activity. Science can thus not be distinguished from other human activities by some particular cognitive process. In their thinking, the scientists incorporated concepts that were available in the historical context and the general theories, models, and metaphors that were common and typical in the culture to which they belonged, but they also revised these concepts, saw new connections and drew new conclusions. Science is, like religion, politics, and art, a way of human orientation in the world, and an arrangement of human experiences.

The Scientific Revolution, often associated with new explanatory models of the universe and the human body that appeared in the sixteenth and seventeenth century, were in fact a result of the new ways humans could use

their cognitive skills.[41] The scientific revolution has often been described as a period in European history when new ways of thinking about the world were introduced, either by theoretical factors, mathematics and Platonism (see further my chapter in this volume), or by emphasis on new experimental methods, the introduction of new instruments, or a new social organization of science.[42] The debate has focused on internal versus external explanations, scientific or social, theoretical or practical-experimental factors. A cognitive perspective would instead provide a unified picture of what occurred. Internal and external, scientific or social factors, references to a new philosophy or new methods are individually insufficient. A cognitive approach disclaims positivist and idealist conceptions excluding the context and favouring the vision of the mind playing with ideas. It also complicates the more radical examples of poststructuralist approaches treating science purely as texts, and social constructivist approaches reducing it to mere social interactions or constructions of power among social beings. What is missing is an integrated cognitive theory that considers both internal and external scientific and social factors: both mind and matter in interplay. An explanation of historical change can partly be found in human cognitive abilities interacting with a changing environment, the reciprocal effects of the human mind and its spatial and temporal embeddedness, that is, an enactive cognitive theory of human history.

The transformation of science in the seventeenth and eighteenth century can be explained by the fact that some people in a certain culture and spatio-

[41] For a more elaborate explanation, see Dunér 2016.
[42] Burtt 1925; Butterfield 1949; Dijksterhuis 1950; Koyré 1957; Kuhn 1962; Shapin & Schaffer 1985; Shapin 1996; Gaukroger 2006; Harrison 2007.

temporal situation acquired new possibilities and ways of using their cognitive abilities over a relatively limited period of time. It could be summarized into some cognitive factors underlying the changes in scientific thought: discoveries of new worlds (situated cognition), enhanced senses (perception), tools to enhance thinking (distributed cognition), stronger links between cause and effect (causality), new ways of seeing something as something else (metaphors), a renewed interest in systematization and classification (categorization), and new opportunities for collaboration between inner worlds (intersubjectivity). The change thus consists of a multitude of different, mutually intertwined, problem-solving strategies developed over a long period, through several generations of researchers. Instead of mainly focusing on the choices scientists and philosophers made between this or that theory, the cognitive historian could look at how they used their cognitive abilities in order to formulate explanatory models.

Conclusion

The cognitive-historical approach involves three undertakings: i) to delve into the current theories of cognitive science, to evaluate and select the most useful theories for historical research; ii) to collect historical data that is representative, challenging, and relevant; and iii) to implement the cognitive theories on the collected data, and through this produce new interpretations and theories that push the field forward.

If this fails, then either both the theories and results of cognitive science are false, or the theories and results of cognitive science are not relevant for

historical research. An answer to the first option is that the theories and results of cognitive science are well-grounded; there are many experimental trials that have been carefully checked. If we believe in the scientific enterprise, we can rule out the first explanation. Even if cognitive science turns out to be completely wrong in its proclamations, human beings still use categories, metaphors, objects, etc. in their daily lives and in science; this is a fact which still needs an explanation. Turning to the second option; if these theories and results of cognitive science are universal and valid for all humans, this must also include the immediate ancestors of our own species (they must reasonably have had brains). If this is not so, I cannot find any explanation for this other than that the cognitive historian has not yet convinced other historians by showing new results that inspire new research on other topics.

Cognitive history might be a promising complementary approach for future historical research. It will hopefully give the historian new tools for analyzing and interpreting ideas in history, explaining events and historical change, and enabling a detailed understanding of how humans thought, felt, and believed as historical beings situated in time and space, and enlightening the insight into the interaction between the mind and its surroundings. In all, it will let the historian enter the black box of hidden cognitive processes of human minds in history. The fundamental concepts of cognitive history, that have been explained above, could give the historian new and powerful tools and strategies for tackling old unsolved problems and opening up new vast, uncharted fields for research.

With a new cognitive-historical method, new sources will be sought and discovered; material that before seemed to be hard to use will now be useful, and well-known sources must be re-interpreted. Successful new methods provide not only new interpretations and explanations, they discover new facts, use known sources in a new way, and discover new sources that can be used in historical research. An empirical cognitive history will explain the cognitive processes behind human encounters with the surrounding world, what happened to the mind in unknown environments, how mental images in science and technology were used, how objects and techniques enhanced thinking in science, and unveiling the metaphorical thinking behind concept formation and the categorization strategies in systematics and taxonomy. In all, such cognitive-historical studies will give new explanations to the emergence of human thinking as an interaction between the mind and the world.

With cognitive theory, history will contribute to the on-going research in cognitive science and on cultural evolution. It could become an interdisciplinary historical theory integrated with the collected knowledge. History cannot only borrow and learn from other disciplines; it will also contribute to them and provide important data that will give clues as to how our distant ancestors thousands of years ago gradually enhanced their cognitive abilities and techniques and finally gave birth to postmodern thinking, feeling, and living beings.

The cognitive history outlined here is an open field of possibilities. It will take time to explore its vast territory, that is for sure, and the enterprise will

require hordes of historians to be occupied for decades. But this endeavour must begin someday. Cognitive history relates to the basic human conditions; it unites human beings in history through the experience of living; that we register and participate in the world around us – the flowing of the veins, the storms of emotions, and escaping thoughts. It provides an understanding of the thoughts and lives of humans in history, as sentient and reflective beings. It unveils the hidden thought processes in the past.

Captions

Figure 1.1. *Nosce te ipsum*, know thyself. Man, confined within a perfect crystal sphere topped with a cross, looks up to the starry sky, the sun and the moon. Know your own thinking, and you will know the world. Copperplate by Crispijn de Passe the Younger, in Floris van Schoonhoven, *Emblemata* (1618). Photo: private collection.

Figure 1.2. A human skeleton with anterior nerves, spinal and cranial nerves, brachial and lumbar plexus, etc. The mandible, removed from the skull, is in the right hand of the skeleton. Behind it is a rural landscape, with a calm sea, mountains and a fishing village. An apocalyptic sky looms above. Human thinking is embodied. Woodcut by Étienne de La Rivière, in Charles Estienne, *De dissectione partium corporis humani libri tres* (1545). Credit: Wellcome Collection.

Figure 1.3. A comparison between the optics of the eye and the camera obscura, by the German physicist and astronomer Christoph Scheiner. Art and nature simulate each other. The eye resembles a tube-shaped camera obscura, and thanks to the arts we can the gain knowledge about the human faculty of sight. Christoph Scheiner, *Rosa vrsina sive sol* (1626–1630). Photo: Lund University Library.

Figure 1.4. The sexual classification of plants, according to Carl Linnaeus. Botany is for Linnaeus to classify and to name categories. The plant kingdom is divided into 24 classes, which are categorized according to the number and position of the stamens. Coloured copperplate engraving by Georg Dionysius Ehret from 1736. Photo: Uppsala University Library.

Figure 1.5. *Nil, nisi mota*, nothing, if there is no motion. A visual representation of a man who turns to Echo for advice, by Adriaan van der Venne, copperplate by Jan Swelinck, in Jacob Cats, *Alle de wercken, so ouden als nieuwen* (1658). It reflects the effect of the echo, as described by Erasmus in his *Parabolae*, following Pliny's *Naturalis historia*, "The echo does not answer unless it receives a voice that it can return". Photo: Lund University Library.

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