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Abstract	<p>This chapter presents a biosemiotic perspective on the basic situation for human beings and that of other organisms, with an emphasis on the subjective experience of sentient animals, and the sign use of all lifeforms. The human condition is portrayed as traditionally conceived, and then revisited in the new context of the current environmental crisis. A cornerstone of the text is an analysis of the materiality of the environmental crisis, and how the massive changes humans have caused in the physical environment can be understood in light of the semiotic agency of humans and other living beings. Experiential aspects of the environmental crisis are highlighted. The aim of the text is to improve our understanding of our species' place in the natural world, our historical role in causing a global crisis for life, and how we can move forward towards a more sustainable future.</p>	
Keywords (separated by “ - ”)	Environmental crisis - Human condition - Biosemiotics - Phenomenology - Semiotic agency - Semiotic causation - Anthropocentrism	

Chapter 7 1

A Biosemiotic Perspective on the Human 2

Condition and the Environmental Crisis 3

Morten Tønnessen 4

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Keywords Environmental crisis · Human condition · Biosemiotics · 16
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Introduction 18

The environmental crisis reactualizes fundamental issues about what it means to be 19
human. In the context of what is sometimes referred to as “the human condition,” a 20
crucial matter concerns how different, or similar, we are compared to other living 21
beings. What can we learn from the different ways in which all organisms make use 22
of signs? This chapter presents a biosemiotic perspective on the basic situation for 23
human beings and that of other organisms, with an emphasis on sentient animals. 24
Applied to the context of the environmental crisis, a biosemiotic perspective can 25
provide some of the framework that is required to properly understand our species' 26

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27 place in the natural world, our historical role in causing a global crisis for life, and
 28 how we can move forward towards a more sustainable future.

29 Given that all organisms display forms of semiotic agency, a broad and inclusive
 30 view on phenomenology is warranted. Such a biosemiotic and eco-phenomenological
 31 perspective on the natural world is informative regarding understanding the human
 32 condition and the current environmental crisis, which is seldom analyzed from a
 33 broad experiential perspective implicating the subjective experiences of all sentient
 34 animals. By studying how semiotic causation supplements and interacts with effi-
 35 cient causation, we can shed light on how human beings are embodied in a material
 36 world and simultaneously strive to organize matter and ecology according to our
 37 human- and culture-specific agendas. It is a telling and disturbing fact that while the
 38 human body needs about 20 of the known chemical elements to function properly,¹
 39 humankind today exploits absolutely all of the 81 non-volatile elements that consti-
 40 tute natural matter on Earth,² with little regard for the utility of these for other spe-
 41 cies. Arguably, current anthropocentrism and overexploitation can partly be
 42 explained by our lacking recognition of the agency, needs, and interests of other
 43 organisms, and a lacking understanding of our semiotic and material embodiedness
 44 in nature at large. As humans, we are naturally capable of symbolic and abstract
 45 thinking, but by disregarding more basic forms of sign exchange, and forgetting the
 46 impact that pursuing narrow self-interest has on the natural world, we lose contact
 47 with, and a sound sense of, the Earth that sustains us. A return to making use of our
 48 core experience as foundational for how we navigate in the world can help lead us
 49 in a more sustainable direction.

50 **The Human Condition as Traditionally Conceived**

51 The expression ‘the human condition’ lacks a precise, universally applied defini-
 52 tion. It is often applied to matters of fundamental importance to human beings.
 53 While some use the expression to describe what will always apply to human beings,
 54 in a timeless fashion, others—such as Erich Fromm³—have used it to characterize
 55 the time they live in, with the challenges that are characteristic for humans of
 56 that period.

57 Those who refer to the human condition in a timeless fashion might think of it as
 58 something that is more or less synonymous with “human nature.” However, whereas
 59 talk of the human nature is common in moral and political discourse, “there are seri-
 60 ous disagreements concerning the concept’s content and explanatory

¹Maria Antonietta Zoroddu, Jan Aaseth, Guido Crisponi, Serenella Medici, Massimiliano Peana, and Valeria Marina Nurchid, “The essential metals for humans: A brief overview,” *Journal of Inorganic Biochemistry* 195 (2019): 120.

²Roger-Maurice Bonnet and Lodewijk Woltjer, *Surviving 1000 Centuries: Can We Do It?* (Berlin-Heidelberg-New York/Chichester, UK: Springer/Praxis Publishing, 2008), 226, 242.

³Erich Fromm, “The Present Human Condition,” *The American Scholar* 25, no. 1 (1955): 29–35.

significance—the starkest being whether the expression ‘human nature’ refers to anything at all.”⁴ Classical claims about what is uniquely human have portrayed human beings e.g., as ‘political animals’ (Aristotle) or ‘rational animals’ (Descartes). In modern times, such claims have been faced with ‘the Darwinian challenge’ from evolutionary theory, which has recontextualized human beings as natural beings on par with other organisms. Other advances in scientific knowledge about nonhumans have likewise required ever new rounds of critical reassessments of claims about allegedly unique human traits.

In recent decades, the expression ‘The Human Condition’ has been strongly associated with the political philosopher Hannah Arendt (1906–1975). In her book with the same name, she emphasizes that “the human condition is not the same as human nature, and the sum total of human activities and capabilities which correspond to the human condition does not constitute anything like human nature.”⁵ In Arendt’s view, the human condition must be understood in light of the fact that human beings are conditioned beings, and the conditions we are met with could in principle change.

The most radical change in the human condition we can imagine would be an emigration of men from the earth to some other planet. Such an event, no longer totally impossible, would imply that man would have to live under man-made conditions, radically different from those the earth offers him. [...] Yet even these hypothetical wanderers from the earth would still be human; but the only statement we could make regarding their “nature” is that they still are conditioned beings, even though their condition is now self-made to a considerable extent.⁶

As for whether or not the human condition is to be seen as changeable, Arendt takes the middle ground. What she offers is “a reconsideration of the human condition from the vantage point of our newest experiences and our most recent fears,”⁷ treating “those general human capacities which grow out of the human condition and are permanent, that is, which cannot be irretrievably lost so long as the human condition itself is not changed.”⁸ Her book is said to deal “only with the most elementary articulations of the human condition, with those activities that traditionally, as well as according to current opinion, are within the range of every human being,”⁹ and which “are fundamental because each corresponds to one of the basic conditions under which life on earth has been given to man.”¹⁰

Implicit in Arendt’s narrative is a portrayal of a human tendency to have an ambivalent relation to the human condition. Arendt herself appears to share this ambivalence to some extent. In Arendt’s view, “nothing entitles us to assume that

⁴Neil Roughley, “Human Nature,” in *The Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta, Spring 2014.

⁵Hannah Arendt, *The Human Condition* (Chicago: The University of Chicago Press, 1958), 9–10.

⁶Ibid., 10.

⁷Ibid., 5.

⁸Ibid., 6.

⁹Ibid., 5.

¹⁰Ibid., 7.

97 man has a nature or essence in the same sense as other things.”¹¹ While “[t]he earth
 98 is the very quintessence of the human condition, and earthly nature, for all we know,
 99 may be unique in the universe in providing human beings with a habitat in which
 100 they can move and breathe without effort and without artifice,” Arendt stresses that
 101 the “human artifice of the world separates human existence from all mere animal
 102 environment.”¹² In this sense, in her view, human reality is distinguished from the
 103 reality of any other living being on Earth. In a somewhat similar way, Erich Fromm
 104 holds that “Man’s character has been molded by the demands of the world he has
 105 built with his own hands.”¹³

106 Arendt describes “scientific endeavors [...] directed toward [...] cutting the last
 107 tie through which even man belongs among the children of nature”—in short, “the
 108 wish to escape the human condition.”¹⁴ Aspects of what she characterizes as “the
 109 rebellion against” the human condition, such as protests against the toil and trouble
 110 of labour, is “as old as recorded history”¹⁵ —and have in recent centuries been
 111 supplemented by some philosophers’ dislike of bodily existence. In her own time,
 112 Arendt observes novel upheavals in the form of attempts to engineer a “future man,
 113 whom the scientists tell us they will produce in no more than a hundred years” and
 114 which implies “a rebellion against human existence as it has been given.”¹⁶ This lat-
 115 est rebellion carries with it a resistance against being restrained by customary
 116 Earthly conditions regarding phenomena such as natural births and death by dis-
 117 ease, and means “that we, who are earth-bound creatures [...] have begun to act as
 118 though we were dwellers of the universe.”¹⁷

119 Typically, when we claim that something relates to the human condition, we
 120 imply that it is something *all* humans, and *only* human beings, have to deal with.
 121 This might be warranted in some cases, but we should not rule out the possibility
 122 that some experiences or challenges that are of fundamental importance to human
 123 beings also apply to some cognitively complex animals. Whether or not this is the
 124 case is an important issue which must be examined in relation to the question of
 125 how unique human beings are.

126 As it happens, there is a strong correlation between assertions to the effect that
 127 human beings are so unique that we cannot even be compared to non-humans—i.e.,
 128 that humans are incomparably unique—and the understanding that human beings
 129 are “alone in the universe” (or at the very least alone on Earth).¹⁸ Existential loneli-
 130 ness of this sort correlates with human exceptionalism and is indicative of a lacking

¹¹ Ibid., 10.

¹² Ibid., 2.

¹³ Fromm, “The Present Human Condition,” 29.

¹⁴ Ibid.

¹⁵ Ibid., 4.

¹⁶ Ibid., 2.

¹⁷ Ibid., 3.

¹⁸ Whether or not astrobiology with its hunch that “there must be somebody out there” can alleviate our longing for community with other intelligent beings like ourselves remains open to discussion. We feel superior among the species of Earth. If we, upon discovering more intelligent beings than

sense of community with non-human nature. The lack of identification with a larger natural community is in its turn often accompanied by a sense of alienation from nature, which is reinforced by the ways in which we arrange our daily lives in modern industrialized societies.

As Shaun Gallagher observes, “the concept of existential loneliness is said to be more fundamental [than other forms of loneliness], pervasive and part of the very structure of being human.”¹⁹ The concept’s philosophical roots “are intertwined with the existential analyses of Heidegger and Sartre,”²⁰ both of whom regarded human beings as ontologically incomparable to other living beings. Overcoming this sense of existential loneliness and alienation from nature is part and parcel of the task of solving the environmental crisis.

One would perhaps think that human exceptionalism, if nothing else, unavoidably benefits human beings, but that is not necessarily the case. Srinivasan and Kasturirangan criticize what they call ‘mainstream development,’ which they hold to represent human exceptionalism, for entertaining “a very specific idea of human wellbeing: it envisages a ‘good’ human life as one that is freed from the vicissitudes—the risks and vulnerabilities—of living on the planet, of being a part of ‘nature’, of being animal.”²¹ Not only is human exceptionalism responsible for “rendering nonhuman life killable,”²² giving the impression that “the instrumental use of other beings is acceptable in the pursuit of human wellbeing”²³—it also frames human development as being

about amplifying those human features that are believed to be maximally different from other species [...] and about pushing ‘forward’ those societies that do not meet these standards of development. Human ways of life that depart from the norms of human exceptionalism [...] are animalized and cast as in need of upliftment—of ‘development.’”²⁴

Semiotic Agency in Humans and Non-humans

A foundational idea in biosemiotics is that all life makes use of, and relate to, signs. Among biosemioticians, a common understanding is that this implies that all organisms—as well as a number of other living systems—have semiotic agency.²⁵ Part of

ourselves elsewhere, were to acknowledge ontological inferiority rather than ontological superiority, it is conceivable that we might start experiencing a humbler type of loneliness.

¹⁹ Shaun Gallagher, “A Critique of Existential Loneliness,” *Topoi* (2023).

²⁰ Ibid.

²¹ Krithika Srinivasan and Rajesh Kasturirangan, “Political ecology, development, and human exceptionalism,” *Geoforum* 75 (2016): 126.

²² Ibid.

²³ Ibid., 127.

²⁴ Ibid., 126.

²⁵ Alexei Sharov and Morten Tønnessen, *Semiotic Agency: Science beyond Mechanism* (Cham: Springer Nature, 2021).

160 the basic situation for human beings and any other organism is that our relations to
161 the environment, and to other living beings, are sign-mediated.

162 This biosemiotic perspective on the living world and on our place as human
163 beings in the natural world has some fundamental implications for philosophical
164 anthropology: First of all, in terms of sign use as such, human beings are *not* “alone
165 in the universe.” On the contrary, our capacity to understand and to make use of
166 signs, and our predicament as a living being that has to relate to the world through
167 signs, is principally something we share with everything that lives. Second, how-
168 ever, this does not at all imply that there is nothing unique about human beings and
169 our sign use. The semiotic diversity that is to be found among lifeforms, and among
170 species, is as significant as biological diversity by other measures. This calls for a
171 more thorough characterization of the semiotic nature of human beings.

172 While human beings have *something* in common with all that lives, we have a lot
173 more in common with (other) sentient animals, who, like us, are capable of reason,
174 feeling, and having positive and negative experiences in the form of pleasure, pain,
175 and the like. There are obvious physiological and behavioral similarities between us
176 and them. Since experience and behaviour, as well as biological processes that
177 occur within the body, are sign-based, we also have a lot in common in terms of
178 specific sign processes.

179 One way to characterize what is unique about human beings in terms of sign use,
180 is to refer to Charles Sanders Peirce’s division of signs into symbols, icons, and
181 indices.²⁶ While some semioticians hold that only human beings make use of sym-
182 bols, I believe it is more accurate to state that human beings make *much more* use of
183 symbols than any non-human does. An important point concerning symbols is that
184 they are the most arbitrary class of signs. This has the effect that symbolic thought
185 and imagery is rich, diverse, and amenable to change and innovation. In contrast,
186 icons are characterized by their likeness to something else, and indices are charac-
187 terized by some sort of relation to something else. While icons as well as indices
188 tend to refer to something tangible in the natural world, symbols can pretty much
189 refer to anything imaginable. The human capacity to make use of, understand, and
190 invent symbols equips us with great and very flexible semiotic and cognitive
191 resources. But all the advantages symbols have come with a risk of in effect decou-
192 pling our thinking and our experience from the natural world. In light of this, it can
193 be said that the symbolic mode of thinking is simultaneously perhaps our greatest
194 human resource, and our Achilles heel as a species. This is because symbolic
195 thought is a constitutive element of the varieties of anthropocentrism which inclines
196 us to think, mistakenly, that ‘everything is human.’

197 Our capacity for using symbols extensively and systematically enables us to
198 apply language and abstract thinking. This has in turn resulted in the great cultural
199 diversity found among humans, with thousands of cultures and languages giving
200 rise to a considerable variation in how things are perceived by human beings. With

²⁶Charles Sanders Peirce, *Collected papers of Charles Sanders Peirce* (Cambridge, MA: Harvard University Press, 1931–1958).

this in mind, we should be cautious in our claims about what “the human way” of perceiving or acting amounts to. 201
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There is no doubt, however, that the use of language is part of what distinguishes human capabilities from the semiotic capacities and behaviours of nonhumans. Here, too, there is considerable diversity. The phenomenologist David Abram addresses the differences in worldview found among oral and alphabetic cultures.²⁷ In this context, we should acknowledge that oral and written languages are equally symbolic—and yet be open to the idea that the symbolicity of language can play out very differently when transmitted in different media. Using a written language provides humans with incredible intellectual resources, for instance by enabling transfer of knowledge, information and narratives across time and space. But, as Abram narrates, transitioning from using an oral language to using a written language also tends to increase the distance to nature, as it were, in our felt relationship with the natural world. The apparently ‘timeless’ nature of written signs may, for one thing, have given rise to ideas about there being a dimension of reality which is equally timeless and just as real as the natural world we live in. This may have contributed to a devaluation of nature. 203
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Above I have portrayed the semiotic agency of human beings *en masse*. It is worth pointing out, however, that if by agency we mean the capacity for effecting changes, then agency is not evenly distributed among human beings, but tends to reflect inequalities in income and consumption. The privileged in terms of consumption and currently high CO₂ emissions are also “those who are characterized by a high level of individual agency as well as having the organizational capabilities to actively exercise their agency.”²⁸ 218
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The Materiality of the Environmental Crisis 225

A proper understanding of the semiotic capabilities of human beings sheds new light on the materiality of the environmental crisis. In this section, I will start with describing aspects of the materiality of the environmental crisis in general, and then proceed to explain how this can be understood in a semiotic perspective. This ultimately relies on an understanding of human ecology in which ecosystems can be understood in terms of sign flows, with special attention devoted to how human sign use affects ecosystems as a whole. 226
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A first question is how living matter stands out from inanimate matter. In his description of the “universal nature of biochemistry,” Norman R. Pace stresses that organisms as we know them require macromolecules, given that molecules that “serve terrestrial organisms typically are very large [...] with molecular weights of 233
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²⁷David Abram, *The Spell of the Sensuous. Perception and Language in a More-Than-Human World* (New York: Vintage Books, 1997).

²⁸Ilona M. Otto, Marc Wiedermann, Roger Cremades, Jonathan F. Donges, Cornelia Auer, and Wolfgang Lucht, “Human Agency in the Anthropocene,” *Ecological Economics* (2020): 106463.

237 thousands to millions of daltons”²⁹ (with one dalton being a unified atomic mass
238 unit that is roughly equivalent to the weight of the lightest atom).

239 Life on Earth is often characterized as carbon-based. Of all the natural elements,
240 carbon and silicon are unique in being “known to serve as the backbones of mole-
241 cules sufficiently large to carry biological information,” and while silicon “interacts
242 with only a few other atoms,” carbon “can readily engage in the formation of chemi-
243 cal bonds with many other atoms, thereby allowing for the chemical versatility
244 required to conduct the reactions of biological metabolism and propagation.”³⁰ A
245 crucial feature of organic reactions, which involve carbon in interaction with other
246 elements, is that they, unlike silicon-based reactions, are “broadly amenable to
247 aqueous conditions.”³¹ This reflects the fact that water is the standard milieu for life,
248 and typically accounts for a considerable part of the weight of living organisms.

249 Along with oxygen and hydrogen, carbon makes up more than 90% of the weight
250 of a human body, with oxygen amounting for the most, followed by carbon and
251 hydrogen. Oxygen is the most abundant element in most organisms, and also in the
252 Earth’s crust. In contrast, hydrogen is only the tenth most abundant element in the
253 crust, and carbon only the 17th most abundant element, with an abundance of about
254 200 parts per million (ppm).³² This illustrates how organisms stand out from matter
255 in general in their material composition, and makes clear that organisms need to be
256 systematically selective in their pursuit of maintaining their own materiality.

257 Altogether, around 60 elements are found in the human body, but only around 20
258 of these “are considered to be essential for life.”³³ In humans as well as other organ-
259 isms, deficiency symptoms indicate a lack of elements that are essential for life. To
260 qualify as an essential element, its total absence from an organism must imply dam-
261 age to vital functions.³⁴ Essential elements include essential metals. In a human
262 organism, the medium amount of essential metals varies from about 1 kg of Calcium
263 (Ca), which is mostly needed in the skeleton, to about 2 mg of Cobalt (Co), which
264 is a key component of vitamin B12.³⁵ Iron (Fe) is “an essential element for practi-
265 cally all living systems” and occurs in a medium amount of about 5 g in a
266 human body.³⁶

267 This brief outline of how living matter stands out from inanimate matter under-
268 lines our dependence on, and intermingling with, the physical environment. A sec-
269 ond question concerning the materiality of the environmental crisis is to what extent
270 humans have altered physical environments on Earth. The fact that humankind is

²⁹Norman R. Pace, “The universal nature of biochemistry,” *PNAS* 98, no. 3 (2001): 805.

³⁰Ibid.

³¹Ibid.

³²“The most abundant elements in the Earth’s crust,” World Atlas, accessed May 28, 2023. <https://www.worldatlas.com/articles/the-most-abundant-elements-in-the-earth-s-crust.html>

³³Zoroddu et al., “The essential metals for humans: A brief overview,” 127.

³⁴Ibid., 121.

³⁵Ibid.

³⁶Ibid., 121, 124.

currently causing considerable changes in the physical environment is the key motivation behind designating our current geological epoch as ‘the Anthropocene.’³⁷

Jan Zalasiewicz and colleagues describe the ‘physical technosphere’ which has resulted from human activities, and which contains parts which are actively in use as well as material residue.³⁸ Material residue includes “gaseous components (e.g. carbon dioxide and methane that accumulate in the atmosphere).”³⁹ The biggest components of the technosphere in terms of mass are urban areas, rural housing, pastures, cropland, and trawled sea floor, with major components adding up to a mass of around 30 trillion Tons (Tt), “equivalent to > 50 kg/m² of the Earth’s surface” or about 100.000 times as much as the weight of all humans.⁴⁰

A third question is how human activities have affected biodiversity on Earth—whether it has happened by altering the physical environment, or by other means. Bar-On and colleagues estimate the distribution of current global biomass.⁴¹ They also provide estimates of prehuman values for global biomass for mammals compared to current values, which indicate the impact human civilization has had in the long run. These suggest that 100,000 BP, the biomass of wild mammals were about six times higher than today. On the other side, the current biomass of humans and livestock outdo the prehuman biomass of wild mammals by a factor of 4 or so⁴² While wild mammals have been marginalized, then, the total biomass of mammals has increased quite substantially—but is now dominated by civilized (human) and captive (domesticated) mammals.

Combined, humans and livestock now account for an astonishing 96% of terrestrial mammal biomass, with humans alone accounting for 36%. In the bigger picture, however, mammals account for only a marginal share of animals, which in turn account for only a marginal share of global biomass (about 0.36%). At an estimated 550 gigatons of carbon (Gt C), global biomass is dominated by plants, followed by bacteria, fungi, Archaea, and protists—and only then animals.

Human civilization has had an impact far beyond mammals. Domesticated poultry now accounts for three times as much biomass as the global biomass of wild birds, and wild fish stocks have declined by an estimated 15% compared with their pre-human levels. While crops cultivated by humans amount for no more than about 2% of total plant biomass, human civilization “has also profoundly reshaped the total quantity of carbon sequestered by plants,” leading to total plant biomass having “declined approximately twofold relative to its value before the start of human

³⁷Will Steffen et al., “The Anthropocene: Conceptual and Historical Perspectives,” *Philosophical Transactions of the Royal Society A* 369 (2011): 842–867.

³⁸Jan Zalasiewicz et al., “Scale and diversity of the physical technosphere: A geological perspective,” *The Anthropocene Review* 4, no. 1 (2016): 3.

³⁹Ibid., 3–4.

⁴⁰Ibid., 11.

⁴¹Yinon M. Bar-On, Rob Phillips, and Ron Milo, “The biomass distribution on Earth,” *PNAS* 115, no. 25 (2018): 6506–6511.

⁴²Ibid., Supplementary Information Appendix, 88 (Fig. S5).

305 civilization.”⁴³ In other words, there were about twice as much plant biomass in
 306 pre-human times.

307 As Burgess and Gaines observe, one of the interesting findings of the study of
 308 Bar-On and colleagues is that there is much more biomass on land than in the
 309 oceans—actually, by a factor of 80.⁴⁴ At the same time, “more than 70% of global
 310 animal biomass is found in the ocean.”⁴⁵ In simplified terms, this allows us to say
 311 that “Earth has a plant-dominated landscape and an animal-dominated seascape.”⁴⁶
 312 Burgess and Gaines point out that in terrestrial and marine ecosystems alike, “the
 313 increasing human appropriation of global primary production has put disproportio-
 314 nate ecological pressure on other energy-intensive forms of life, namely large-
 315 bodied animals and top predators.”⁴⁷ Overall, human appropriation of primary
 316 production is particularly intensive in cropland and infrastructure areas—and, in
 317 geographical terms, in Europe, Northern Africa, and Western and Southern Asia.⁴⁸

318 The declines in biomass and biodiversity in different lifeforms can in many cases
 319 be mutually reinforcing and can be further challenged by climate change. For
 320 instance, about half of all plant species are dispersed by vertebrate animals.⁴⁹ The
 321 current “seed dispersal function has steeply declined from its natural level,” and
 322 “defaunation has already limited the ability of animal-dispersed plants in many
 323 parts of the world to keep pace with climate change.”⁵⁰

324 A fourth and final question, which takes us back to the semiotic perspective
 325 applied in this chapter, is how human agency can have a so profound impact on
 326 ecosystems globally, despite our limited share of global biomass.

327 In this context, human impact on the environment can be outlined in terms of the
 328 expanding and eventually practically global range first of our own species and then,
 329 in our wake, also of several of our affiliated and favored species—notably livestock,
 330 and crop species—leading over time to the establishment of a global colonial organ-
 331 ism.⁵¹ The implied ecological empire, which is hierarchically organised with *Homo*
 332 *sapiens* on top, has “provided global breeding grounds” for some species, while
 333 leaving others marginalized.⁵²

⁴³ Ibid.

⁴⁴ Matthew G. Burgess and Steven D. Gaines, “The scale of life and its lessons for humanity,” *PNAS* 115 no. 25 (2018): 6328.

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Ibid., 6329.

⁴⁸ Helmut et al. Haberl, “Quantifying and Mapping the Human Appropriation of Net Primary Production in Earth’s Terrestrial Ecosystems,” *PNAS* 104, no. 31 (2007): 12944.

⁴⁹ Evan C. Fricke et al., “The Effects of Defaunation on Plants’ Capacity to Track Climate Change,” *Science* 375 no. 6577 (2022): 210.

⁵⁰ Ibid., 212, 213.

⁵¹ Morten Tønnessen, “The Global Species,” *New formations: a journal of culture/theory/politics* 69 (2010): 98.

⁵² Ibid.

In a biosemiotic perspective, the notion of semiotic agency is crucial for understanding human agency. In his Ph.D. thesis, cognitive semiotician Juan Carlos Mendoza-Collazos introduces the notion of ‘enhanced agency,’ which is a useful supplement, stating that the notion “implies the prosthetic incorporation of artefacts into the agentive capabilities of the agents.”⁵³ In his view, all humans are endowed with enhanced agency, which expands human beings’ capacity for action.

Part of the explanation of humans’ immense impact, then, is related to the human use of domesticated animals and plants, and of tools and artefacts, which expands our species’ semiotic agency and ecological reach. The biosemiotician Jesper Hoffmeyer, who acknowledges “agency as an inherent property of living systems,”⁵⁴ introduces the notion of ‘semiotic causation’ or ‘semiotic causality,’ which he defines as “*bringing about things under guidance of interpretation in a local context*,”⁵⁵ or “*bringing about effects through interpretation*.”⁵⁶ In Hoffmeyer’s conception, semiotic causation “must always operate through the mechanisms of material efficient causation.”⁵⁷ It “cannot be reduced to efficient causality, but is dependent on efficient causality since interpretative activity, even in its most primitive modes, is connected to possible anticipatory action, and action unquestionably depends on efficient causality.”⁵⁸ Hoffmeyer sums up his view by stating that semiotic causality “thus gives direction to efficient causality, while efficient causality gives power to semiotic causality.”⁵⁹

In a biosemiotic perspective in the tradition of Hoffmeyer, all organisms are capable of interpretation, and therefore capable of triggering semiotic causation. Figure 7.1 shows the interplay between semiotic and efficient causation for an organism endowed with an *Umwelt* in its dealings with the physical environment (*Umgebung*). As illustrated by the figure, the *Umwelt*, or subjective, experienced world of the organism in a broad sense can more precisely be divided into an *Innenwelt* (inner subjective world, within the organism) and an *Umwelt* (outer subjective world, surrounding the organism).⁶⁰

In principle, all organisms are capable of both impacting the physical environment they live in and adjusting to it. The *Umwelt transitions* organisms endowed

⁵³ Juan Carlos Mendoza-Collazos, *Agency and Artefacts: A Cognitive Semiotic Exploration of Design* (Lund: Lund University, 2022): 24.

⁵⁴ Jesper Hoffmeyer, “Why do we need a Semiotic Understanding of Life?”, in *Beyond Mechanism. Putting Life Back into Biology*, ed. B.G. Henning and A.C. Scarfe Janham (Boulder, New York, Toronto, Plymouth, UK: Lexington Books, 2013), 157.

⁵⁵ *Ibid.*, 158.

⁵⁶ Jesper Hoffmeyer, “Semiotic Scaffolding of Living Systems,” in *Introduction to Biosemiotics: The New Biological Synthesis*, ed. Marcello Barbieri (Dordrecht: Springer, 2008), 152.

⁵⁷ *Ibid.*

⁵⁸ Jesper Hoffmeyer, “Semiotic individuation and Ernst Cassirer’s challenge”, *Progress in Biophysics and Molecular Biology* 119 (2015): 610.

⁵⁹ *Ibid.*

⁶⁰ Jakob von Uexküll, *Umwelt und Innenwelt der Tiere* (2nd ed.) (Berlin: Verlag von Julius Springer, 1921).

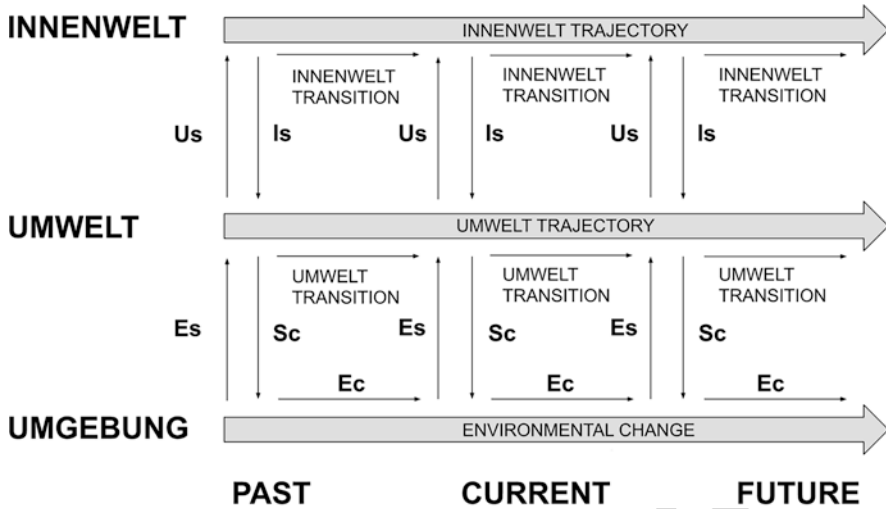


Fig. 7.1 Three-dimensional interactive semiotic model of environmental change. Abbreviations: *Ec* Efficient causation, *Es* Environmental signals, *Is* Innenwelt signals, *Sc* Semiotic causation, *Us* Umwelt signals. (From Morten Tønnessen 2019: 420)

364 with an Umwelt go through are of different kinds, some are regular, while others
 365 constitute historical events.⁶¹ The environmental crisis involves several of the latter
 366 kind, and as a global crisis, it can be conceived of as a massive global Umwelt
 367 transition.

368 In light of semiotic causation, we should acknowledge that all organisms, as sign
 369 users, are directly affected by the environmental crisis, and that their lives change as
 370 the sign flows of ecosystems are affected by human actions.

371 **Experiential Aspects of the Environmental Crisis**

372 Using the outlook of biosemiotics as a starting point, it makes sense to emphasize
 373 experiential aspects of the environmental crisis, with a scope covering the subjective
 374 experience of human beings as well as the subjective experience of all sentient ani-
 375 mals. The latter—animal experience—is seldom granted much attention in main-
 376 stream science and policymaking. For some reason, the animals' experience is
 377 acknowledged, to some extent, in the context of animal welfare, with its focus on
 378 individuals of animals, but typically disregarded in the context of environmental
 379 problems, where a more systemic focus is common. While this might follow from
 380 the different framing of animals in different policy contexts, the different framing in

⁶¹ Morten Tønnessen, "Umwelt Transitions: Uexküll and Environmental Change," *Biosemiotics* 2, no. 1 (2009): 47–64.

itself cannot legitimately justify the disregard for subjective experience in the context of environmental problems.

Analyzing the environmental crisis from the vantage point of subjective, sentient experience has implications for how we conceive of the environmental crisis. If subjective experience is emphasized, then the ways in which environmental problems affect the lives of individual human beings and sentient animals must be emphasized. This will tend to favorize views on the environmental crisis that are perceptive with regard to damages and threats to living conditions and wellbeing. The inclusion of *animal* experience points towards a more equitable view on the interests of humans and animals, which conflicts with human exceptionalism with its one-sided prioritization of human interests only.

In the case of human perception of nature, it is important to be aware that our specifically human Umwelt is layered, as it were, with different kinds of experience involved. Distinctions can be made between our *core* Umwelt experience, our *mediated* Umwelt experience, and our *conceptualized* Umwelt experience.⁶² Only the first kind of experience involves direct encounters with other living beings or with nature. Often when we relate to nature, we do so in an indirect way, mediated by ideas, imagery, or the like, rather than by way of our own encounters. In our symbol-laden modern cultures, many of our perceptions—and beliefs—are shaped in a sphere where there is little room for tangible nature experiences.

The perspective of biosemiotics calls for a broad and inclusive view on phenomenology which acknowledges phenomena beyond human phenomena. Contemporary endeavors to naturalize phenomenology are supported by biosemiotics and should be extended to include a reconceptualization of natural history. A biosemiotic narrative on natural history ultimately amounts to portraying the natural history of the phenomenal world, with its stepwise emergence of new layers of semiotic, cognitive, and phenomenal complexity, interrupted by periodical crises. A chapter in this story concerns the current environmental crisis. An eco-phenomenological re-telling of human—nature relations and ecological developments leading up to our current crisis is highly relevant in helping us to understand the Anthropocene as a geological era dominated by human agency.⁶³

When considering the experiential aspects of the environmental crisis, we should bear in mind how global biomass and biodiversity is distributed, as discussed earlier in this chapter. Many would be inclined to acknowledge subjective experience in a proper sense only in sentient animals. That leaves out the organismic circumstances of all plants, bacteria, fungi, Archaea, protists, and viruses, which taken together amount for the vast majority of individual organisms in nature, and a dominant share of global biomass.⁶⁴ In a biosemiotic perspective, however, all these lifeforms also make use of signs, and through their sign use, they are directly affected by the ways in which humans have altered their environments.

⁶²Morten Tønnessen, “Umwelt Trajectories,” *Semiotica* 198 (2014): 159–180.

⁶³Will Steffen et al., “The Anthropocene: Conceptual and Historical Perspectives.”

⁶⁴Bar-On et al., “The biomass distribution on Earth.”

421 As for animals, we should recall that the majority of animal species are insect
 422 species, and that most animals in terms of biomass live in the oceans.⁶⁵ Despite the
 423 human dominance of terrestrial mammals, the typical animal is either a miniscule
 424 insect—or a marine arthropod. And the most typical animal environment is argu-
 425 ably not terrestrial, but marine—and aqueous.⁶⁶

426 The Human Condition Reconsidered

427 Some scholars have argued that the human condition is fundamentally changed
 428 given our current predicament involving the environmental crisis. Dipesh
 429 Chakrabarty refers to a “collapsing of multiple chronologies—of species history
 430 and geological times into our

431 very own lifetimes, within living memory,”⁶⁷ and concludes that

432 the human condition has changed. This changed condition does not mean that the related
 433 but different stories of humans as a divided humanity, as a species, and as a geological agent
 434 have all fused into one big story, and a single story of the planet and of the history of life on
 435 it can now serve in the place of humanist history. As humans we have no way of experienc-
 436 ing [...] these other modes of being that are also open to us today. Humans, humans as a
 437 species, and humans as the makers of the Anthropocene [...] are agents of very differ-
 438 ent kinds.⁶⁸

439 While Hannah Arendt did not relate to the environmental crisis as such, she did
 440 acknowledge in her classical work on the human condition that “there is no reason
 441 to doubt our present ability to destroy all organic life on earth.”⁶⁹ In a reading of
 442 Arendt, Anna Yeatman notes that the “human way of being alive both ties humans
 443 to other creaturely beings and differentiates humans from them. But being alive, as
 444 such, is what these beings have in common, and it indicates a shared dependence on
 445 an earth-bound existence.”⁷⁰ A biosemiotic understanding of the basic situation for
 446 humans and nonhumans alike as fellow sign users takes this outlook an important
 447 step further.

448 Masatake Shinohara proposes, as part of a critique of Arendt, that “we may con-
 449 sider the contemporary ecological crisis as causing the breakdown of the human

⁶⁵ Ibid.

⁶⁶ Burgess and Gaines, “The scale of life and its lessons for humanity,” 6328.

⁶⁷ Dipesh Chakrabarty, “The Human Condition in the Anthropocene,” in *The Tanner Lectures in Human Values*, Vol. 35, ed. Mark Matheson (Salt Lake City: University of Utah Press, 2016), 180.

⁶⁸ Ibid.

⁶⁹ Arendt, *The Human Condition*, 3.

⁷⁰ Anna Yeatman, “The Human Condition in the Anthropocene,” in *Manifesto for Living in the Anthropocene*, ed. Katherine Gibson, Deborah Bird Rose, and Ruth Fincher (Brooklyn, NY: Punctum books, 2015), 124.

world and its collision with terrestrial reality.”⁷¹ He stresses that “what conditions human beings in the most fundamental sense includes not only the world of the human artifact but also the world of earthly things,” which is ultimately “beyond any human measurement.”⁷² In his view, “the consideration of the human condition should be fundamentally reformulated” by making the human world “open to the earthly things that vastly expand outside of the human artifice,” and he suggests that “the existential condition upon which human livings depends might be reconstructed within the vastness of the earthly reality, becoming part of it.”⁷³ This appears to be compatible with a biosemiotic understanding of the basic situation for humans and other living beings.

Paths Towards Sustainable Futures

Coming from a background as an economist, John Maynard Keynes claimed, almost a hundred years ago, that “the economic problem, the struggle for subsistence, always has been hitherto the primary, most pressing problem of the human race”⁷⁴—and “not only of the human race, but of the whole of the biological kingdom from the beginnings of life in its most primitive forms.”⁷⁵ In his view, “we have been expressly evolved by nature—with all our impulses and deepest instincts—for the purpose of solving the economic problem.”⁷⁶

Keynes envisioned that the economic problem, the struggle for subsistence, would be solved around our current times, and that this would change the living conditions for humans fundamentally—if only old habits would allow us. He did not “see the solution to the economic problem as limited by human nature (unlimited wants)”⁷⁷—in this sense Keynes was optimistic, and foresaw a post-scarcity society.

For a majority of humankind, though not yet for all, this has now come true in terms of material affluence. But at what cost? Given the ecological crisis, we have not yet arrived at a sustainable society. A truly sustainable society will have to be sustainable both in social terms and in environmental terms. This will have to include reducing resource use overall. Unfortunately, it has been demonstrated that the United Nations’ Sustainable Development Goals overall favors further

⁷¹ Masatake Shinohara, “Rethinking the Human Condition in the Ecological Collapse,” *The New Centennial Review* 20, no. 2 (2020): 179.

⁷² *Ibid.*, 180.

⁷³ *Ibid.*, 195.

⁷⁴ John Maynard Keynes, “Economic Possibilities for our Grandchildren,” in *Essays in Persuasion* (New York: W.W. Norton & Co., 1963).

⁷⁵ *Ibid.*

⁷⁶ *Ibid.*

⁷⁷ Robert Chernomas, “Keynes on Post-Scarcity Society,” *Journal of Economic Issues* 18, no. 4 (1984): 1009.

480 economic growth, rather than resource containment.⁷⁸ In the context of energy
 481 needs, we should consider how much of Earth's biomass humans are already
 482 exploiting. An anticipated further increase in biomass harvest for 'green' bioenergy
 483 purposes "would almost double the present biomass harvest and generate substan-
 484 tial additional pressure on ecosystems."⁷⁹

485 Some of the foundational ideas of ecological economics are still very pertinent
 486 under current circumstances. As Herman Daly stipulated already in 1968, "the ulti-
 487 mate subject matter of biology and economics is one, viz., the life process."⁸⁰ This
 488 perspective requires us to reconceptualize the economy from being conceived of as
 489 a solely human enterprise to being considered as a more comprehensive natural
 490 economy which also encompasses the "non-human economy"⁸¹ and all "the
 491 exchanges of economic and ecological commodities making up the total economy
 492 of life."⁸² While some progress has been made in this respect—ecological econom-
 493 ics is now as blossoming field of study—we are still far from a truly ecological
 494 understanding of economics in the mainstream. To make further progress, main-
 495 stream economists and policy makers must wrap their heads around the idea that
 496 human beings are not the only stakeholders in the context of the economy, that there
 497 are resources that matter to non-humans, too, and that there are values and valuers
 498 beyond human ones.⁸³ In short—in economics, as well as in other fields of political
 499 relevance, human exceptionalism must be overcome, and the agency of nonhumans
 500 must be acknowledged.

501 As mentioned earlier, the human Umwelt is layered, and involves mediated and
 502 conceptual aspects in addition to core Umwelt experience related to our direct
 503 encounters with other living beings and with nature. With our species-specific pref-
 504 erence for symbolicity, we run a risk of disassociating from tangible nature experi-
 505 ences and being alienated from nature. As a countermeasure against such tendencies,
 506 we need to cultivate a culture of appreciation for more basic forms of sign exchange
 507 which is of fundamental importance to ecological functioning. This concerns how
 508 we look at nature beyond human nature, and also how we choose to spend our time,
 509 engaging with nonhuman nature.

510 Implicit in the change that is needed to overcome the environmental crisis is a
 511 growing sense of acknowledgement of the varieties of nonhuman subjective

⁷⁸ Nina Eisenmenger et al., "The Sustainable Development Goals prioritize Economic Growth over Sustainable Resource Use: A Critical Reflection on the SDGs from a Socio-Ecological Perspective," *Sustainability Science* 15 (2020): 1101–1110.

⁷⁹ Haberl et al., "Quantifying and Mapping the Human Appropriation of Net Primary Production in Earth's Terrestrial Ecosystems," 12946.

⁸⁰ Herman E. Daly, "On Economics as a Life Science," *Journal of Political Economy* 76, no. 3 (1968): 392.

⁸¹ *Ibid.*, 401.

⁸² *Ibid.*, 403.

⁸³ Morten Tønnessen, "The True Value of 'Doing Well' Economically," in *Innovation and the Arts: The Value of Humanities Studies for Business*, ed. Piero Formica and John Edmondson (Bingley: Emerald Publishing, 2020): 91–109.

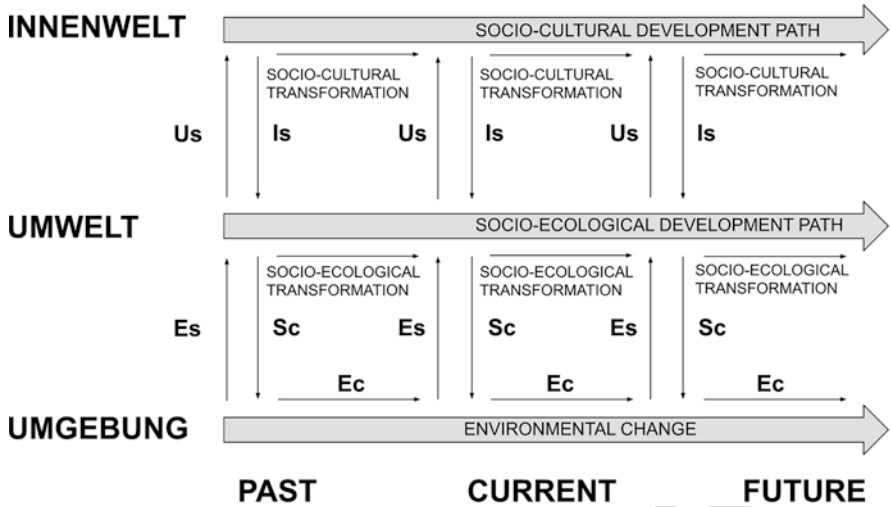


Fig. 7.2 Three-dimensional interactive semiotic model of societal transformations. Abbreviations: *Ec* Efficient causation, *Es* Environmental signals, *Is* Innenwelt signals, *Sc* Semiotic causation, *Us* Umwelt signals. (From Morten Tønnessen, “Anticipating the Societal Transformation required to Solve the Environmental Crisis in the 21st Century,” 26)

experience. To overcome anthropocentrism and human exceptionalism, we must start by overcoming our habitual obsession with narrow self-interest. A further step in the right direction would involve adapting more to the seasons, rhythms, and local variations of nature, rather than trying to engineer nature so as to match human standards and expectations.

The changes that are needed to embark upon paths toward sustainable futures can also be understood in the perspective of a reworked version of the three-dimensional interactive semiotic model of environmental change presented in Fig. 7.1. Figure 7.2 shows a similar model applied to human societies. Changes both in the human Innenwelt (values, beliefs, identity etc.) and the human Umwelt (perceptions, behaviors, etc.) are required to achieve socio-cultural and socio-ecological transformations towards sustainable futures.

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required to solve the environmental crisis in the 21st century” (in *Sign Systems Studies*, 2021). 619