Glossary of concepts related to Evolutionary Worldviews, Noosphere and Human Energy

The following is a list of key terms that explain the conceptual framework used by Human Energy and the group working on the evolutionary-systemic worldview at the Center Leo Apostel of the Vrije Universiteit Brussel. This framework aims to address the current climate of meaninglessness, anxiety and despair by formulating a positive, science-based narrative of evolutionary progress towards greater complexity and consciousness.

Contributors: Francis Heylighen, Jasmine De Bruycker, Sheila Hassell Hughes and Shima Beigi.

Table of contents:

Meaning and Worldviews

Meaning

People consider their lives meaningful if they have a system of goals and values that tells them what is good or worthwhile for them to do. They also need to have a general

understanding of how the world around them functions and how they and their activities fit in with that world. That provides them with a prospect of potential courses of action that would allow them to achieve their goals concretely. It also gives them a sense of connection, knowing which external resources they can rely on and how their actions can contribute to the larger whole.

Sense of Coherence

Based on many interviews with people confronted with difficult challenges (such as illness or accidents), the sociologist Antonovsky has developed a theory of what people need in order to feel good, be healthy, and cope effectively with challenges. He called this a “sense of coherence”. Having such a sense means that people feel that life is comprehensible (i.e. they understand how the world functions), manageable (i.e. they have access to the necessary skills and resources) and meaningful (i.e. they have goals worth striving for). (Antonovsky, 1998; Eriksson, 2017)

VUCA

The VUCA acronym refers to a situation that is *Volatile* (everything is continuously changing), *Uncertain* (we cannot predict what will happen next), *Complex* (all the changes are interconnected), and *Ambiguous* (we do not really know what these changes mean). A VUCA situation is intrinsically very difficult to understand and manage, even when it is not per se threatening.(Mack & Khare, 2016)

Techno-Social Dilemma

The ever-more rapid evolution and growing interconnection of technological systems deeply affect society. It creates a VUCA world in which people are continuously bombarded with disconnected snippets of information, many of which refer to problems and dangers. For people growing up in such a world, such as the present generation Z, it is difficult to find meaning in life or to see the direction in which the world is heading. In other words, they lack a sense of coherence. The resulting psychological and ethical confusion, anxiety and sense of despair form what we call “the techno-social dilemma”.(Heylighen & Beigi, 2023)

Integrated Worldview

As the philosopher Leo Apostel defines it, an integrated worldview is a system of thought that explains how human life fits within the larger cosmos. It provides meaning, values, understanding, and a sense of coherence. It answers fundamental philosophical questions, such as: What is the universe made of? Why is it organized like that? Who are we? Where do we come from? Where are we going? (Aerts et al., 2002; Vidal, 2008)

Ontology

An ontology is the part of a worldview that defines the most fundamental constituents of reality. For instance, in the ontology of materialism, the constituents are considered to be material particles or atoms, in idealism, they are abstract forms or ideas, and in process metaphysics they are elementary processes.

First story

By the “first story”, we refer to the family of worldviews that are rooted in mythology, oral traditions and religious scriptures, such as the Bible, Qur’an and Talmud. They are based on an origin story that explains how the world came into being and what people’s role in that world is. Thus, they provide meaning, values, and explanation. However, these explanations no longer fit in with our present scientific understanding of the cosmos, and some of their values (such as the superiority of certain groups or beliefs) need reconsidering.

Second story

The “second story” refers to the traditional worldview of science, which is known as Newtonian or mechanistic. This worldview assumes that all phenomena can be reduced to combinations of material particles moving through space according to the laws of nature. It provides a detailed explanation of how the world functions, based on observations and mathematical representations. Thanks to its very accurate predictions, it has allowed us to develop powerful technologies. However, it does not provide any values, because it presents the universe as a mere clockwork mechanism indifferent to human action. At most, it suggests that we can make our life better by accumulating material possessions or providing technological fixes.

Third story

The “third story” is the newly emerging worldview, which integrates the accurate explanations and predictions of science with the sense of meaning, values and ethics formerly provided by the religion-based first story. It sees the universe as self-organizing or evolving towards greater complexity, intelligence and integration. Humans can participate in that evolution by being curious, creative and open-minded, ready to transcend their limited, selfish perspective, and by fostering synergy and cooperation with others. They thus become free, self-actualizing agents contributing to a larger whole, which we call the noosphere. (Heylighen et al., 2024)

Evolution

Evolution

Evolution is the long-term, cosmic process that generates ever more complex and adaptive systems, from particles to atoms, molecules, cells and multicellular organisms to societies, cultures and their supporting technologies. The most fundamental mechanism of evolution was described by Darwin as variation followed by natural selection. The application of this mechanism at different levels of existence has been called “Universal Darwinism”.

Variation

Variation refers to undirected changes occurring in a system. In the case of biological systems, variation happens through mutation (accidental copying errors) and recombination of genes. However, other systems, such as molecules, ideas, or technologies, also undergo such random mutations or (re)combinations (assembling parts of different systems into a new system). Variation produces a variety of different configurations. Most of these are unstable and will therefore tend to fall apart as soon as they were formed. Only a small proportion will survive.

Natural Selection

The principle of natural selection can be defined as the survival of the fittest. Systems that are not fit enough to survive simply disappear, thus being eliminated from the

scene. That leaves only the fitter ones. As variation constantly creates systems that are in some way different from the existing ones, it occasionally happens that such a new variant is fitter. This variant will then gradually replace the less fit ones. Thus, as variation and selection continue, together they tend to create systems that are ever more fit.

Fitness

A system is fit if it is good at surviving and multiplying in a given environment. Therefore, fit systems tend to replace less fit ones. To be fit, a system must be adapted to the environment in which it lives. That means that it must be able to evade common dangers and to efficiently use available resources to maintain itself and grow. Fitness does not mean that the system is selfish, dominant or powerful in subduing others, but rather that it has developed symbiotic relationships with the other systems in its environment. In other words, it has found (or developed) a niche in which it fits.

Niche

A niche is a particular environment or way of life in which a system of a given type fits. That means that the niche provides all the resources the system needs to survive, while providing sufficient shelter to protect against dangers. For example, koalas survive by eating leaves high up in the eucalyptus trees. They are the only animals that can digest eucalyptus leaves, and are thus perfectly adapted to the niche formed by the eucalyptus forest. Different systems specialize in exploiting different resources and therefore fill different niches within the overall ecosystem that consists of all the interacting systems.

Niche construction

Niche construction describes how organisms can change their environment, creating a niche in which they fit, thus affecting their own selection. For example, beavers build dams on streams that create ponds in which they build their nests, thus being protected from predators. Thus, beavers change their environment in such a way that they are more likely to survive in that environment.

Self-organization

Self-organization is defined as the spontaneous emergence of a global order out of local interactions. It occurs when initially independent elements or agents settle into a coordinated pattern, without any internal 'manager' or external 'designer' telling them how to do this. Think of those thousands of starlings who manage to swirl in a synchronized swarm, without bumping into each other. Each bird follows the same simple rules, continuously adapting to the movements of its neighbors, but without following any leader. Self-organization is sometimes presented as an alternative mechanism of evolution, complementary to natural selection, because it does not require selection by an external environment. However, self-organization is better conceived as mutual alignment or adaptation, where a local component fits into the environment formed by the other components it interacts with. (Heylighen, 2001, 2023c)

Directionality of evolution

Variation is commonly conceived as random or blind. That means that it has no systematic preference for the direction in which it goes, and that it is unpredictable. However, selection creates a direction for evolution by eliminating all variations that reduce fitness, while multiplying the ones that increase fitness. Thus, the overall direction of evolution is towards increasing fitness. That implies increasing alignment and mutual adaptation of the different co-evolving systems.

Law of complexity-consciousness

This is not an actual scientific “law”, but a general trend posited by the scientist/philosopher Teilhard de Chardin. It proposes that as evolution proceeds, both the complexity and the consciousness of the systems it produces increase. Complexity here refers to the diversity of components and the multitude of connections that integrate these components into a coherent whole. Consciousness refers to the fact that the systems become aware of an increasingly wider range of other systems in their surroundings, and become better at making sense of what these other phenomena mean for their own survival.(Heylighen, 2023a; Savary, 2014)

Major evolutionary transitions

A major evolutionary transition refers to the emergence of a higher level of complexity by the integration of simpler systems into an encompassing supersystem. Examples are

the origin of life from molecules, the formation of multicellular organisms from cells, and the formation of social systems from individuals. In such a higher-level system, the component systems are dependent on each other for their joint survival. This means that they need to coordinate their actions with these others.(Maynard Smith & Szathmáry, 1997; Okasha, 2005; Stewart, 2020)

Cosmological evolution

Cosmological evolution refers to the evolution of the physical universe, starting from its origin in the Big Bang. The Big Bang produced a very dense state of energy, which started expanding in space and thus cooling down. The energy coalesced first in elementary particles. These then aggregated into atoms—initially just hydrogen and helium. Through gravitational attraction, these atoms coalesced into clouds and then stars, where they started up nuclear reactions. These reactions produced heavier elements, such as carbon, iron and oxygen. These were released into space by supernova explosions. These heavier elements underwent chemical reactions, forming different types of molecules and coalescing into planets. (Chaisson, 2005; Swimme & Tucker, 2011)

Biological evolution

At least on the planet Earth, some of the molecules reacting with each other formed self-maintaining cycles. These gave rise to the first living cells. These cells stored the procedures on how to function effectively in their genetic memory, carried by the DNA molecule. When organisms reproduce, they pass on this genetic knowledge to their offspring, typically with variations. As different variations fit into different niches (ways of living), new species arise, and the diversity of life forms increases.

Humans as the Symbolic species

What distinguishes humans as a species from the animals out of which they evolved is the versatility of human language. Humans use symbols, such as words, signs and pictures, to express ideas and to communicate. By combining words or other symbols according to the rules of grammar, they are able to generate an infinite number of sentences, describing a myriad of possible situations. This ability allows them to transfer knowledge to others and to register that knowledge in enduring documents. Symbolic thinking also allows humans to reason and reflect about hypothetical situations and thus invent new ideas. The emergence of symbolic thought led to an

explosion in knowledge and technology, which made humans into the dominant species on this planet.(Deacon, 1998)

Cultural evolution

Culture refers to the knowledge, behavior and ideas that are transmitted “horizontally”, from individual to individual, or “vertically”, from parent to offspring. Genetic information, on the other hand, is transmitted only vertically. Therefore, different biological species cannot share or pool their genes. As a result, they tend to diverge as they evolve. Culture, in contrast, is exchanged and thus shared between individuals within and across groups. Therefore, the dynamics of cultural evolution tends to be more convergent than divergent: good ideas tend to spread from group to group. It is also much faster and more efficient than biological evolution.

Conscious evolution

Up to now, evolution was merely a very slow, large-scale process that we had to passively undergo. With symbolic communication, culture, and contemporary technology, that process has tremendously accelerated. Moreover, we are starting to better understand the mechanisms of variation, selection, adaptation and self-organization that drive evolution forward. That allows us in principle to guide or steer evolution along a more efficient path, with less trial-and-error, while avoiding common pitfalls, such as extinctions or collapses. Thus, humanity seems ready to consciously evolve itself and its surrounding ecosystem.

Global Systems

Geosphere

The geosphere refers to the physical materials that cover the surface of the planet Earth. These include the atmosphere (air), the hydrosphere (water, oceans, rivers) and the lithosphere (rocks and sediments). These materials interact and thus transform each other. For example, the weathering of rocks by rain and wind turns them into sand that is deposited by rivers in the sea, forming sediments.

Biosphere

The biosphere refers to the layer of living organisms that covers the surface of the Earth and that interacts with and thus helps shape the geosphere. This includes plants that convert carbon dioxide into oxygen, animals that breathe oxygen, and decomposers like bacteria and fungi which recycle dead organic matter into nutrients used by plants.

Gaia

The Gaia hypothesis is named after the Greek goddess of the Earth. It proposes that the biosphere and geosphere together function like a living organism. This planetary organism, called Gaia, produces and regulates its own living conditions, such as atmospheric oxygen levels and temperature, in order to sustain itself. This happens through the mutual adaptation of the different components of the geosphere and biosphere.(Lovelock, 2000; Rubin et al., 2021; Shoshitaishvili, 2023)

Noosphere

The noosphere refers to the layer of thought, mind or consciousness that envelops the Earth. This global "thinking circuit" emerged together with human culture and symbolic communication. These enabled the global spread, recombination and evolution of ideas, thus accelerating the production of new knowledge and insights. The noosphere is sometimes used as a synonym for the Global Superorganism, or at least its Global Brain. (Teilhard de Chardin, 1959; Vidal, 2024)

Anthropocene

The ideas produced in the noosphere are now directly affecting the biosphere and geosphere via their implementation in technological systems. The anthropocene refers to the new geological period in which these effects of human activity, such as increasing CO2 levels, roads covered with concrete, or plastics accumulating in the oceans, have become as important on the planetary level as those of biosphere and geosphere. (Shoshitaishvili, 2023)

Globalization

Globalization is the process by which the influence of human activities is extended from a region or country to the planet as whole. This is facilitated by transport technologies, such as jet planes, shipping lanes and continent-wide pipelines, and also by information and communication technologies, such as the World-Wide Web. The resulting economic, social and cultural exchanges are increasingly regulated through international institutions and agreements.

Superorganism

A superorganism is an organism that consists of component organisms. Examples are a multicellular organism that consists of cells, and an ant colony that consists of individual ants, yet behaves like a unified, single organism.

Global superorganism (aka Metaman)

Humanity as a whole can be conceived as a collective organism which consists of individual people, supported by their technological extensions. Like a biological organism, this social organism has a metabolism (or physiology), which converts raw materials into the energy and products needed to sustain its functioning. It also has a circulatory system, which transports these resources to where they are needed, and a nervous system, which processes and distributes information. (Further detail on these different functions shared by biological and social organisms can be found in Miller's Living Systems Theory.)(Heylighen, 2007; Stock, 1993; Stock & Campbell, 2002)

Global Brain

The global brain can be defined as the nervous system of the global superorganism. This is the subsystem responsible for acquiring, interpreting, distributing and storing information. The components of the global brain are human individuals, their ideas and knowledge, together with the communication technologies they use to process, exchange and register these data. Thus, the global brain is more or less synonymous with the noosphere, which was characterized by Teilhard de Chardin as a "brain of brains". The global brain is supported by the Internet, with human individuals or computer systems playing the role of neurons, and the network links between them playing the role of synapses. (Heylighen, 2017; Heylighen & Lenartowicz, 2017; Russell, 2008)

Consciousness

Consciousness is the ability to monitor, examine and redirect mental processes. Most processes in the human brain are subconscious: they happen immediately and automatically, in the background, without any possibility for the self to intervene. Examples are reflex reactions, recognition of objects and understanding of language. For conscious processes, such as acting, thinking, or speaking, on the other hand, we can conceive different possibilities, and choose between them. We can also correct the process if it does not go as desired. (Dehaene, 2014; Seth, 2021)

Collective intelligence

Collective intelligence is the degree to which the agents in a system together make better decisions or solve more complex problems than any of them individually. For example, individual ants have very limited intelligence, but the ant colony as a whole can make surprisingly good decisions, such as developing a map with paths of pheromone indicating the shortest routes to various sources of food.

Noospheric consciousness

If the noosphere is interpreted as the brain of the global superorganism, then this brain is likely to be thinking at both a conscious and a subconscious level. The conscious level corresponds to issues that are openly debated, with different arguments pro and con being publicly considered before a collective decision is made. The subconscious level corresponds to automatic processes going on in the background, such as particular messages or posts being forwarded to certain people but not to others, without these people being aware of the algorithms making such decisions.(Beigi & Heylighen, 2021)

Intuition

Intuition is a form of subconscious thinking: we may become conscious of the conclusion, but we are not aware of the intermediate neural processes that led to that conclusion and are not able to reconstruct or redirect them. Because the neural networks in our brain are very good at making associations and picking up minor signals, intuitions are often correct. But since we have no control on how they are

produced, we cannot check the correctness of the underlying evidence or arguments. Therefore, it is risky to rely on intuition alone.

Symbolic thinking

Symbolic thinking is a form of controlled thinking, where we consciously examine the different steps in the train of thought that leads to a particular conclusion. That is possible because these steps are represented as statements consisting of concepts or symbols (typically words). These statements can be held in working memory, allowing them to be evaluated as to their correctness. This form of thinking is also called reflection, reasoning, or rationality. It is typical for humans, who are the only species that systematically uses symbols to reason.

Technological singularity

The development of technology seems to be accelerating ever more quickly. Some thinkers, such as Ray Kurzweil, have suggested that the speed of technological change would become infinite within a finite period (e.g. by the year 2045). A singularity is a mathematical term for the point where an otherwise continuous function gets an infinite value. That means that the curve cannot be extrapolated beyond this singular point. The implication is that we cannot imagine what comes after. Usually, the technological singularity is interpreted as the moment when Artificial Intelligence programs would become so smart that they can reprogram themselves to become even smarter, thus “taking off“ to a level of intelligence so much beyond human intelligence that we cannot really imagine it. (Heylighen, 2008; Kurzweil, 2005)

Teilhard de Chardin, Pierre

Pierre Teilhard de Chardin was a French paleontologist, philosopher and theologian, who coined the term “noosphere” in 1923. His writings on the evolution of humanity have inspired millions of people, and can be said to have anticipated current developments, such as globalization and the world-wide web. However, because of his poetic, complex and often obscure style of writing, it is often difficult to understand the implications of his philosophy. The Human Energy project in part intends to extend and clarify his philosophy in terms of contemporary science.

Chapter 10 (Teilhard de Chardin)

“The Formation of the Noosphere” is an article by Teilhard de Chardin that summarizes his evolutionary philosophy, and in particular the emergence of a global superorganism or “brain of brains”. It therefore provides a good introduction to his thinking. It was published as Chapter 10 in the book “The Future of Man”, which provides a compilation of his essays. In the Human Energy project, Chapter 10 is often referred to as a foundational text, because it surveys many of the ideas that inspired the project.

Vernadsky, Vladimir

Vladimir Vernadsky was a Russian/Ukrainian geochemist who showed that the biosphere also affects the geosphere. He further developed the concept of the noosphere in collaboration with Teilhard de Chardin, thus being one of the founders of the theory of the noosphere.

Social Interactions

Cooperation

Cooperation occurs when two or more autonomous agents engage in a mutually beneficial interaction, helping each other to achieve benefit. Usually, cooperation is intentional: the agents work together in the expectation of a benefit. If the beneficial interaction is unintentional, it is called “synergy". Synergy and cooperation have driven the rise of complex living organisms over the past 3.9 billion years. (Sources)

Evolution of cooperation

Evolution of cooperation is the general tendency for interactions to become more synergetic through variation and selection, thus reducing competition and conflict. The biggest obstacle to the evolution of cooperation is the problem of “free riders”. (Source)

Synergy

Synergy is a form of cooperation where agents not only mutually benefit from their interaction, but where the combined result is greater than the sum of the individual contributions, and the positive-sum interaction is unintended. (Other source)

Symbiogenesis

Symbiogenesis is the formation of more complex organisms by the merging of independently evolved organisms that have developed some form of synergy. The complex, “eukaryotic cells” out of which we and most multicellular organisms are constituted evolved as a merger between simpler “prokaryotic” cells similar to bacteria. (Source).

Friction

Friction is the opposite of synergy. It occurs when the interaction between agents of a system decreases their overall benefit. In this negative sum interaction, all parties lose (although one may gain at the expense of a larger loss by others). Friction often results in the dissipation or waste of resources during the interaction. In a traffic jam, for example, enormous amounts of fuel, time and energy are wasted because of the mutual obstruction between vehicles. When the negative sum interaction is intentional, we may call it conflict. An example is war, where the warring parties together lose more than if they had not gone to war (Source)

Division of labor

The “division of labor” is a common way of achieving synergy through specialization. Other terms are “combination of labor”, "synergistic collaboration", and "cooperative synergy." It occurs when (groups of) agents within a system cooperate by specializing in different tasks or functions, with the combined result being more efficient, effective and productive than if each agent were to work independently.

Multilevel selection

Selection not only takes place at the level of genes or individuals, but also at the levels of cells, colonies, multicellular organisms and groups of organisms. This is called

“multilevel” selection. In higher-level systems, both the whole system and its component system(s) need to be fit enough to survive natural selection. Therefore, selection happens simultaneously at different levels. This implies that the component systems cannot afford to care merely for their own benefit; they also need to take into account the fitness of the whole system to which they belong.(Okasha, 2005; Wilson, 1997)

Group selection

Group selection refers to the fact that a group as a whole can survive or be eliminated. This evolutionary mechanism favors traits and behaviors that enhance the fitness of the group, even if these may be disadvantageous for individuals within the group. For example, groups of cooperating individuals are more likely to survive than groups of selfish individuals, even though a selfish individual within a cooperating group (a “free rider”) may be fitter by profiting from the efforts of others. Therefore, group selection will tend to eliminate groups with too many free riders. Determining in which cases group selection is strong enough to counter individual selection remains a topic of ongoing discussion in evolutionary theory.(Sober & Wilson, 1998)

Free riders

Free riders are agents that exploit others' collaborative efforts without contributing anything. They are named after people who use public transport, such as buses, without paying, relying on others to pay enough so that the buses continue to ride. Free riders extract more benefit from the cooperation than the cooperators, because they don’t pay the costs. Therefore, free riders risk outcompeting the cooperators, destroying any tendency to cooperate. This problem can be overcome via certain coordination or control mechanisms, also known as social institutions, that make free riding difficult. Such mechanisms may evolve through group selection.

Group selfishness

When different groups compete, group selection may promote groups that only care about their own benefit to the detriment of rival groups. Thus, people will typically want to get as much as possible for the community or group to which they belong (e.g. a company, trade union, or country), even if this takes away resources from other groups. This mentality of group selfishness is also known as “Us vs. them”, or “Ingroup vs. outgroup”. It is at the base of most large-scale conflicts and tensions in society, such as war, oppression, or discrimination.

Common(s)

A “common” consists of three elements: 1) a shared resource, such as a forest, a lake, or a field; 2) a community which uses that resource; and 3) rules to ensure that the resource is well managed and not overexploited. Examples of commons are the oceans and the fish stocks they contain, the water people extract from rivers and aquifers, and the knowledge shared by all in repositories such as Wikipedia. A common is owned, taken care of, and preserved by a community, not by individuals, companies or governments. A common is neither capitalist nor communist, but exists in a different economic realm. You can’t commodify (buy or sell) or give away a common, but should pass it on to the next generations - intact, without degrading it, while ensuring that everyone can equally benefit from it. (Last, 2017; Rifkin, 2014)

Global commons

The global commons are all the (extra)terrestrial parts that fall outside national jurisdictions, so they are not owned or controlled by any single nation. They are considered humanity's common heritage, and their health is critical to the health of the noosphere itself. Examples include the international waters (high seas), Antarctica, the atmosphere, biodiversity, genetic resources, cyberspace (the internet), and outer space (celestial bodies like the Moon and Mars).

Tragedy of the Commons

The tragedy of the commons is the idea that individuals, when left to their own devices, will tend to act as free riders by extracting as many resources (e.g. fish, or water) from the commons as they can for themselves, without caring about the other users. This would result in the depletion and eventual collapse of the common resource. This concept has influenced environmental policies and resource management strategies for decades, by suggesting that commons should as much as possible be privatized, so that the individual owner would be motivated to preserve rather than exhaust the resource. However, it has also received criticism for being a misleading and potentially dangerous “myth”. (Feeny et al., 1990)

Prosocial model (Ostrom principles)

A prosocial model is a framework for managing the commons. Economist and political scientist Elinor Ostrom developed a set of guiding principles that promotes the sustainable and intergenerationally equitable use of a common. They emphasize the importance of clear boundaries of the common, community ownership, cooperative governance, equitable distribution of benefits and responsibilities, collective monitoring and decision-making processes, and the enforcement of self-determined rules and norms to prevent overuse or degradation. Ostrom underscores the natural capacity of local communities worldwide, in entirely different contexts, to develop this prosocial model, challenging the widely accepted notion of the "tragedy of the commons”. (Atkins et al., 2019)

Sustainable Development

Sustainable development is social and economic development that meets the needs of the present, complies with the planetary boundaries and does not compromise the ability of future generations to meet their own needs without transgressing these same planetary boundaries. (Source)

Sustainable Development Goals

The Sustainable Development Goals (SDGs) are global milestones collectively set by world leaders for achieving long-term sustainable development by 2030. They replaced the Millennium Development Goals (MDGs) which expired in 2015 and were implemented over 15 years. The SDG framework consists of 17 goals for environmental sustainability, social inclusion, economic development, peace, justice, good governance, and partnership, which are the main challenges for the world population in the 21st century. Each goal has several targets (in total, 169). (Source)

Noospheric values

Noospheric values reflect the idea of a collective human consciousness that transcends individual and localized perspectives. They promote global cooperation, understanding, and the well-being of humanity as a whole. Examples include global awareness (recognizing the interconnectedness of all beings), environmental stewardship, social justice, knowledge sharing, and so on.

Noopolitik

Noopolitik is an emerging form of statecraft (governmental strategies, methods and practices) adapted to the information age. It wants to reimagine geopolitics from a noospheric perspective, offering an alternative to ‘Realpolitik’. Noopolitik emphasizes the importance of sharing ideas, stories, values, laws and ethics globally, as enabled by the noosphere. The essence of Noopolitik is dealing with the ‘battle of ideas’, which becomes increasingly important as the noosphere expands. It focuses on persuasive soft power (such as cultural diplomacy, fostering economic relationships, interreligious dialogue, information dissemination), rather than on traditional military hard power. Of course, there are also ‘dark’ forms of Noopolitik such as weaponized narratives, strategic deception and epistemic attacks. (Ronfeldt & Arquilla, 2018)

Realpolitik

Realpolitik involves policies that primarily consider given circumstances and factors rather than strictly following explicit ideological notions or ethical premises. Morality, justice, and fairness are given a back seat in Realpolitik, also called “political pragmatism”. While first used as a positive or neutral term, as of around 2014, Realpolitik has been used to imply political policies that are coercive, amoral, or Machiavellian. Its policies enable stronger nations to dominate weaker ones, maintaining an uneasy status quo. Realpolitik also keeps powerful nations at each other’s throats, keeping them from cooperating to avert threats to the global commons. Realpolitik, therefore, seems poorly suited to propel the deep transformations we need today. (Sources)

Memes

A meme is an element of culture, such as an idea, joke, or song, that spreads by being transmitted from person to person, potentially becoming “viral”, i.e. “infecting” a large population. Memes can be more or less effective in spreading, depending on their form, content, and fit with what people find interesting. They thus undergo selection for fitness or “virality”, much like viruses or genes in biological evolution. A meme can take various forms (image, video, text, idea) and tones (humorous, satirical, thought-provoking). It conveys ideas, trends, behaviors, jokes and practices that reference or comment on popular culture, current events, or shared experiences. Memes thus to some degree, reflect society's collective consciousness of what is happening in the world. (Brodie, 1996; Heylighen & Chielens, 2009)

Relational Agency

Relational agency is a new ontology that transcends the limitations of the traditional object-based worldview. The relational worldview sees the world as a network of interacting agencies rather than a collection of independent objects subjected to external forces. It recognizes the importance of relationships, networks, processes and context in understanding how individual agencies are shaped and how complex systems emerge, self-organize and co-evolve. (Heylighen, 2023b)

Object-based worldview (objectcy)

The object-based worldview sees the world as a collection of independent objects subjected to external forces. It assumes that all phenomena we observe can be reduced to objects and their movements in space. (Source)

Systems

System

A system is a cohesive assembly of components (agents, elements, subsystems) held together by a network of relationships or couplings. This cohesion distinguishes the system from its environment and other components with which there is a weak(er) interaction. When the components in the system share a goal, the system functions like a higher-order agent. Systems can be natural (e.g. organisms, ecosystems), artificial (e.g. cars, computers), or some combination (e.g. cities, socio-technological systems). A system is typically part of a larger, encompassing system, its supersystem.

Open systems

A typical system is coupled to the rest of the world, which is known as its environment. This coupling means that changes in the environment (external) can produce changes in the system (internal), and, vice-versa, that changes in the system (internal) can affect the environment (external). Incoming influences, which can take the form of matter, energy and/or information, define the input of the system. Outgoing influences, which can similarly be material, energetic or informational, define its output. All living systems are open: they require an input (“food” or resources) from which they can extract the

energy necessary to sustain their metabolism while producing an output (“waste”) that they release into the environment.

Emergence

An emergent property is a property of a whole (system) that cannot be deduced from the properties of its parts. For example, a material has properties such as hardness or temperature, which are absent in the atoms out of which the material is composed. Similarly, a car is characterized by emergent properties such as fuel consumption or maximum speed, lacking in its components, such as engine, frame, or wheels. Emergent properties arise from the specific relations or couplings that turn an assembly of parts into a coherent whole. Since there are in general, myriad ways to interconnect parts into a whole, the properties of that whole cannot be predicted just from the properties of the individual parts. (Heylighen, 2023c)

Complexity

The complexity of a system refers to the diversity of its components and the multitude of connections that integrate them into a coherent whole. The more differentiated the components in a system, and the more integrated they are by the connections between them, the more complex the system, and the more difficult it will be to analyze, understand, or predict.

Subsystem/Supersystem

A supersystem of a given system is the larger system that contains the systems as one of its interconnected components or “subsystems”. For example, an individual human is a system that belongs to the supersystem of the company or organizations in which that person works, which in turn is part of the even more encompassing supersystem of the society. The human system itself is a supersystem for its subsystems, which include its organs and circuits. These in turn consist of tissues and cells, which are their subsystems. Cells consist of organelles, which consist of molecular structures, which consist of molecules, atoms, elementary particles, etc. Thus, each system can be positioned in a hierarchy, with its supersystem at the levels above, and its subsystems at the levels below. To really understand a system, you not only need to analyze it into its subsystems (reductionist approach), but also to see what function it performs within its supersystem (holistic approach). For example, to understand a particular person,

Complex adaptive systems

A complex adaptive system consists of many interacting subsystems, called agents, that are relatively loosely coupled. Examples are markets, ant colonies, cities, and the immune system. The agents' actions are not rigidly fixed, preprogrammed or controlled, but continuously adapt to the actions of the other agents, and to changes in the environment. As a result, the system as a whole adapts and self-organizes, exhibiting emergent phenomena, such as collective intelligence, coordination, and properties of the whole that are lacking in the individual agents.

Living Systems Theory

Living systems theory, developed by James Grier Miller, is a broad framework for understanding both biological and social systems, from single cells all the way up to cities and complex societies. Living systems are fundamentally open, constantly exchanging matter, energy, and information with their environment. The theory proposes that such systems are characterized by a set of 20 critical subsystems necessary to survive. These subsystems handle essential functions such as acquiring, processing, transporting and storing material resources and information while adapting to the environment. These subsystems can be classified in those that handle matter and energy (corresponding to an organism's metabolism) and those that handle information (corresponding to its nervous system). As such, living systems theory provides a useful framework for analyzing, understanding and modeling the major subsystems of the global superorganism (Noosphere), such as its transport and communication networks or its stores of goods and knowledge.(Miller, 1995)

Autopoiesis

Autopoiesis ("self-production") refers to a system's ability to produce and maintain its own organization, including its processes, structures and boundaries. This is characteristic of biological organisms. Autopoietic systems have a boundary, such as a skin, bark or cell membrane, that distinguishes them from the environment. The self-regenerating network of processes allows them to function as an autonomous, unified whole, which creates its own components. All living organisms, including humans, are autopoietic systems. While 'autopoiesis' originated in biology, the concept has been extended to other fields such as cognitive sciences, cybernetics, philosophy (of mind), artificial intelligence and complex systems thinking. (Luisi, 2003; Maturana & Varela, 1987; Mingers, 1994)

Resilience

As defined by Beigi (2015), Resilience is “a natural, malleable, and system-level property that during stressful conditions facilitates optimal performance of complex adaptive systems in the space between stimuli and response.” (Beigi, 2019; Walker et al., 2004)

Cybernetics

Cybernetics is the science of communication, coordination, and control in natural and artificial systems. It examines how complex biological, mechanical, or social systems process information, maintain stability, steer towards goals and adapt to changes in their environment. Cybernetics treats systems from a new angle. It doesn’t ask, “what does this system consist of?” but “how does it function?” thus examining more or less intelligent forms of goal-directed behavior. Cybernetics aim to understand the principles and mechanisms underlying self-steering systems (such as negative feedback) in various disciplines (biology, psychology, computer science, sociology…) and application domains (artificial intelligence, robotics, engineering, management, etc). (Ashby, 1964; Heylighen & Joslyn, 2003)

Metabolism (or physiology)

An organism's metabolism refers to its network of chemical reactions to maintain itself by producing the necessary resources and components. These reactions are essential for energy production, growth, repair, and waste elimination. Metabolism has two essential aspects. Anabolism describes the synthesis of complex molecules from simpler ones, requiring an input of energy. Anabolic processes are associated with an organism's growth and development. Catabolism involves breaking complex molecules into simpler ones, like the breakdown of nutrients during digestion. Catabolic processes release energy needed for the organism’s cellular activities. Overall, metabolism encompasses a network of interconnected pathways that regulate the flow of energy and the building blocks so as to ensure the proper maintenance and functioning of living organisms.

Nervous system

The nervous system is a complex network of nerve cells (neurons) transmitting signals between animal body parts. Its primary functions include sensing the environment,

processing and transmitting information, and coordinating the body's responses. The nervous system plays a crucial role in various physiological processes, including movement control, involuntary functions (heartbeat, digestion, respiration), sensory perception, cognition, and emotional regulation. The nervous system can be divided into two main parts: 1) the Central Nervous System (CNS) consists of the brain (command center) and spinal cord (messenger between brain and body); 2) the Peripheral Nervous System (PNS) includes all the nerves and ganglia (clusters of nerve cells) outside the central nervous system. The PNS connects the CNS to the limbs and organs, facilitating communication between the central nervous system and the rest of the body.

Homeostasis

Homeostasis refers to the ability of a system to maintain its internal stability in the face of external changes. It can be found in biological, ecological, and mechanical systems. Homeostasis does not imply a static state but a dynamic equilibrium where the internal conditions fluctuate within a narrow range. For example, in our bodies, homeostasis involves the regulation of body temperature, blood pressure, and glucose levels to ensure optimal physiological functioning. In ecological systems, it may involve the regulation of population sizes or nutrient cycles to sustain a stable environment. Understanding homeostasis is crucial in systems theory as it helps explain how systems self-regulate, adapt to changes, and maintain stability in dynamic environments.

Internet / ICT

The Internet is the global network of interconnected computers that communicate by using standardized protocols (TCP/IP). It connects people across the globe, enables collaboration, and facilitates the exchange of information and communication by giving people access to a wide range of resources and services, including websites, email, social media, research, and so on. The World Wide Web (WWW) is one of the most popular services on the Internet, allowing users to access and publish material on interlinked websites. Information and Communication Technology (ICT) encompasses all technologies used for the manipulation and communication of information. This includes hardware, software, networks, and services that facilitate the storage, retrieval, transmission, and manipulation of data. ICT plays a crucial role in various aspects of modern life, including communication, business, education, healthcare, and entertainment.

Mindful Smart Cities

Shima Beigi (2020) defines Mindful, smart cities as “WE space”- intersubjective spaces, interfaces to explore possibilities of becoming greater. A WE SPACE is also a space of refinement, a space of procreation, a space of inclusion, and a space of healing tensions and conflicts between generations and nations. The civic space is a collective space that contains citizens' access to raw transcendence in the shape of higher values such as democracy, sense of belonging, inclusivity, sense of place, safety and, last but not least, sustainability. In other words, the civic space is a potent collective and intersubjective space where citizens co-imagine a vision for their cities. See also Raw Transcendence by Liogier (2023). (Beigi, 2020)

Spirituality and Ethics

Ethics

Ethics specifies the values (abstract concepts of what is good), norms (more specific social standards) and rules (explicit dos and don'ts) that individuals should follow in order to positively contribute to the larger system to which they belong. This includes avoiding actions that harm other people, society, and the encompassing ecosystem. The third story grounds such ethics in the evolution of the noosphere.

Spirituality

We define spirituality as the feeling or experience of being part of a larger whole, thus transcending the individual self and its petty concerns. It implies a widened awareness or sense of connection with the universe and a sensitivity for agency or intelligence beyond human individuals. This means it does not see reality as merely a collection of inert, material objects. However, spirituality does not imply a belief in supernatural entities.

Awe

Awe is an intense emotion that is often associated with spiritual, self-transcendent experiences. It is typically triggered by encountering a vast, powerful and extraordinary phenomenon, such as a view of Earth from space, the Grand Canyon, a waterfall, a cathedral, or a magnificent work of art or music. It makes the self feel small in relation to the larger whole and opens the mind, inciting us to develop new insights (cognitive

accommodation). Awe can trigger religious devotion as well as scientific curiosity about the universe.(Chirico & Yaden, 2018; Keltner, 2024)

Transcendence

Transcendence refers to the process of surpassing the limitations of a person's mind, e.g. in terms of perception, representation, or understanding. It means going beyond the boundaries of the self and its mundane preoccupations in order to attain a deeper or broader insight into reality and a sense of connectedness to a greater whole. It requires stepping outside the conventional symbolic categories that are used to describe reality and moving on to a higher, more encompassing level of consciousness. (Heylighen, 2024; Yaden et al., 2017)

Raw Transcendence

Coined by Raphaël Liogier (2023), raw transcendence refers to transcendence in its original state, free from the refinements of all forms of representational, symbolic and rational systems such as religion and science. Religious versions of transcendence or mystical experiences are refined, explained, and contained due to the profundity of raw transcendence and the complexity of its embodiment, which calls for facing the anguish of the void by individuals. See also Anguish of the Void. (Liogier, 2023)

Catastrophic Thinking

Catastrophic thinking or catastrophizing is the tendency to magnify a perceived threat and overestimate the seriousness of its potential consequences.

Industrialism

The attitude and ideology that goes together with the materialistic and mechanistic worldview of traditional, Newtonian science (the "second story"). It reduces progress to the accumulation of consumer goods, wealth and purely quantitative growth, neglecting ecological, qualitative and spiritual aspects. It is typical for capitalist, communist and neo-liberal political systems.

Identitarianism (or Identity politics)

The recent trend of defining people by their social identity, i.e. by subdividing them into separate groups depending on characteristics such as nationality, religion, race, gender, or sexual orientation. Many people derive meaning from the values and properties associated with their social identity. However, because each person is different, there will never be a perfect match between this social grouping and their real self. Moreover, the subdivision of humanity into such categories tends to create antagonism between the groups (see group selfishness). Finally, meaning based on group membership tends to be parochial and conservative, ignoring the wider universe, its unlimited evolution and drive for transcendence.

Anguish of the Void

An existential anguish closely linked to the impermanence of life. The void here refers to the infinite space of the unknown lacking any signposts or boundaries. Feeling the anguish of the void can activate the drive to create and for greatness or can lead to neuroticism and the impulse to fill the void with material objects or other immediately gratifying behaviours. See also Positive Hubris and Raw Transcendence.

Triple Negativity

Raphaël Liogier (2023) shows the patterns of doom and despair manifest at three progressively deeper levels. The first level, the phenomenological or narrative, is where we comment on the world and choose our language. At the phenomenological level, a dominant anti-progress, anti-human and anti-positivity has become pervasive in almost all industry sectors. The second level, the decisional or agency level, is where we actively seek concrete actions in response to our narrative. However, when negativity seeps deeper into our global collective consciousness, it reaches the third and most intimate level, our psyche, reflecting this negativity in the form of moral negativity. Caught with moral negativity, a vicious negative cycle fed by previous negativities, our collective logic becomes about blame-shifting and finger-pointing towards each other and other nations.

Positive Hubris

Raphaël Liogier defines positive Hubris as the desire to be greater, to move beyond one’s current situation and conditions.

Alphabetic Index

Global superorganism (aka Metaman)
Globalization
Group selection
Group selfishness
Homeostasis
Identitarianism or Identity politics
Industrialism
Integrated Worldview
Internet / ICT
Intuition
Law of complexity-consciousness
Living Systems Theory
Major evolutionary transitions
Meaning
Meaning and Worldviews
Memes
Metabolism (or physiology)
Multilevel selection
Natural Selection
Nervous system
Niche
Niche construction
Noopolitik
Noosphere
Noosphere
Noospheric consciousness
Noospheric values
Object-based worldview (objectcy)
Ontologies
Open systems
Positive Hubris
Prosocial model (Ostrom principles)
Raw Transcendence
Realpolitik
Relational Agency
Resilience
Second story
Self-organization

Sense of Coherence
Society
Spirituality
Spirituality and Ethics
Subsystem/Supersystem
Superorganism
Sustainable Development
Sustainable Development Goals
Symbiogenesis
Symbolic thinking
Synergy
System
Systems
Techno-Social Dilemma
Technological singularity
Teilhard de Chardin, Pierre
The Symbolic species
Third story
Tragedy of the Commons
Transcendence
Triple Negativity
Variation
Vernadsky, Vladimir
VUCA

Bibliography

Aerts, D., Apostel, L., De Moor, B., Hellemans, S., Maex, E., Van Belle, H., & Van der Veken, J. (2002). *Worldviews: From fragmentation to integration*. VUB Press. http://www.vub.ac.be/CLEA/pub/books/worldviews.html

Antonovsky, A. (1998). The sense of coherence: An historical and future perspective. In *Stress, coping, and health in families: Sense of coherence and resiliency* (pp. 3–20). Sage Publications, Inc.

Ashby, W. R. (1964). *An Introduction to Cybernetics*. Methuen London.

Atkins, P. W. B., Wilson, D. S., & Hayes, S. C. (2019). *Prosocial: Using Evolutionary Science to Build Productive, Equitable, and Collaborative Groups*. New Harbinger Publications.

Beigi, S. (2019). A Road Map for Cross Operationalization of Resilience. In S. I. S. Rattan & M. Kyriazis (Eds.), *The Science of Hormesis in Health and Longevity* (pp. 235–242). Academic Press. https://doi.org/10.1016/B978-0-12-814253-0.00021-8

Beigi, S. (2020). *Mindful Smart Cities: Rethinking Smart Cities with Mindfulness Engineering*. VUBPRESS.

Beigi, S., & Heylighen, F. (2021). Collective Consciousness Supported by the Web: Healthy or Toxic? In N. T. Nguyen, L. Iliadis, I. Maglogiannis, & B. Trawiński (Eds.), *Computational Collective Intelligence* (pp. 81–93). Springer International Publishing. https://doi.org/10.1007/978-3-030-88081-1_7

Brodie, R. (1996). *Virus of the Mind: The New Science of the Meme*. Integral Pr.

Chaisson, E. (2005). Epic of Evolution: Seven Ages of the Cosmos. In *Epic of Evolution*. Columbia University Press. https://doi.org/10.7312/chai13560

Chirico, A., & Yaden, D. B. (2018). Awe: A Self-Transcendent and Sometimes Transformative Emotion. In H. C. Lench (Ed.), *The Function of Emotions: When and Why Emotions Help Us* (pp. 221–233). Springer International Publishing. https://doi.org/10.1007/978-3-319-77619-4_11

Deacon, T. W. (1998). *The Symbolic Species: The Co-evolution of Language and the Brain*. W. W. Norton & Company.

Dehaene, S. (2014). *Consciousness and the Brain: Deciphering How the Brain Codes*

Our Thoughts. Penguin.

Eriksson, M. (2017). The sense of coherence in the salutogenic model of health. *The Handbook of Salutogenesis*, 91–96.

Feeny, D., Berkes, F., McCay, B. J., & Acheson, J. M. (1990). The tragedy of the commons: Twenty-two years later. *Human Ecology*, *18*(1), 1–19. http://link.springer.com/article/10.1007/BF00889070

Heylighen, F. (2001). The science of self-organization and adaptivity. In *The Encyclopedia of Life Support Systems* (Vol. 5, pp. 253–280). EOLSS Publishers Co Ltd. http://pespmc1.vub.ac.be/Papers/EOLSS-Self-Organiz.pdf

Heylighen, F. (2007). The Global Superorganism: An evolutionary-cybernetic model of the emerging network society. *Social Evolution & History*, *6*(1), 58–119. http://pcp.vub.ac.be/papers/Superorganism.pdf

Heylighen, F. (2008). Accelerating socio-technological evolution: From ephemeralization and stigmergy to the global brain. In *Globalization as evolutionary process: Modeling global change* (p. 284). Routledge. http://pcp.vub.ac.be/papers/AcceleratingEvolution.pdf

Heylighen, F. (2017). Conceptions of a Global Brain: An historical review. In B. Rodrigue, L. Grinin, & A. Korotayev (Eds.), *The Way that Big History Works: Vol. III* (pp. 341–256). Primus Books.

Heylighen, F. (2023a). A contemporary interpretation of Teilhard's law of complexity-consciousness. *Religion, Brain & Behavior*, 1–3. https://doi.org/10.1080/2153599X.2022.2143404

Heylighen, F. (2023b). Relational agency: A new ontology for co-evolving systems. In P.

Corning, S. A. Kauffman, D. Noble, J. A. Shapi, R. I. Vane-Wright, & A. Pross (Eds.), *Evolution 'On Purpose': Teleonomy in Living Systems* (pp. 79–104). MIT Press. https://researchportal.vub.be/files/79556854/Heylighen_RelationalAgency.pdf

Heylighen, F. (2023c). Why Emergence and Self-Organization are Conceptually Simple, Common and Natural. In *Proceedings of the Science Week on Complexity, UM6P, Ben Guerir, 2023*.

Heylighen, F. (2024). Transcending the Rational Symbol System: How Information and Communication Technology Integrates Science, Art, Philosophy, and Spirituality into a Global Brain. In N. Gontier, A. Lock, & C. Sinha (Eds.), *Oxford Handbook of Human Symbolic Evolution* (p. 0). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780198813781.013.37

Heylighen, F., Beigi, S., & Vidal, C. (2024). *The Third Story of the Universe: An evolutionary worldview for the noosphere* [CLEA Working paper]. CLEA/Human Energy. http://cris.vub.be/ws/portalfiles/portal/110058395/Third_Story_working_paper.pdf

Heylighen, F., & Chielens, K. (2009). Evolution of Culture, Memetics. In R. Meyers (Ed.), *Encyclopedia of Complexity and Systems Science* (pp. 3205–3220). Springer. https://doi.org/10.1007/978-0-387-30440-3_189

Heylighen, F., & Joslyn, C. (2003). Cybernetics and Second-Order Cybernetics. In Robert A. Meyers (Ed.), *Encyclopedia of Physical Science and Technology* (3rd ed., Vol. 4, pp. 155–169). Academic Press. http://pespmc1.vub.ac.be/Papers/Cybernetics-EPST.pdf

Heylighen, F., & Lenartowicz, M. (2017). The Global Brain as a model of the future information society: An introduction to the special issue. *Technological Forecasting and Social Change*, *114*, 1–6. https://doi.org/10.1016/j.techfore.2016.10.063

Keltner, D. (2024). *Awe: The New Science of Everyday Wonder and How It Can Transform Your Life*. Penguin Books.

Kurzweil, R. (2005). *The singularity is near*. Penguin books.

Last, C. (2017). Global commons in the global brain. *Technological Forecasting and Social Change*, *114*, 48–64.

Liogier, R. (2023). *Khaos: La promesse trahie de la modernité*. Les Liens qui Libèrent.

Lovelock, J. (2000). *The Ages of Gaia: A Biography of Our Living Earth*. Oxford University Press.

Luisi, P. L. (2003). Autopoiesis: A review and a reappraisal. *Naturwissenschaften*, *90*(2), 49–59.

Mack, O., & Khare, A. (2016). Perspectives on a VUCA World. In O. Mack, A. Khare, A. Krämer, & T. Burgartz (Eds.), *Managing in a VUCA World* (pp. 3–19). Springer International Publishing. https://doi.org/10.1007/978-3-319-16889-0_1

Maturana, H. R., & Varela, F. J. (1987). *The Tree of Knowledge: The Biological Roots of Human Understanding*. Shambhala.

Maynard Smith, J., & Szathmáry, E. (1997). *The major transitions in evolution*. Oxford University Press, USA.

Miller, J. G. (1995). *Living systems*. University Press of Colorado.

Mingers, J. (1994). *Self-Producing Systems: Implications and Applications of*

Autopoiesis. Springer Science & Business Media.

Okasha, S. (2005). Multilevel Selection and the Major Transitions in Evolution. *Philosophy of Science*, *72*(5), 1013–1025. https://doi.org/10.1086/508102

Rifkin, J. (2014). *The Zero Marginal Cost Society: The Internet of Things, the Collaborative Commons, and the Eclipse of Capitalism*. Palgrave Macmillan. http://www.bookdepository.com/Zero-Marginal-Cost-Society-Jeremy-Rifkin/9781137278463

Ronfeldt, D., & Arquilla, J. (2018). *The Continuing Promise of the Noösphere and Noöpolitik: Twenty Years After* (SSRN Scholarly Paper ID 3259425). Social Science Research Network. https://doi.org/10.2139/ssrn.3259425

Rubin, S., Veloz, T., & Maldonado, P. (2021). Beyond planetary-scale feedback self-regulation: Gaia as an autopoietic system. *Biosystems*, *199*, 104314. https://doi.org/10.1016/j.biosystems.2020.104314

Russell, P. (2008). *The Global Brain: The Awakening Earth in a New Century*. Floris Books.

Savary, L. M. (2014). *Expanding Teilhard's" complexity-consciousness" Law*. American Teilhard Association. https://dtnetwork.org/wp-content/uploads/2014/04/Teilhard-Studies68LouSavary.pdf

Seth, A. (2021). *Being You: A New Science of Consciousness*. Dutton.

Shoshitaishvili, B. (2023). Is our planet doubly alive? Gaia, globalization, and the Anthropocene's planetary superorganisms. *The Anthropocene Review*, *10*(2),

434–454. https://doi.org/10.1177/20530196221087789

Sober, P. E., & Wilson, P. D. S. (1998). *Unto Others: The Evolution and Psychology of Unselfish Behavior* (First Edition edition). Harvard University Press.

Stewart, J. E. (2020). Towards a general theory of the major cooperative evolutionary transitions. *Biosystems*, 104237. https://doi.org/10.1016/j.biosystems.2020.104237

Stock, G. (1993). *Metaman: The merging of humans and machines into a global superorganism*. Simon & Schuster.

Stock, G., & Campbell, J. (2002). Human Society As An Emerging Global Superorganism. In *Evolution, Order and Complexity* (pp. 181–198). Routledge. https://doi.org/10.4324/9780203013151-8

Swimme, B. T., & Tucker, M. E. (2011). *Journey of the Universe*. Yale University Press.

Teilhard de Chardin, P. (1959). The Formation of the Noosphere: A Plausible Biological Interpretation of Human History. In *The Future of Man* (pp. 149–178). Image Books Doubleday. https://www.organism.earth/library/document/formation-of-the-noosphere

Vidal, C. (2008). What is a worldview? In *De wetenschappen en het creatieve aspect van de werkelijkheid*.

Vidal, C. (2024). What is the noosphere? Planetary superorganism, major evolutionary transition and emergence. *Systems Research and Behavioral Science*, *n/a*(n/a). https://doi.org/10.1002/sres.2997

Walker, B., Holling, C. S., Carpenter, S. R., & Kinzig, A. (2004). Resilience, adaptability and transformability in social–ecological systems. *Ecology and Society*, *9*(2), 5.

ftp://131.252.97.79/Transfer/WetlandsES/Articles/walker_04_socio-ecology_resilience.pdf

Wilson, D. S. (1997). Altruism and Organism: Disentangling the Themes of Multilevel Selection Theory. *The American Naturalist*, *150*(S1), S122–S134. https://doi.org/10.1086/286053

Yaden, D. B., Haidt, J., Hood, R. W., Vago, D. R., & Newberg, A. B. (2017). The Varieties of Self-Transcendent Experience. *Review of General Psychology*, *21*(2), 143–160. https://doi.org/10.1037/gpr0000102