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Approaches to Altered States of Consciousness in Contemporary Western Science and Technology

Birgit Menzel[1]

Abstract – This article presents a discussion of publications in Anglo-American and German research, mainly since 2000, on topics related to Altered States of Consciousness (ASC). It is motivated by an unprecedented expansion of brain-research which has fostered a boom of reductionist models of the human mind with visions of a technologically augmented humanity and numerous successful neuro-enterprises. At the same time a new movement has emerged toward integrative approaches to ASC, also toward a reconciliation of science, the humanities and spirituality. In the first part, a number of specialized studies is described, followed by an overview of four comprehensive new textbooks which offer comprehensive basic models of explanation for the question of consciousness. The second part contains a discussion of two diametrically opposed approaches to ASC, the project of Transhumanism as a movement in favor of neuroscience in the service of Neuro-enterprise, and Fritjof Capra's and Pier Luigi Luisi's Systems View of Life which is paradigmatic for an integral approach to ASC.

Keywords: consciousness – altered states of consciousness – neuroscience – transhumanism

Zugänge zu außergewöhnlichen Bewusstseinszuständen in der gegenwärtigen westlichen Wissenschaft und Technik

Zusammenfassung – Dieser Artikel bietet einen Überblick über neue Publikationen westlicher – anglo-amerikanischer und deutscher – wie auch russischsprachiger Forschung über veränderte Bewusstseinszustände seit 2000. Der Anlass ist zum einen der präzedenzlose Aufstieg der Gehirnforschung und Neurowissenschaft in den letzten beiden Jahrzehnten, der einhergeht mit der Entwicklung reduktionistischer Modelle des menschlichen Geistes und Visionen einer technologisch augmentierten

1 Prof. Dr. Birgit Menzel is a professor for Russian Literature and Culture at the University of Mainz, where she teaches at the largest Faculty for Translation and Interpretation in Europe. She has published (10 books: 2 monographs and 8 collected volumes) on 20th and 21st century Russian and Eurasian Culture, including: *Russian Literary Criticism in the Perestroika, Late and Post Soviet Popular Literature* (incl. Science fiction); *The New Age of Russia Occult and Esoteric Dimensions* (both in English), 2011, including Russian Shamanism, Occult Space Travel, Roerich and the political occult. Her current joint German-Russian research project is on "New Religious Movements in Late and Post-Soviet Russia" (New Age) in which her part is on "Citizen Diplomacy. A Soviet-American Grassroots Movement to End the Cold War."

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Menschheit. Zum anderen sind zeitgleich integrative Modelle zu solchen Bewusstseinszuständen entwickelt worden, die auf eine Versöhnung der sich vertiefenden Kluft zwischen Natur- und Human-/Geisteswissenschaft und Religion/Spiritualität hinwirken. Im ersten Teil des Artikels werden das sogenannte "neurocentric age" und neue Publikationen und Ansätze aus verschiedenen Disziplinen zu außergewöhnlichen Bewusstseinszustände vorgestellt: z. B. aus dem Bereich der kognitiven Religionswissenschaft, der Musikanthropologie bzw. Musikwissenschaft und aus der klinischen Psychologie infolge wieder aufgenommener Experimente mit psychoaktiven Substanzen (LSD). Anschließend werden vier grundlegende Publikationen beschrieben, die aus langjährigen kollektiven Studien interdisziplinärer Experten hervorgegangen sind und die integrative Modelle im Umgang mit außerordentlichen Bewusstseinszuständen vorstellen.
Im zweiten Teil des Aufsatzes werden zwei diametral entgegengesetzte Ansätze zum Umgang mit außergewöhnlichen Bewusstseinszuständen diskutiert: das Projekt des Transhumanismus (um Ray Kurzweil) als Beispiel für ein hochspekulatives, mit eschatologischen Visionen unterlegtes Konzept im Dienste der High-Tech Neuro-Industrie; und der systemisch-integrative Ansatz von Fritjof Capra und Pier Luigi Luisi als Versuch, Natur- und Geisteswissenschaften und Religion bzw. Spiritualität miteinander zu versöhnen und eine ökologisch nachhaltige Vision für die Zukunft der Menschheit anzubieten.

Schlüsselbegriffe: Bewusstsein – veränderte Bewusstseinszustände – Neurowissenschaft – Transhumanismus

> Today, the problem of consciousness – perhaps together with the question of the origin of the universe – marks the very limit of human striving for understanding. It appears to many the last great puzzle and the greatest theoretical challenge of our time.
>
> (Thomas Metzinger, 1995: 3)

> For world is not to be narrowed till it will go into the understanding…, but the understanding to be expanded and opened till it can take in the image of the world, as it is in fact.
>
> (Francis Bacon, 1620/1999: 193)

For the past two decades, following the post-genomic "decade of the brain" (Bush, 1990), along with groundbreaking developments in cognitive science, bio- and neuroscience, consciousness studies have reflourished in multidisciplinary Western academic publications. This article presents an overview of publications in Anglo-American and German research, mainly since 2000, on topics related to these fields, both specialized and comprehensive. After a brief critical discussion of the 'neurocentric age', the widening range of multidisciplinary publications on altered states of consciousness (ASC) will be described with several examples, followed by

publications which try to reconcile science and spirituality. In a second part, I will present two different approaches to ASC, Ray Kurzweil's *Project of Transhumanism* (Singularity) and Fritjof Capra's *Systems View of Life*. By juxtaposing these two, I argue for a fundamental opposition between a mechanistic, disembodied approach and an integrated, embodied view on ASC. This article attempts to sketch an ongoing shift of paradigm and aims at contributing to a discussion about different, controversial attitudes to basic questions of life, the nature of reality and human consciousness in the future.[2]

An altered state of consciousness, according to Charles Tart, is "any mental state induced by physiological, psychological, or pharmaceutical maneuvers or agents, which deviates from normal waking state of consciousness".[3] In 1994, a new organization was founded, the *Association for the Scientific Study of Consciousness* (ASSC). Since that time, publications have skyrocketed continuously.[4] Among them are numerous journals,[5] articles, internet platforms and monographs on altered states of consciousness (ASC), eleven only since 2000. There is also a heightened interest in consciousness and neuroscience-related problems in the public which is reflected in a growing number of publications and ongoing presence of popular science reports in the media. Projects of open access information, such as the remarkable new database wisewiki.org,[6] respond to this interest and have begun to make multidisciplinary scholarly research on scientific anomalistics and phenomena of all kinds, including ASC, available to the public beyond the academic community.

So, what has triggered this revival, and what is new compared to the late 1960s, when the wave of interest peaked and the psychologist Charles Tart published his first book on altered states

2 For inspiring ideas and critical comments I would like to thank Paul Hillery, Birgitte Beck Pristed, Arem Roukema and my anonymous reviewers.

3 It can be associated with artistic creativity, and it can be shared interpersonally. The term was first used by Ludwig (1969) in Tart (1990: 18–21). The psychologist Imants Barušs who argues that neither "normal waking states of consciousness" nor altered states can be clearly and distinctly determined, since borders are often blurred and shifting, suggests to speak of "alterations of consciousness" instead Barušs (2003: 5).

4 Metzinger (1995). While the bibliography of the first volume (1970–1995), contained only about 1000 titles, for the fifth edition in 2005 the authors listed already 2700 publications.

5 *Anthropology of consciousness*, see: Consciousness Journals (http://wisewiki.org/tiki-index.php?page=Consciousness+Journals+and+Periodicals+in+the+WISE+Digital+Library) and Malakhov 2013, 82–88.

6 Wisewiki.org is a work in progress of more than 257 different periodical titles with more than 30.000 pages from currently 240 countries, founded and run by the World Wide Resource Center (WWRC) from the World Institute for Scientific Exploration. A number of leading universities, prestigious libraries and other institutions have chosen to participate in this rapidly growing online library project.

of consciousness? (Tart, 1969) I argue, that along with an unprecedented expansion of brain-research which has fostered a boom of reductionist 'production models' of the human mind with hugely successful neuro-enterprises, there is also a new movement toward integrative approaches; toward reconciliation of science, the humanities – philosophy, psychology – and spirituality.[7] In view of growing global crises, economic, religious and military conflicts what has been called the new life sciences[8] aim at converging to seek theories and models for solutions. Some see these life sciences already being replaced by the 'mind sciences' (Metzinger, 2009: 24).

The Neurocentric Age

Since 1990, brain research has become a leading science. One may even observe a shift of paradigm toward a neurocentric age. One of the main reasons for this, besides genetics after deciphering the human genome, is the development of imaging technologies for brain research, such as functional neuroimaging (functional Magnetic Resonance Imaging = fMRI; Positron Emission Tomography = PET; Single Photon Emission Computed Tomography = SPECT) which for the first time enables to watch the living human brain at work. Basic principles, like the plasticity of the brain, have been discovered and continue to impact research from memory process to medical problems. These inventions have triggered massive research in a wide range of fields, as well as enthusiastic beliefs in a new level of progress which would ultimately explain the human mind and consciousness via simulation and brain-scans. "Any human experience including scientific argumentations, mathematical models of thought, moral insights, artistic expressions and religious experiences, is based only on our brain. There is no exception from this rule," exclaimed Jeffrey Saver and John Rabin in 1997 (Saver & Rabin, 1997, quoted from Hasler, 2012: 61). And Gerhard Roth, a neurobiologist and director of the Institute for Brain-Research at the University of Bremen, states that neuroimaging methods have expanded scientific analysis into fields formerly reserved for psychology, psychiatry and philosophy (Hasler, 2012; Lengrezi, 2011: 20). Martha Farah, a historian of science, even states: "Brain-images have become the scientific icons of our time, which have replaced Bohr's nuclear model as symbols of science" (Farah, 2009). Neuro-related disciplines have emerged like mushrooms – neuro-psychiatry, neuro-semiotics, neuro-quantology, neuro-pedagogy, nano-neuroscience and even

7 See for instance *Beyond Physicalism* (Kelly et al., 2015). The term "production models" has been used by Edward F. Kelly, 493.

8 The term *life sciences* comprises all fields of scientific research on living organisms. *Mind sciences* can be seen as a more specialized part of life sciences dealing with problems of neuroscience and consciousness. Along with the scale and growing complexity of problems, traditional borders between natural sciences and the humanities have become much less distinct.

neuro-theology (Kripal, 2014). A new "neuro-mythology"[9] can be observed which has meanwhile affected many areas of everyday life: cognitive enhancement, brain-training computer-games, programs of cerebral self-discipline, neuro-esoteric concepts and an exceptional boom of psycho-pharmaceuticals illustrate this. There is an all-encompassing movement from psyche to body, from mind and soul to brain. In psychology a massive shift can be observed, as it increasingly relies on and integrates findings of neurobiology. This has not only an impact on methodology, but can also indicate an epistemological change. Not only the largest amounts of research-funding go into the neurosciences, but neuro-marketing has even become a factor for the economy. The production and commercialization of cerebral subjects, patients of psycho-pharmaceuticals and transparent consumers has become a successful field of investment, with specialized enterprises and even with its own financial Index.[10] Associations have been founded, giant research projects, such as the Human Brain Project (Lausanne/Switzerland), funded by the EU with 1 billion Euros promise to simulate a human brain on computer within ten years. An explosive growth of publications and more than 100 journals with the word "neuroscience" in their title have occurred, and in 2005 the *Society for Neuroscience* held the largest congress ever in Washington, with 35.000 registered participants.[11]

In these models of neuroscientific brain-research, human consciousness has become scientized. But ASC, as part of inner experience, continue to be a basic challenge or even inaccessible for rational explanation, and therefore still often tend to be pathologized, even if there is empirically proven evidence around it (Cardeña, Lynn & Krippner, 2000). One of the popular scientists who enthusiastically embrace the neurocentric age is Michio Kaku, professor for theoretical physics in New York. In his publications and media-presentations he emphasizes physiological approaches, i. e. neuroscience using methods appropriate for biological science. In his book *The Future of the Mind* (2014), Kaku summarizes the latest advancements in neuroscientific research of the human brain and mind, as well as artificial intelligence. He addresses ASC mostly in the form of mental illnesses like schizophrenia, but also reports how scientists try to locate spirituality.[12] Although he concedes that some experiments with psychiatric patients have revealed "real connections" between "temporal lobe epilepsy" and attitudes of "hyper-

9 The term was coined by Felix Hasler (2012).

10 The NASDAQ NERV (Nasdaq NeuroInsights Neurotech Index) for venture investment in neurotechnology, founded in 1999, has nearly tripled by 2010 (to 145 Billion $, 85% of which for neuropharmaceutical revenues), *Neurotech clusters 2010: Leading regional leaders in the global neuro-technology industry 2010–2020*. Retrieved from http://www.neuroinsights.com/neuro-techclusters2010.html; Stadler (2012: 135–158), here 142; Hasler (2012: 30–34). Also: Hess & Jokelt (2009).

11 One of the reasons may have been the opening of the Conference by the Dalai Lama. Cf. Hasler (2012: 17).

12 See esp. Chapter 9: Altered States of Consciousness (195–214).

religiosity", that deep religious feelings can even be induced by activating the brain with magnetic fields, and some scientists have been eager to generalize from certain studies, such as the "god gene" from one genetic association study (Hamer, 2004), Michio Kaku reasonably admits that in spite of the unprecedented progress in brain research, artificial intelligence, cybernetics and computer-technology in the past decades, neuroscience is not anywhere near explaining the connection between brain, mind and consciousness, let alone its altered states. Another cognitive approach to ASC is quantitative linguistics, investigated by the Russian philologist Dmitrii (Spivak, 1992, 2004) Spivak, a prominent Russian expert on ASC, director of the Russian Institute for Cultural Research in St. Petersburg and leading scientist in the Bekhterev Institute for Brain Research (Spivak, 1992, 2004).

The German philosopher Thomas Metzinger, who has cooperated with neuroscientists on experiments with altered states of consciousness says that for serious scholars of philosophy, ASC, such as meditation, lucid dreams and out-of-body experiences, should no longer be tabooed but should be taken into account as phenomenologies of inner experience for a new theory of consciousness (Metzinger, 2009: 14).[13] Metzinger sees an inherent danger in the triumphant wave of the neurosciences:

> The idea of a continuous existence of a conscious Self after physical death will now become so unplausible that the emotional pressure on people who nevertheless choose to preserve their traditional worldviews could become hardly bearable. (Metzinger, 2002: 32 – translation by B. M.)

The philosopher foresees possible violent collisions of competing views of human beings and ideologies in the future between "hyper-enlightened materialists, *Homo cerebralis*, and angry religious fundamentalists" and calls for a need of neuro-ethics:

> We urgently need fresh and convincing answers to questions like the following: (…) Which states of consciousness do we want to foster, and which do we want to ban on ethical grounds? Which states of consciousness can we inflict upon animals, or upon machines? Which states of consciousness do we want to show our children, in which do we want to die? (Metzinger, 2009: 3)[14]

As some scientists, like Felix Hasler, who also participated in experiments with drug-induced ASC, warn of the epidemic neuromania and call for more skepticism, others offer paths of reconciliation of science and spirituality. Let us now take a look at recent Western publications of this research on ASC, focusing on the level of individual consciousness.

13 The term "Ego-Tunnel" is a central metaphor for conscious experience.

14 The last question is quoted from the German edition (Metzinger, 2009: 16; translation by B. M.).

New Publications on Altered States of Consciousness

Two new comprehensive textbooks for college students have been published (Barušs, *Alterations of Consciousness*, 2003; Vaitl, *Veränderte Bewusstseinszustände*, 2012), which try to present the topic systematically: Barušs addresses social science-students, Vaitl aims at describing and documenting the widest fields and largest amount of evidence for ASC in the widest possible range of fields and audience. Both authors explicitly address the young generation of college students because they are more open to consider the serious challenges than the majority of the scientific establishment.

As mentioned before, a number of projects and publications aim at a reconciliation of science and spirituality.[15] Among the most comprehensive recent publications with a basic methodological approach may be the following four: three English monographs (all collective volumes): *Irreducible mind: Toward a psychology of the 21st century* (2007) and the follow-up *Beyond physicalism: Toward a reconciliation of science and spirituality* (2015), which also addresses the younger generation of college-scholars. A third one is *Altering consciousness* (2011), in two volumes (1. History, culture, and the humanities, 2. Biological and psychological perspectives) and edited by two psychologists, Etzel Cardeña and Michael Winkelman, who have published other major works in the field (Cardeña, Lynn & Krippner, 2000; Winkelman, 2000). A fourth one is the German handbook *An den Grenzen der Erkenntnis: Handbuch der wissenschaftlichen Anomalistik* (*At the Frontiers of Knowledge. A Handbook of Scientific Anomalistics,* 2015). They will be introduced in more detail below.

Over the past decade, a new generation of academic scholars has boldly begun to venture into one of the core fields of the humanities, religious studies, exploring the uses of cognitive and neuroscience for the study of the history of religions as well as religious experiences and the phenomenon of religion. A growing number of cross-disciplinary studies apply experimental methods combined with introspection and other methods for studying the experiential or cognitive dimension of ASC, such as creativity and perception. The latter have traditionally been analyzed by psychologists, philosophers and scholars of religious studies.

The cognitive science of religion (CSR) has emerged as a sub-discipline of religious studies, which indicates a further expansion of evolutionary psychology as the traditionally leading discipline for the study of ASC. The publications related to this emerging field, including the academic studies of esotericism (Asprem & Davidsen, 2017), are mostly interdisciplinary endeavours, connecting evolutionary psychology, anthropology and, to a minor extent, linguistics and

15 For earlier ones see for instance Dürr & Zimmerli (1989); also The International Society for Science and Religion http://www.issr.org.uk/meet-issr-members/member/?member_id=122. More recently Johnson (2008).

semiotics (Whitehouse, 2004; Pyysiäinen, 2012; Schjoedt, 2009). Some of them investigate, with experimental methods, religious experiences (Taves, 2009; Taves & Asprem, 2017), others try to test and measure the effects of prayers with catholic nuns and Buddhist monks or of hallucinogens on the religious experience, the human mind and body. Several studies investigate deep meditation as an ASC and its impact on the brain (Franco, 2009; Hilbrecht, 2013; Lutz, 2008; Winkelman, 1999). Shamanism has also become a subject of cross-disciplinary research by ethnographers and neuro- and medical scientists (Baker, 1999; Eigner, 2001; Kharitonova, 2006).[16]

Remarkable studies have been presented in research on music-induced ASC (Aldrich & Fachner, 2006; Olsen, 1975, 2011). Music-induced ASC, with and without additional hallucinogens, are successfully being studied and practiced in palliative medicine, at hospices around the world, as well as in therapies of trauma and addiction. There are numerous cross-fertilizations between modern urban and indigenous ancient cultures of East and West, North and South, and the studies show an impressive array of topics, methods and approaches by international multi-disciplinary researchers in cooperation. For instance, Alla Sokolova, an anthropologist from the Adyghea State University in Russia, explains a traditional healing ceremony in an Adygh Caucasian mountain village where the ancient melody sung by the collective of villagers gathering around a sick person's bed precisely reflects the line of mountain range surrounding the village (Sokolova, 2016).[17] And the German pediatrician Uwe Maas describes "Polyrhythms Supporting a Pharmacotherapy", as music is used in an initiation ceremony by an African tribe in Gabon. The author both witnessed many ceremonies and then underwent the process as he himself was being initiated (Maas & Strubelt, 2006). Reflecting these studies, David Aldridge suggests that music can be a transcultural means of personal religious-spiritual therapy leading to a healing experience by a transcendental understanding of suffering (Aldridge, 2006). This cooperation of different disciplines with complementary methodological approaches, addressing the physiological, cognitive and experiential dimension of ASC, seemed impossible before.

Another striking recent development is the renaissance of clinical therapeutic experiments with hallucinogenic or psychedelic drugs, namely psilocybin, the psychoactive substance in "magic mushrooms", a natural drug used in most human civilizations since ancient times (Pollan, 2015; Roseman & Leech et al., 2015). The chemical substance LSD was used officially in psychiatric treatments in the U.S. and Europe between 1953 and 1970. Both LSD and psilocybin were easy to obtain, but then they turned out to be useless for military-strategic aims. Instead they got out of control during the hippie movement and were banned in 1970; psychedelic drugs seemed to

16 A comprehensive bibliography on research on shamanism in East and West can be found in Kharitonova (2006).

17 An explanation for this phenomenon could be found in the mathematical complexity theory of Mandelbrot fractal patterns. See Capra & Luisi (2014: 116–125).

disappear from the public, as well as in science and in psychiatric practice. It was forgotten, that during that decade 116 studies had been published on more than 1700 subjects, funded with $4 million by the U.S. federal government. But in 1996, at the Esalen Institute, the Californian retreat center of the human potential movement, several symposiums brought together a few open-minded representatives from the U.S. medical psychiatric establishment, experienced counter-cultural psychedelics-experts, a young enthusiastic computer-technology-leader from Silicon Valley, and a representative of the federal Anti-Drug Agency to start a new "acupuncture of history."[18] After overcoming administrative obstacles of drug-prohibition, these scientists finally, in 2006, succeeded in opening up several official programs in leading university medical schools in America and in Europe[19] for legal treatments with psychedelic drugs. According to Pollan (2015), doctors are now treating patients suffering from cancer, depression and various addictions, including alcohol, with psilocybin and get many positive results. The echo in both scientific journals and popular articles has been enthusiastic; all emphasizing the amazing spiritual, life-changing effect of the psychedelic drug on patients most of whom, completely unprepared, have never experienced any ASC before. Needless to say, that this is only a small niche challenging the dominant scientific paradigm in which the human body is still treated like a mother board of a computer, with a brain in which areas of creativity, memory, even religious consciousness can be identified as isolated static objects. In Germany and Switzerland, a group of so-called "reflexive neuropsychologists" has been founded in 2014, most of them doctors whose scientific and personal attitudes have been deeply affected by their experimental treat-

18 The strongest initiative came from the young CEO of the Silicon Valley computer company Oracle, Robert Jesse, for whom the legalization of psilocybin was mainly a gate to accessible spirituality for everybody, "a betterment of better people" (Pollan, 2015).

The substance psilocybin was first introduced in the West in 1957 by Gordon Wasson. Inspired by his mushroom-experienced Russian wife Valentina, Wasson went to Mexico where he became exposed to the magic mushrooms by Maria Sabina, a local shaman. (See Gordon Wasson, 1957. This information I owe Birgitte Beck Pristed.) In the US, psychedelics were tested on alcoholics, people struggling with obsessive-compulsive disorder, depressives, autistic children, schizophrenics, terminal cancer patients, and convicts, as well as on perfectly healthy artists and scientists (to study creativity) and divinity students (to study spirituality) (Pollan, 2015).

The term 'acupuncture of history' has been introduced by Michael Murphy, the founder of Esalen, for the strategy of inspiring innovation beyond hierarchies from points in- and outside the political, scientific and social establishment.

19 Programs were opened in the following university clinics: Johns Hopkins, NYU, Columbia; London, Zürich, Heidelberg. In 2006, Roland Griffiths published, together with others, the results of his double-blind experiments in the landmark article "Psilocybin can occasion mystical-type experiences having substantial and sustained personal meaning and spiritual significance" in the *Journal of Psychopharmacology*.

ments with psychedelic drugs, and who now call for a basically different approach to scientific research, namely a systemic approach, to overcome the mechanistic-materialistic worldview (Hasler, 2012; Northoff, 2012, 2014).[20]

Toward a Reconciliation of Science and Spirituality

While "most contemporary psychologists, neuroscientist, and philosophers of mind, as well as scientists in general, continue to subscribe explicitly or implicitly to a worldview" that "in the end all facts are determined by physical facts alone, and we human beings are nothing more than extremely complicated biological machines, that in principle everything is explainable in terms of physics, chemistry and biology" (Kelly, 2015: xi-xiii), there is a growing number of scientists, philosophers and scholars of religious or cultural studies who seriously question this paradigm.[21] Extraordinary human experiences, among them ASC, may be the greatest challenge to this ontological physicalism of the human mind and personality.[22] This is why ASC have become the starting point for four major recent publications addressing this problem and offering conceptual models for possible solutions. As mentioned above, I will now briefly introduce these publications here. Each volume is the result of a long-term cooperation of international multidisciplinary collectives of highly qualified scientists and scholars from prestigious academic institutions.[23]

Two voluminous collected volumes are connected and have been the result of a group of scientists and religious scholars meeting at the Center for Theory and Research of the Cali-

20 Instead of a purely biological object, static and isolated, the brain has to be seen as an interconnected network with mind, consciousness and the environment, in fact as a 'medium for the relations between biology and the social world' (Northoff, 2014).

21 The main reasons for the blockade of mainstream science the authors see, particularly in North America, in the polarized public controversy between (neuro-)scientists and religious fundamentalists. In European and other Western countries they see the humanistic disciplines deeply afflicted by the prevailing postmodern aversion to universal narratives of any kind, with the excessive preoccupation with the sorts of doctrinal and textual differences that feed academic specialization and territorialism. (Kelly, 2015: xviii).

22 "One of our central contentions is that precisely because of its physicalist presuppositions, the currently dominant mainstream scientific approach to brain/mind issues has been seriously compromised by virtue of systematically and deliberately excluding from consideration some of the most important and theoretically significant categories of mental phenomena, including in particular (1) paranormal, psychic, or 'psi' phenomena, and (2) 'higher' or 'mystical' altered states of consciousness" (Kelly, 2015a: xv).

23 Among the authors are philosophers, anthropologists, folklorists, psychologists, historians of science, neuroscientists, physicists, scholars of religious studies, specialized in various Eastern and Western religions, and cosmologists.

fornian Esalen Institute since 1998: *Irreducible mind: Toward a psychology for the 21st century* (2007) and *Beyond physicalism: Toward reconciliation of science and spirituality* (2015). Both volumes venture, from explicitly scientific positions, to expand the dominant paradigm into the "'undiscovered country' of science/the mind" and propose contours of some richer form of metaphysics, a worldview grounded in science *and* spirituality (Kelly, 2015b: 494).

Edward Kelly, one of the authors and editors, a former Harvard cognitive linguist and scientist, now research professor in the Division of Perceptual Studies at the University of Virginia, states that the prevailing ontological "physicalism", the *production model* of the human brain/mind relation is not only *inadequate* but also demonstrably *incorrect* and must be rejected (Kelly, 2015b: 493). *The Irreducible Mind* (IM) presents a systematic collection of empirical evidence for that. Based on the massive body of scientific studies of extraordinary human experience, collected by F. W. H. Myers (1903), here for the first time, theoretically crucial, but scientifically "taboo" topics are being presented altogether: phenomena of extreme psychophysiological influence such as stigmata and hypnotically induced blisters, prodigious forms of memory and calculation, psychological automatisms and secondary centers of consciousness, near-death and out-of-body experiences including experiences occurring under extreme physiological conditions such as deep general anesthesia and/or cardiac arrest, genius-level creativity and mystical-type experiences whether spontaneous, pharmacologically induced, or induced by transformative practices such as intense meditative disciplines of one or another sort.[24]

In the second, more theoretically oriented volume, the authors develop more in depth concepts and "models which view the brain not as the generator of mind and consciousness, but as an organ of adaptation to the everyday environment, selecting, focusing, channeling, and constraining the operations of a mind and consciousness inherently far greater in capacities and scope" (Kelly, 2015a: xiv). For expanding the "undiscovered country of science and the mind", they introduce a class of models abbreviated as ROSTA: *Resonant Opening to Subliminal and Transpersonal Assets* (Kelly, 2015b: 496ff.), which allows to include phenomena as subtle bodies and energies, the imaginal and other levels of consciousness. As a final reflection, an essay by Michael Murphy on "The emergence of evolutionary panentheism", panentheism is introduced as a possible Third Quid, a synoptic vision with practical implications "providing humanity with an expanded worldview that is fundamentally life-affirming and optimistic, profoundly spiritual and ecumenical in character, and defensible in light of our most fundamental traditions including that of the leading-edge modern science" (Murphy, 2015: 553–576; Kelly, 2015b: 492–543).

Another publication, *An den Grenzen der Erkenntnis: Handbuch der wissenschaftlichen Anomalistik* (*At the frontiers of knowledge: Handbook of scientific anomalistics*, 2015), is in German

24 *Irreducible Mind* (2007), Contents, and Kelly (2015a: xiii–xiv).

and differs in character from the other volumes.[25] This excellent handbook presents a comprehensive overview of and discusses, in three parts and 35 chapters, with numerous subchapters, (1) the historical development of the field of research and theoretical debates on scientific anomalistics/extraordinary human experiences (including basic anthropological issues, faith, distribution, anomalistics in media discourse and others), (2) the various fields of research (such as: experimental psi-research, altered states of consciousness), and (3) methodological approaches (laboratory, imaging technologies, interviews, field research, clinical approaches). The general structure of all chapters is the same: first phenomena are described, then information is given about their quantitative and qualitative distribution and their state within the field of epidemiology and thirdly existing current explanatory concepts are introduced.

In the final methodological and conceptual part, "Diagnostics and classification of extraordinary experiences", the authors suggest a new model of classification mostly following the German philosopher Thomas Metzinger. Here, the authors too, state that generally all extraordinary human experiences are still being identified and dealt with only as psychopathological disturbances and within a field of clinical symptoms so that most diverse factors are mixed and valid statements independent of psycho-diagnostic presuppositions and presuppositions of worldview and faith are unfortunately impossible. Metzinger's "Theory of Mental Representation" presumes that every human being produces a mental model of reality, an "inner description" of parts of reality which consists of two fundamental sub-models:

> 1) In the *self-model* elements of experience are being represented which, as inner states of consciousness, are only accessible to the person experiencing it, such as body-perceptions, emotions, thoughts, motivations, fantasies, imaginations etc.;
>
> 2) In the *world-model* phenomena are being represented which are accessible also to the outside world and can be experienced also by other people (sources of physical perception, objects, body-experiences).
>
> Within this model of reality, two complementary couples of possible deviations are presumed/conceptualized, one couple concerning localization: *external phenomena* in the *world-model* (such as ghosts) and *internal phenomena* in the *self-model* (such as voices in the head). The other couple is concerned with relations: elements from both the inner and the outer world can mix and overlap in various ways so that *phenomena of coincidence* (such as lucid dreams) and *phenomena of dissociation* (such as out-of-body experiences) can be distinguished. The dichotomy of self- and world-model should, however, be understood as purely descriptive. These four basic categories of phenomena of extraordinary experiences (EE) provide a comprehensive model with a valid distinction between Self and World, they are called *categorial EE*. It is significant that this approach allows to

25 This volume was produced mostly by authors – 29 besides the editors – of or close to the "Institute Frontier Areas of Psychology and Mental Health", Freiburg/Germany.

> describe and classify EE in the utmost open way, without implications to any worldview, i. e. it allows both naturalistic and metaphysical frameworks of values, interpretation and (religious) belief. At the moment, the authors state, interpretations of EE are being prominently discussed within the concept of "synchronicity" (which they call *dual-aspect-monism*). This concept, introduced by C. G. Jung and Wolfgang Pauli, describes events which are correlated in time, but not causally, and which nevertheless are being perceived as interconnected (Fach & Belz, 2015: 471–472).

After reviewing publications focusing on the individual level of ASC, I will now present two approaches to ASC, which I see as diametrically opposed. Both sketch paths to a collective change of consciousness. As I have mentioned above, there have been different visions for the future of humanity, with different interests and different consequences: Ray Kurzweil's project of Transhumanism which I see as a neurocapitalist based techno-science vision and Fritjof Capra's Systemic Approach which I see as one of the most comprehensive convincing approaches to an integrative vision.

Neuroscience in the Service of Neuro-Enterprise: The Project of Transhumanism

Transhumanism is a contemporary Western futurist ideology and movement aiming at the alteration of the human condition by enhancing the intellectual, physical and psychological capacities with sophisticated technologies. Although the term was coined already in the early 20th century,[26] the new nascent ideology and social movement of various organizations and networks emerged in the early 1980s.[27] Focusing on the collective global level, Transhumanism calls for a leap of mankind into the so-called Singularity, a new state of evolution. The term Singularity was first applied in mathematics and astrophysics in the late 1950s for a unique situation in which given objects cannot be defined by physical laws or other known theories. The hypothesis of a technological Singularity combines acceleration with discontinuity (Chalmers, 2010).

Transhumanism is concerned with the development and application of human enhancement technologies and aims at a perfection of mankind by pharmaceutical, biotechnological and other means. In the Singularity, the physical body and mind would be augmented to a point

26 One of the first who used the term "transhumanism" was the British geneticist J. B. S. Haldane in his essay "Daedalus: Science and the future" (1923). In 1957, the Cambridge biologist, philosopher and writer Julian Huxley wrote an influential article "Transhumanism" (Huxley, 1957). For a study comparing the two very different brothers Huxley see Deese (2014).

27 There are basically two organizations at the core of this movement: „Humanity+" (http://humanityplus.org/) with its Transhumanist Declaration and the „Extropy Institute" (http://www.extropy.org/), founded in 1991 by Max More (see Principles of Extropy which is affiliated with UNESCO Africa).

where it transcends into a new being. And this would be achieved by a merging of altered states of consciousness, biochemical, pharmaceutical, psychotronic, cybernetic, nanotechnical and computer enhancement.

One of the central proponents of Transhumanism is Ray Kurzweil (born 1948), an engineer, inventor, and entrepreneur who has founded a dozen companies and has about fifty patents to his name.[28] He developed the first text-to-speech reading machines for the blind in the 1970s and he is also known as the inventor of the Kurzweil synthesizer, which helped form the new sample-based sound of the 1980s. Since the late 1990s, Kurzweil has published four books, the titles of which reflect his growing aspirations from a technological to a spiritual utopia: *The age of intelligent machines* (1999), *The age of spiritual machines* (1999) and *The singularity is near* (2005) which became an international bestseller, and *How to create a mind* (2012).

Transhumanism has emerged as an organized movement only since the late 1980s. Though it has a growing international following and recent cooperations have also occurred in Russia, its core realm is the US-high-tech industry and Silicon Valley, where today's laboratories of the future have moved to. In 2008, Kurzweil co-founded the Silicon Valley-based "Singularity University" together with people such as Google[29] co-founder and CEO Larry Page. It is a private education institute based on his ideas, aiming to "educate, inspire and empower leaders to apply exponential technologies to address humanity's grand challenges."[30] Kurzweil's assumption is that humanity has reached a stage in evolution where we are able "to understand our own intelligence – to access our own source code, if you will – and then revise and expand it." Humanity can transcend its biological limitations, and such transcendence is desirable, even a necessary task for our long-term survival. He predicts three overlapping revolutions in the near "future that transcends biology": Genetics, Nanotechnology and Robotics, i. e. Superintelligence.

28 According to a Google patents search, 20 June 2013.

29 The term „Singularity" was first used in mathematics, then in astrophysics. It was applied to technology in 1958 by the mathematician John von Neumann. Ray Kurzweil explains it as "an event capable of rupturing the fabric of human history", "a future period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed" (Kurzweil, 2014: 399).

In astrophysics, „gravitational Singularity", is explained by Sir Penrose and S. Hawking as the initial state of the universe before the Big Bang. Another type of Singularity is inside a Black Hole, where quantities, otherwise meaningful (density, spacetime) become infinite or meaningless. The hypothesis of a technological Singularity combines acceleration with discontinuity (Susskind, 2012).

30 Since 2006 at Stanford University, each year "Singularity" Conferences are held in different metropolises around the world.

> Nanotechnology, [being] an intersection of information and the physical world, promises to build the tools to rebuild the physical world, our bodies and brains included. (Kurzweil, 2005: 320)

This means that not only will humankind dispose of bodies but also overcome the ultimate biological limit: death.[31] It is "only a matter of time, before the biologists discover what it is that is causing us the trouble and that this terrible universal disease or temporariness of the human body will be cured" (Kurzweil, 2005: 320). In his last book *The singularity is near*, the almost messianic dimension of his project becomes quite obvious. Singularity is defined by Kurzweil as "a future period during which the pace of technological change will be so rapid, its impact so deep, that human life will be irreversibly transformed."[32]

This Singularity will transform not only all of humankind, but as a cosmic event, it will ultimately transform the whole universe. The total alteration of consciousness becomes only one ingredient of this leap in evolution. At the "unrestricted heights of creative power …we have the opposable appendage to manipulate the universe to our will." (Kurzweil, 2005: 4). "Our civilization infuses the rest of the universe with its creativity and intelligence" and acquires a "superluminal ability" (Kurzweil, 2005: chapter 6), "the ultimate destiny of the Singularity and of the universe" (Kurzweil, 2005: 21). The date for the Singularity to appear is marked as 2045.

Kurzweil and the Transhumanists share a "macrohistorical" vision (a term by Garry Trompf) by which all of human *and* natural history, even the history of the universe itself, can be understood in terms of one single mathematical concept: the exponential function. As Kurzweil radically predicted growth from computer science to a "Law of Accelerating Returns", he foresees practically *unrestrained* growth by new technological abilities which tend to find new and previously unforeseen ways to *sidestep* limitations. This exponential growth is *not* confined to computing power alone, but applies to *all* of technology, as well as to all of *evolution* – including non-biological evolution.[33] The exponential function thus expresses the *telos* of the entire universe – from the big bang to the end of times.[34]

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31 Kurzweil quotes the Nobel Prize winning physicist and first initiator of nanotechnology Richard Feynman: "Death is by no means inevitable" (Kurzweil, 2005: 320).

32 "If we apply not the 'intuitive linear' but an 'exponential historical view' (for example: 'two billion years from the origins to cells and 14 years from Personal Computer to the WWW')" (Kurzweil, 2001).

33 Non-biological evolution is currently discussed in synthetic and computational biology and in systems theories with respect to theories about the origins of life. See for instance Ciudad (2013).

34 In one of the dialogue-sections of Ray Kurzweil's book *The singularity is near* he discusses the question of a new, essentially leaderless religion that can come to grasp with the concept of the Singularity. His friend Bill Gates asks him: "So is there a God in this religion?" And Kurzweil answers:

In some ways, Transhumanism with its aspiration to a transgressive spirituality seems to revive certain esoteric ideas, such as the "alchemical" ideal, the transmutation of the body, the soul, and the world itself, and the attainment of immortality as a stage towards spiritual perfection (Asprem, 2013).[35] This can be confirmed by the fact that Transhumanist milieus are currently *merging with* and *mobilizing* parts of what used to be the "New Age movement" and with its adoptions of 'Eastern' religious systems, namely Buddhism.

Some representatives of Transhumanism have visited Russia and Kurzweil's concepts have also appeared in Russia. Thus, they inspired the young billionaire Dmitry Itskov (born 1980) to invest and contribute to the proliferation of Transhumanism in Russia. Itskov has decided to invest his money into the project *Russia 2045*, the event dated for the transcendence into a godlike intelligence, for physical immortality through Avatars. With two international conferences, 2012 in Moscow and 2013 in Belgorod,[36] where internationally leading scientists advancing in Genetics, Nanotechnology and Robotry/Artificial Intelligence came together with major proponents and gurus of mostly Buddhist spirituality from East and West, as well as a massive online-appearance, the project aims at transforming humanity. This has been laid out in four stages: the first prototypes will be remote-controlled via brain-computer interface, later brain transplantation and even consciousness upload will be available. By the time of the singularity, the intelligence-explosion hits, the avatars will have become "holographic" – a code word for bodies made up of polymorphing nanobots. Itskov deliberately tries to synthesize Transhumanist ideology with spirituality. Some of the gurus of the New Age movement from the 1960s, such as Amit Goswami (*The Self-Aware Universe*), the scholar and Tibetan Buddhist spokesperson Robert Thurman, as well as two of the leading theoreticians of "quantum consciousness", Roger Penrose and Stuart Hameroff, were among the 35 keynote-speakers in Moscow, some of "the smartest scientists of the world", at the *2045* congress. In 2014, Itskov also travelled to Dharamshala/India to visit the Dalai Lama and, judging from the online-picture, got his support for his project (Itskov, 2013).

A special volume of the journal *Philosophical Sciences* presented articles by philosophers and scientists from Russia on Transhumanism in fall 2013.[37] Some contributors discuss the challenge

> Not yet, but there will be. Once we saturate the matter and energy in the universe with intelligence, it will "wake up", be conscious, and sublimely intelligent. That's about as close to God as I can imagine. (Kurzweil, 2005: 375).

35 Asprem speaks of an evolutionary "theology of emergence". For this concept see Asprem (2014: 232–247). This outlook is in line with concepts from Teilhard de Chardin, Alfred North Whitehead, and Samuel Alexander. See Robinson (2013).

36 The congress in Belgorod in 2013 had the title: "Global Future 2045: – Anthropological Crisis. Convergent Technologies and Transhumanist Projects."

37 *Filosofskie nauki* (*Philosophical Sciences*), *8, 9*, (2013).

of android science and robotics in the context of mythological thinking (Klimova, 2013). Others relate to Transhumanism as a question of belief, call it a „cosmic mission" and legitimize the project by its predessecors, i. e. Julian Huxley's humanism (Yudin, 2013). The cosmonaut Sergey Krichevsky expresses a rather doubtful view of a „Transhumanist" cosmic future. He relates it to the context of both unsolved political, socio-economical and ecological problems on earth and unsolved problems in space (waste, asteroids, reproduction in space), as well as to the history of Soviet space technology. Far from the mythologizing enthusiasm of the past, Krichevsky's attitude to a possible cosmic future is clearly modest and sobering (Krichevskii, 2013).

The philosopher David Dubrovsky (born 1929) sees Transhumanism, the prospected leap into the singularity, as a possible strategy for radical social and moral change in order to overcome what he sees as an anthropological crisis; to eliminate the negative traits of mass consciousness and behavior, such as greed and consumerism, which he sees as human attitudes dominating history since antiquity. This seems to reflect rather a cultural pessimistic reaction to the post-Soviet present than Kurzweil's technological futurism (Dubrovsky, 2013).

Most optimistic and at the same time familiar with the Western concepts seems the philosopher, mathematician and physicist Vladimir Budanov. He tries to combine the Transhumanist project with Capra's approach of self-organization and calls for a new "quantum-synergetic anthropology." It should be based on the theory of complexity, self-organization, and nonlocal quantum phenomena. However, like the other contributors, he barely mentions technology and instead envisions a fusion of Eastern medicine and Western integral medicine to create new healing methods for harmonic living organisms (Budanov, 2013).

The Systemic Approach of Fritjof Capra

In 2014, the Austrian-American quantum physicist Fritjof Capra,[38] together with the Italian biochemist Pier Luigi Luisi, published a book under the title *The Systems view of life: A unifying vision* (2014). Based on the advancement in the new life sciences, including cybernetics, complexity theories in mathematics, and computer technology, it offers a systemic approach to key questions like "What is life?," "What is consciousness?", by connecting cognitive science,

38 Fritjof Capra, one of the first Western scientists who explored the parallels between new quantum physics and Eastern spirituality (*The tao of physics*, 1975), is also one of the leading representatives of deep ecology. See also Capra: *The network of life* (1996).

Quantum physics has both reconnected science and religion/spirituality and caused claims of rigorous separation. Since the 1920s, quantum physics, the deciphering of the molecular structure of the human DNA (1953/2010) have, indeed, triggered a new level of matching/merging the human brain/man and machine.

consciousness studies, deep ecology and post-religious approaches to spirituality. The integral approach is based on "the realization that systems are integrated wholes that cannot be understood by analysis" (Capra & Luisi, 2014: 68) and these "revolutionary changes in our concepts of reality that were brought about by the new physics were followed (…) by conceptual revolutions in several other sciences out of which a coherent worldview is now emerging" (ibid.: 70). During the past three decades, this new thinking has led to a closer connection between science and the humanities, including science and religion: "Connectedness, relationship, and belonging are fundamental concepts of ecology; and connectedness, relationship and belonging are the essence of spiritual experience" (ibid.: 70).

The book opens up with a historical review of the Cartesian and Newtonian mechanistic worldview and the rise of systemic thinking in philosophy, quantum physics, gestalt-psychology, integral biology and ecology in the early 20th century. This is followed by a presentation of classical and general systems theories, which flourished since the 1950s with theories modeling the human brain and mind as digital computers (cybernetics) and applying concepts of circular causality ("feedback-loops") to social and economic systems. Human intelligence was equaled to a computer as a sophisticated machine processing information, functioning according to rules and represented by symbols (Varela, 1989). The triumphant perspectives of cybernetics opening a new information age which were accompanied by breakthroughs in genetics, were, however, questioned in the 1970s: the human brain was shown as neither following strict rules nor being controlled by one central processor or storing information logically. Instead, the idea of the brain functioning as a network, i. e. with non-linear relations in all directions, entered systemic thinking and began to circulate. Together with new mathematical models of complexity theories (i. e. non-linear dynamics) which included creativity, development and evolution into the process of self-organization, systemic thinking became more open and dynamic.

What is called "A New Conception of Life" (title of Part III of the book) then presents an overview of the present theories about life and the living world, from Darwin's theory of evolution to theories about the origin of the Earth and the human species. This is followed by introducing a systems view of life in various fields, such as mind and consciousness, science and spirituality, life, mind and society, and health. The book ends with a chapter connecting all the previously explained fields in systems thinking about the state of the world and introducing several concrete global projects to offer systemic solutions. Especially in the chapters about present day controversial theories and hypotheses about the origin of life, the Earth and the human species, additional guest essays are included by scientists with differing approaches.

In their systemic view Capra and Luisi follow the Chilenean neuro-biologists and philosophers Humberto Maturana (born 1928) and Francisco Varela (1946–2001), who during the

1970s discovered that life is a self-generating and self-organized network pattern (*autopoiesis*) (Maturana & Varela, 1980). According to their so-called "Santiago school of cognition", living systems are defined by cognition (knowing), which includes a continuous adaptation to the environment (learning). Cognition is much broader than consciousness and involves the entire process of life, including perception, emotion, and behavior. It does not even necessarily require a brain and a nervous system.[39] In the network of life, the relationship between brain and mind is that of structure (brain) and process (mind). Consciousness, which is connected with the process of knowing, requires higher functions of the nervous system, the perception and awareness of the environment, and the experience of self-awareness. The study of consciousness as lived experience has begun only recently and was taboo before in cognitive science. In this systemic view, ASC are seen as gateways to the cognitive universe, a cosmic continuum present in all living and non-living organisms.[40]

Conclusive Remarks

The question of consciousness seems to be crucial for contemporary research in the Western sciences, both natural sciences and the humanities, when it comes to future perspectives of humanity. ASC are among the greatest challenge in this question, because they question the underlying paradigm of Western science. ASC have occurred in all times and around the world, they have always been a topic in the arts (Fauchereau & Pijaudier-Cabot [Eds.], *L'Europe des esprits ou la fascination de l'occulte,* 2011; Tuchman & Freeman, *The Spiritual in Art,* 1986; Loers [Ed.], *Okkultismus und Avantgarde,* 1995). But mainstream science has until recently not seriously confronted itself with this challenge, although ASC on the level of individual experience have been systematically studied by a growing number of scientists. The different approaches and numerous multidisciplinary recent publications introduced here show that this situation is in fact about to change.

Since the 1990s the new achievements of neuroscience have brought fundamental breakthroughs and opened up new perspectives to the scientific exploration of the human brain and consciousness. However, along with a vastly exaggerated and popularized neuro-hype with mythological dimensions, critical self-reflection and neuro-skepticism have been called for by some scientists. Two big visions for the change = altering of collective consciousness towards transcendence have emerged from the beginning of systemic thinking since the 1950s and were

39 Capra & Luisi (2014: 254), quoting Maturana's paper "Biology of cognition" (1980/1970).

40 Capra & Luisi (2014: chapter 12: Mind and consciousness). There has been a rapidly growing number of studies on the nature of consciousness in this new perspective of interconnectedness in recent years. See Capra & Luisi (2014: 256–260). Also Roger Penrose et al: *Consciousness and the universe* (2011).

introduced as opposing perspectives in this article. I argue that they represent two incompatibly contrary positions.

Ray Kurzweil's highly speculative concept of Transhumanism offers to transcend human consciousness, to overcome the limitations of human nature via the abolition of body and the sexes, aiming at the final abolition of diseases, the prolongation of life and ultimately the abolition of death. It is based on the unrestrained confidence in the power of scientific anthropo-technology in a new digital age. Transhumanism is about granting individuals supreme intelligence, superhuman strength, an altogether different state of consciousness and eternal life through genetic engineering, artificial intelligence and nano-robotics.[41] Steve Jobs (1955–2011), the founder of Apple computers and one of today's almost messianic global icon-heroes, had some of his most groundbreaking ideas in an ASC, under the influence of LSD.[42] Remembering this, some of the almost unrestrained optimism of the early days of the personal computer-revolution in California, the hope for a merging of information technology, cyber-culture and spirituality becomes visible.[43] Transhumanism, as presented here, thrives at the heart of the booming US tech-industry and is now closely connected with applied corporate business. Kurzweil is not alone with his visions, in that he is involved in one of today's most powerful global companies: since December 2012 he has been director of engineering at Google. Transhumanism epitomizes the neurotic self-involvement of the individual subject. It takes hyper-individualism to its extreme which ideally does not meet any challenge with reality. In Kurzweil's Singularity, there is no difference between the inner and the outer world, individual and society, society is of no interest, other than inevitable co-existence.[44]

On the opposite, the Systems View of Life offers a path which accepts mind and consciousness, the personal human perception and experience as a reality, with an independent psychophysical dimension. A scientific theory is offered which unifies mind, brain, consciousness, matter, and life. It comprises all living organisms including earth itself, but also new science and technology, complexity theories, nonlinear dynamics and above all deep ecology. It offers an integral vision of life and nature which is combined with an urge to change, both inside (by an *ecoliterate* view on life and nature) and outside (by stopping the destruction of nature and

41 Timothy Leary, the well-known 1960s proponent of psychedelic counterculture, once said, that "the laptop became the LSD of the 1990s".

42 Fink & Segal (2015): "I Did LSD with Steve Jobs" http://money.cnn.com/2015/01/25/technology/lsd-psychedelics-silicon-valley/index.html?iid=TL_Popular.

43 It is still reflected in the early 2000s NBIC Converging Technologies Project (2002) (http://www.wtec.org/ConvergingTechnologies/Report/NBIC_report.pdf) and the Global Consciousness Project (http://global-mind.org/). See Wertheim (1999).

44 For a critical discussion see Ahrend (2006), Coenen et al. (2010) and Coenen (2009).

society). It calls for opening up to an altogether ASC in which traditional and new forms of spirituality are integrated, as opposed to a mechanistic, reductionist paradigm of science, as well as any dogmatic form or institution of religion.

Finally, the four most recently published English and German collected volumes which have been introduced here point in a similar direction. They offer comprehensive basic models of explanation for the question of consciousness and with this new scientific paths towards a reconciliation of science and spirituality.

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