

ence. And that, indeed, should lead to the next paradigm, for, as Sagan's book tacitly implies, the present scientific world view is gradually becoming harder to sustain.

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The Demon-Haunted World: Science as a Candle in the Dark by Carl Sagan. New York: Random House, 1995, 457 + xviii pp. \$25.95(c). ISBN 0-394-53512-X.

Opinions about Sagan run the gamut from disdain by science observers like Jeremy Bernstein and a National Academy of Sciences that will not elect him, through profusely respectful groups like physics teachers and CSICOP who lavish him with praise and awards. What one thinks of this book will also depend strongly on one's own viewpoint. Heartfelt attempts like Sagan's to arouse interest in science, to combat superstition and silliness, *and* to be intellectually rigorous and honest make inevitable certain compromises that are bound to strike the one group or the other as unwarranted.

The book is a strange mixture: well argued in places, but superficial and sophomoric in others: it deals with science and with anomalies, but it is also replete with socio-political opining of the politically correct flavor. The index is comprehensive, but the bibliography is quite inadequate for checking quotes and generalizations in the text. While in several ways it is acknowledged that much of the material has appeared elsewhere, the reader is not helped to discover exactly what was published where and when.

Sagan's reputation would be best served if readers who are serious about anomalies begin with Chapter 17, "The Marriage of Skepticism and Wonder," go on to Chapter 18, and then turn to Chapters 4 to 10 inclusive.

The less said about the other chapters, the better for Sagan and the publishers, who should bear most of the blame — they, after all, had contracted with him years ago for a series of books, for straightforward commercial reasons and not on the basis of a substantive plan outlining material that deserved publication. Good copy-editors would surely have caught most of the logical non-sequiturs or contradictions that abound in chapters that read like stream-of-

consciousness dictation. Thus in Chapter 1 (p. 4), "the ocean keeps many secrets" followed immediately by "there isn't a trace of oceanographic or geophysical support for Atlantis and Lemuria."

In uncountable places the author(s) postulate(s) that everyone shares their emotional and intellectual passions, *e.g.* "so much in real science... [is] exciting." Someone is sympathized with for "never [having been] taught... how to distinguish real science from the cheap imitation," a trick that no one has yet been taught including those who read this book from cover to cover. "If it were widely understood that claims to knowledge require adequate evidence before they can be accepted, there would be no room for pseudoscience," (p. 6) is hardly adequate enough instruction. Tired scientific shibboleths are repeated throughout the book, how "perilous and foolhardy for the average citizen to remain ignorant about global warming [etc., etc.]" (p. 7), how dangerous if everyone doesn't share Sagan's views on science, politics, and all else. Naive anti-religious sentiments abound: "For me, it is far better to grasp the Universe as it really is [no mean feat!] than to persist in delusion [but how to avoid that?] (p. 12)"; "to entertain the notion that we are a particularly complex arrangement of atoms, and not some breath of divinity, at the very least enhances our [what, everybody's?] respect for atoms" (p. 13). Quite often after such silly generalizations, Sagan puts in a qualification, *e.g.* "although there's no reason why religions have to play that role." (p. 15) But this putting together of opposing thought-bites does not amount to a useful discussion.

In some places, the book's carelessness makes it downright misleading, for example, that "Under Communism, both religion and pseudoscience were systematically suppressed." (p. 17) What about Lysenko? What about the strictures against quantum mechanics? What about the paeans to Stalin and Party as guides to correct science?

"The devil is in the details," and the book is replete with errors of fact, oversimplifications, opinion stated as fact, and the like. But enough about the book's inadequacies.

Sagan's heart is clearly in the right place, about science, education and society in general. The Preface has him at his most disarming: open about the personal background that shaped his views; slipping in the occasional deep question: "How can you tell when someone is only imagining?" (xii); introducing the view expanded in Chapter 17, that science invokes "the two uneasily cohabiting modes of thought" of skepticism and wonder (xiii). "Both... are skills that need honing and practice. Their harmonious marriage within the mind of every schoolchild ought to be a principal goal of public education... [By everyone,] stringent standards of evidence... should be applied with at least as much rigor to what they hold dear as to what they are tempted to reject with impunity." (p. 306)

Sagan is clear that skeptics sometimes "wax superior and contemptuous... I've even sometimes heard, to my retrospective dismay, that unpleasant tone in my own voice." (p. 297) I suggest that much can be forgiven one who makes

such an admission; and I was reminded of the respect Sagan earned years ago when, giving a splendid explanation, he refused to sign the authoritarian "Objections to Astrology" that sparked CSICOP's founding. (p. 302)

In Chapter 17, Sagan is open about the dilemma of how to deal with people who have deep-seated beliefs or faiths that one believes to be wrong: "Many pseudoscientific and New Age belief systems emerge out of dissatisfaction with conventional values and perspectives — and are therefore themselves a kind of skepticism." (p. 300) "No stuffy dismissal by a gaggle of scientists makes contact with the social needs that astrology... addresses, and science does not." (304) "Mere skepticism is not enough." (p. 305)

He is open that "CSICOP is imperfect. In certain cases such a critique is to some degree justified" that "It's hostile to every new idea... will go to absurd lengths in its knee-jerk debunking, is a vigilante organization, a New Inquisition." (p. 299)

Sagan also admits that what is called pseudo-science might not be pseudo: "Perhaps one percent of the time, someone who has an idea that smells, feels and looks indistinguishable from the usual run of pseudoscience will turn out to be right." (p. 302) "Objections to pseudoscience on the grounds of unavailable mechanisms can be mistaken." (p. 303)

With those credentials, the book's discussions of anomalies in Chapters 4 to 10 ought to be respected. Chapter 4 ("Aliens"), Chapter 5 ("Spoofing and Secrecy") and Chapter 6 ("Hallucinations") are well argued, though of course they will displease some because Sagan's opinion is that we have not (yet) come into contact. Sagan disagrees with most ufologists as to the likelihood that any UFO observations cannot be explained in mundane ways; though he is "perfectly prepared to believe that at least some UFO reports and analyses, and perhaps voluminous files, have been made inaccessible to the public... It's time for the files to be declassified and made generally available." (p. 88) Chapter 7, "The Demon-Haunted World," will be relatively uncontroversial since few contemporary anomalists believe in a reality of traditional demons. Many will agree with much in Chapter 8, "On the Distinction Between True and False Visions" — especially of course on the generalities while sometimes disagreeing on their application to specific instances such as abductions.

Chapter 9, "Therapy," and 10, "The Dragon in My Garage," completes the list of chapters that serious anomalists might do well to peruse. Sagan says he has known John Mack for many years. Taking his patients' "stories at face value is not the only option available" (p. 185). "What Mack really means when he talks about beings from other dimensions is that... he hasn't the foggiest notion of what they are." (p. 183) "The main challenge posed by Mack's cases is the old one of how to teach critical thinking more broadly and more deeply in a society — conceivably even including Harvard professors of psychiatry — awash in gullibility" (p. 184). No indubitable bit of extra-terrestrial or super-human knowledge or technology has been proffered by abductees:

"These failures must tell us something." (p. 186) "Their absence must tell us something." (p. 187)

Sagan can be incisive, clear-headed, fair-minded; I wish those qualities could be applied to the whole book rather than to only a third of its chapters.

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Additional Comments on Carl Sagan by Zan Stevenson

Carl Sagan died — too young — on December 20, 1996. We must acknowledge that he was not averse to the scientific study of anomalies nor to the purposes of the Society for Scientific Exploration. In 1988 he addressed the Society's Seventh Annual Meeting (at Cornell University) on the topic of "Critical Thinking."

In the book reviewed here we find on page 302 an exemption from his strictures for three lines of investigation. He wrote: "...there are three claims in the ESP field which, in my opinion, deserve serious study: (1) that by thought alone humans can (barely) affect random number generators in computers; (2) that people under mild sensory deprivation can receive thoughts or images 'projected' at them; and (3) that young children sometimes report the details of a previous life, which upon checking, turn out to be accurate and which they could not have known about in any other way than reincarnation. I pick these claims not because I think they are likely to be valid (I don't), but as examples of contentions that might be true."

Reports of two of the three lines of investigation that Sagan believed "deserve serious study" have figured prominently in the pages of this Journal. He would have approved of that.

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In the Footsteps of the Russian Snowman, by Dmitri Bayanov. Cryptologos Publishers, 12, Bloc 3, Osenny Boulevard, Moscow, 121 614 Russia, 1996, 240 pp., ISBN 5-900229-18-1.

This is the world's first English-language book on the searches, conducted throughout the lands of the former Soviet Union, for the elusive relict hominoids known popularly as "snowmen." Although a number of books by foreign authors have been written, at least in part, about snowmen in Russia, this is the first one written entirely by Russian researchers on the subject.

The simple fact that this book could even be published in Russia speaks vol-

umes about how freedom of expression has evolved there since the collapse of the Soviet Union. Earlier, as is well known, the Soviet state controlled all publishing and other communications and media activities, and only those elements of information and opinions and other lines of thought which met with government approval could hope to see the light of day in print.

In 1958, the Soviet Academy of Sciences became interested for a time in the subject of the Himalayan yeti, and a major expedition was undertaken into the Pamirs in an effort to establish the existence of yetis or other "snowmen" there. Unfortunately, this expedition failed to bring back any meaningful evidence. As a result, in a great scramble to protect reputations and to save face, the Soviet scientific establishment promptly declared research on "snowmen" to be a pseudo-science, to be classified along with astrology and parapsychology. This meant that any further publication on the topic was banned, a ban which lasted until the dissolution of the Soviet state.

One small and carping criticism which I might make of this book relates to its title: The use of the term "snowman" is derived from the expression "abominable snowman," which has been used to designate the yeti of the Himalayas. It is generally held, however, that the yeti is *not* a hominoid but, rather, is quite likely an as-yet unidentified species of ape.¹ In consequence, the yeti technically does not merit the designation of "man" or "snowman." On the other hand, the creatures described in Bayanov's book are clearly hominoids, and thus deserving to be called some sort of "man." However, because of the association of the term "snowman" with the yeti, I have here used the expression "wildman" to designate the hominoids reported by Bayanov.

Properly speaking, Dmitri Bayanov is both author and editor of this work; he has assembled and edited a variety of reports by various Russian researchers, all of whom are respected scientists in their own fields, and he has also contributed a number of sections describing his own, original field research work.

The contents of the book are well-organized, well edited, and provide fascinating and colorful reading both for the scientist and the interested layman. There are numerous illustrations, including photographs, drawings and sketches, and the reports are well referenced. Moreover, the quality of printing and binding of the book is surprisingly good, considering the unsettled and chaotic conditions prevailing when it was produced.

In summary, the book is a compilation of much of what is known about the hairy, bipedal, man-like creature, known variously as "snowmen," "wildmen," "men of the forest," *etc.*, which apparently have been encountered in various regions of Russia, Central Asia and Siberia throughout most of recorded history. The creatures have appeared regularly in art and writings, in travelers' accounts and scientific reports, for at least the past 2500 years.

¹ Heuvelmans, B.(1995). *On the Track of Unknown Animals*. London: Kegan Paul International Ltd.

The material is presented separately by major geographic regions, and then in chronological or historical order within each region. The major regions covered are scattered across the lands of the former Soviet Union: the Caucasus, the Pamirs and the Tien-Shan Mountains, Siberia, European Russia, and the Russian Far East.

Within each region, the unfolding story begins with ancient artifacts, such as carvings and gold and silver works from the pre-Christian era, as well as Middle Eastern and Oriental writings and drawings from olden times, all illustrating hairy, man-like creatures. The story progresses through tales of long-ago encounters with such creatures, and moves on into modern times with detailed eyewitness reports of encounters and sightings, a number of these having occurred just in the past few years.

There would appear to be at least two distinct family types of these hairy hominoids: One is the creature of the Caucasus, studied extensively by Dr. Marie-Jeanne Koffmann, and known by its name in the Kabardino-Balkarian language as "almasty." The other seems to be somewhat larger, and to bear more than a passing resemblance to the sasquatch of the Pacific Northwest of the North American continent.

Indeed, this latter leads Bayanov to ask, with tongue in cheek, "Does Russia also have its own 'sasquatchski'?"

The reports of earlier encounters as well as recent eyewitness reports all are consistent in their description of the creatures: they are bipedal, they walk erect, they are covered with hair that is generally brown to light gray in color; they are extremely powerful, with proportionately longer arms than in man; they are remarkably fast runners, and can climb steep slopes and cliffs with astonishing ease; they have no speech, but make mumbling, whistling sounds. The sasquatch-like hominoids stand two meters or more in height, and many eyewitnesses report that their eyes glow brilliantly at night. They are said in general not to be hostile to man but, rather, to retreat from the presence of man.

One cannot fail to be impressed by the abundance of indirect evidence for the existence of these creatures which this book presents: detailed eyewitness reports, plaster cards of footprints, droppings, tufts of fur and hair, observation of nests, *etc.*, and, in one case, even the discovery of bones, not human but also not belonging to any known animal.

Most telling of all are the carefully screened and selected eyewitness reports, which come across with eminent credibility: Marie-Jeanne Koffmann alone has assembled and checked out more than 500 such reports. These reports come from two categories of witnesses: first, there are reliable local people (country people), such as villagers and elders, shepherds, farmers, hunters, fishermen, reindeer herders, who have little formal education and little knowledge of the world at large, but whose knowledge of nature and whose faculties of observation are beyond reproach. Then, there are the serious and objective outsiders; people such as government officials, veterinary physicians, military officers, engineers, geologists, professors, and scientists, whose business led

them to the remote areas where they experienced chance encounters with "wildmen."

In the late 19th and early 20th century there are a number of reports of "wildmen" being killed or captured. In some instances the captured creature succeeded in escaping, while in others it was confined and ultimately domesticated to a certain extent. Several reports tell of female "wildmen" being trained to do simple household tasks, although no language ability ever emerged. Perhaps more astonishingly, there are also reports of crossbreeding between female "wildmen" and human men. The offspring were reported to have a strange combination of physical and mental traits — some human, some not. In one instance, the grave of such an offspring was found long after its death, and the skeleton exhumed. The skull was reported to show both ancient features as well as features of modern man. This, of course, would suggest that the "wildmen" are very close relatives of our own species.

In general, all of the enormous body of evidence accumulated for the existence of "wildmen" in Russia is indirect and circumstantial; the "clincher" still eludes us — we still do not have a verifiable specimen, either living or dead, nor do we even have so much as a complete hide or skull. Nevertheless, the indirect evidence assembled by Bayanov and his colleagues is so extensive and abundant, and so convincing, that one cannot avoid the conclusion that these creatures do indeed exist. Thus, it would seem only logical to pursue field research to the point where one or more living specimens have been captured unharmed, examined thoroughly by qualified zoologists, and the findings announced to the world.

Overall, the eyewitness reports over the past century show a pattern of modern man extending his territory steadily outwards, and pushing his primate rivals farther back into increasingly remote and inaccessible mountain fastnesses. Earlier, observations of man-like creatures occurred across great expanses of remote parts of Russia, but, beginning in the early part of the 20th century, these have declined steadily in frequency, which suggests that human pressure is pushing the "wildman" population steadily back and back, toward the edge of extinction.

Will this happen before we are able finally to establish firm and verifiable contact with our cousins — to make their acquaintance, to establish links with them, and so be able to provide them with shelter and protection?

For hominologists, cryptozoologists and other scientists, for amateur zoologists and the interested layman, this book is fascinating and highly recommended reading.

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Reincarnation: A Critical Examination, by Paul Edwards. Buffalo, NY: Prometheus Books, 1996. 313 pp., \$28.95 (c) ISBN 1573920053 TC.

What amazes me about such people is their smug dogmatism and their colossal arrogance. They "know," and are completely certain of things that cannot be known, and their "knowledge" is not harmless because it is made the basis for vicious conduct. To such fanatics one can only quote the words (suitably adjusted) of Oliver Cromwell in a letter he wrote to the General Assembly of the Church of Scotland: "I beseech you, in the bowels of Gautama, think it possible you may be mistaken." (p. 46)

Edwards, in the above passage, is referring to philosophers sympathetic to the concept of karma, but it is tempting to read it as referring to himself and others of skeptical inclination. The very qualities he laments are clearly on display in his book, and the bastardized quotation from Cromwell could properly be addressed to many skeptics as well.

Reincarnation: A Critical Examination is a much expanded version of a series of articles that appeared in the humanist journal, *Free Inquiry*, in 1986 and 1987. It contains 17 chapters and an "Irreverent Postscript" that deals with "God and the *Modus Operandi* Problem." Although the relevance of the postscript to the rest of the book is not altogether clear, Edwards appears to mean it to underscore what he sees as the central problem with the idea of survival after death. This is the difficulty of specifying exactly how survival occurs, especially given the amount of data from biology and the brain sciences that seems to weigh against it.

The 17 chapters that form the body of the book cover a variety of topics directly or indirectly related to reincarnation — among them karma, cases (child prodigies, *e.g.*) sometimes thought to be explicable in terms of reincarnation, past-life regressions (a chapter is devoted to Bridey Murphy), "future-life progressions," spontaneous past life memories, the "astral body," out-of-body experiences, near-death experiences, deathbed visions, reports by Stanislav Grof of past life memories under LSD, reports of memories of the period between lives (called the "interregnum" by Edwards), and finally the work of Ian Stevenson.

Reincarnation logically entails some form of survival, so it is appropriate that a book dealing with reincarnation (especially one with philosophical pretensions) treat the survival problem more generally. Many readers, however, may wonder about the amount of space given to out-of-body and near-death experiences. They may also be disappointed to find serious reincarnation research of the sort associated with Ian Stevenson given such short shrift. Stevenson receives most of one chapter and a small portion of a second, for a total of about 30 pages. This compares to 38 pages devoted to Elisabeth Kübler-Ross and 27 pages devoted to Stanislav Grof.

The book is replete with footnotes and index (although it lacks a bibliogra-

phy or reference list), and appears at first glance to be exhaustively researched. However, a closer look at sources is revealing. Edwards has a decided tendency to prefer popular treatments, especially skeptical ones. Astonishingly little is cited from scientific journals or scholarly books, and when cited, the references are sometimes incorrect. Edwards' seeming uncertainty about the title of the *Journal of Nervous and Mental Disease* is emblematic of his difficulties here. In the text on p. 243 the journal is called the *Journal of Nervous and Mental Diseases*, whereas in a footnote on the same page it is identified as the *Journal of Nervous and Mental Disorders*.

The reluctance to engage primary source material may be part of the reason for important omissions. Apparitions and mediumship, both with considerable literatures of their own but with much more direct relevance to the survival problem than out-of-body and near-death experiences, are hardly mentioned. There is no mention of the now considerable number of statistical and cross-cultural studies of children who remember previous lives, or of the patterns that have emerged from such studies. Several important theoretical and philosophical approaches to explaining survival and reincarnation are ignored. Xenoglossy (the use of unlearned language) is acknowledged but exempted from treatment, with a reference to an article in the *Skeptical Inquirer*.

Edwards frequently cites the views of fellow skeptics, but does not attempt to address the responses of survival researchers, even when these are available to him. For instance, he references my 1990 review of reincarnation research (Matlock, 1990), which deals with all of the issues cited in the last paragraph, and which includes detailed rebuttals to a number of critical comments on Stevenson's research. However, not only does Edwards fail to take note of my comments, he ignores them and trots out many of the same tired arguments.

At times, Edwards seems not to grasp the relevant issues. What is wrong with the "dreariness" of Virginia Tighe's memories as Bridey Murphy? (p. 62). Their very dreariness suggests their authenticity more than a dramatic account would. In discussing a spontaneous child case from India, Edwards wonders whether the word for "prostitute" would be known to children in India (p. 257). Probably not — but perhaps the child recalled the word in association with the past life memories he was describing. Edwards writes (p. 269) that "Stevenson assumes" that the previous personalities of Western subjects also lived in the West. However, this is not an assumption on Stevenson's part, but a conclusion based on the characteristics of cases he has investigated.

There are several outright mistakes, which betray a less than sure grasp of the relevant literature and personalities. Although Osiris and Haraldsson have written a book about deathbed visions, they do not "specialize" in their study (p. 8). (Indeed, as readers of this Journal know, Haraldsson has lately taken up the study of children who remember previous lives.) Edwards states that a movie based on *The Search for Bridey Murphy* was never made (p. 61), whereas one was released by Paramount in 1956 (and is now available on home video). He states that Stevenson has never investigated a hypnotic regression

case (p. 102), an error he would have been able to correct had he taken the trouble to review the xenoglossy literature. He claims that "birthmarks are cited as evidence only among some of the cultures in which reincarnation is prevalent" (p. 138), thereby overlooking (among many other cases) the English Pollock twins discussed in at least three of the works he cites.

The tone of the book often is condescending. Edwards repeatedly expresses "joy" (e.g., p. 89, 140) and congratulates himself on having an "irrepressible Voltairean sense of humor" (p. 9). An example of this presumably is his allusion to the "bowels of Gautama" cited above. Here is another sample: "It is widely believed that the poet Edith Sitwell was a flamingo in an earlier life and there cannot be a serious doubt that Winston Churchill had once been a bulldog.... As for Marlene Dietrich, the general consensus now is that she was once an emu. There seems to be no other way of explaining her treatment of her daughter, Maria Riva" (p. 12-13).

Edwards is not beyond putting others down, sometimes to the point of slander. "I cannot rid myself of the suspicion that the brilliant thinker quoted here is none other than Bernstein himself" (p. 64). Of Raymond Moody he writes, "the suspicion is that he has fudged his data so that the cases would exhibit a far higher degree of similarity than what was actually reported" (p. 153). Of Alexander Cannon, "I cannot decide whether Cannon was mad or a fraud. It is possible that he was both, with madness predominating" (p. 83).

As philosophy, the book is disappointing. Edwards mostly rehearses the arguments of others, makes few original points, and does not closely examine any issue. Moreover, his bias sometimes leads him into circular arguments. For example, since he dismisses the possibility of an "astral body," he can say of birthmarks in reincarnation cases that there is "no conceivable way" that a wound could be transmitted from a dead person to an embryo (p. 139). Again, "the absence of genuine memories of previous lives" are said to constitute "powerful evidence *against* reincarnation" (p. 27, italics in original), whereas reports of such memories are dismissed partly because they imply reincarnation.

Edwards is not at all sympathetic to the possibility that there are limitations to the scientific world view to which he adheres. "Reincarnationists, at least those who know a little science," he tells us, "constantly look for gaps in existing scientific explanations, which reincarnation is then supposed to fill" (p. 56). It is not clear, at least to this reviewer, why this is such a bad strategy — if we are not willing to dismiss empirical evidence, as Edwards is, what more likely place to look for explanation than in the gaps in mainstream scientific knowledge? At one point he notes that "Stevenson, too, does not accept this argument [on *déjà vu*] but, as is usual with him in the cases of arguments he finds inadequate, he sees some significant merits in it" (p. 52). This is something Edwards cannot (or will not) do. The world appears to him in black and white, never shades of gray.

Who is this book for? Edwards spends much time on issues to which no seri-

ous researcher gives much attention (Kiibler-Ross, Grof), and does not deal at all adequately with the more important scholarly literature, so serious researchers will find little of value here. Another potential audience is the large popular audience drawn to subjects like reincarnation. This presumably is the target audience, but readers expecting an even-handed, if critical, treatment of the subject matter will be disappointed, and I suspect that many will be put off by the unrelenting skepticism, put-downs, and outright dismissals. This leaves the like-minded skeptic, the reader already committed to Edwards' point of view. This reader is likely to find a great deal of interest in this book. Such a reader is likely to enjoy Edwards' writing style, his treatment of other authors, his minute dissection of many of the more vacuous writings on survival, and to come away from this book all the more deeply convinced that he or she is right.

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Forming Concepts in Physics, by Georg Unger, Parker Courtney Press of the Science and Mathematics Association for Research and Teaching, 307 Hungry Hollow Road, Chestnut Ridge, NY 10977, \$24.75.

Georg Unger's book, *Forming Concepts in Physics*, is a seminal study of the conceptual foundations of modern science of quantum mechanics, probability and relativity theory, and mathematics. Central to the book is an examination of the role of thinking in gaining physical knowledge. Unger focuses on the transition from classical to modern physics to suggest what will be a radical shift in consciousness for most readers. Unger shows that, far from passive observing, scientists employ active thinking to gain access to the world of phenomena. In other words, seeing employs thinking in order to organize sense data into coherent experience. Reality is in this coherent experience of phenomena and does not lie in a metaphysical world behind experience. In this phenomenological analysis, thought is taken to bring reality to existence within human beings.

In a careful and insightful analysis, Unger discusses in detail what actually happened in the transition to Twentieth Century physics. Of particular importance in this regard is Unger's treatment of the concept of matter. Unger formulates the concept of matter as the togetherness or simultaneous appearance of sense qualities. It follows from such an understanding that the boundaries of sense reality are reached when the condition of such togetherness is no

longer present. The failure of classical ideas is unavoidable in the face of the "non-togetherness" that is characteristic of quantum phenomena. One of the beauties of Unger's approach is that we can understand the so-called paradoxical nature of pseudo-realistic elements such as the atom or other fundamental particles as an artifact of forgetting the role of thinking when we gain coherence of sense reality. Once it is realized that the boundary of the sense perceptible has been crossed, then the supposed paradoxical nature of the fundamental particles disappears, and other paradoxes such as wave particle duality make sense.

Unger takes special note of the role of statistics in quantum theory. He devotes a chapter to a detailed discussion of the mathematical concept of probability, and concludes that fundamentally statistical phenomena point to something other than a classically describable system. In his final chapter Unger returns to this idea. This final chapter, titled "Physical World View and Spiritual Science," is a radical departure from the previous approach of the book. Here, instead of a philosophical/historical analysis of modern physics but nevertheless based on it, Unger imagines how the facts of the so-called micro-world might be differently described if the self-limitation of physics (based on ignorance of the role of thinking) were removed. Here he discusses how the "fundamentally statistical phenomena" of modern physics might be interpreted in terms of sensible effects of supersensible spiritual beings acting across the boundary of the sense perceptible. Unger uses Rudolf Steiner's description of a supersensible world for his examples, but his ideas need not be limited to the particulars of Steiner's description of a spiritual world.

Forming Concepts in Physics is highly recommended for anyone who is interested in understanding the epistemological ground of modern science. It will be of special interest to anyone who wishes to move beyond the habitual assumptions of reductionism and quasimaterialism.

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