RECONNECTING SCIENCE AND SPIRITUALITY: TOWARD OVERCOMING A TABOO

by Harald Walach and K. Helmut Reich

Abstract. We argue that reconnecting science and spirituality yields the best rational understanding of the world. Spirituality is seen as the core of many religions. Distinctions are drawn between science and scientism and between spirituality and religion. A historical analysis provides a partial explanation of scientists' aversion to religion. A thought experiment illustrates that spirituality could not only be a legitimate research topic of science but also inform science by offering certain insights. Specifically, science could and should more freely study spirituality in its beneficial impact on individuals' attempts to attain personal wholeness, overcome substance abuse, achieve a more communal society, and safeguard the environment.

Keywords: complementarity of science and spirituality; history of science and religion; methods in science and in religion; religion; science; spirituality.

This is a reasoned plea to recognize spirituality as a rich and rewarding theme for scientific research. As is apparent from recent studies too numerous to list here, the importance of spirituality resides specifically in its potential for improving individual and communal life. While in this context we need to deal with science and religion (besides spirituality), their evolving relationship, symmetry, harmony, respective language use, and so

Harald Walach directs the Department of Evaluation Research in Complementary Medicine of the University of Freiburg, Germany. His mailing address is University Hospital Freiburg, Institute of Environmental Medicine and Hospital Epidemiology, Samueli Institute—European Office, Hugstetterstr. 55, D-79106 Freiburg, Germany; e-mail harald.walach@uniklinik-freiburg.de. K. Helmut Reich is Professor at the nonresident Rutherford International University in Evanston, Wyoming, U.S.A., and Richmond, British Columbia, Canada, School of Consciousness Studies and Sacred Traditions. He is also a Senior Research Fellow emeritus at the School of Education of the University of Fribourg. His mailing address is Route des Chemins de Fer 3, CH-1823 Glion, Switzerland; e-mail helmut.reich@tele2.ch.

[*Zygon*, vol. 40, no. 2 (June 2005).]
 ISSN 0591-2385

on, these issues as such are not at the center of our considerations. Rather, we aim to discern roadblocks on the way to reconnecting science and spirituality such as scientism and religious dogmas and attempt to move them out of the way in order to study the inner experiences associated with spirituality using appropriate scientific methods.[1] Besides making analytic distinctions, we review historical developments that have led to a persisting cleavage between science and religion/spirituality that now seems ill-conceived and in need of reconsideration.

To avoid misunderstanding: we are aware that a purely utilitarian approach to spirituality would destroy its essence. Spirituality cannot be forced to produce willed results. Being a way toward a better knowledge of oneself, toward cosmic embedding, toward a healthier life, and toward community and solidarity, it requires humbleness, patience, persistence, and personal engagement to lead to positive results whenever they arrive. This does not mean that one cannot or should not make conscious efforts toward developing one's spirituality, only that such an enterprise has its own "laws," which are quite different from, say, training for proficiency in computer use. However, spirituality as such is not our theme here.[2] Our plea is directed to science, not primarily to spirituality. Nevertheless, the foregoing remarks highlight an intrinsic difficulty of researching spirituality scientifically—it is quite unlike, for instance, testing materials to the breaking point or even studying supernovae (e.g., Reich 2000a, b; 2001).

Popular accounts of scientific progress not infrequently propagate the idea that science constitutes the supreme stage of human development. Consequently, religion has to be left behind as belonging to a premodern era. It still appears to be a tacit presupposition of many modern scientifically minded intellectuals that science and religion (and related concepts such as magic, spirituality, and faith) are contradictory notions. Although this is mostly an implicit stance, it seems to be vindicated by opinion polls among scientists that show a general unease with religion, at least in the context of science proper (Larson and Witham 1998). All this despite an accelerating movement toward a more positive view of science-and-religion as a complementary whole that is important for many areas of individual and communal life (e.g., The John Templeton Foundation 1996; van Huyssteen 2003). The question thus arises of why the impact of this movement is not faster and deeper.

The main purpose of this essay is to analyze the conditions that led to the view that science has made religion (and spirituality as its core) obsolete, to question the validity of such a view, and to indicate ways and means to overcome a centuries-old mistaken assessment of the relevance of spirituality. We first draw a distinction between science, a method of inquiry, and scientism, a worldview or overarching philosophy. Next, we elaborate the distinction between spirituality and religion. Then we try to show and understand why the aversion of science to religion is at places so trenchant,

using a historical approach. Figuratively speaking, the adolescent science, an heir to the Enlightenment, had to cut the umbilical cord to theology (and religion and spirituality) in order to become adult. This growing-up process having been achieved, science could and should more freely study the indicated beneficial impact of spirituality.

Nature and Evolution of Science

As an everyday notion, science often means two things: (1) a way to understand the natural makeup of the world by means of rational methods of inquiry, and (2) a *weltanschauung*, a worldview that uses the insights of natural science to inform people's way of living, their purpose in life, and the choices they make. We refer to these two versions as *science* and *scientism*, respectively. Historically, for instance in the old cultures of Sumer, Egypt, and China, science was instrumental in achieving certain overarching societal goals and was embedded in a larger cultural context, usually nourished and fostered in particular by religious beliefs. In contrast, classical Greece offers an example of a rationality that did not accept restraint by religious teachings and concepts. This is apparent in Greek philosophy and in first achievements in geometry, astronomy, logic, empirical medicine, and some descriptive natural science. These early results of scientific work were partially preserved and further elaborated by Islamic scholars, while in the Christian culture most was lost because of the breakdown of the Hellenic-Roman culture during the Dark Ages. It was only in the Middle Ages that natural science became once again a topic of interest, when classical texts reemerged, often reintroduced by scholars such as Adelard of Bath ([c. 1137] 1998), who had traveled widely in the Mediterranean Greek-Islamic cultural sphere and brought his discoveries back to England. From there, scientific endeavors arose, spurred by the writings of Robert Grosseteste, who gave them the necessary theological backing (Southern 1986). Science was at first a branch of the general human striving to understand the world and its contingencies in terms of religious/theological interpretations, and only gradually was it possible for Western science to extract itself from the overarching authority that theology claimed over all education, learning, and rational endeavors (Crombie 1953).

While at the beginning of this development the Christian worldview was a common philosophical-theological background for nearly all Western thinkers striving to understand the world, this was soon questioned as a common denominator of rational-scientific inquiry. Already during the Middle Ages disputes were frequent among scholars who had adopted Aristotelian notions about the natural makeup of the world (some of which, such as the eternal existence of the world, contradicted Christian teachings). And it was not uncommon that philosophers at the University of Paris opposed clerical teachings for the sake of reason and out of adherence

to an Aristotelian conceptualization of the world, as testified in the so-called condemnation of 1277 (Flasch 1989; Hissette 1977; Thijssen 2003). Then, Stephen Tempier, Bishop of Paris, had, with the help of a group of professors of theology, condemned 219 philosophical and theological theses as heretical. Some of these contradicted the teachings of the church or specific interpretations of those teachings, and some were statements about the nature of the world derived from Aristotelian-Islamic proto-science. Attempts to claim freedom of scientific inquiry thus were present right from the beginning of scientific endeavors in the West. Nevertheless, for a long time the majority of scholars devoting their lives to scientific inquiry adhered to the basics of Christian teaching.

Gradually, science, as the epitome of rationality, became wed to a critical stance toward secular and religious authorities, and, during the general rise of Enlightenment, being scientific became tantamount to being modern, critical, rational, and self-reliant in the face of political and religious authorities. To be enlightened was to be scientifically minded. To put it more simply, science, by a marriage with the general movement of eighteenth-century Enlightenment, became not only a method of studying the laws of nature or a canon of methodological agreements but a general movement of rationality against dogmatism and religious teachings. That this breaking free from religious dogmatism has created a new dogmatism, namely, scientism, a worldview or philosophical stance toward the world in general, has been pointed out by many philosophers, Edmund Husserl (1977) being one of the more influential ones, and possibly most poignantly by Max Horkheimer and T. W. Adorno ([1969] 2004) in their classic text on the dialectics of Enlightenment. In that work they showed (and predicted at the same time) that science taken to its extreme and without any counterbalance would produce exactly the opposite of what was intended, namely, a new scientistic kind of dogmatism, which is not simply a method of how to study nature but a worldview on what to believe and not to believe, on what is a scientifically correct topic and what is not. Science today has not only become a method and way of studying nature but, as scientism, has become a powerful worldview (Habermas 1973).

The Scientific Method

Science is, at least in terms of a rational foundation of its core tenets, not different from religion in that it has to extrapolate the validity of general laws from particular knowledge. Science proper restricts its scope to facts that can be observed, or produced, and studied (Oeser 1979a). It cannot say anything, and must not say anything, about the purpose of life, about moral conduct, or about how to best organize one's personal life in order to find fulfillment. These areas are traditionally attributed to religion or secular philosophies of life.

In the Western tradition a methodological unity regarding the nature and types of experience was accepted until roughly 1260. The term *experience* (Latin: *experimentum, experientia*; verb: *experiri*—to experience; *expertus sum*—I have experienced) encompassed both: experience of the outer world through the senses, and experience of the inner world through contemplation. Although the medieval writers originally placed more emphasis on this inner experience, without explicitly saying so, later it became more important to focus on outer experience within the framework of science. Inner experience was relegated to the realms of mysticism and piety, with no scientific claims as to the veridicality of its results, at least in the Western culture (Vandenbroucke 1950). In Eastern cultures it was the other way around: hardly any emphasis was placed on understanding the workings of the natural world through systematic experience, and nearly all cultural effort was put into understanding the world through focusing on the inner experience to be found within consciousness, equally termed enlightenment (Kapleau 1969). Enlightenment in that spiritual sense claims to reveal knowledge of the true nature of the world, or at least of the mind, but with ramifications for the knowledge of the world at large. It may be high time to research the validity domains of both ways of experiencing the world.

A possible meeting ground could be research in *neurotheology*, which we discuss later. Methodologically, the debate here is to what extent third-person quantified data (which are the basis of the impressive results of scientific research over the last centuries) suffice to describe spiritual experiences or to what extent first-person phenomenological data and qualia have also to be taken into account (e.g., Petranker 2003).

Science and Scientism

Partly following Mikael Stenmark, Gregory Peterson (2003, 752–53, 759) distinguishes between (a) border-crossing scientism (of the *axiological*—science as source of values—or the *existential*—science as source of meaning and purpose—kind) and (b) totalizing scientism (all knowledge is described or describable by science; therefore only science provides knowledge of reality and the nature of things—*methodological* scientism). We agree with Peterson that in concrete cases the border between science and scientism is not necessarily obvious. This is all the more true if we argue, as we do, that scientific rationality should be understood in a wider sense than is accepted in physics and chemistry and should move toward considering carefully, and possibly including, first-person phenomenological statements.

Nevertheless, along with others, we claim that it is wise to distinguish between science and scientism and to restrain, even oppose, scientism. This raises the question of what or who else could be the counselor or arbiter for

solving those existential questions that beset humankind (apart from the study of the makeup of the natural world, the area of science). Enter spirituality and religion, those human activities that have dealt with such issues over the last millennia, to which we now turn.

Spirituality and Religion

Spirituality can be understood as a direct inner experience of reality, or transcendent being. By *experience* we mean a holistic type of understanding, implicating at the same time cognitive functioning, emotional-affective functioning, and motivation. *Transcendence* implies transcending the physical and the biological, so that it makes sense to speak, for instance, of the transcendence of art. It is the experience of transcendent being, which is the heart of spirituality and is also at the core of many institutionalized religions.[3] Various direct initial reports of spiritual experiences intimate that their general characteristics might be similar across time and space. However, the way they are later expressed (often metaphorically), symbolized, and communicated is highly dependent on the cultural context. Nevertheless, it seems a plausible presupposition that a generic experience of a transcendent reality is at the base of spirituality. While science tries to understand the laws that bind nature's processes together, spirituality attempts to understand its aesthetic, moral, or general ground.

Just to fix the ideas, we adopt a summary of the (implied) definition of spirituality by Albert Schweitzer ([1923] 1999, 211–19):

> human beings (a) perceive, appreciate and pursue a search for meaning, truth, goodness, and beauty, (b) experience wholeness, love, and connectedness but (c) are also aware that nature and life can be arbitrary, treacherous, cruel and ugly. Spirituality involves walking on a tight rope between these extremes, attempting not to fall off neither to one side nor to the other. This involves a *vita mixta* that is a combination of contemplation and freeing oneself from the domination by the ego on the one hand, and an active life in the service of Life and its respectful admiration on the other.

In what sense, then, is spiritual experience of a transcendent reality different, or touching reality in another way, from a scientific inquiry? A first difference is in the mode of experiencing itself. Whereas our empirical experiential science is founded on and mediated by our senses and their modern technical aids, spiritual experience is attained through consciousness and through a certain methodological use of states of altered consciousness. For touching the reality of transcendent being, consciousness needs to have a certain autonomy over and beyond being a mere derivative or emergent property of matter. This position should not be confused with ontological dualism. In dual-aspect theory or neutral monism (Feigl 1975; Kirsch and Hyland 1987; Walach and Römer 2000) matter and consciousness are two complementary aspects of reality that branch out from an original symmetry break, as described elsewhere (Atmanspacher

2003). If that hypothesis is viable, two routes to understanding reality are open. One is the classical way of modern science, the other that of inner experience, using consciousness as a way of reflecting transcendent being (e.g., Reich 2000a). To be effective, this needs appropriate training (Depraz, Varela, and Vermersch 2003) and a systematic way to come to a plural first-person view via exchanges about inner experiences.

We suggest that spiritual experience is the basis of many religions and that codified religions often are ways to communicate and thus preserve spiritual experiences, make them culturally available, and open the way to similar experiences for a broader group of people through symbolizations, rites, religious imagery, and texts. Religion, then, would be or at least could be the form-giving and clothing of spiritual experience, which is not only contingent on historical and cultural contexts but is needed to channel the spiritual experiences and their impact into culturally acceptable and understandable ways of "seeing" the world. The Christian church has tried to adapt to new cultural challenges with the help of many Councils, whose task it was to reinterpret the original experience in terms of newly available intellectual means, cultural images, and language. This movement is likely to continue, even if it is often too late in the eyes of many who would wish a quicker adaptation.

At the same time, pure experience without a formatting channel is likely to be ineffective. This is true for science as well: A single observation made by someone at some time and not fully described or communicated, let alone replicated and systematically analyzed, is not of much use. It needs to be channeled systematically into a scientific report and communicated effectively to become a scientific fact (Fleck [1935] 1980). Analogously, a spiritual experience that finds no way of connecting to other parts of human experience, to life in general and to other cultural forms, is like a drop of water in the desert: welcome but ineffective.

Spiritual experience and religion—direct experience and its interpretation—are two complementary aspects that belong together and at the same time are in a certain tension with each other. For the interpretative aspect of religion is always slower than direct spiritual experience would have it, just as much (and even more so) as the promulgation of scientific knowledge and experience and the reception by the general population are much slower than the progress of science. By the time new textbooks are out, let alone adopted, let alone understood, let alone have become general knowledge, they are already outdated by the progress of scientific experience.

Tensions between science and religion do not pertain primarily to science as an appropriate method of inquiry and to spirituality as the core of inner experience in a given religion but rather to a totalizing, border-crossing or methodological scientistic worldview (and thus a modern quasi-religion) and to religion as an often crystallized, ossified, sclerotic expression of spiritual experience.

The Compatibility Question

In what ways are science and religion considered incompatible, and to what extent might science and spirituality be compatible? A worldview that is married to the cultural, philosophical, political, and eventually also religious movement of eighteenth-century Enlightenment is understandably antagonistic to traditional religion as it has developed through the ages and become outdated in its way of expressing spiritual experience. Christian religion in the West had adopted the language of Neoplatonism and later of Aristotelian scholasticism to express its spiritual core experiences and had taken on the form of feudal political structures. The church opposed many tenets derived from the rapid progress of science. For instance, institutionalized Christian religion was slow to adopt the modern scientific discoveries of evolutionary theory because it did not find a language for incorporating this into a canon of codified experience, and it still has difficulties with that. When Pierre Teilhard de Chardin in the beginning of the twentieth century tried to bring evolution into theology, he was "exiled" and his writings indexed as heretical. Present-day theological scholars who try to find new expressions, using insights from science and modern language to reinterpret the basic Christian experience, not infrequently incur similar difficulties.

Science as a collective progress toward understanding the natural world had to break loose from the grip of rigid institutionalized religion, even if at times this was dangerous (Easlea 1980). The dispute was understandable, necessary, and prolific, because it allowed science to develop its own agenda without the interference of religious institutions and because it eventually threw religion back onto itself, outside the spheres of secular power. This provided religion with an opportunity to rediscover its own roots in spiritual experience and the necessity to reinterpret its message ever anew.

It is germane to science to question, criticize, overthrow dogmas trespassing its domain, be skeptical, demand evidence, challenge authority, and have no final arbiter but the historical development of science itself and the collective movement of the scientific community (Laudan 1977). But it would be a misunderstanding to equate this freeing itself from religious dogmatic bondage with hostility toward spiritual experiences as such, because it is not spiritual experiences that have been the target of scientific struggles for autonomous survival but their institutionalized religious dogmas. How and in what sense could there be a fruitful relationship between science and spirituality—or should there be?

Verification in Science and in Spirituality

As its core, science involves a canon of methods for how to best gain experience and derive knowledge about our world from that experience. It is

systematic experience. The scientific method involves an intricate interplay between observation of singular events, theoretical modeling of their interrelations, extrapolations from the theoretical notions derived from those models, and their empirical-experimental testing. Spirituality is a way, sometimes institutionalized, of fostering specifically inner experiences about a transcendent reality, about the nature of consciousness, and possibly about the world at large. The methods applied to either activity involve experience, but in the case of science it is directed outwardly, via the senses, whereas in the case of spirituality it is directed inwardly, through blocking out the senses and focusing attention and consciousness on spiritual experience itself. Science claims to establish knowledge about the material world. The validity domain of spirituality is likely to be some complex mix of morality, individual purpose in life, aesthetics, and maybe even some intersubjective domain of the nature of consciousness.

Let us grant that focusing on meditation or contemplation for exploring consciousness can lead to a deep experience of transcendent being, just as focusing in a disciplined way on the experience of our senses can lead to knowledge about the outer, material world. In other words, using a spiritual approach could take us to a deeper insight of the foundations of nature. In what sense is this type of experience different from the standard one of science, the experience mediated by our senses?

First, the mode is different. It is not via the senses but via consciousness itself that this experience is mediated. A concise scientific theory of such an experience is a future desideratum. Second, the epistemological quality is different. All trained observers can at least theoretically use a telescope and verify the fact that Jupiter is circled by moons, and in the same sense the purported empirical facts of science can be validated by competent observers, at least in principle and ideally. This is not necessarily the case in the realm of spiritual experience (Depraz, Varela, and Vermersch 2003), which is by definition a subjective, not an intersubjective, experience. While the outer experience of science in the first instance also is subjective, as in a first-ever observation, science has introduced methods that make individual and subjective experiences testable and thus convert subjective claims into intersubjective ones, and thereby science approaches objectivity or at least approximations to an objective reality (Oeser 1979b).

In spirituality this is not so straightforward, and for this reason tests of spiritual experience and its validity have always been pragmatic. In the Zen tradition, for instance, the sign of a true experience is not the verbal self-report of the experience, although that can be a useful step, but a way of reacting, behaving, or living (Aitken 1988; Suzuki 1970). The same is true for the Christian tradition: the Bible states that the test of truth is in actions, not words (Matthew 7:20, 12:35, 13:23). Thus, claimants of experience in the spiritual sense can be tested only indirectly and pragmatically, but nevertheless there is this understanding of intersubjective

testing of purportedly spiritual experience to ascertain its validity. And just as in conventional science, where not everyone can master the higher mathematics and precise experimental skills to be able to prepare entangled pairs of photons or trapped ions, in spirituality a certain kind of proficiency and maybe even giftedness is necessary in order to reach a certain inner experience. But the fact that most people are unable to prepare entangled pairs of photons, that only a handful of laboratories in the world can actually reliably do this, does not invalidate the fact that such observation brings out the deep structure of the material world and was discovered by science—that is, outer experience. And the fact that the majority of people probably would not pass a pragmatic test of having attained an inner experience of spiritual enlightenment does not invalidate the claims and the experiences of those who have.

The content of the experience and the ensuing claim of truthfulness have to be examined in both scientific and spiritual activities. A new scientific result may be eagerly picked up, replicated, and expanded elsewhere. It also may happen that original findings, though valid and well published (for example, the stability of nonradioactive atoms), are not appreciated and are studied and understood only later, when the necessary theoretical framework becomes available. For instance, the fact of entangled quantum systems lay dormant all along the original formulation of quantum theory. It took time and some trenchant opposition to quantum mechanics on Albert Einstein's part to bring this issue to the fore (Einstein, Podolski, and Rosen 1935). It took another generation and some formal combinatorial exercises by John Bell to bring the controversy into a testable form (Bell 1964), and it took nearly another generation before the first empirical test of Bell's arbitrating criteria was accomplished (Aspect, Grangier, and Roger 1981; 1982; Bell 1987). And only very recently has the intriguing fact of entanglement seized the imagination of researchers who conceive various applications and extrapolate the ramifications of this fact (Atmanspacher, Römer, and Walach 2002). Yet, inasmuch as the predictions and derivations are borne out by experience, they have been present and "true" all along. Thus, the validity testing of science is a complicated matter that goes through numerous stages, some of which are incidental and leave room for the chaotic self-organization that is typical of science.

Spirituality also has claims to make about the nature of the world and of consciousness. It is fashionable to point to the history and to diverse authorities who guarantee the claims of spirituality, as for instance Ken Wilber (1998) does. However, in a scientific context it is inappropriate to simply rely on authorities, historical or otherwise. Let us construct a thought experiment to see how a possible testing of claims in the domain of spiritual experience could work.

A Thought Experiment: The Prisoner's Experience

Suppose that spirituality were to be reinvented today with no knowledge of earlier traditions. Suppose that someone, let us assume a naturally calm person put into jail by a judicial error, instinctively starts to meditate. He discovers by accident that if he sits quietly for a while and focuses on a rhythmic pattern such as his breathing or a steady object such as something written on the wall of the jail, he floats into an altered state of consciousness. This state is very calm at the beginning and contentless, and after some practice suddenly bursts into a kind of fullness of a new kind of experience. What would our (re-)discoverer of spiritual experience do with this experience? Suppose we are his audience. How do we know whether this "experience" is more than a whim of his nervous system turning boredom into some fun? Does such an experience teach us anything at all about the nature of consciousness, and if so, what? Assume further that our prisoner, after repeated experiences, comes up with some claims about the nature of the mind and about the world in general, and that one of the claims is that all of life is interconnected in a certain way, and crimes are misguided actions directed in the end against oneself, and thus going to jail for crimes is not such a bad thing after all, provided one understands the deeper reality behind it.

Now suppose that our imprisoned (re-)inventor of spirituality communicates his experiences and their consequences to his fellow inmates. Some will laugh at him, some will threaten him for collaborating with the jail system, some may even believe him and try the method. Suppose that those who try it eventually have experiences very similar to the original one, a fact that they discover on communicating their experience and trying to find words for it. Maybe they even change their complete outlook on life and begin changing their behavior as a consequence of a changed affective and emotional life. This alters the whole context of jail life, and other inmates of the prison get "infected," and although they do not have the same experience they believe their companions' teaching, even though they do not completely understand the basis for it. Assume that from the first prisoner's experience life in jail is changed to the extent that the administration and governors reconsider several terms of imprisonment. Now, imagine that in rehabilitating some of the prematurely released prisoners social workers discover that they are atypically altered, lead a socially acceptable life, make themselves useful, and start organizations that help youth on the verge of becoming criminal to find other ways of expressing themselves and thus lower the crime rate in the neighborhood.

Finally, suppose that these facts have been observed and demonstrated with high validity, after long-term observations, and in repeated cases. Perhaps the ex-inmates have founded a community of like-minded persons linking up in small groups, practicing their meditation together, and

eventually discovering ways to distinguish between those with "true" experiences and impostors who have read something and claim to have had such experiences.

Suppose that, contrary to what some impostors think, the person submitting to such a "test" does not have to provide an account of his or her experience but to fulfil some practical task, which is always invented anew so that no codified correct answer can be given. For example, someone might faint in front of the new candidate, whose behavior is then watched and assessed. Suppose those who have had the alleged experience are, if not in unison, in large agreement about what responses to the tests are genuine and which are not, because they would have all reacted in a similar way. In the long run this would constitute a quite reliable method for separating impostors from persons who truly had spiritual experiences. Of course, there would be no external criterion of validity for the correctness of the test results, just pragmatic criteria of consensus on who has passed the tests and who has not. (Whoever thinks that this is too arbitrary a criterion: the only universal test of being human—whether a baby, a handicapped person, or a healthy adult—is to be recognized as such by other human beings [Foerst and Reich 2002]). But still, let us assume that the system works sufficiently well and succeeds in the long run in helping interested newcomers to have such experiences and make use of those experiences in their lives. What would that tell us?

It would at the very least tell us that those original experiences had some very powerful impact on individuals who are difficult to get along with and who are unlikely by themselves to change their personality in such a dramatic way. It would tell us that such inner experiences are in a sense valuable and might be socially useful. It might even imply that there are ways of indicating what type of experiences belong to the category of "true" experience and which ones do not. Even if we did not accept the fact that the content and referent of those experiences had anything to do with reality in the strict sense of the word, we would have to accept that the belief of those who have had the experience that they have touched ultimate reality does have such an impact. And even if the claims about truth and reality of the content of experience seem doubtful, the fact that the experience itself has some important impact is beyond doubt, so the fact of experiencing would become an important subject for scientific inquiry.

Now suppose that a thorough scientific inquiry into the phenomenology of those experiences, a qualitative study of the contents and the narratives of their impact, and quantitative studies of their long-term sequelae conveyed a remarkable convergence of contents of experiences, effects in individual lives, and social impact. Suppose further that the same findings are replicated over many studies and generations and that the claims of the content of experiences are always within a finite spectrum of narratives. Would that not at some stage compel researchers to look more deeply not

only into the subjective meaning of those experiences but into the actual content of that which is experienced? Might not a thorough scrutinizing of spiritual experiences tell us something about consciousness (and meaning making) that would be acceptable by appropriate scientific standards? And if we learn something about consciousness from a plural first-person perspective, as opposed to the third-person perspective of conventional scientific research, might this not greatly enlarge our knowledge, inform our theories, and correct hypotheses that we derive from scientific theories? Might it not even be possible that we find, by way of some bridging theorems, that the inner mode of experience as given in spiritual experience indeed has something to do with the world at large (given a proper theory, of course)?

Our hypothetical exercise shows that spiritual experience would be an interesting topic for scientific research. Far from a colonializing stance, which occurs in both directions—relegating spirituality to the realm of psychiatric illness, or attempting to drop the validity claims of science into the ocean of the all-is-one-and-we-are-all-interconnected-anyway type of pseudo-enlightenment—spirituality has a specific domain, namely, that of inner experience, as has science with the world of matter-energy and space-time. We hold that it is both useful and necessary to respect the distinctness of the two domains of validity claims yet also to bridge the domain of spirituality with the domain of science at the present time. Maybe in the end we will find that a broader notion of experience arises that encompasses both modes, the inner and the outer, and arrives at reality full circle from two opposite directions (Reich 2001). But this is, for the time being, a mere possibility.

It should be clear by now, however, that spiritual experience could be a proper topic of scientific inquiry. Formal religion would come into play inasmuch as it is an expression of spiritual experience. Science could maintain its independence from religion and yet study spirituality as a mode of experiencing. That way the undercurrent of mystical or spiritual experience, which has been present and yet lay dormant since the early stages of natural science, could eventually come out into the open and unite its force with that of natural science, or at least run parallel to it. It is possible to respect the tradition of science, its allegiance to the Enlightenment, and the necessity of freedom from religious dogma and still be open to spirituality both as a topic for scientific inquiry and as a possible mode of experiencing, or at the very least as a way of generating knowledge about our consciousness. This should be enough to drop the skeptical or hostile stance still noticeable among scientists when topics involving spirituality arise. We hope to have shown that this expectation is warranted by the early history of scientific endeavors and more recent insights into the nature of both science and spirituality.

But is reconnecting science and spirituality also necessary?

Conclusion: Spirituality as an Integral Part of Science

We have shown that science need not shun spirituality if the distinction between religion and spirituality is kept in mind. Our thought experiment demonstrates that spirituality may have an impact on some important social issues. Indeed, an empirical study of meditation in prison shows just that (Chandiramani et al. 1994), and many studies reveal the impact of meditation practice on crime rates, health status, and subjective parameters (Buchheld, Grossman, and Walach 2001) as well as on rehabilitating addicts. A possible remedial mechanism is the closing of a split between cognition and affect/emotions, the rebalancing of the self-other relation, and a better appreciation of context dependence and independence (Blakeney, Blakeney, and Reich 2005). Although research into the effect of spiritual engagement is scattered, unsystematic, and recent, first results seem promising in the sense that the subject matter of spiritual practices and their outcomes should be studied thoroughly (Grossman et al. 2004). But, apart from the effects of spiritual practices on different sorts of individual outcomes and its impact on the community, is spiritual experience important for science in a deeper sense? Does it touch scientific reality, and, if so, how and to what extent?

The earlier question, which has yet to be answered, is whether spiritual experiencing is more than hallucination and self-entertainment of a complex neuronal system left to play with itself. Spiritual traditions would, of course, answer "Yes, it is more." But it has rightly been observed that the mere consensus of persons experiencing the same "reality" does not guarantee that what is experienced is indeed reality or has anything to do with it (Weis 2002). It might simply be a consensual hallucination. Social perception experiments have demonstrated that perception can be adapted to social demands in a way that is believed to be perceived something different from reality conforming to the current social construction of reality (Asch 1952). Spiritual traditions would counter that the social functioning of persons who have had such spiritual experiences is usually improved, and they pass well the test of reality. Besides, the phenomenology of the experience is such that a deep sense of touching reality as it is flavors it (James [1902] 1985). A critic would counter by saying that this is to be expected, since our brain is the reality-constructing organ of our body, and by falling back on itself what else should the brain encounter than its own reality in some sense? (Roth 1997)

There is an additional argument worth considering: If what the mind is and experiences, namely consciousness, is not only an emerging property of the brain as a complex system but a complementary aspect of reality, then using consciousness as a vehicle of experiencing this reality means indeed touching reality. Consciousness would then touch reality not in its material but in its complementary manifestation (Globus 2003). In that case, spiritual experience and its scientific study could help us understand

consciousness and its relation to the brain. We need not embark on an open or cryptic version of idealism in order to postulate that spiritual experience is a way of touching reality, as, for instance, Wilber (1997) does. A neutral monist position with dual aspects would do the job (Velmans 2002). What would be incompatible with a position holding that spiritual experience touches reality is a radically reductionist materialist position in the mind-body discussion.

There is another angle to these considerations. Every good scientific theory carries an element of nonalgorithmic reasoning, which was called abduction by Charles Sanders Peirce (Sebeok 1985; Wirth 1996), a fact that was in essence already pointed out by Aristotle in his last part of the Organon (Aristotle [c. 350 B.C.E.] 1990). We would venture to postulate that those intuitive insightful moments (Sternberg and Davidson 1995) at which an idea lights up in the mind of a researcher as the seminal outline of a new theory which then has to be worked out and tested are akin to spiritual experiences. Plato, in his sixth letter, described the insight into truth as a sudden lightening up, using the terminology of spiritual experience (Plato [c. 360 B.C.E.] 1967). Every great scientific success, be it Newton's literal apple that gave him his insight into gravitation, Albert Einstein's ideas about relativity, or Max Planck's, Niels Bohr's, Erwin Schrödinger's, and Werner Heisenberg's concept of quantum mechanics, started with a seminal, intuitive grasp of reality (Primas 1981), akin to a spiritual experience. This nonalgorithmic, abductive reasoning, which is holistic and synthetic and gives science its guiding notions and nascent theories, is a mode of insight complementary to the analytic way of everyday science (Nisbett et al. 2001). We presume that an intuitive, experiential grasp of reality is at the base of that process, which is very similar to that advocated in spiritual traditions proper if not identical in essence.

The spark of creativity, the speck of (sudden) nonanalytic intuitive awareness seminal to science, might be from the same source as the light of spiritual enlightenment, a fact pointed out already by Grosseteste at the cradle of scientific reasoning during the twelfth and thirteenth centuries (Grosseteste [ca. 1230] 1912; Crombie 1953; Southern 1986). If this is true, science and spirituality have a common ground not only in their respective initiation. They also have a common goal: to understand reality. Moreover, they are ignited and nourished by the same initial process: an experiential, intuitive, holistic grasp of reality, realized by consciousness turning back on itself and touching reality experientially. Their ways part later on: while spirituality tries to deepen this inner experiential grasp of reality, science turns toward the world and explores the ramifications of the initial grasp by rational thinking, by outward-bound experience, and by many small inductive steps.

Thus, science and spirituality could well be complementary modes of knowing and understanding reality, especially if the issue to be researched

is the position and the role of human beings in a sustainable environment. Bohr, who made complementarity (Laurikainen 1988) the key notion of quantum mechanics, borrowed this concept from psychology (Plaum 1992). He had come to know the vexing figure-ground images of Edgar Rubin that represent two things as one or the other: an old hag or a young beauty, a rabbit or a duck, two faces or a chalice. It was recently shown that complementarity is indeed a notion of quantum mechanics that cannot be reduced or relinquished and is thus basic to our scientific grasp of reality (Kim and Mahler 2000). We take it that in such a sense science and spirituality are complementary: They both try to touch reality in their respective ways and by their respective methods of experiential knowledge. Seemingly, they both mutually exclude each other; either we think or we meditate, either we open our senses and experience the world or we turn inward and experience our inner world. And yet they are both necessary to describe the full meaning of knowledge. In that sense they are not reducible to each other; neither is one of them more important. They have different domains and scopes, and in a given context one explains more than the other does (Reich 2002). Together, they constitute what human methods of understanding the world we have.

While science and science-based technology have already rendered huge practical services to humankind, from agriculture and animal husbandry to zener diodes and zip fasteners, spirituality may yet produce at least equally important results, even if it is a more difficult approach that is less foreseeable in its results. Here we are not thinking only of medicine, psychiatry, psychotherapy, and rehabilitation from substance abuse but also of more spiritual personal and societal life styles that involve goals and satisfactions (Giacalone and Jurkewicz 2003) other than production and consumption at a level that is unsustainable—worldwide, anyway. The time has come for reconnecting science and spirituality.

NOTES

Harald Walach is funded by the Samueli-Institute. The thoughts expressed in this essay have been nourished by many discussions and collaborations, mainly with Hartmann Römer, Günther Mahler, and Theo Pindl. Walach gratefully acknowledges clarifications of the scope of spirituality through many talks and discussions with Pia Gyger and Niklaus Brantschen. For Helmut Reich's numerous acknowledgments see Reich 2002, xiii–xiv.

1. The magazine *Science and Spirit* (under the new editorship of Karl Giberson) informs the general reader on developments that reconnect science and spirituality.
2. This is one reason why we do not discuss its numerous, controversial definitions but restrict ourselves to presenting a summary that reflects our own ideas.
3. This is clearly the case for classical Buddhism and Vedanta, less so for some other religions. However, Islam has Sufism, and Christianity has many spiritual leaders from Augustine, Hildegarde of Bingen, Bonaventura, Marguerite Porete, Meister Eckhart, Julian of Norwich, Ignatius of Loyola, Teresa of Avila, and John of the Cross to their present-day successors.

REFERENCES

Adelard of Bath. [c. 1137] 1998. *Conversations with His Nephew: On the Same and the Different, Questions on Natural Science, and on Birds*. Cambridge: Cambridge Univ. Press.

Aitken, Robert. 1988. *Zen als Lebenspraxis*. München: Diederichs.

Aristotle. [c. 350 B.C.E.] 1990. *Aristoteles, Lehre vom Beweis oder Zweite Analytik (Organon IV)*. Hamburg: Meiner.

Asch, Solomon E. 1952. *Social Psychology*. New York: Prentice Hall.

Aspect, Alain, Phillippe Grangier, and Gérard Roger. 1981. "Experimental Tests of Realistic Local Theories via Bell's Theorem." *Physics Review Letters* 47:460–63.

———. 1982. "Experimental Realization of Einstein-Podolsky-Rosen-Bohm Gedankenexperiment: A New Violation of Bell's Inequalities." *Physics Review Letters* 49:91–94.

Atmanspacher, Harald. 2003. "Mind and Matter as Asymptotically Disjoint, Inequivalent Representations with Broken Time-reversal Symmetry." *Biosystems* 68:19–30.

Atmanspacher, Harald, H. Römer, and Harald Walach. 2002. "Weak Quantum Theory: Complementarity and Entanglement in Physics and Beyond." *Foundation of Physics* 32:379–406.

Bell, John S. 1964. "On the Einstein-Podolsky-Rosen Paradox." *Physic*s 1:195–200.

———. 1987. *Speakable and Unspeakable in Quantum Mechanics*. Cambridge: Cambridge Univ. Press.

Blakeney, Charles D., Ronnie F. Blakeney, and K. Helmut Reich. 2005. "Leaps of Faith. The Role of Religious Development in Recovering Integrity among Jewish Alcoholics and Drug Addicts." *Journal of Mental Health, Religion and Culture* 8:63–77.

Buchheld, N., Paul Grossman, and Harald Walach. 2001. "Measuring Mindfulness in Insight Meditation (Vipassana) and Meditation-Based Psychotherapy: The Development of the Freiburg Mindfulness Inventory (FMI)." *Journal for Meditation and Meditation Research* 1:11–34.

Chandiramani, K., S. K. Verma, P. L. Dhar, and N. Aggarwal. 1994. "Psychological Effects of Vipassana on Tihar Jail Inmates: A Preliminary Report." In *Vipassana—Its Relevance to the Present World: An International Seminar*, Vipassana Research Institute, April 1994. New Delhi, Mumbai, India: Apollo.

Crombie, Robert. 1953. *Grosseteste and the Origins of Experimental Science 1100–1700*. Oxford: Clarendon.

Depraz, Natalie, Francisco J. Varela, and Pierre Vermersch. 2003. *On Becoming Aware*. Amsterdam: John Benjamins.

Easlea, Brian. 1980. *Witch Hunting, Magic and the New Philosophy: An Introduction to the Debates of the Scientific Revolution 1450–1750*. Brighton, England: Harvester.

Einstein, Albert, Boris Podolsky, and Nathan Rosen. 1935. "Can Quantum-Mechanical Description of Reality be Considered Complete?" *Physical Review* 47:777–80.

Feigl, Herbert. 1975. "Russell and Schlick. A Remarkable Agreement on a Monistic Solution of the Mind-Body Problem." *Erkenntnis* 9:11–34.

Flasch, Kurt. 1989. *Aufklärung im Mittelalter? Die Verurteilung von 1277*. Das Dokument des Bischofs von Paris, eingel., übers. und erkl. v. K. Flasch. Mainz: Dieterich.

Fleck, Ludwik. [1935] 1980. *Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv.* Mit einer Einleitung herausg. v. L. Schäfer und T. Schnelle. Frankfurt: Suhrkamp.

Foerst, Anne, and K. Helmut Reich. 2002. "Welches Symbol für den Menschen: Roboter oder Abbild Gottes?" *Die Neue Sammlung* 42:379–403.

Giacalone, Robert A., and Carole L. Jurkiewicz, eds. 2003. *Handbook of Workplace Spirituality and Organizational Performance*. New York: M. E. Sharpe.

Globus, Gordon G. 2003. *Quantum Closures and Disclosures. Thinking-Together Postphenomenology and Quantum Brain Dynamics*. Amsterdam: John Benjamins.

Grosseteste, Robert. [c. 1230] 1912. *Die philosophischen Werke des Robert Grosseteste, Bischof von Lincoln*, besorgt v. L. Baur. Beiträge zur Geschichte der Philosophe des Mittelalters 9. Münster: Aschendorff.

Grossman, P., L. Niemann, S. Schmidt, and Harald Walach. 2004. "Mindfulness-based Stress Reduction and Health Benefits: A Meta-analysis." *Journal of Psychosomatic Research* 57: 35–43.

Habermas, Jürgen. 1973. *Erkenntnis und Interesse*. Frankfurt: Suhrkamp.
Hissette, Roland. 1977. *Enquête sur les 219 articles condamnés à Paris le 7 mars 1277*. Philosophes Médiévaux 22. Louvain: Publications Universitaires.
Horkheimer, Max, and Theodor W. Adorno. [1969] 2000. *Dialektik der Aufklärung. Philosophische Fragmente*. 12th ed. Frankfurt/M.: Fischer.
Husserl, Edmund. 1977. *Die Krisis der europäischen Wissenschaften und die transzendentale Philosophie*. Hamburg: Meiner.
James, William. [1902] 1985. *The Works of William James. The Varieties of Religious Experience*. Cambridge: Harvard Univ. Press.
The John Templeton Foundation. 1996. *Who's Who in Theology and Science*. New York: Continuum.
Kapleau, Philip. 1969. *The Three Pillars of Zen: Teaching, Practice, and Enlightenment*. New York: Harper.
Kim, Iilki, and Günter Mahler. 2000. "Uncertainty Rescued: Bohr's Complementarity for Composite Systems." *Physis Letters A* 269:287–92.
Kirsch, Irving, and Michael E. Hyland. 1987. "How Thoughts Affect the Body: A Metatheoretical Framework." *The Journal of Mind and Behavior* 8:417–34.
Larson, Edward J., and Larry Witham. 1998. "Leading Scientists Still Reject God." *Nature* 394:313.
Laudan, Larry. 1977. *Progress and Its Problems: Towards a Theory of Scientific Growth*. Berkeley: Univ. of California Press.
Laurikainen, Kalervo Vihtori. 1988. *Beyond the Atom: The Philosophical Thought of Wolfgang Pauli*. Berlin, Heidelberg: Springer.
Nisbett, Richard E., I. Choi, K. Peng, and Ara Norenzayan. 2001. "Culture and Systems of Thought: Holistic versus Analytic Cognition." *Psychological Review* 108:291–310.
Oeser, Erhard. 1979a. *Wissenschaftstheorie als Rekonstruktion der Wissenschaftsgeschichte. Band 1: Metrisierung, Hypothesenbildung, Theoriendynamik*. München: Oldenbourg.
———. 1979b. *Wissenschaftstheorie als Rekonstruktion der Wissenschaftsgeschichte. Band 2: Experiment, Erklärung, Prognose*. München: Oldenbourg.
Peterson, Gregory. 2003. "Demarcation and the Scientific Fallacy." *Zygon: Journal of Religion and Science* 38 (December): 751–61.
Petranker, Jack. 2003. "Inhabiting Conscious Experience. Engaged Objectivity in the First-Person Study of Consciousness." *Journal of Consciousness Studies* 10 (12): 3–23.
Plato. [c. 360 B.C.E.] 1967. *Briefe—Griechisch-Deutsch*. Ed. W. Neumann. München: Heimeran.
Plaum, E. 1992. "Niels Bohrs quantentheoretische Naturbeschreibung und die Psychologie." *Psychologie und Geschichte* 13:94–101.
Primas, Hans. 1981. *Chemistry, Quantum Mechanics and Reductionism*. Heidelberg: Springer.
Reich, K. Helmut. 2000a. "Scientist vs. Believer? On Navigating between the Scilla of Scientific Norms and the Charybdis of Personal Experience." *Journal of Psychology and Theology* 28 (3): 190–200.
———. 2000b. "The Leaping Lamb: Investigating the Spirituality of Children." *Science & Spirit* 11 (July/August): 46–49.
———. 2001. "Spiritual Development: Han F. de Wit's and Stanislav Grof's Differing Approaches." *Zygon: Journal of Religion and Science* 36 (September): 563–74. In German: *Transpersonale Psychologie und Psychotherapie* 8 (2002): 85–96.
———. 2002. *Developing the Horizons of the Mind: Relational and Contextual Reasoning and the Resolution of Cognitive Conflict*. Cambridge: Cambridge Univ. Press.
Roth, Gerhard. 1997. *Das Gehirn und seine Wirklichkeit. Kognitive Neurobiologie und ihre philosophischen Konsequenzen*. Frankfurt/M.: Suhrkamp.
Schweitzer, Albert. [1923] 1999. *Die Weltanschauung der Ehrfurcht vor dem Leben. Kulturphilosophie III* (hrsg. von C. Günzler und J. Zürcher). München: Beck.
Sebeok, Thomas A. 1985. "One, Two, Three . . . Spells UBERTY." In *Der Zirkel oder im Zeichen der Drei: Dupin, Holmes, Peirce*, ed. U. Eco and T. A. Sebeok, Supplemente Bd. 1:15–27. München: Fink.
Southern, Richard William. 1986. *Robert Grosseteste: The Growth of an English Mind in Medieval Europe*. Oxford: Clarendon.
Sternberg, Robert J., and Janet E Davidson, eds. 1995. *The Nature of Insight*. Cambridge, Mass./London: MIT Press (Bradford).

Suzuki, Shunryu. 1970. *Zen Mind, Beginners Mind*. Ed. Trudy Dixon. New York/Tokyo: Weatherhill.
Thijssen, Hans. 2003. "Condemnation of 1277." *The Stanford Encyclopedia of Philosophy,* ed. E. N. Zalta. *http://plato.stanford.edu/entries/condemnation.*
van Huyssteen, J. Wentzel Vrede, ed. 2003. *Encyclopedia of Science and Religion*. New York: Macmillan Reference.
Vandenbroucke, F. 1950. "Le divorce entre théologie et mystique. Ses origines." *Nouvelle Revue Théologique* 72:372–89.
Velmans, Max. 2002. "How Could Conscious Experiences Affect the Brain?" *Journal of Consciousness Studies* 9 (11): 3–29.
Walach, Harald, and Hartmann Römer. 2000. "Complementarity is a Useful Concept for Consciousness Studies. A Reminder." *Neuroendocrinology Letters* 21:221–32.
Weis, Hans-Willi. 2002. "Ken Wilbers transpersonale Systemspekulation—Eine kritische Auseinandersetzung." In *Transpersonale Forschung im Kontext*, ed. W. Belschner, J. Galuska, H. Walach, and E. Zundel, 101–14. Oldenberg: Bibliothek & Informationssystem (BIS).
Wilber, Ken. 1997. *The Eye of Spirit: An Integral Vision for a World Gone Slightly Mad*. Boston: Shambala.
———. 1998. *The Marriage of Sense and Soul: Integrating Science and Religion*. New York: Random House.
Wirth, U. 1996. "Abduktion und ihre Anwendungen." *Zeitschrift für Semiotik* 17:405–24.