

# Thinkpiece

## SCIENCE AND RELIGION: GETTING READY FOR THE FUTURE

by Antje Jackelén

*Abstract.* I explore three challenges for the current dialogue between science and religion: the challenges from hermeneutics, feminisms, and postmodernisms. *Hermeneutics*, defined as the practice and theory of interpretation and understanding, not only deals with questions of interpreting texts and data but also examines the role and use of language in religion and in science, but it should not stop there. Results of the post-Kuhnian discussion are used to exemplify a wider range of hermeneutical issues, such as the ideological potential of scientific concepts, the dynamics of interdisciplinarity, and the significance of the socioeconomic situatedness of science and religion. *Feminist research* analyzes the consequences of the interplay of masculine, feminine, and gender typologies in religion and science. Examples from the history of science as well as current scientific conceptualizations indicate that beliefs in the inferiority of woman form part of our inherited scientific, religious, and metaphysical framework. It is argued that *postmodernism* in its most constructive form shares the best fruits of modernity, especially of the Enlightenment, while avoiding some of its most serious mistakes. In conclusion, reflecting on the three publics engaged in the dialogue between science and religion—academe, religious communities, and societies—I offer constructive suggestions and critical observations concerning the future of this dialogue.

*Keywords:* construction; Enlightenment; feminism; future; hermeneutics; ideology; interdisciplinarity; language; post-Kuhnian debate; postmodernism; principle of permanent critique; rationality; religion; science; socioeconomics; theology.

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This essay is written from a Christian theological perspective. Most of the examples emerge from that context. I am aware of the risk of this particularity, but I also think that the way to openness, inclusiveness, and wholeness goes via particularity. Properly understood, particularity is not self-enclosed but always open toward that which discloses and transcends its own self-understanding. This is why I think that honest particularity transcends itself into an ethically informed openness toward the other. It is my hope that this article contributes to such openness.

The main part is devoted to the discussion of three challenges to science and religion: hermeneutics, feminisms, and postmodernisms. I conclude by sharing some thoughts about future expectations.

#### LOOKING AT THREE CHALLENGES FOR SCIENCE AND RELIGION TODAY

*The Challenge of Hermeneutics.* What is hermeneutics? The dictionary definition is usually something like “the practice and theory of interpretation and understanding.” I often say that hermeneutics is what turns suspicion from a vice into an art. Hermeneutics is taking seriously the critical questions of how we understand and how we interpret. Hermeneutics is a constructive way of handling the suspicion that we might never get it all right. It is not just a name of a method of the human sciences; it is about the nature of understanding itself. Or, put differently, there is a “hermeneutic fore-structure” (Caputo 2000, 156) preceding all kinds of knowledge.

A recent conference on religion and science stated that hermeneutics matters, both in science and in religion.<sup>1</sup> It also found that issues of hermeneutics probably have played less of a role for the religion-and-science dialogue than they should have. I have a hunch that hermeneutics in religion and science in the future will need to reach beyond questions like whether or not critical realism or naturalism provides an adequate epistemological framework.

Evidently, the concept of language is crucial in hermeneutics. Niels Bohr and Werner Heisenberg spent time and effort reflecting on the role of language in general and in the natural sciences in particular. They rightly noticed that language is not an individual but an interpersonal skill. It is learned only in interaction. “Language is,” reports Heisenberg from a conversation with Bohr, “as it were, a net spread out between people, a net in which our thoughts and knowledge are inextricably enmeshed” (Heisenberg 1971, 138). In spite of what they call the “strange, fluid character” of language (1971, 134), both seem to agree that the language of mathematical formulae at some point has to pass over into everyday language.<sup>2</sup> “For if we want to say anything at all about nature—and what else does science try to do?—we must somehow pass from mathematical to everyday lan-

guage" (1971, 135). Bohr and Heisenberg conducted these conversations with a couple of colleagues and friends around Easter 1933 in an alpine skiing hut of rather basic standard. Bent over the washing-up bowl one night, Bohr clothed his new insights in a down-to-earth metaphor: "Our washing up is just like our language. . . . We have dirty water and dirty dishcloths, and yet we manage to get the plates and glasses clean. In language, too, we have to work with unclear concepts and a form of logic whose scope is restricted in an unknown way, and yet we use it to bring some clarity in our understanding of nature" (1971, 137).

From these conversations Heisenberg emerges as a hopeful bridge builder between idealism and realism, trying to find possibilities beyond the limits of Aristotelian logic (Heisenberg 1984, 288–301). Bohr appears as an optimistic pragmatist: language is terribly imprecise, yet it works. Albert Einstein remains in this respect more of a pessimistic idealist, concerned as he is with a Lord who is "raffiniert, aber nicht boshaft," subtle but not malicious (Fölsing 1994, 579; cf. Jackelén 2002, 214–20).

From an awareness of the role of language to a full-fledged hermeneutical discourse is quite a way. A detailed description of the geography of that journey would go beyond the limits of this essay. Therefore, I offer just a few remarks.

Reflection on language and interpretation has often been focused on the hermeneutical process of the individual (Cf. Keller 1992). In addition, we need to ask how interpretations relate to judgments of a whole community of scholars on what is and what is not an adequate description of reality. I once heard a scientist make the claim that Heisenberg and Bohr were able to come up with uncertainty and complementarity because they were familiar with thinking in terms of mystery and paradox by means of their immersion in crucial features of their religion (Dick 2001, 150). I do not support this claim. But I do think that there is evidence enough to state that the interplay of religious, philosophical, and scientific views has shaped interpretation and understanding—sometimes enhancing, sometimes misleading. For example, as I have shown elsewhere (Jackelén 2002, 170–92), it is striking how well Newton's mathematical system fits his theological concepts. The clarity of absoluteness and determinism calls for a God who is one—Newton detested the doctrine of the Trinity (Westfall 1980, 311 ff.; Petry 1994, 427)—and whose foremost attribute is power, understood as omnipotence and omnipresence. For the inventor of calculus, especially in Newton's form as compared to that of Leibniz, it made perfect sense to conceptualize God above all as the determiner of the initial conditions. God's omnipotence and the elegance of calculus make up a perfect couple. In Einstein's case, it is well known how clearly his problems with a dice-throwing God resonated with his repugnance to some of the implications of quantum theory (Jackelén 2002, 206ff.). It also has been shown that more recent cosmological theories still follow the same

theological pattern: "God is again identified with the abstract mathematical structure that governs the evolutionary process of the universe. God, basically reduced to the total interaction of all forces in a comprehensible and comprehensive theory, is again identified with the one in control," as James F. Moore points out in his analysis of the cosmological concepts of Frank Tipler, Stephen Hawking, Paul Davies, and Steven Weinberg (Moore 1995, 621).

The critical discussion of Thomas Kuhn's concept of paradigm and its role in so-called scientific revolutions has rendered some precious hermeneutical insights. It highlighted the historical situatedness of scientific research and the role of consensus in rationality. It lifted up the interplay of scientific and nonscientific components in the development of science. It focused on the ambiguity of commitment as that which can both undercut rationality and make scientific work successful. And it acknowledged the circularity of abstracting data into a paradigm (or theory) that informs the selection and interpretation of new data.

Among the enduring fruits of the post-Kuhnian debate I would count: a broadened concept of rationality and an affirmation of the complexity and contextuality of rationality; a constructive discussion on the translatability of various discourses; a critique that questions the self-assuring power of paradigms, calling for an examination of the roles not only of culture in general, huge though that influence is, but also of race, gender, age, and political and economic power in the process of forming guiding ideas; and an exploration of discourses that call themselves postfoundationalist (van Huyssteen 1999).

Hermeneutical reflection has taught us suspicion toward singular forms (singular in the grammatical, not the mathematical, sense). We have realized the need to acknowledge the diversity of the different bodies of knowledge. Rather than science *per se*, we speak of sciences. Rather than of religion or theology, we speak of religions and theologies. The study of the sciences in terms of history, sociology, pedagogy, and psychology of sciences also adds new hermeneutical dimensions to the scientific discourse. In a similar way, the study of religion in terms of history, sociology, pedagogy, and psychology of religions adds extra dimensions not only to the understanding of religions themselves but to the religion-and-science dialogue, making it ever more obvious that scientists of different disciplines and theologians from different traditions need each other.

Hermeneutical analysis also has shed light on the process of how models, metaphors, or theories that are successful in one area extend their influence to a whole range of different areas. Scientific vocabulary has what I have called a potential of building ideology, which should not be underestimated. Scientific concepts influence areas outside their homelands. They are also subject to reverse influence from other areas. For example, the success of explanation of the mechanics of heaven and earth in terms of

the one force of gravitation triggered an enthusiastic search for the one principle and unified structure in many other areas (Wertheim 1997, 119f.). The concept of evolution has set off, and still does, more or less imaginative accounts of development in various areas of knowledge. The formulation of the principle of complementarity prompted explanations in terms of complementary relationships outside of its original context. Simplicity, complexity, and beauty are other keywords that live a complicated life inside and outside both religion and science. The exploration of the significance of this life has only just begun (see McAllister 1999). Hermeneutics is a necessary tool to access and to assess these processes of migration of what Isabelle Stengers has called “concepts nomades” (Stengers 1987).

It goes without saying that hermeneutical investigations need to be conducted in an interdisciplinary mode. Interdisciplinarity means mutual acknowledgment of different disciplines as distinct and complicated bodies of knowledge. In religion-and-science circles this may sound self-evident, but it really is not. There is still a popular understanding out there that science is the field for experts whereas religion is a field for everybody. You need to show your expertise in order to talk astrophysics or molecular biology, but you need not have any particular training to talk religion and theology (the latter understood as the critical and self-critical reflection about the content and effects of religious traditions). We have often ended up with books containing thick science and very thin theology.

Another misconception to get rid of is the assumption that the sciences are always in progress while theology stands still and always looks back. We know it is not true. It happens that science looks back and scientists pick up theories and models from the past revisiting what seemed to be blind alleys in the history of science. And theology is certainly changing all the time. Yet, scientists and philosophers sometimes behave as if there were no difference between theologies at the time of Galileo, Newton, Darwin, Einstein, and Hawking.

Finally, hermeneutics itself faces the seemingly impossible task of providing a critique of the hermeneutical process itself. Context matters. The process behind and around research matters, too, not only the results. The consequences, which might arise far from the origin, likewise matter. This applies to the detonation of a bomb far from its scientific origins as well as to less tragic and spectacular processes. If for example Bruno Latour is right in his essay “Give Me a Laboratory and I Will Raise the World,” we should pay more attention to laboratories as spaces “where the future reservoirs of political power are in the making” and to the costs of the construction and transformation of society according to laboratory experiments (Latour [1983] 1999, 273).

This also implies that we need to take a critical look at what “the market” means to science as well as to religion. The market has become an

anonymous power, at times acting fairly irrationally, irrespective of national borders, exercising enormous influence by moving index figures a fraction of a percent up or down. For a long time it seemed that the impact of this was not a proper theme for a decent dialogue between science and religion. To some it sounds like too crude a question, for others a question too complicated to address and too far away from pure science and pure theology. However, it is obvious that science and religion are also subject to the economic structures governing the societies in which these activities are pursued. The increase of privately funded research in biotechnology over against publicly funded academic projects impacts the agenda. It certainly matters who funds research activities and education and who pays for the results. It certainly matters globally whose questions are allowed to be on the top of the agenda and whose interests never make it to the table. It certainly matters globally who benefits from something in the first place, who in the second and third place, and who will probably never do so.<sup>3</sup> We need to be able to place our own areas of knowledge on a global map. Cyberspace often creates the illusion that space does not matter. It does.

These are all examples of issues that point to the importance of hermeneutical reflection. Such reflection will probably not bring us to a position of serene clarity. Rather, it will force us into what theologian Rita Nakashima Brock has called “life in the messy middle of things” (1993, 43f.). It is not the most glorious place we can think of, but for the sake of credibility, I think the dialogue between religion and science needs to be taken there, and needs to take place there. If the dialogue is not helpful in the messy middle of life, we should spend our lifetime on other things.

*The Challenge from Feminisms.* At the age of 41 or 42, probably in 1602 or 1603, the great Francis Bacon ponders on the right method to pass on scientific knowledge (Farrington 1964, 18). Looking for the right interpretation and the right pedagogy, he writes a monologue addressed to a young man whom he calls “son.” It is what we know as the fragment “The Masculine Birth of Time.” With blistering criticisms of many of the great thinkers—he calls them “the whole mob of professorial teachers” and asks whether someone will not “recite the formula by which I may devote them all to oblivion”<sup>4</sup>—he arrives at what is his own agenda:

My intention is to impart on you, not the figments of my own brain, nor the shadows thrown by words, nor a mixture of religion and science, nor a few commonplace observations or notorious experiments tricked out to make a composition as fanciful as a stage-play. No; I am come in very truth leading to you Nature with all her children to bind her to your service and make her your slave. . . . So may it go with me, my son; so may I succeed in my only earthly wish, namely to stretch the deplorably narrow limits of man’s dominion over the universe to their promised bounds. . . . (Bacon [1653] 1964, 62)

My dear, dear boy, what I purpose is to unite you with *things themselves* in a chaste, holy and legal wedlock; and from this association you will secure an increase beyond all the hopes and prayers of ordinary marriages, to wit, a blessed race of Heroes or Supermen who will overcome the immeasurable helplessness and poverty of the human race. . . . Take heart, then, my son, and give yourself to me so that I may restore you to yourself. ([1653] 1964, 72)

We see here an intricate play with male and female typology. On the one hand we have nature with all her children to be bound to service and slavery. When “a true son of science . . . has left the antechambers of nature trodden by the multitude, an entrance at last may be discovered to her inner apartments” (Bacon 1859, 344 [Preface]). Here, “the secrets of nature betray themselves more readily when tormented by art,” as Bacon says in “*Novum Organum*” (1859, 363 [Summary of Second Part, Aphorism 98]). This sounds pretty much like what has been described as the spirit of the English Royal Society: the male scientist subdues the feminine nature, penetrates her, and forces her to reveal her secrets (Von Wright 1986, 65). Or, more poetically expressed in Thomas Sprat’s *History of the Royal Society*, “The Beautiful Bosom of *Nature* will be Expo’d to our view: we shall enter into its *Garden*, and tast [sic] of its *Fruits*, and satisfy our selves with its *plenty*” (Sprat 1958, 327). On the other hand, we hear about the scientist’s holy and chaste wedlock to science. In Bacon’s world, also science is female, and powerfully so: “. . . science must be such as to select her followers, who must be worthy to be adopted into her family” (Bacon 1964, 62). Science is the saint who gathers her followers in monastery-like noble communities, whereas nature is the wild woman that needs to be forced into submission. Variations of this typology have survived well into modern times.

In his Nobel Lecture 1965, Richard Feynman did what he called “something of less value,” namely, describing not only the facts but also the process behind his work on quantum electrodynamics. This, he says, is of value neither scientifically nor for understanding the development of ideas; its only value is “to make the lecture more entertaining” (Feynman 1965, 155)—a viewpoint surprisingly unaware of the hermeneutical perspectives just raised. His conclusion sounds like this: “So what happened to the old theory that I fell in love with as a youth? Well, I would say it’s become an old lady, that has very little attractive left in her. . . . But, we can say the best we can for any old woman, that she has been a very good mother and she has given birth to some very good children” (1965, 178).

What may sound somewhat playful can distort the truth about facts and is in need of critique. Dealing with science-and-religion issues, feminist scholarship has developed this critique in three main areas:

1. raising issues of ethics and politics that are basically human issues, equally involving women, men, children, and the nature we all relate to;

2. addressing issues of exclusion and inclusion of women and their work, and of minorities and their cultures, especially focusing on the use of religious themes in science;
3. demonstrating how gender categories are informing and biasing both research agendas and the interpretation of data, feminist research has analyzed and suggested different ways of doing science.

A number of scholars have provided analyses of gender relations, arising from biological, social, and cultural conditions, which are a matter for both sexes and genders and not just for feminists. I mention only a few here, focusing mainly on the second and third areas.

Carolyn Merchant (1989) has described how during the sixteenth and seventeenth centuries the image of an organic cosmos with a living female earth at its center was replaced by a mechanistic worldview in which nature was reconstructed as dead and passive, to be dominated and controlled by humans. She uses the history of mining as an example of how feminine imagery of nature was used. Londa Schiebinger (1989) has described many nuances of the dynamics of gender in the history of science, such as the interplay of representations of science in female and male symbols. She has given numerous examples of the manifold contributions of women in the realm of the sciences as well as of the obstacles they met. And she has argued that with the disappearance of the female symbolism in the scientific culture in the late eighteenth century, the history of science was rewritten in a way that diminished or excluded the achievements made by women. Margaret Wertheim (1997) has pointed out that from Pythagoras to Kepler, Newton, Boskovitch, Faraday, Einstein, and beyond, scientific research has been fueled by a religious belief in the unity and harmony of nature—with mathematical man as the high priest of science. Also John Barrow (1991, 15f.) has pointed to religiously motivated enthusiasm as the root for the powerful concept of laws of nature, and Mary Midgley (1985; 1992) has repeatedly explored the religious dimensions of science. I do not know whether Hawking made the connection between a Theory of Everything and knowing the mind of God out of conviction or in order to make his book a bestseller, but both the retail success of *A Brief History of Time* and the long history of this kind of connection suggest that there is something important going on here. Wertheim asks critically: On what grounds are enormous mental and material resources invested into the race for a Theory of Everything? What is defensible from a social-justice point of view, and what is not? Her thesis that physics is like the Catholic Church of science, which to the very last denies women priesthood, may seem a bit overdone. On the other hand, the ratio of men and women present at the founding meeting of the International Society for Science and Religion (ISSR) seems to suggest the possibility that Wertheim has something like a point here.<sup>5</sup>



The parallels between science and ecclesiastical authoritarianism have also been critiqued from a Native American perspective, as for example by Vine Deloria Jr. European thinkers have failed, argues Deloria, because “Science and philosophy simply copied the institutional paths already taken by Western religion and mystified themselves. . . . Institutionalization of science . . . meant that scientists would come to act like priests . . .” (Deloria 1995, 17), and he adds, “As many lies are told to protect scientific doctrine as were ever told to protect ‘the church’” (1995, 18). True or not, the effects on American Indians Deloria points to resemble very much what feminist writers have observed concerning the position of women. They are used as objects of research and as informants but not regarded as fellow researchers and partners. In her book *The Less Noble Sex*, Nancy Tuana has demonstrated the reflective and constructive impact of scientific, philosophical, and religious conceptions of woman. Traveling all the way from Hesiod’s *Theogony* to Freud’s psychology, she concludes, “belief in woman’s inherent inferiority . . . remains a part of the fabric of Western culture” (Tuana 1993, 169). The belief that women are less perfect, less evolved, less divine, less rational, less moral, and less healthy than men, and hence in need of control, forms part of our inherited metaphysics (1993, xi). This belief nurtures the construction of maleness and femaleness in relation to the subject matters of science as well as in relation to the role of the scientist, as Sharon Traweek has pointed out in her essay “Pilgrim’s Progress: Male Tales Told during a Life in Physics” ([1988] 1999).

Feminist discourse has come a long way from the analysis of how categories of sex are applied in religion and science to the study of how gender is construed and how these constructions operate in various areas of scientific theory and praxis. In this sense, the focus is on different ways of doing science—what I described as the third area of feminist research of special relevance for religion and science. Nancy Howell and others have argued that interpretations of the interaction between sperm and egg and the cell nucleus and cytoplasm in terms of marriage metaphors have been misleading (Howell 1999a, 873; 1999b, 7; Tuana 1993, 170f.). Examples like these reflect a deeply rooted structure of thought about knowledge, science, and the subjects and the objects of science, where male tends to be associated with active, rational, public, and dominant and female with passive, irrational/emotional, private, and subordinate.

Emily Martin has examined the central images in popular and scientific literature on immunology. She found an overwhelming presence of war vocabulary, such as battlefield, invasion, Blitzkrieg, mines, bombs blasting through the invader’s cell membrane, and execution. The body is seen in the image of a national state that seeks to identify intruders and put them out of action. It is about distinguishing self from nonself and eliminating the latter, the other, either by the so-called killer T cells, often described

with male associations, or by the less aggressive, evolutionarily more primitive phagocytes, often described with female associations (Martin [1990] 1999, 363). In her search for alternative images of the body, Martin turns to the Polish biologist Ludwik Fleck, who would rather “speak of a complicated revolution within the complex life unit than of an invasion of it” (Martin [1990] 1999, 368). If instead of focusing on war imagery more attention were given to the relation between microorganisms and macrophages, we would be more likely to reason in terms of ecological interdependency. Martin notes: “Instead of a life and death struggle, with terrorism within and war at the borders, we would have a symbiosis within a life unit that encompasses the body and its environment” ([1990] 1999, 369).

Constructions like these do not happen only in labs, they happen perhaps even more in the field. Comparing Japanese and American research on great apes, Frans de Waal (2001a; 2001b) has shown how conscious and unconscious paradigms—for instance about individualism and social behavior—inform a research agenda and the interpretation of data. Long before Western researchers started to ask questions about social behavior among monkeys and great apes, Japanese scholars had successfully studied patterns of communal behavior. These did not gain much international appreciation as long as the West was attached to an individual-centered agenda, epitomized by the idea of the selfish gene. Anthropologist Sarah Blaffer Hrdy, also looking at research practices in primatology, has argued that early studies of social behavior were distorted by a number of biases (ideological, methodological, and observational) that in many cases made researchers overlook active roles played by females. Studies of baboons show that “[n]ot only are male-female relationships much more reciprocal and complex than previously realized, but there is also much more involvement by males with infants” (Hrdy 1990, 134). Hrdy is critical of simple revisionist strategies that would just replace one set of biases with another. Rather, she encourages what one might call a hermeneutics of permanent multidirectional critical reassessment of scientific theory and praxis.

Karen Barad, to mention an example from epistemology, has developed the concept of agential realism as an epistemological and ontological framework, at least in part inspired by her reading of Bohr. Agential realism takes into account that the practices of the sciences are not only descriptive but also productive. Yet, they are not mere social constructions but “constrained by particular material-discursive factors” (Barad [1998] 1999, 2). In her view,

Agential realism is a feminist intervention in debates between realists and social constructivists. It provides an understanding of the nature of scientific practices which recognizes that objectivity and agency are bound up with issues of responsibility and accountability. . . . Agential realism is not about representations of an independent reality but about real consequences, interventions, creative possibilities, and responsibilities of interacting within the world. ([1998] 1999, 7–8)

Today, we are in possession of numerous contributions that spell out the challenge from feminism. Sandra Harding's *Whose Science? Whose Knowledge?* (1991), Nancy Howell's *A Feminist Cosmology* (2000), Lucy Tatman's *Knowledge That Matters* (2001), Sallie McFague's *The Body of God* (1993), as well as Evelyn Fox Keller, Donna Haraway, Vandana Shiva, Ann Pederson, and Lisa Stenmark all incorporate feminism, science, technology, and religion in their work.

The challenge of feminisms has been a journey in questioning: Who is speaking for whom? Who is speaking from whence? Whose experience and whose knowledge is taken as standard? What does something mean in the perspective of community? This is more than just reversing a flawed agenda. Acknowledging that adequate representation, interpretation, and application is a process far more complicated than not only Francis Bacon and his followers thought but even we ourselves tend to believe, has consequences yet to be seen.

*The Challenge from Postmodernisms.* It would not surprise me if one or another scientist who has read thus far, at this point feels tempted to skip the rest of this article. Many scientists work in a climate where feminism and postmodernism are counted as anti-science. It is hard to understand this in the case of feminism, because there is enough evidence of scientific rigor in the discussion of feminist theories to disprove this belief. But when it comes to postmodernism I have less of a problem seeing why one would be worried on behalf of science. But these are healthy worries.

I can identify with the scientist who says, "Let them tell me that it's all construction, still the technological applications of my science are all very real," or "Let them believe that it is all a matter of interpretation and contextuality, still  $2 + 2$  makes  $4$ , no matter whether you are in Granada or Calcutta, in Canberra or Reykjavik, in Jerusalem or Chicago, on earth or on the moon." We cannot reduce everything to otherness and particularity. As is well known, respect for what is other and care for what is particular are favorites of postmodern thought; they are kind of the good guys in postmodernism. There are after all things left that are marked by sameness and universality, although reduction of diversity to sameness and preoccupation with universal systems are somehow the bad guys in postmodernism.<sup>6</sup> Of course,  $2 + 2$  makes  $4$  on the Indian countryside as well as in Greenland. But as an Indian scholar once told me in a conversation about these issues, "You know, we really appreciate that some Western missionaries said: unless you send not only the boys but also the girls, we will close this school. That was fine. Nevertheless, *how* they taught our children that  $2 + 2$  makes  $4$ , the system they used, the examples they chose, the applications they trained, they were not ours." We have to realize that all theory is value-laden. Data do not simply speak for themselves. There is no innocent communication. Scientific theory communicates also values,

sometimes in a very subtle way. Bacon's optimism that "[g]enuine truth is uniform and self-reproducing" ([1653] 1964, 71) seems naive today.

In its most constructive form postmodernism offers a way between the Scylla of boundless relativism and the Charybdis of rigorous nonambiguity, of totalization, of reduction to sameness. Actually, constructive postmodernism shares some of the best things with Enlightenment thinking: In the same way as the center of Enlightenment thought can be understood—not as the construction of permanent principles but as the establishment of the principles of permanent critique—so also postmodern thought can be understood as the principle of permanent critique. I think I have support for this point by none less than the one who has been called the prophet of deconstruction and the incarnation of postmodernism, Jacques Derrida. "Derrida would describe himself not as a postmodern, but as a man of the Enlightenment, albeit of a *new* Enlightenment, one that is enlightened about the Enlightenment and resists letting the spirit of the Enlightenment freeze over into dogma," as John Caputo has pointed out (Caputo and Scanlon 1999, 2).

Postmodernism does not necessarily say that everything is construction, but it argues that pretty much everything comes along with constructions. "Science does not descend from the sky like a god to save us, but neither are we just making it up as we go along" (Caputo 2000, 154, in describing Heidegger's view of science). There is a solid middle path to walk between the extremes of rigid rationality and fuzzy relativism.

Regarded this way, modernism and postmodernism seem closer to each other than one might think. René Descartes' famous *cogito, ergo sum* (I think, therefore I am) appears to have a respectable partner in a postmodern *dubito, ergo sum* (I doubt, therefore I am). As Descartes invoked God as the guarantor of coherence or perception, so even postmodernists seem to invoke guarantors. More or less surprisingly, some of them—Derrida, Gianni Vattimo, and Caputo—turn to God in one way or another;<sup>7</sup> others, like Emmanuel Levinas, seem to see the guarantee in the face of the other person as the place where transcendence and ethics meet (Levinas 1961, 50f.). The ethical demand expressed in the face of the Other/ the You is of divine dignity.

In my view, the continuity between modernity and postmodernity is far greater than the discontinuity between the two phenomena. There are, no doubt, significant dissimilarities, especially concerning the notions of universalism, totalization, and sameness. But the word *postmodernism* itself, with its connotation of a linear chronology, is perfectly modern. "What then is the postmodern?" asks Jean-François Lyotard, and answers: "It is undoubtedly part of the modern" (Lyotard 1997, 12). We can see still greater similarities, especially if we—as I suggested above—choose to interpret the critiques of the Enlightenment (such as the Kantian critiques of pure and practical reason and of judgment) not as the establishment of permanent principles but as the principle of permanent critique.

In spite of all the differences between modernity and postmodernity, even postmodern thinking in its most constructive shape embraces the message of the parable of the rings as presented by Gotthold Ephraim Lessing in the Enlightenment play *Nathan the Wise*: the noble competition of the best candidates for truth.<sup>8</sup> In this sense, postmodern critique is not as radical as it might look. Actually, it has much in common with what physicist and Nobel laureate Max Born so elegantly stated in his Nobel lecture from 1954, at a time when postmodernism was not yet spoken of:

I believe that ideas such as absolute certitude, absolute exactness, final truth etc. are figments of the imagination which should not be admissible in any field of science. On the other hand, any assertion of probability is either right or wrong from the standpoint of the theory on which it is based. This *loosening of thinking* seems to me to be the greatest blessing which modern science has given to us. For the belief in a single truth and in being the possessor thereof is the root cause of all evil in the world. (Born 1978, 298f.)

Postmodern critique has trained us in healthy suspicion toward the big singulars of our cultures and inspires us to experiment with plural forms. However, embracing the creativity of play and plurality is not the same as ignoring rational structures. Quite the reverse, it is depending on rationality, yet offering more. The postmodern quest, as I understand it, is not a quest for less rationality but for more than rationality. “More than rationality” would mean an understanding of rationality beyond its merely epistemological character. It takes into account the contextuality of rationality and its interrelatedness with emotions, intuition, and various contingencies. It is also critically aware of the fact that rationality tends to carry ideological connotations that privilege certain ways of knowing over others. This “more than rationality” does not say that causes do not matter, but it suggests that there is more to the whole picture than an explanation in terms of *A* causes *B*.

At least two outcomes of the Human Genome Project seem to point in the same direction. There are only a third as many genes as anticipated; and junk DNA (DNA that does not code for proteins) does not seem to be junk after all. Both of these findings suggest that we look in the direction of interaction and relatedness more than we have done before. It is not just that *A* causes *B*, it is also about a web of relations bringing about complex developments. In a similar vein, instead of trying to describe autopoietic systems, maybe we should rather be looking for communiopietic systems (if this linguistic mixture of Latin and Greek is allowed).

Postmodernism asks not in the first place what makes up a system, what knits things together. Rather, it looks for the ruptures and asks what they reveal. That is what deconstruction was about:

A deconstruction is an exhibition of complexity and hidden tensions which demonstrates that beneath the calm surface of unity a thing puts forth there lies a multiplicity of competing elements, that beneath the reassuring look of certitude

and knowledge there is restlessness and undecidability. Underneath the look of seamless continuity there are ruptures and interruptions and disruptive continuities. . . . This is not to say that there is no truth or tradition, but rather that truth and tradition and continuity are not what they say they are. . . . (Caputo 2000, 200)

We could say that deconstruction is a strategy that already was successfully applied by quantum physicists in coping with the frustration of the discovery that quantum theory turned the great expectations of progress in atomic theory into resignation. The understanding of what this rupture revealed was key to the success of quantum theory, as Niels Bohr suggested in 1929 (Bohr 1958, 94; 1985, 249).

Postmodernism is not happy with looking at abstract reason only; it keeps asking what the significance of embodied reason is. It does not diminish the exact knowledge about the molecular components of a drug, but it claims that the knowledge of how anticipated effects of the drug interact with such semi-exact or subjective factors as a person's age, body weight, sex, race, mental state, and belief system is equally respectable and necessary.

Postmodernism is not satisfied with looking at the self only. It claims that any body of knowledge and every social institution is marked by a call from the other, a call that it either suppresses or encourages. This constitutes the basis for the claim of postmodernism that ethics overcomes ontology (Levinas 1967).

In the benevolent reading I suggest, postmodernism can help the science-and-religion dialogue to stay out of the ditches of either divinizing or demonizing one or both of science and religion. Commitment to listen to the voice of the other nourishes the hope that insights from postmodern thinking might help to bring about a more wholesome future for more people. However, for that to happen, postmodernism needs to break through the walls of individualism and get rid of the flavor of intellectual luxury that has surrounded it for quite a while.<sup>9</sup>

#### LOOKING INTO THE FUTURE

My presupposition is that the science-religion dialogue addresses basically three publics, which, of course, partly overlap, namely academe, religious communities, and societies. As an invitation to further discussion, let me briefly share some ideas of what is required to respond to the needs of these three publics.

In the *academic world*, we need to engage younger scholars and take advantage of smaller, younger, upcoming universities and university colleges with fresh resources that often have less compartmentalization and more interdisciplinarity at the core of their teaching and research profile than traditional universities have. It should no longer be the case that a scientist's interest in questions of ethics, worldview, and religion is regarded

as detrimental to his or her career. Interdisciplinary engagement should be a realistic opportunity for scientists and theologians well before they approach retirement. If it is a realistic expectation that this dialogue makes better scientists and maybe even better science and better theologians and even better theology, and if we expect both to contribute to a world with more justice and more peace, some things should change in the academic world.

We also need to discuss the question whether or how religion-and-science should develop into a discipline in its own right. Should it be institutionalized as a kind of epistemic community<sup>10</sup> of its own, or should scholars rooted and active in their own specialties pursue it in the form of side projects or ad-hoc conversations?

In terms of *religious communities*, two related strands of dialogue need to be developed—conceptual worldview thinking and ethical questions. It goes without saying that it is desirable to do this ecumenically, in inter-faith or at least multifaith settings. Religious communities should not underestimate the promise of a process where proponents of different religious traditions meet not only to discuss questions of faith with each other but also to discuss science and technology. It is a joint interest to fight anti-intellectualism in religious communities. As a candidate for a promising common platform for conversation I suggest further exploration of the concept of wisdom. How does (scientific) knowledge relate to wisdom? On this topic we can expect valuable contributions from many religions and denominations. In the Christian sphere, Eastern Orthodox theologians seem to have been the best stewards of the concept of wisdom. Thinking of Sergei Bulgakov (1993), the sophiological tradition is controversial enough to be exciting, and thinking of various religious traditions, it is common enough to be constructive. In combination with the thought tradition linked to the life and work of Pavel Florensky, this topic can bring something new and longed for to the dialogue that for so long has been dominated by Western Christianity (see for example Lossky 1998; Valliere 2000; Florensky 1997). In recent years, Western theology has been increasingly open to wisdom thought, as shown for example in works by Jürgen Moltmann, inspired by Judaism; Elizabeth Johnson (1992), inspired by the scriptural Sophia tradition; and more recently by Celia Deane-Drummond (2000), applied to theology-and-biology. In my view, it will also be healthy and helpful to link Western thoughts about divine *kenosis* (usually translated as the self-emptying of God), a popular concept in the science-and-religion dialogue, to the strengths of the Eastern Orthodox concept of *theosis* (usually translated as divinization).

In terms of *societies*, increasing science literacy as well as religion literacy seems to be a shared interest. In many countries and societies, it is an urgent task to keep public discourse alive in the face of an increasing privatization of politically significant questions. We also need to address the

issue of instrumentalization of religion, especially concerning an expanding area of research. A rigorous examination is needed of the methods used in studying the health effects of religion and the effectiveness of prayer. These studies need to be seen in the context of societies that face an aging population and the problem of increasing costs for health care and pensions. They require a theological analysis of the underlying assumptions and of the intended applications as well as a discussion about unintended possible applications of the results. “An Apple a Day Keeps the Doctor Away” makes me smile. “A Service a Day Keeps the Doctor Away”<sup>11</sup> seems to me deeply problematic.

Finally, from the viewpoint of societal implications we need to move beyond the implicit division into science-theology/religion on the one hand and technology-ethics on the other. For ordinary, practical people, this is a highly artificial separation. In terms of social responsibility there is no such division. Most of the burning issues like questions of anthropology, artificial intelligence, stem-cell research, therapeutic and reproductive cloning, reproductive rights, overpopulation issues, and physician-aided suicide transcend this polarization anyway.

What Bacon calls “a mixture of religion and science” ([1653] 1964, 62) is indeed not a good idea. The opposite isn’t, either, as an anecdote about the pious Michael Faraday and his two keys suggests.<sup>12</sup> A toothless harmony is as bad as a watertight separation. Science-and-religion is certainly not about smoothing out all the discontinuities, forgetting the depth of the abysses and the height of the mountains yet to climb. None of this can be done without a body whose muscles are kept in just the right tension. It is my hope that the community of scholars in religion-and-science will form bodies that keep up what the Greek called *eu-tonos*—a beneficial or salutary tension—as a necessary condition for an energetic and fruitful relationship.

## NOTES

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1. “Interpretation Matters. Science and Religion at the Crossroads.” Conference at Haverford College, Haverford, Pennsylvania, 15–20 June 2002.

2. At this point they differ diametrically from the philosophy of the Royal Society as put forward in Sprat 1958, 327. Sprat states that a lot of words and metaphors will be gotten rid of without any loss, only to use strong metaphors in his next sentence (last sentence of this quote): “What can we lose, but only some few *definitions*, and idle *questions*, and empty *disputations*? Of which I may say as one did of *Metaphors*, *Poterimus vivere sine illis*. Perhaps there will be no more use of Twenty, or Thirty obscure Terms, such as *Matter*, and *Form*, *Privation*, *Entelichia*, and the like. But to supply their want, and [sic] infinit [sic] variety of *Inventions*, *Motions*, and *Operations*, will succeed in the place of words. The Beautiful Bosom of *Nature* will be Expos’d to our view: we shall enter into its *Garden*, and tast [sic] of its *Fruits*, and satisfy our selves with its *plenty*.”

3. In addition, the question of what should be defined as a benefit proves to be rather intricate. What are the values behind the definition of what counts as a benefit? Speaking in terms of anthropology, is longevity a universal value? (See for example the discussion of this issue in



Fukuyama 2002.) Is perfection, understood as the extermination of every functional disorder, a desirable goal for human civilization? By historical experience we know that bad intentions can have good consequences, and vice versa, which adds another dimension that complicates our tasks.

4. Bacon [1653] 1964, 63. Examples of Bacon's ardent critique of some of this "whole mob of professional teachers": Aristotle "composed an art or manual of madness and made us slaves of words" (p. 63). "Your philosophy, Plato, was but scraps of borrowed information polished and strung together . . . you took men's minds off their guard . . . you turned our minds away from observation . . . you taught us to turn our mind's eye inward and grovel before our own blind and confused idols under the name of contemplative philosophy" (p. 64). On Paracelsus: "You have a passion for taking your idols in pairs and dreaming up mutual imitations, correspondences, parallelisms, between the products or your elements" (p. 65). "By mixing the divine with the natural, the profane with the sacred, heresies with mythology, you have corrupted . . . both human and religious truth" (p. 66). Hence, Bacon concludes, "it would not be a proper thing for me, who am preparing things useful for the future of the human race, to bury myself in the study of ancient literature . . . generally speaking science is to be sought from the light of nature, not from the darkness of antiquity. It matters not what has been done; our business is to see what can be done" (pp. 68–69).

5. At the time of its foundation meeting in August 2002, the membership of ISSR consisted of ninety men and eight women.

6. Paradoxically, the universalism attacked by postmodern and postcolonial critique sometimes reappears in the critique itself, as a tool of the very critique that tries to unmask the oppressiveness of the universalism of the other(s). Critique of universalism has to struggle with the risk of becoming universalizing itself.

7. See Derrida 1991; Vattimo 1996; Caputo 2001. See also Svenungsson 2001. It is an issue for discussion whether this turn to general religion (cf. also Caputo 1997), which in some ways resembles Einstein's cosmic religiosity, is an escape from the world of historic and dogmatic particularities and contingencies into philosophical metareligion. However, this tendency seems to be balanced by the concept of God as the indefinable *You*. See also Caputo 2001, 90: "Religious transcendence is beginning to transcend the traditional religions," be it in various forms of New Age spiritualities or the mixture of mysticism and science fiction represented by, for example, *Star Wars*.

8. Lessing 1779. The story about the rings runs like this. An exceedingly precious and beautiful ring has been inherited from generation to generation in a family. This ring has the secret power of making the owner loved by God and people, if he is mindful of this promise. The rule says that the father before his death ought to give the ring to his most beloved son (there are no mothers and daughters in the story). The ring has now come upon a father of three sons. As death draws near, the father realizes that he loves his sons equally and thus cannot decide to whom to give the ring. Finally, he has an artist make two more rings that look exactly like the ring that carries that wonderful promise with it. Nobody can tell the difference by looking at them, not even the father himself. Secretly, he gives each son a ring. Of course, confusion abounds after the father's death. Which one is the true ring? Who is going to be the true leader, loved by God and people? How can they find the truth? They call in a judge, who conjectures that the father had wanted to put an end to the tyranny of the one ring/one truth. Hence, the only thing the three ring owners can do is to outdo each other in being good. The judge tells them to strive for love without prejudices and for tolerance. In Lessing's play, the father symbolizes God and the three rings symbolize the three Abrahamic religions; and in this sense the parable is today as topical as ever. I think, however, that the model of noble competition also can apply to the question of truth in our postmodern situation. For more on the parable see *Dritter Aufzug, siebenter Auftritt*, pp. 365ff.

9. It may rightly be argued that all three challenges are variations of only one theme, namely hermeneutics in a broad sense. Because feminism is so broad and diverse a movement, I think it may justifiably be treated as a special issue. The continuity between hermeneutics and postmodernism is rather explicit. It is not pure coincidence that Caputo titled two of his books *Radical Hermeneutics* (1987) and *More Radical Hermeneutics* (2000). Yet, the specifics of postmodern discourse also provide reasons for a separate treatment, especially in its relation to science.

10. Tatman 2001, 20, mentions four components of a disciplinary paradigm constituting an epistemic community: (1) a set of shared metaphysical assumptions; (2) shared metaphors; (3) shared models; and (4) shared value judgments. While agreement concerning 2–4 is in principle

well in the range of science-and-religion dialogue, it is precisely disagreement on the first that provides much of the dynamics of the field itself.

11. Headline of an article by Doug Oman in *Research News & Opportunities in Science and Theology* 2/11–12 (July/August 2002), 8.

12. It is told that whenever Faraday entered his lab, he carefully locked his prayer chapel; whenever he went into his prayer room, he made sure the lab was cautiously locked. Thus he kept the two worlds he could not bring together neatly separated (Daecke 1987, 624).

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