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Explanatory pluralism and the cognitive science of religion

Why scholars in religious studies should stop worrying about reductionism

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Nearly forty years ago when I was a graduate student (at the Divinity School of the University of Chicago) trying to envision how the theoretical tools, the findings and the methods of the cognitive sciences might be brought to bear on religious phenomena, the *universal* response that such speculations elicited was some variation or other on the comment “Oh! ... You are a *reductionist*.” The comment, uttered with the hint of a sneer, suggested something akin to either disgust or contempt.

Unfortunately, but not surprisingly, it took *leaving* the field of religious studies for me to find more hospitable intellectual environs in which to pursue and develop those ideas. I have spent most of my subsequent career among philosophers and practitioners of the psychological, cognitive and neurosciences. In the 1990s, after Tom Lawson and I (both jointly and individually) had begun to publish our ideas about carrying out a cognitive science of religion, I began, once again, to travel in the world of religious studies.

Lawson and I argued for the interdependence of explanatory and interpretive enterprises in inquiries about human affairs and expressed our concern, simply, to redress what seemed to us to be a serious imbalance in religious studies in favour of the latter (Lawson & McCauley 1990: 13, 22–31). In the twenty-plus years since, wariness about our and others’ explanatory proposals persists in many quarters (examples include Buckley & Buckley 1995; Bell 2005; however, see Lawson & McCauley 1995). Fortunately, in the meantime, others have argued for the same sort of *productive* engagement for which we argued between work in religious studies and explanatory projects in the cognitive science of religion (see Tite 2004; Slingerland 2008; Saler 2009).

This paper is a further attempt to reassure those who are concerned with the religious, the meaningful, the spiritual, the subjective, the conscious, the

experiential, the historical, the sociocultural and the culturally constructed (and with the details of each), that neither the substantial growth of the cognitive science of religion over the past two decades nor its on-going progress poses any threat to their concerns or to their objects of study. The reasons for that are legion; however, here I intend to focus on but one consideration concerning the character of what has traditionally been referred to as “reduction” in science. Specifically, religion scholars’ worries about cognitive science explaining away the religious, the meaningful, the spiritual, and so on presume a coarse-grained and unsatisfactory model of cross-scientific relations that has undergone withering criticism in the philosophy of science.

After a preliminary comment criticizing loose talk about reduction in popular discourse, in religious studies, in the humanities, and even in some of the social sciences, I shall offer a brief overview of levels of analysis in science and of the models of reduction in science of the logical empiricists and of the New Wave reductionists. Then I will differentiate two different kinds of reductive relations that arise between scientific projects. I will argue that the major worries of scholars of religion about the powers of cognitive theories of religion to eliminate the religious, the meaningful, the spiritual, and so on confuse these two sorts of reductive contexts. The explanatory pluralist model of cross-scientific relations illuminates the kind of multidisciplinary programmes of research that are pursued both in the contemporary cognitive sciences generally and in the cognitive science of religion.

In a brief final section, I will illustrate the explanatory pluralist’s contention that the cognitive science of religion inevitably looks to conventional religious studies for help and guidance, and, thus, show why (a) scientism, (b) methodological exclusivism and (c) worries about eliminativism are so wrong-headed. Explanatory pluralism stresses, first, that science is not the only game in town and that it is not the only way that we acquire knowledge (no scientism). Consequently, second, if they ignore one another, traditional religious studies and the cognitive science of religion will each be done less well than they can be (no methodological exclusivism). And, third, the cognitive science of religion will not eliminate the religious, the meaningful, the spiritual, and so on (no eliminativism). For the sake of brevity, I will focus in the discussion that follows on the religious, since all of the others (the meaningful, the spiritual, the subjective, etc.) have served as the bases for arguments for the uniqueness or the autonomy or the specialness of the religious at one time or another.

What the cognitive science of religion may do on such fronts, if anything, is *vindicate* the key contributions that scholars studying such matters can make to our understanding of the phenomena at issue. What it certainly has done and will continue to do is enrich our understanding of those phenomena by showing how they connect with operations of the human mind/brain, which is both embodied and embedded in traditions, cultures and discourses. The

cognitive science of religion does so by enlisting and integrating both the findings and the methods of at least half a dozen different scientific approaches and their concomitant theoretical perspectives. Those perspectives include the cognitive, developmental, comparative, evolutionary, neural and archaeological, to name but some of the most prominent. Cognitive scientists of religion have begun to deploy those methods to generate all sorts of new evidence bearing on our understanding of both religious systems and individuals' religious cognition and conduct.

A preliminary

Science is opportunistic. Scientists will consider evidence wherever they find it, and anything that we know about the world may prove relevant to their assessments of any particular scientific hypothesis. Finally, this should be true for any hypothesis (scientific or not), and, just as finally, such attention to bona fide evidence is the mark of the reasonableness of *any* inquiry, not just scientific inquiries. (The salient difference between the sciences and other inquiries concerns their focus on discovering, discerning, collecting, recording, generating, analysing and assessing *empirical* evidence.)

Special pleading arises when inquirers in some field abandon such evidential opportunism (Fodor 1983: 106). They seek to insulate cherished commitments from some of or the entire evidential onslaught. Various disciplines, including sciences, have had periods when some or even most of their practitioners resorted to special pleading. Examples include protecting vitalism in the biological sciences in the late nineteenth and early twentieth centuries and insisting in the social sciences on the primacy of social facts or thick descriptions (Durkheim 1964; C. Geertz 1973).

Religions famously do their special pleading upfront, so, perhaps, it should come as no surprise that religious studies has been plagued, throughout its history, with a penchant for special pleading too. In its scholarly guise, special pleading in religious studies has taken a variety of forms, beyond those it borrows from the social sciences. These have included claims that religious phenomena are, in all interesting respects, *sui generis* or that inquiries about religion *must* be autonomous or anti-reductionist. Assertions about the need for special methods to study religious phenomena have typically accompanied such claims.

Compared to the blanket anti-reductionism that scholars of previous generations affirmed, more recently, special pleading in religious studies has adopted forms that do not appear merely to be benign but to be both true and reasonable as well. These days it turns out that each and every *particular* scientific explanation of religious phenomena just happens to be reductionist

and, thus, unacceptable. In each case the evidence for that charge is that these explanations are insufficient or incomplete. Reductionist explanations, after all, *reduce!* They always remove or ignore something; otherwise, they would not count as reductions. Consequently, critics fault them for failing to supply *full* explanations and, thus, deem them unsatisfactory and even unacceptable. The charges are true, but the conclusions are neither reasonable nor benign.

Whether it employs the older, blanket strategy or the contemporary one of disqualifying each and every explanatory proposal on a case-by-case basis, anti-reductionist special pleading holds, in effect, that *all* scientific explanations are, ultimately, reductionist by virtue of the fact that they all pick and choose among phenomena. Science employs theories and theories are invariably selective.

Note, however, that to be anti-reductionist in this sweeping sense is to be anti-explanatory, anti-scientific and anti-theoretical. It is hyper-anti-reductionism. For the adjective “reductive” to carry any import when modifying the term “explanation”, it must pick out some subset of explanations that are objectionable. If the presumption is that *all* explanations are reductive, then opposing reductive explanation is just to oppose explanatory approaches across the board. In the light of the modern sciences’ successes with regard to explanation, prediction and control over the past four hundred years, such hyper-anti-reductionism is unreasonable and obscurantist. Arguably, no heuristic of discovery in modern science has been any more productive and successful than reductionism.

The standard rejoinder at this point is to reply that the objectionable subset of reductionist explanations is the subset of those that concern some or all of the religious, the meaningful, the spiritual, and so on. The inevitable selectivity of explanatory theories in these domains, critics avow, disregards or discards something that matters (about us!). Two comments must suffice.

First, hyper-anti-reductionist thinkers are correct that complete, full, sufficient or (fully) adequate explanations in science do not exist. (Ironically, it is only in religion that such explanatory presumptions arise!) But the bad news is that to say, therefore, that an explanation fails to meet such standards, that is, that it is not complete or full or sufficient or fully adequate, is no interesting criticism at all. No scientific explanations meet such standards. In science all explanations are partial. There is no such thing as an exhaustive scientific explanation.

Second, what *matters* is always a function of the interests and problems of the inquirer. What we are inclined to take as criteria for explanatory sufficiency or adequacy are always relative to our interests and the problems that inform them. Basically, the complaints of hyper-anti-reductionists in religious studies amount to pointing out that their interests differ from those who are interested in explanation. Certainly, these anti-reductionists need

not apologize for their interests; however, *nothing* follows about the unsatisfactoriness or the unacceptability of explanatory proposals *qua* explanatory proposals, and to the extent that anti-reductionists' special pleading forestalls not only the checks and balances but, as I shall argue, the opportunities that will arise from integration with other related inquiries, their grumblings fail to advance our knowledge.

Levels of analysis in science

Less immoderate talk about scientific reduction reliably depends on common assumptions about levels of analysis in science and their hierarchical arrangement. Such talk typically looks to the relations of parts and wholes (i.e. "mereological" relations) in nature and, specifically, to their implications for things' relative sizes. A consequence of using considerations of scale for differentiating levels in nature and levels of analysis in science is that higher-level sciences treat big things and the lower-level sciences treat progressively smaller things. The physical sciences are the most fundamental sciences and operate at the lowest levels of analysis, because they deal with the smallest things that are the parts of everything else. The biological sciences treat larger systems that involve more complex physical arrangements. The psychological and social sciences tackle larger systems still. At least some of the time, psychology examines organisms situated in physical and social environments, and the sociocultural sciences address large collections of psychological systems that are causally connected in sociocultural networks.

Even when looking at the broad families of sciences, an account of organizational levels in nature and of analytical levels in science that appeals to considerations of scale will prove inadequate. Not all big things with many parts (e.g. asteroids and sand dunes) are highly integrated systems that demand higher-level analyses. The physical sciences not only address subatomic particles but avalanches, weather systems and stars. The biological sciences investigate not only molecular genetics but the evolution of populations. The standard conception of analytical levels in terms of the size of the things they discuss fails to situate sciences like meteorology, geology, astrophysics, ecology and evolutionary biology.

Organizational and contextual considerations inspire mechanists' accounts of analytical levels. Mechanists argue that attention to the organization and operations of situated mechanisms and to the local view of analytical levels that results eviscerates presumptions about lower levels' causal closure and the putative comprehensiveness of lower-level explanations (Bechtel 2006; 2007: 182; Craver & Bechtel 2007; Craver 2007). Mechanists are agnostic about the generalizability of the resulting pictures of analytical levels and have

abandoned characterizations of the sciences' connections overall. With their reservations in mind, the question of salvaging any plausible global account of analytical levels looms. Still, whether in scholarly debates or more popular disputations, many controversies that modern science inspires, including those swirling around reduction, presume that a general account of analytical levels is available. The mechanists are unquestionably right that in each case the details matter, but that need not rule out the search for ways to talk more carefully either about those larger issues or the arrangement of the sciences they presume (see Rosenberg 2006: 40).

Three considerations can help with the latter task. These three are independent of one another and each point to roughly similar arrangements among the major families of sciences, at least.

The first looks to a science's comparative explanatory *scope*. The lower an analytical level is, the wider is the corresponding science's scope. All of the phenomena studied at higher levels are describable at lower levels, but the opposite is not true. Subatomic particles are the building blocks of all other physical systems (from atoms to galaxies and from DNA to societies). The range of things a higher level concentrates on constitutes a subset of those dealt with by lower-level sciences. This criterion delineates a salient respect in which lower level sciences *are* more fundamental, since they possess resources for describing a wider range of phenomena.

The order of analytical levels also corresponds to the chronological *order in natural history* that various systems evolved. The lower a science's analytical level, the longer the things to which it primarily attends have existed. For example, the subatomic particles and atoms that are the principal objects of study in the basic physical sciences appeared quite soon after the Big Bang whereas the systems that the biological sciences scrutinize first began to appear (on Earth, at least) but a few billion years ago. Developed nervous systems, brains, and the minds that eventually seemed to have accompanied them, by contrast, look to be at least a couple of billion years more recent. And, finally, cultural systems that the sociocultural sciences investigate date from a few million years ago on the most optimistic estimates and, perhaps, no more than some tens of thousands of years ago on more demanding criteria.

A third consideration, the *complexity of phenomena*, is intuitively compelling, even if it defies precise description. The intuition is that each higher level deals with progressively more complex phenomena. Minds/brains seem more complex than cells, which, in turn, seem more complex than molecules. Mereological considerations may point in this direction, but by themselves they are, again, inadequate. Our sense of a system's complexity, regardless of its size, depends on whether or not wholes are notably organized or are simply aggregates of their parts (Wimsatt 1986; 1997; 2007: chapter 9). With neither settled criteria of complexity nor a general measure of systems' comparative

EXPLANATORY PLURALISM

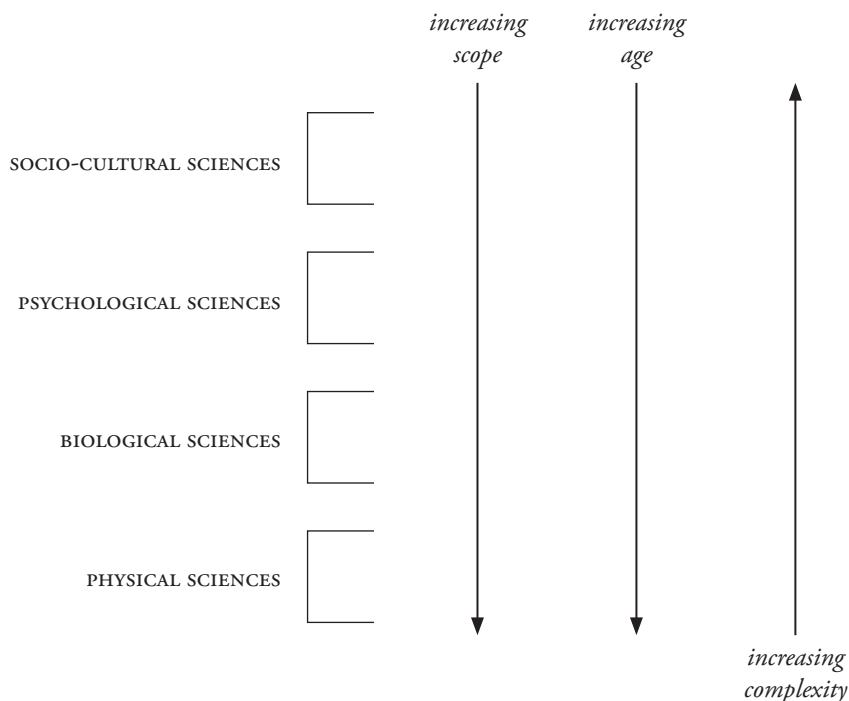


Figure 2.1 Three criteria for families of sciences.

integration, this consideration remains only a rough intuition for now. It is unclear how much weight it can bear in the discrimination of analytical levels in science, but scholars are bringing sophisticated, new computational tools and models to the treatment of these questions (Mitchell 2009). Figure 2.1 summarizes how these criteria organize the analytical levels of science.

Traditional reductionism and New Wave reductionism

Some philosophical models of reduction in science would substantiate the fears of scholars in religious studies about the cognitive science of religion, since those models suggest that the cognitive scientists' explanatory proposals might explain the religious, the meaningful, the spiritual and so on *away*. New Wave reductionists (Hooker 1981; P. M. Churchland & P. S. Churchland 1990; Bickle 1998, 2003) offer an *all-purpose*, one-size-fits-all model of reduction. Like the logical empiricists before them, they presume that accounts of the structural relations of scientific theories' explanatory principles (e.g. laws) and of the things that those theories describe exhaust what is of ontological and

epistemological interest in such comparisons. Elsewhere I have argued that New Wave proposals downplay epistemologically significant features of the relevant sorts of scientific research (McCauley 1996, 2007). I have also argued that the New Wave models fail to discriminate between two crucially different classes of intertheoretic relations (McCauley 1986, 1996, 2007). It is this second flaw on which I shall elaborate here, for it motivates the New Wavers' overly broad conclusions about elimination in science that seems to justify the anti-reductionists' fears about the cognitive science of religion.

On the standard logical empiricist model (Nagel 1961), scientific reduction involves deducing the laws of one scientific theory (the reduced theory, e.g. the laws of classical thermodynamics) from those of another (the reducing theory, e.g. the principles of statistical mechanics). This inference requires supplementing the laws of the reducing theory with a set of statements (variously known as "bridge principles", "coordinating definitions" and "reduction functions") that lay out systematic logical and material connections between the two theories' predicates while incorporating the boundary conditions within which those connections are realized.

The standard view construes reductions as a type of explanation in which the item getting explained (the *explanandum*) is *not* some phenomenon but rather some law or other of the reduced theory. A successful reduction demonstrates how the reducing theory's explanatory resources encompass those of the reduced theory. Thus, in effect, the reduced theory constitutes an application of the reducing theory in one of its sub-domains specified by the boundary conditions.

The bridge principles must insure the "derivability" of the reduced theory from the reducing theory by articulating connections between the two theories' predicates of sufficient logical strength to support the derivation. The bridge principles should also justify a metaphysical unity in science. They have to certify substantial links between the entities and their properties that the two theories discuss, that is, to certify their "connectability" (Nagel 1961). Establishing such connections between scientific theories motivates *programmes* for unifying science via "microreductions" (Oppenheim & Putnam 1958; Causey 1977). These programmes fashion a case based on mereological relations for a materialist metaphysics and envision the reduction of entire sciences. They foresee the possibility of scientists eventually abandoning research at higher levels in deference to explanations at lower levels (P. M. Churchland 1979; P. S. Churchland 1986; Bickle 1998, 2003). Proposals differ about the logical and material strength of the bridge principles; however, all foresee a comprehensive mapping of the reduced theory's ontology on to that of the reducing theory (Nagel 1961: 354–5; Causey 1977).

The appeal of the standard model's formality, clarity and precision is uncontested. Philosophers, however, began to realize that its idealized account

of intertheoretic relations came at the price of its ability to capture many cases of intertheoretic relations that did not meet its exacting standards (Wimsatt 1978). The resulting connections frequently seemed capable of sustaining neither the derivation of the reduced theory nor the comprehensive mapping of its ontology on to the reducing theory's ontology. (Contrast, e.g. Patricia Churchland's diverging assessments of the prospects for the reduction of various aspects of consciousness: P. S. Churchland 1983, 1986, 1996.)

This diagnosis is consonant with the impression that the reducing theory's resources often do not merely encompass those of the reduced theory. On the basis of its added precision alone, the reducing theory usually appears to *improve* upon the reduced theory's account of things. For example, the articulated picture of the numerous connections permitting the sharing of information in the processing streams of the "what" and "where" pathways of primate visual systems', as presented by van Essen and Gallant (1994), arguably constitutes a correction of the initial proposal of Ungerleider and Mishkin, which construed these subsystems' operations as basically independent (Ungerleider & Mishkin 1982; Mishkin *et al.* 1983).

On the standard model of reduction, though, if reducing theories *correct* reduced theories, then the reduced theories' laws should *not* follow deductively from premises about the reducing theory's laws and the bridge principles. With some of history's most impressive reductions, the logical empiricists faced the embarrassing dilemma of either repudiating their deductive model of explanation or accepting bridge principles that leave enough semantic slack to render the putative derivation guilty of equivocation (Wimsatt 1976: 218; P. M. Churchland 1989: 48).

New Wave reductionists regard our *inability* to sustain bridge principles capable of underwriting the derivation of the reduced theory's regularities as a *virtue* of any putative reduction that improves upon those regularities. Instead of standing by a formally perspicuous, idealized model of reduction that fails to describe many cases, the New Wavers hold that the reducing theory only explains an *analogue* of the reduced theory constructed within the reducing theory's conceptual framework. This enables the reducing theory simultaneously to correct the reduced theory and to explain at least something very much like it. Moreover, relying on analogy, the New Wave model of reduction apparently accomplishes all of this without needing to specify bridge principles (however, see Endicott 1998: 71–2). The strength of the analogy can vary considerably from one case to another, resulting in a spectrum of analogical strength that ranges from retentive reduction at one end to outright theory replacement at the other (see Figure 2.2).

Although analogies fail to meet the constraints of the standard model, they do undergird a picture of *approximate reduction* that embraces the familiar cases. On the New Wave account, the standard model's ideal designates

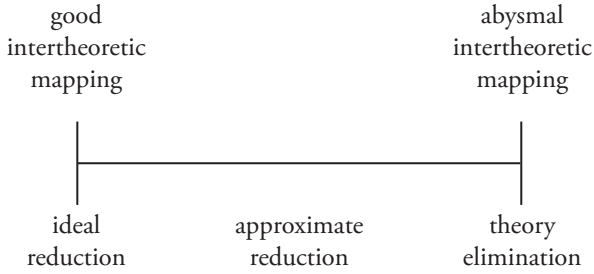


Figure 2.2 New Wave continuum model.

an end point on the continuum of the comparative levels of isomorphism between reduced theories and their analogues. If even the standard model's parade cases from the physical sciences, in fact, fall short of the anchor point that designates that ideal on this continuum, then that would only underscore the significance of New Wave analyses' abilities to make sense of these many familiar cases of approximate reduction. On the New Wave account, the standard model's parade cases *are* only approximate reductions, since they reliably require counterfactual assumptions (Bickle 1998: 38; 2003: 11).

Distinguishing cross-scientific and successor contexts

The New Wavers' continuum orders the relative goodness-of-mapping relations possible between reduced theories and their images constructed within the frameworks of their corresponding reducing theories. None of the New Wave reductionists, though, offer any precise criteria for when the slack becomes intolerable, that is, when the theory-analogue's approximation of the reduced theory becomes too loose to make sense of reductive talk (Bickle 1998: 100–101). At some point on that continuum the goodness-of-mapping becomes sufficiently weak that the case for intertheoretic continuity collapses.

According to New Wavers such situations do not yield reductions but, instead, the “historical theory succession” that marks scientific revolutions (Bickle 1998: 101). New Wave reductionists take inspiration from Paul Feyerabend's and Thomas Kuhn's objections to the logical empiricists' standard model (Feyerabend 1962; T. Kuhn 1970). In scientific revolutions the superior theory simply displaces its inferior predecessor. If their intertheoretic mappings are as tenuous as those in uncontroversial historical cases such as between Stahl's account of combustion and Lavoisier's or between Gall's phrenological hypotheses and modern cognitive neuroscience, we are, presumably, justified in speaking of the complete *elimination* of the inferior theory.

As grounds for constructing an analogue of the reduced theory dwindle, cases are arrayed further and further to the right on the continuum in Figure 2.2. On the New Wave account the prospects for retaining either the principles or the ontology of the theory to be reduced decrease as cases exhibit fewer and fewer correspondences. In the right half of the continuum the outlook for reconciling the two theories moves from dim to dismal. New Wave reductionists maintain that the failure of intertheoretic mapping in the dismal cases is so thoroughgoing that the success of the reducing theory impugns the integrity of the reduced theory and motivates its outright rejection. Many of the classic revolutions in the history of science fall here. These include the elimination of the Aristotelian–Ptolemaic cosmology and the gastric theory of ulcers with the rise, respectively, of the Copernican theory and the bacterial theory (Thagard 1992; 1999).

New Wave reductionists, especially the Churchlands, famously argue that many cases of intertheoretic relations at the interface of psychology and neuroscience should be located at this end of the continuum as well. They contend that it will be the psychological theories, especially our folk psychology of beliefs and desires, that will end up on the scrap heap of the history of science, along with other discarded theories about such things as phlogiston, caloric fluid, the luminiferous ether and an expanding and contracting, but otherwise stable, Earth (P. M. Churchland 1989: 1–22; P. S. Churchland 1986: 373).

Such pronouncements rightfully transfix anti-reductionists, including those in religious studies, since, if the Churchlands' claims were true, they would suggest that anti-reductionists' claims in behalf of the religious, the meaningful, the spiritual, the subjective, the conscious, the experiential, the historical, the sociocultural and the culturally constructed would probably face the same fate, even, perhaps, at the hands of the newly flourishing cognitive science of religion.

Although I do not mean to rule out absolutely the possibility of eliminating some cherished conceptions, long deployed in religious studies, I do want to argue, first, that such upheavals would not arise according to the New Wavers' blueprint and, second, that a more satisfactory conception of cross-scientific relations, namely, explanatory pluralism, suggests (of a piece with the principle of evidential opportunism that I highlighted before) that the foremost form of interaction between the cognitive science of religion and traditional religious studies will be one of mutual enhancement.

What is wrong with the New Wavers' blueprint? New Wave models analyse theory succession over time within a science in the same way that they analyse the relations of theories from different sciences at a particular point in time. In short, they ignore the differences between *successor* relations and *cross-scientific* relations. They are wont to ignore this distinction because the New

Wave continuum *can* be deployed in *both* settings and cases arise in both in which the intertheoretic translations are abysmal. But it does not follow that the two settings involve the same dynamics.

Successor relations concern changes over time within a science at some level of analysis. As the New Wavers' continuum shows, the mapping of one reigning theory onto its successor can range from smooth to bumpy to no contact whatsoever, short of some overlap in their *explananda*. The changes during such theoretical transitions in a science can be minor or major; they can be gradual or abrupt. The alterations to the account of free fall near the surface of the Earth across the history of modern physical science have been minor and gradual. This is an example of scientific *evolution*. More recent and more *general* mechanical accounts can make sense of and improve upon the earlier notions of free fall. By contrast, when changes are major and abrupt, for example, the change from Stahl's account to Lavoisier's account of combustion, they constitute one of Kuhn's scientific *revolutions* (see Figure 2.3).

Other than the fact that they address many of the same aspects of the world, that is, that they have some common *explananda*, the theories in these cases have so few connections that the triumphant successor does not reductively explain its predecessor. Instead, it eliminates it. Across its history, science has frequently discarded once-honored theories and large portions, if not all, of their ontologies, concerning everything from the crystalline spheres above to the bodily humours within, in favour of new, superior successors. Eliminations can occur in either case, but whereas in the evolutionary settings they only involve small parts of a theory and tinkering at their edges, in revolutionary settings they are overwhelming, if not complete. So, although most of Galileo's mechanical proposals, for example, his concept of inertia, can be plausibly mapped onto Newtonian mechanics, his notion of *natural motions*, which Galileo inherited (and transformed) from the ancients, falls away. By contrast, all of the principles and ontology of Stahl's chemistry are abandoned less than three decades after the publication of Lavoisier's new theory (Thagard 1992).

Cross-scientific relations concern arrangements of a very different sort. Cross-scientific relations are those between different sciences with a common *explanandum* operating simultaneously at different levels of analysis either within or across the families of the sciences. Everyone from molecular-level neuroscientists all the way up to the highest-level social scientists seek models for explaining aspects of human behaviour and mentality. Evidential opportunism is not the only kind of opportunism in science. Scientists at any level will have a host of reasons to look to research carried out at another level, whether downstairs or upstairs. They may seek new forms of evidence, new experimental techniques and tools, or new theoretical resources. Scientists will borrow useful tools of any sort wherever they can be found. Often they are

*Families of sciences
(levels of analysis in science)*

*Examples of specific sciences (and
theories) within the various families*

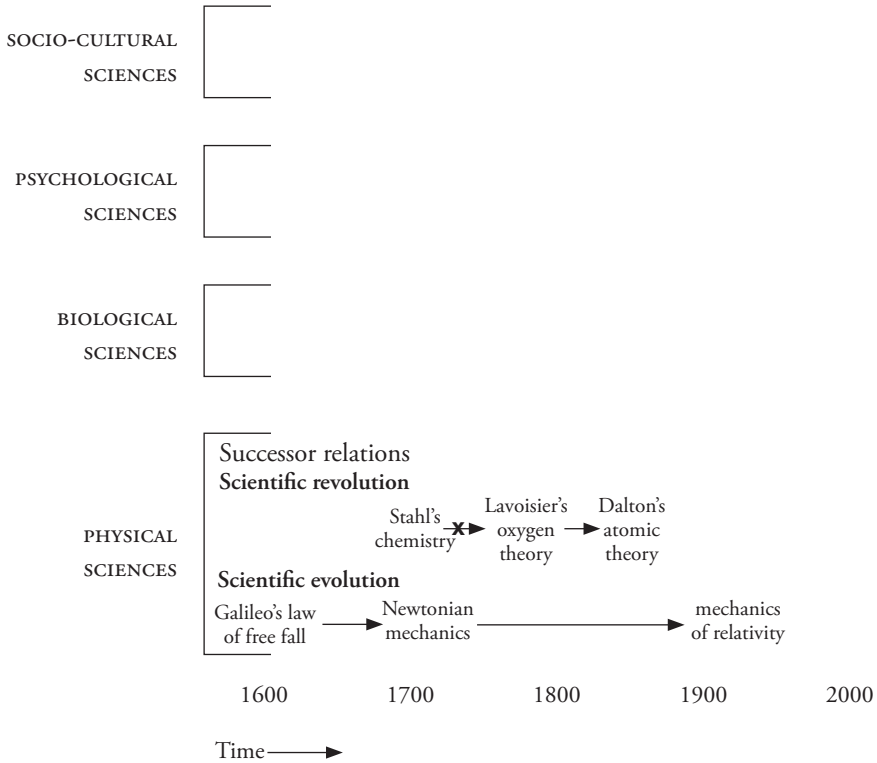


Figure 2.3 Successor relations: scientific evolution versus scientific revolution.

most easily found among other scientists approaching related problems at a different analytical level.

We call looking downstairs “reductionism”. When inquirers discover a pattern among phenomena at one level, a standard explanatory strategy in science is to look downstairs for a mechanism responsible for that pattern. If psychologists find dissociations between people’s abilities to locate an object and their abilities to identify that object, it is reasonable to look for separate processing streams for such information in the brain. Or if, across cultures, rituals overwhelmingly cluster around certain attractor positions in the space of possibilities, it is reasonable to look for underlying psychological mechanisms to explain the appeal of the corresponding forms (McCauley & Lawson 2002). Arguably, such reductionism has proved one of the most effective problem-solving strategies in the history of modern science.

As noted, the New Wavers' continuum of intertheoretic mapping can be applied in these cross-scientific contexts just as readily as it can in successor contexts. When the mapping is particularly good, the conditions approximate the logical empiricists' ideal, and the success of the reducing theory at the lower level generally *vindicates* the reduced theory. Physical accounts of atomic structure, for example, sustain the principles of molecular bonding in chemistry. Successful reductive explanation in cross-scientific settings does not supply grounds for replacing upper-level theories and sciences. Rather, what it demonstrates is that in at least one limited area (specified by the boundary conditions that are incorporated either in the traditional model's bridge principles or in the implicit limits of the New Wavers' theory-analogue) the upper-level theory's explanatory principles accurately and usefully summarize the myriad details of the microstructures and processes that the lower-level account captures. Even though they are always context-specific, successful cross-scientific (approximate) reductions provide reasons for *retaining* not only the upper-level theories but the research programmes they inspire, the investigative tools they motivate, the evidence they generate and the ontologies they presume. One illustration of such cross-scientific cooperation is the neurosciences' widespread reliance on the theoretical resources, the experimental designs and the empirical findings of experimental psychology (e.g. Hirst and Gazzaniga 1988: 276, 294, 304–5). Note that rather than explaining away or eliminating the upper-level science or its theories, this is an instance of research in a lower-level science (neuroscience) taking inspiration and obtaining aid from a higher-level science (experimental psychology).

So, if the inter-level mapping is good between claims in religious studies about the religious, the meaningful, the spiritual and so on and cognitive theories of religion, then there are not only no grounds for worrying about the elimination of religious studies' projects but there are also reasons to expect an on-going cross-pollination between them and those of the cognitive scientists. This, however, is the easy case. What about cases when the connections between religious studies' prized notions and cognitive theories are meagre?

Explanatory pluralism

Because they do not distinguish between successor and cross-scientific contexts, the New Wavers presume that substantial breakdowns of intertheoretic mapping will *always* end in the eradication of one of the theories in play. The elimination of scientific theories on the basis of cross-scientific comparisons that they envision could lead to the wholesale elimination of the *sciences* from which those theories issue. It would, after all, be forlorn to pursue some line of research dominated by a thoroughly discredited theory. At least some of

the time (P. M. Churchland 1981; Bickle 1998: 205–6; 2003: 110) neither Churchland nor Bickle has retreated in the face of that apparent consequence of their views.

Explanatory pluralism maintains that when the connections between theoretical projects at different levels of analysis are fragmentary, the dynamics of cross-scientific relations differ from those between successive theories within some science (McCauley 1986, 1996, 2009; McCauley & Bechtel 2001; Looren de Jong & Schouten 2007; Dale *et al.* 2009). If we can rule out the New Wavers' one-size-fits-all model of reduction, reductionist research strategies should no longer automatically sound alarms for scholars of religion.

With regard to cases of negligible intertheoretic mapping, the New Wavers' penchant for treating successor and cross-scientific cases in the same way does not square either with the historical illustrations they cite or with the principle of evidential opportunism (or with the broader opportunism) that characterizes scientific inquiries. Neither the historical evidence nor plausible conceptions of science suggest that the New Wavers' eliminativist conclusions in cross-scientific settings are sound.

The historical argument: the New Wavers identify no convincing cases from the history of science illustrating their claims for the possibility of eliminations in cross-scientific settings (McCauley 2007). *All* of the illustrations of theory eliminations in the history of science to which the New Wavers point (including the theories of the bodily humours, crystalline spheres, impetus, phlogiston, caloric fluid, the luminiferous ether, phrenological faculties, vital spirits, etc.) have resulted from theory succession within a particular science. *None* of these eliminations have resulted from comparisons of theories in cross-scientific settings, that is, from the comparison of theories reigning simultaneously in sciences operating at different analytical levels and, in particular, across the borders between the major families of sciences (see Figure 2.4). Scientific revolutions and the theoretical and ontological eliminations they underwrite occur between successive theories in a science, not between theories operating at different levels of analysis.

The normative argument: explanatory pluralism suggests that the New Wavers' putative cross-scientific eliminations would simply decrease the theoretical, evidential and experimental resources available for science to call upon, and, thus, deprive it of resources for the further testing of theories. The sciences' honorific epistemic status depends in part on their on-going demand for *new* empirical tests. Much of the evidence that a theory must account for stems from work at other (including higher) levels of analysis.

Contrary to the New Wave picture, explanatory pluralism stresses that cross-scientific pressures do not cause scientific disciplines to disappear, certainly not once they have achieved both intellectual stability based on theoretical and empirical accomplishments and institutional stability based on

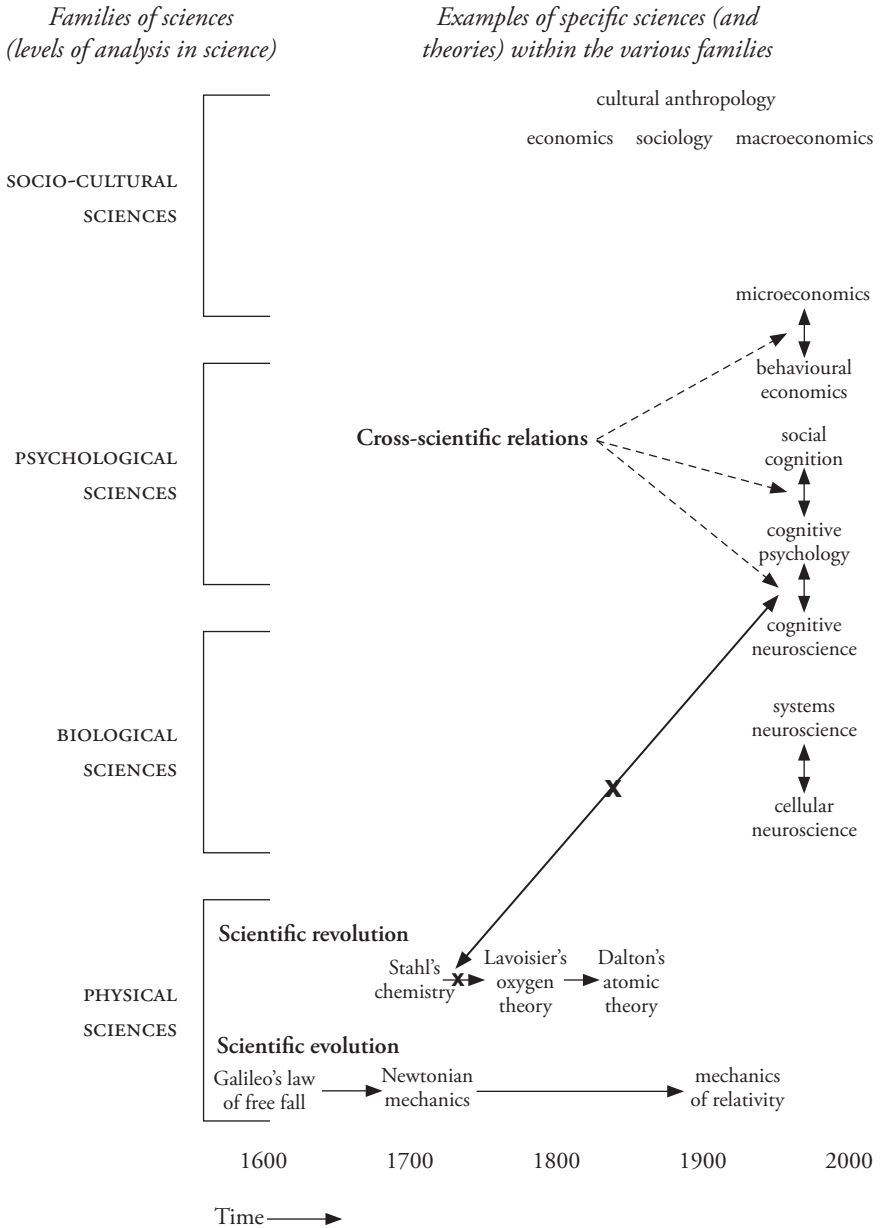


Figure 2.4 Cross-scientific relations versus successor relations.

professional societies, specialized journals and university departments. Their persistence increases the range of explanations that science furnishes and proffers empirical findings that, consistent with the principle of evidential opportunism, may abet research in other sciences.

Explanatory pluralism does not merely showcase the *reductionist* strategy for integrating the sciences. It also emphasizes the role of a *contextualist* strategy in which scientists use higher-level sciences to explore the settings in which a system may be situated and the various external factors that constrain its shape, its inputs and, therefore, its behaviours (see Craver 2007: 189). Scientists can just as readily look upstairs, exploring some targeted item's place and role in larger systems. They can examine the item's position in and interactions with its environment, and they can examine the contributions it makes to the characteristic patterns those larger systems exhibit.

Contrary to the special pleading of anti-reductionists for the autonomy of some inquiry or phenomenon, explanatory pluralism holds that exploring reductive possibilities downstairs, no less than exploring integrative contextualist possibilities upstairs, opens new avenues for sharing both explanatory insights and methodological, theoretical and evidential resources. Anti-reductionists' special pleading not only forestalls the checks and balances that reductive integration imposes, it also blocks opportunities for new investigations at both levels and for collaborative research between them. Concerns for access to the full range of available evidence and problem-solving strategies will – at all levels of scientific inquiry – safeguard (rather than diminish) spaces for reductive explorations. The explanatory pluralist's message is that, unaccompanied by scientific agendas, those spaces for reductive explorations pose no threats to research carried out at higher analytical levels or, more specifically, to the traditional programmes of interpretive research in religious studies.

Explanatory pluralism also offers a rationale for why, with regard to the putative slings and arrows of reductionism, scholars in religious studies may, perhaps, have *less* to worry about than most anti-reductionists. After all, for more than a century, religious studies has often engaged research from across the sociocultural sciences (Durkheim [1915] 1965; Weber 1964) and the psychological sciences (James [1902] 1929; Freud [1927] 1962). Some scholars in religious studies (e.g. Burkert 1996) have even taken inspiration from the biological sciences, just as the new cognitive scientists of religion have. The point is that for decades religious studies has frequently functioned as an opportunistic enterprise itself, taking inspiration, in particular, from the highest levels of the social sciences, from the psychology of religion and, in the case of Freud, even from the sub-personal psychological levels. The emerging cognitive science of religion facilitates explorations *downward* to new areas of sub-personal psychological research and, at least recently, down further to the findings from the new imaging technologies in the neurosciences (e.g. Schjoedt *et al.* 2009) (see Figure 2.5). Scholars of religion have seen first-hand that progress in the psychology of religion has not put the sociology or the anthropology of religion out of business, no more than the amazing progress

*Families of sciences
(levels of analysis in science)*

Examples of specific sciences (and theories) within the various families

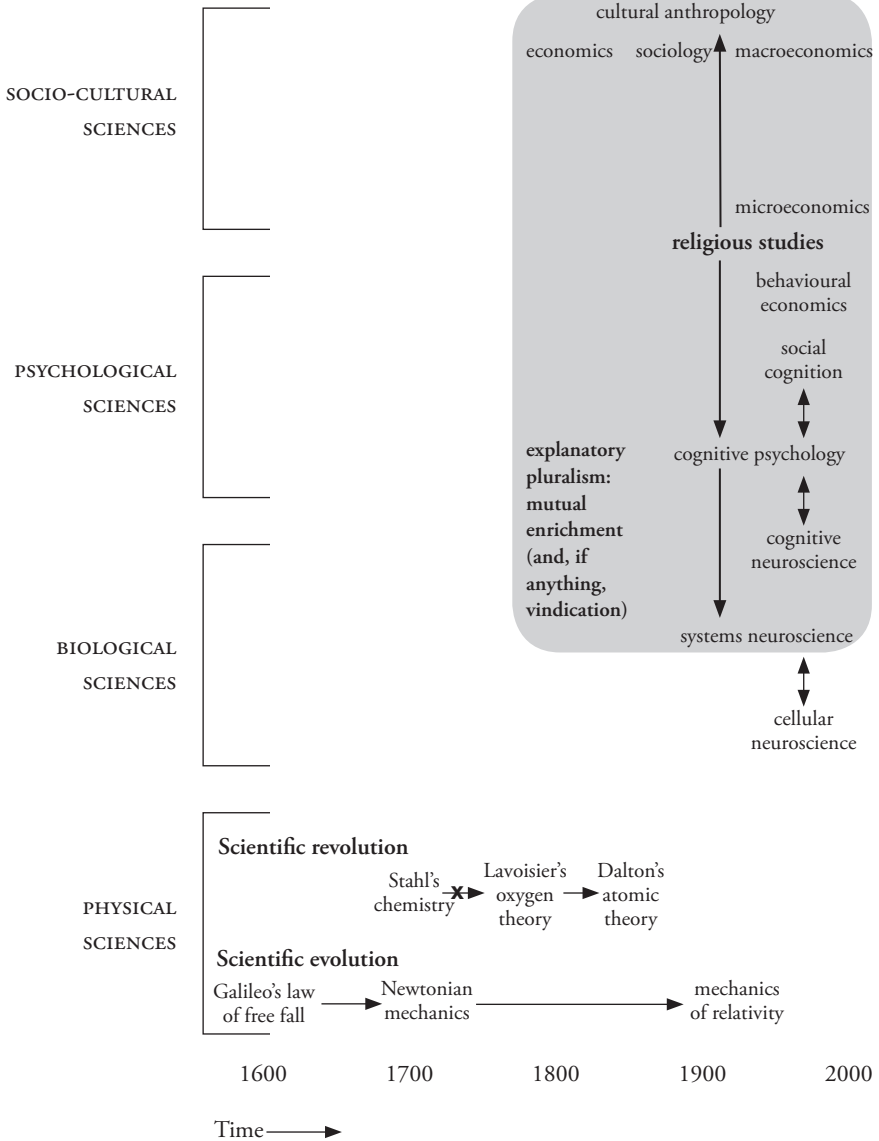


Figure 2.5 Explanatory pluralism and religious studies.

of molecular neuroscience over the past three decades will put cognitive neuroscience or the psychology of religion out of business.

According to explanatory pluralism, any reductionist impulses exhibited by the cognitive science of religion only promise means for further enriching our

understanding of the religious, the meaningful, the spiritual and so on. The kinds of cross-scientific connections involved do not lead to the elimination of either fields (such as religious studies) or their objects of study.

A footnote: not even scientific revolutions between successive theories within a particular science typically involve the elimination of phenomena. To recognize the theories as competitors depends upon the substantial overlap of their *explananda*.

Two ways that the cognitive science of religion and traditional religious studies can be mutually enriching

On the basis of a variety of cognitive considerations, my and Tom Lawson's cognitive theory of participants' religious ritual competence draws a major distinction between two major classes of religious rituals (McCauley & Lawson 2002). One of those classes is "special agent rituals". Special agent rituals are those in which agents possessing counter-intuitive properties ("CI-agents" hereafter) serve, either directly or via their ritually established intermediaries (e.g. priests), as the *agents* in participants' tacit cognitive representations of the rituals in question. In religious participants' commerce with the gods, special agent rituals are the religious rituals in which CI-agents do something to religious participants, at least some of whom, in any given case, serve as the patients of these rituals.

By virtue of their counter-intuitive properties CI-agents are capable of doing things *once and for all*. They need not repeat themselves. Consequently, participants typically need to participate in these special agent rituals as their patients only once. Participants typically are baptized only once, go through only one bar mitzvah, are wedded to their spouse only once and so on. Participants may *observe* the various rites of passage and all other special agent rituals (consecrations, investitures, etc.) many times, but the patients of those special agent rituals will change with each performance.

Lawson and I have argued that it is by virtue of participants' cognitive representation of the forms of special agent rituals that they incorporate comparatively elevated levels of sensory pageantry. High levels of sensory stimulation, either positive or negative, across any of the sensory modalities tend to excite human emotions and arouse human minds, which Lawson and I maintain is just the ticket for marking the personal and cultural salience of an event. By contrast, Harvey Whitehouse has, in effect, maintained that the high levels of sensory pageantry are a function of the comparative infrequency with which special agent rituals are performed (Whitehouse 1995, 2004). All three of us agree, however, that special agent rituals inhabit a hotspot within the space of possible ritual arrangements, in which performance frequency is low and

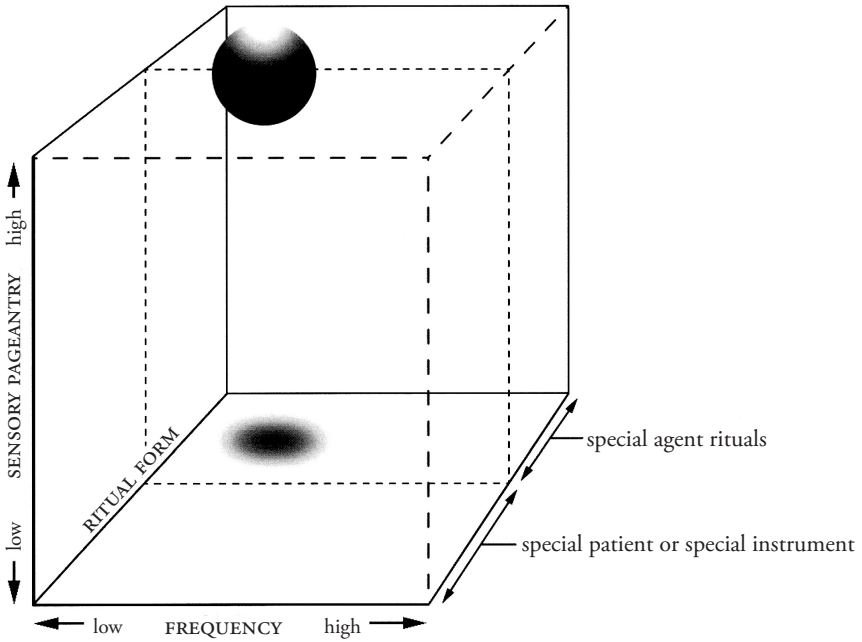


Figure 2.6 Special agent rituals.

comparative levels of the sensory pageantry associated with such rituals is high (see Figure 2.6). We also agree that in combination with a variety of other factors, these rituals are likely to prove comparatively memorable, meaningful and motivational. Here I wish to highlight that third feature.

Crucially, “motivation” here connotes, among other things, participants’ inclinations to transmit their religious representations to others. Since such transmission is a necessary condition for a religion’s growth, from the standpoint of cultural evolution these motivational effects of special agent rituals matter (Sosis & Alcorta 2003; Atran & Henrich 2010). A few complications aside (which Lawson and I address at length elsewhere), the more times a participant serves as the patient of a special agent ritual the more likely that participant will be to act on and transmit his or her religious representations (McCauley & Lawson 2002: 124–92; Ginges *et al.* 2009). That observation, though, occasions a dilemma.

The dilemma is that although it is an advantage for a religion to provide a steady regimen of special agent rituals, typically, as I have noted, participants serve as the patients of special agent rituals only once. Because of the expenses involved in producing the elevated levels of sensory pageantry associated with special agent rituals (including such things as special foods, clothing, music, dance, etc.), having a large menu of *different* special agent rituals will quickly

present prohibitively high costs. Consequently, there is an incentive for religions to have some means by which they can *repeat* a more limited list of special agent rituals with the *same* patients.

At least three sorts of ritually extraordinary circumstances permit the repetition of special agent rituals with the same ritual patients, namely, reversals, failures and substitutions. If two people are divorced, they can be remarried. If the ritual practitioner performing the special agent ritual is an imposter, the performance is invalid and must be done again. If one person stands in for another, then that person may undergo a special agent ritual another time.

Substitution in special agent rituals is the best of these options for a host of reasons. Those reasons include negative considerations associated with the first two options having to do with risking the appearance either of fickleness, indifference or impotence among the gods or of iniquity or incompetence among ritual practitioners. They also include positive considerations in addition to the fact that ritual substitution has none of the major disadvantages associated with the other two options. Among those positive considerations are that ritual substitution supplies both prospective and retrospective justifications for repeating a special agent ritual with the same patient and it affords a limitless number of such re-performances. No considerations of ritual form constrain the number of persons for which a participant can substitute.

Mutual enrichment: my and Lawson's theory of religious ritual competence not only discloses these social patterns but explains them on cognitive grounds. Having a theory that both ascertains these general patterns across religious systems and illuminates some of the dynamics underlying them certainly endows explanatory insights available to all scholars of religion, regardless of their methodological or theoretical orientations. That is one way the cognitive science of religion can enrich religious studies.

The question remains, however, whether this relatively idealized cognitive theorizing actually squares with the facts on the ground. The account I have sketched above generates at least one prediction, namely that, all else being equal, religions that allow the repeated substitution of the same ritual participants in special agent rituals will enjoy a competitive advantage over those that do not. Scholars of religion, especially historians of religion, can play a vital role here. The obvious questions are: what religions had or have such rituals and did they or do they enjoy such a competitive advantage? I do not wish to be coy here. In a separate paper I note one religion that does employ such ritual substitution and briefly sketch a case for the claim that, *ceteris paribus*, it does enjoy such a competitive advantage (McCauley in press). Just identifying religions that have incorporated participants' substitution for patients in special agent rituals would be a valuable contribution. Presumably,

no one is better prepared than historians of religion to report on the fate of those religions! That is one way in which religious studies can enrich the cognitive science of religion.

Cognitive scientists of religion welcome such collaboration.