

HOW SCIENCE AND RELIGION
ARE MORE LIKE THEOLOGY
AND COMMONSENSE EXPLANATIONS
THAN THEY ARE LIKE EACH OTHER:
A COGNITIVE ACCOUNT

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No one has explored the implications of cognitive theories and findings about religion for understanding its history with any more enthusiasm or insight than Luther Martin. Although my focus here is not historical, I assume that I will be employing cognitive tools in ways that he finds congenial. In the paper's first section, I will make some general comments about standard comparisons of science and religion and criticize one strategy for making peace between them. In the second section of the paper, I will delineate two cognitive criteria for comparing science, religion, theology, and commonsense explanations. Finally, in the third section, I will suggest that such a comparison supplies grounds for thinking that our longstanding interest in the comparison of science and religion is, oddly, somewhat misbegotten from a cognitive perspective.

1. Some Comments on Traditional Comparisons of Science and Religion

Standard comparisons of science and religion have not generally waltzed to cognitive tunes. Traditionally, most scholars (whether philosophers, scientists, or theologians) have focused on science and religion's comparative epistemological and metaphysical merits. Their focus has been either on how each activity does or does not contribute to our knowledge or on what each discloses about reality. Two trends have emerged. Generally, the champions of science have tended to headline its epistemological merits. They tout the fact that science stands unmatched in its ability to increase and improve our knowledge. By contrast, defenders of the faiths, in the face of what they see as the metaphysical severity of science, usually commend religions' metaphysical liberality. Those defenders concur that assumptions about invisible sources of agency, both in us and in other kinds of beings, help to make sense of human experience, to undergird what they see as proper moral and social arrangements, and to frame the most daunting

questions humans face, concerning their own mortality, in particular.

An examination of these enterprises' cognitive foundations not only provides new views of science and religion, it also explains these trends. From the standpoint of popular conceptions of the world, science can appear metaphysically hobbled. Hawking *radically* counter-intuitive representations (that the earth is spinning at one thousand miles per hour, that solid objects are mostly empty space, that all current organisms are descendants of other organisms who would not have qualified as members of their species, etc.) whose appreciation requires painstaking cognitive processing that takes years, if not decades, to master, science carries some substantial liabilities into the marketplace of ideas, let alone into everyday marketplaces. Cognitively awkward representations that are often inconsistent with the representations of things that human minds most readily deploy are never a quick or easy sell. In particular, science's abandonment of agent causality across its history in a progressively wider set of domains inevitably leaves human minds, with regard to at least some of those domains, floundering and incredulous. Over the past fifty years the sciences of the mind/brain have even begun to constrain appeals to invisible sources of agency *within us*. It is the undoing of agency in the biological realm that has been the principal political flashpoint in contemporary American public life and that is at the crux of those battles over Darwinian evolution.

In the short run, science, just like anything else, most effectively grabs human attention when it seems wondrous. For the first fifty years of television in America, the best known purveyor of scientific insights was, not coincidentally, called Mr. *Wizard*. (Alas, American television has had no comparably sustained or well known purveyors of science since.) For most of the public, science's only major selling points are connected with those occasions when its effectiveness at explanation, prediction, or control are timely or when related technologies either thrill or fascinate. When the work of scientists develops effective vaccines for deadly diseases or successfully transplants organs or predicts celestial events or explains the mechanisms of inheritance or inspires the latest advance in computing, the public is less inclined to challenge science's epistemic authority, even if people find its shifting verdicts and its underlying metaphysical commit-

ments utterly perplexing.

By contrast, the recurrent ontological commitments of religions are far easier to swallow cognitively. They square almost perfectly with the deliverances of humans' maturationally natural cognitive systems, and they capitalize, especially, on the penchant of human minds to presume that noteworthy events are the results of the actions of mindful agents. Proliferating agents poses no special cognitive problems for human minds in standard operating mode. That mode relies on perception, cognition, and dispositions to act that are automatic and unreflective. Across a vast range of physical, cultural, and historical circumstances, human beings routinely develop intuitions about a variety of domains. On the basis of a paucity of cues in those domains, humans can, in an instant, draw elaborate inferences and act effectively. From such things as their command of the basic physics of solid objects, to such things as the recognition of agents, the comprehension and production of complex utterances, the knowledge of how to deal with environmental contaminants, and the discernment of emotional and intentional states on the basis of facial expressions, bodily postures, and tones of voice, humans at the onset of middle childhood have developed skills of perception, cognition, and action that enable them to manage a host of mechanical, biological, and social problems. Those intuitions and dispositions rarely result from any explicit instruction, yet most of them are normally in place by the time children reach the age of seven. These maturationally natural capacities concern matters and result in actions that are so fundamental to human life that their appearance in development helps to define what counts as 'normal'. Such capacities count as maturationally natural on the basis of their spontaneity, their ubiquity, their early onset (for the most part), and their independence both from explicit instruction and from other forms of culturally distinctive support.

Pascal Boyer (1994 and 2001) has argued that religious representations violate humans' maturationally natural presumptions only modestly. These modestly counter-intuitive representations that dominate popular religion are easy to use. (Tweney et al. 2006) By nearly always presuming, in any particular context, but one or, very occasionally, two violations of intuitive knowledge, the representations of popular religions permit participants to utilize a huge range of *default inferences* that accompany our maturationally natural ontological knowledge. Consequently,

these modestly counter-intuitive representations possess an abundant inferential potential. Knowing that a something is an *artifact* allows us to infer that it has a determinate size, shape, and weight, that human beings have had some influence on its current state, but also that it does not indulge in respiration, contemplation, or copulation. On the other hand, knowing that something is an *agent* allows us to infer that it has goals, desires, and preferences, that it finds some attitudes and behaviors offensive, and that it is disinclined to help anyone who manifests such. That some agent has biologically counter-intuitive origins (a breach of folk biology) does not block our ability to draw all of the standard inferences about that agent's mental states, aims, interests, values, and likely behaviors that we can draw about any other agent (Tremplin 2006, pp. 112-113).

Boyer holds that representations that conflict so modestly with humans' ontological intuitions, while simultaneously drawing on all of their associated default inferences, approximate cognitively optimal arrangements from the perspective of making sales within the marketplace of culture. (Boyer and Ramble 2001) Such representations approach the best available balance among the multiple ends of simultaneously attracting human attention, enhancing human memory, and increasing inferential potential. That is another way of saying that standard religious wares sell comparatively easily. It is also a way of saying that religious representations probably never completely lose their natural attractiveness, regardless of intellectual training. The most valuable evidence here is not the steadfast denials of the non-religious about their conscious mental lives but, rather, indirect tests that tap cognitive influence and activity that operate below the level of consciousness. Unshakeable, subterranean forces are the more interesting marks of some representation's natural cognitive allure.

The downside, though, is that ease of swallowing from a cognitive standpoint does not guarantee ease of digestion from an intellectual standpoint. Enduring texts afford systematic assessments of the truth of their claims. Because religious representations typically wear their violations of ontological intuitions on their sleeves, many of the logical problems they engender are transparent in literate contexts where methodical reflection is prized. Such conditions spawn *theological* reflection and proposals, which can end up appearing nearly as convoluted as the most puzzling claims of science. Because theological and scientific claims part

so substantially from our maturationally natural knowledge, people often find them baffling. Generations of Calvinists have been bewildered by Calvin's notion of predestination (Slone 2004, chapter 5). Once the claims of popular religion undergo inspection in a literate culture, though, the conundrums they generate can become uncomfortably clear to thoughtful participants and, often, laughable to outsiders (I have yet to meet a scholar of religion or a religious person who has not admitted to finding some belief, practice, or artifact of *someone else's religion* nothing short of hilarious). The claims of popular religion, especially those in behalf of religious experience, cannot easily bear the unencumbered scrutiny of a literate public and the rigorous application of methods employed to study other areas of human conduct (Dennett 2006; Silk 2006). In these precincts the religious and, all too often, even scholars of religion break into special pleading, which is not a script for creating durable epistemological credentials¹.

Although the link is hardly deductive, these two trends among conventional comparisons of science and religion spur on a popular strategy for parceling the pertinent intellectual territory out between them. The best known advocate of that strategy recently has been Stephen Jay Gould in his book *Rocks of Ages*. There Gould assigns science and religion to two different 'magisteria'. He asserts that 'the ... magisterium, of science covers the empirical realm' ... while 'the magisterium of religion extends over questions of ultimate meaning and moral value'. This strategy for dividing up the turf is popular, because it promises intellectual peace. Gould stresses that '*these two magisteria do not overlap...*' (Gould 1999, p. 6, emphasis added). No overlap eliminates any possibilities for conflict. In this two state strategy, each activity, according to Gould, rules in its own realm.

This strategy for achieving peace faces problems, though, on at least two counts. First, it is not obvious that these ventures are the sole authorities in the respective magisteria Gould assigns them. For example, what specific religions have to say about meaning and morality always ends up turning, sooner or later, on their particular contents, commitments, and practices. The problem, if these religious systems' recommendations are to be persuasive to anyone

1. See Lawson and McCauley (1990, chapter 1) for illustrations of the latter. Drees (1996) constitutes a welcome corrective to such special pleading.

other than their current subscribers, is that these distinctive features of religious traditions carry little, if any, authority precisely where they need to here, viz., *beyond* the confines of that particular religious system's followers. These contents, commitments, and practices must retain their credibility in a diverse world, if they are to prove any basis for either general, morally obligatory prescriptions or what people, across cultures, take to be meaningful arrangements (Remember all of that laughing about other people's religions that I mentioned above). Arguably, a *particular* religion is exactly what any grounds for binding moral authority *cannot* depend upon, if rational and psychological purchase *across* religious systems and cultures is the aim. This is just one of those areas where it is difficult to underestimate the influence that culture exerts on *conviction*, even if we are inclined to overestimate its influence on *contents* (Hinde 1999, chapters 12-14 and Boyer 2001, chapter 5).

On the other hand, although science is second to none in the empirical realm that is not the same thing as claiming that it is the exclusive authority on empirical matters. Science is young, it operates with limited resources, it is difficult to learn, our lives are short, and the world is huge and complex. We have only just *begun* to question the world scientifically. Moreover, science is a never-ending process. As we do better science, we learn that much more about what we do not know and, as noted above, some of the conclusions invariably change as science progresses. Over the last few decades larger numbers of people have had sufficient time and material support to learn some science, and, occasionally, the particularly diligent get the opportunity of consulting informed, up-to-the-moment scientific judgment, but we should not be embarrassed about the fact that *most of the time* we are stuck with relying on little more than our maturationally natural intuition in our dealings with the world. It is the inevitable consequence, in the face of the practical necessity of getting about from day to day, of the immense variety of the problems that we face, of our limited resources, of the fallibility of our inquiries, and of the substantial intellectual challenges attached to comprehending the sciences.

The second reason why purchasing peace between science and religion on the basis of claims about their non-overlapping magisteria may prove too dear is that it involves some normative sleight of hand. I will only mention two related examples. First, one of the easiest ways of

minimizing the tensions between science and religion is simply to deny that the religious people, who remain especially exercised about the apparent conflicts, deserve to be designated as 'religious' in the first place. Make no mistake about it, such dismissive legislation lurks behind all gentle and, apparently, conciliatory talk of 'true' religion among the faithful, among the theologians, and among many academics. This includes, for example, claims by members of each of those groups that the terrorists who attacked New York, Madrid, and London were not true representatives of religion or, more specifically, of Islam (Sullivan 2001). But the pressing questions are (1) who gets to say whose religiosity is or is not true or whose version of Islam (or any other religion) is the right one? and (2) on what rationally convincing basis do they get to say it? Or consider Gould's (1999, p. 148) declaration that 'creationists do not represent the magisterium of religion'. Gould proceeds as if the religious, let alone the logical, sensibilities of literally hundreds of millions of people should not count when sorting these matters out.

Gould and his allies here invent prejudicial norms where norms of the sort they desire, i.e., non-prejudicial ones, are not to be had. The second trend in conventional comparisons of science and religion, which accentuates religions' metaphysical liberalities while downplaying or even ignoring their epistemological liabilities, amounts to a tacit recognition of that fact. This asymmetry between religion and science is not coincidental. I shall argue in the next section that, as reflective activities, science and theology have different relations to the maturationally natural moorings from which they are born. Theology, like Lot's wife, cannot avoid the persistent temptation to look back - in the case of theology to look back to popular religious forms. By contrast, the radically counter-intuitive commitments at which the sciences inevitably seem to arrive commonly produce unbridgeable gaps with the intuitive assumptions underlying commonsense explanations. The sciences fairly quickly get to a point where they can no longer look back to our maturationally natural predilections, even if scientists wanted to. Theology is largely devoted to making sense of and bringing some logical order to the claims of popular religion. Science, by contrast, follows wherever its inquiries lead and across all of the sciences, that has reliably been away from the automatic deliverances of our maturationally natural mental systems that inform our commonsense understandings of the

world.

As the *Hebrew Bible* amply documents, peoples have routinely construed their own conflicts as conflicts between their gods. The invention of literacy not only made proselytizing religions possible, it also created the possibility for *reflection* on conflicts about religions' comparative intellectual and moral merits. It is not from any lack of effort that advocates for any particular religious view have yet to come up with anything remotely close to the sort of case for their preferred versions of religiosity that comparatively disinterested observers from around the world would collectively find at all persuasive. This contrasts with the way that overwhelming majorities of the world's professional scientists *do* find the resolutions of so many of the controversies in their fields of study convincing, at least for the time being. Scientists regularly arrive at such views on the basis of relevant evidence and without epistemologically troublesome coercion. That, of course, is not to say that they *always* do so without epistemologically troublesome coercion or to say that they *ever* do so completely independently of extra-scientific social influences. The difference here between science and theology is not trivial, but, on the other hand, it should not be overplayed. That is because the sciences' verdicts, even their most fundamental ones, are constantly eligible for reconsideration and because, as noted, evidence sometimes emerges that the influence of scientifically arbitrary forces are *not* negligible.

These considerations lead to a second, related illustration of how designating non-overlapping magisteria for religion and science carries problematic normative consequences. Gould (1999, p. 211) urges both science and religion 'to stay on their own turf'. On his account science is concerned with empirical explanation while religion's magisterium covers morals and meaning. Religions certainly do try to make sense of our lives and of the world in which we find ourselves. The problem, though, is that that process of making sense of things inevitably involves appeals to explanations about the origins, the make-up, and the behavior of things generally and about *our* origins, make-up, and behavior in particular. Religious meaning making, indeed *all* meaning making, *always* makes explanatory assumptions. Some of those assumptions, such as those creationists proffer, are explicit. Many more, connected with such maturationally natural cognitive systems as theory of mind, are usually implicit (Lanman 2007). But in either case making

meanings depends on, among other things, explanatory accounts of how things hang together, of how events are connected, of how the world works, and of how we operate. Whether advocates of exclusive magisteria like it or not, all religions explicitly traffic in explanations some of the time, and all religious meaning making makes explanatory presumptions all of the time (Lawson and McCauley 1990, chapter 1). Much of the time those explanations are superfluous from the standpoint of scientific accounts, if they are not downright inconsistent with the claims of science. The attempt to buy peace by designating exclusive magisteria requires either (a) ignoring the place of explanations, whether religious or scientific, in the processes of finding or assembling meaning or (b) ignoring the logical tensions between the explanations that science and religions favor or (c) ignoring both. Gould's conception of the relation of science and religion is not exactly peace at any price, but it does seem, in light of these normative problems, to be peace at too high an intellectual price.

2. Two Criteria for a Cognitive Comparison

Comparisons of science and religion have been so numerous over the last century as to constitute a cottage industry. The tensions surrounding the relations between science and religion concerning metaphysical and epistemological matters that I sketched in the previous section have been clear even to the casual observer. Contributors have been anxious either to dissolve those tensions or to emphasize them as grounds for extolling one or (like Gould) for extolling both of these enterprises. Such epistemological and metaphysical preoccupations are perfectly legitimate concerns and perfectly understandable philosophically. However legitimate and however understandable they are, though, while they clarify some things, these preoccupations blur others. In a recent volume (Harper 2005) surveying perspectives on science and religion that covered everything from quantum mechanics to the contemplation of the virtues, cognitive approaches received no attention. That oversight is unfortunate, since the exploration of the cognitive foundations of science and religion suggests that these traditional comparisons of science and religion are, from a cognitive standpoint, misbegotten in two related respects.

Of course, anything can be compared with anything. Still, science and popular religion diverge on two kindred cognitive criteria that expose reasons for thinking that their conventional comparisons are less revealing than is

typically presumed. Those criteria permit science and religion, along with theology and commonsense explanations of the world, to be distinctively situated in a two by two table. (See figure 1) The first criterion, represented vertically at the left of figure 1, is a distinction between the relative prominence of two types of cognitive processing in any of these activities.

appeals to agent explanation / causality	unrestricted	restricted
preferred type of cognitive processing	1	2
reflective	<i>theology</i>	<i>science</i>
maturationally natural	3	4
	<i>popular religion</i>	<i>commonsense explanations and understandings of the non-social world</i>

figure 1
cognitive asymmetries

Reflective processing is conscious, deliberate, and comparatively slow. By contrast, the operations of maturationally natural cognitive systems are typically unconscious, intuitive, and fast. Cognitive undertakings

that tilt toward reflective, off-line, cognitive processing and away from maturationally natural cognition are across the top (represented by cells 1 and 2), whereas those that rely more prominently on maturationally natural, on-line, cognitive processing that tends to preempt conscious, off-line reflection are in the bottom row (represented by cells 3 and 4). Reflective, off-line cognition is the most plausible candidate available for thought that is under conscious control. Literacy has played a pivotal role in its enrichment, since the external representation of such thought in publically available texts permits conscious minds to produce and contemplate the elaborate ideas and extended arguments that the most sophisticated forms of reflection involve.

Maturational naturalness is not the only form of cognitive naturalness. Perception, cognition, and action can become intuitive and automatic in domains in which people have invested considerable effort over time to master something. Given that literacy is not much more than five thousand years old, there is no reason to think that human brains have evolved to learn how to read. On the face of it, the widespread incidence of reading disabilities like dyslexia is further evidence that this is so. Human brains were not built by nature to learn to read and write. Those are cultural accomplishments. Thus, most humans must acquire those skills laboriously. The only naturalness that can ever accrue to these forms of cognition is *practiced* naturalness. Their practiced naturalness is best illustrated by how automatic so much of reading becomes for experienced readers. That it is *practiced* naturalness (as opposed to maturational naturalness) is best illustrated by how effortful reading is for inexperienced readers, regardless of their age. How much time humans devote to explicit teaching and structured learning of literate skills is a further indication that any naturalness arising here is a function of extensive practice. Prolonged exercise at reflective activity in some field can yield a practiced naturalness on various intellectual fronts. With considerable experience, experts obtain developed intuitions about their areas of expertise. Research on lapses in deductive and probabilistic reasoning and in the application of scientific theories and concepts indicate that such practiced naturalness in intellectual matters is both hard won and, often, surprisingly inflexible. Small shifts in an otherwise familiar scenario can cause even experts' performance to crash sometimes (Piatelli-Palmerini 1994;

Gilovich et al. 2002).

The second criterion represented horizontally at the top of figure 1 concerns the explanatory prominence accorded *agent causation*, in particular. This distinction arises from my earlier observation about the increasing restrictions that, over its history, science has imposed on the legitimacy of appeals to agent causality. Over the past four centuries science has progressively curbed the use of such explanations - in the physical sciences first, then in the biological sciences, and now increasingly so in the psychological and socio-cultural sciences. Scientific abstemiousness concerning intentional agents and their putative actions is to be contrasted with religions' pervasive recruitment of theory of mind and appeals to agent explanations.

Theory of mind concerns humans' intuitive knowledge about others' minds and what goes on in them and the enriched social world that that knowledge sustains. Humans' ability to draw inferences about others' mental states explains the scope, diversity, and complexity of human social arrangements and plays a pivotal role not only in individual (Dunbar 1996, p. 87) and collective survival but in individual and collective accomplishment.

Acquiring theory of mind involves a series of attainments (Leslie 1994), and it apparently takes some years just to get the maturational basics down. Infants are keenly aware of the fact that people are numbered among a restricted set of things in the world that are prominent because they are *animate*. People are the most conspicuous members of the subset of animate things that qualify as *agents*. Agents not only move about in irregular ways; their movements constitute *actions* with specific *goals*. Philippe Rochat and his colleagues (1997) have provided evidence that infants are sensitive to goal-directed actions at three months of age. No theorist questions that such a capacity is adaptive. Detecting agents, their goals, and their actions is a prerequisite for managing complex social relations in human communities, but it pertains to far more basic matters as well, such as detecting predators and prey.

By the time they are six or seven years old, children not only come to adopt what Dan Dennett (1987; 2006, pp. 109-111) calls 'the intentional stance' toward other agents, they come to regard them as fully qualified 'intentional systems', i.e., they regard them as if they possess not only goals but mental lives and mental representations of their own (Tomasello 1999, pp. 53 and 174). Once they reach early

school age humans know about a world filled with other humans and have already acquired the *basic* skills and knowledge necessary for handling the problems such a world presents. Gaining social experience and ingesting the voluminous narrative materials (stories, myths, dramas, novels, etc.) that saturate cultural spaces provide humans ample bases for elaborating, extending, and embellishing their theory of mind (Frith 2005, p. 48).

The speed, facility, and sophistication with which human beings deploy the intentional stance to make sense of their social world contrasts starkly, though, with their liberality and frequent lack of insight about what qualifies as an intentional system. Deborah Kelemen (1999a; 1999b) has documented pre-school age children's 'promiscuous teleology'. This refers to children's penchant for over-attributing functions to things as a result of their new ability and growing experience with purposeful agents pursuing goal-directed actions. Unlike most adults, most children this age are willing to attribute functions to biological wholes (e.g., tigers) and to parts of natural objects (e.g., a mountain protuberance) as well as to the natural objects themselves (e.g., icebergs).

Adults as well as children are remarkably profligate in their ascriptions of agency, yet any individual who fails to take the intentional stance toward effectively structured systems of much complexity will be at a distinct disadvantage when it comes to predicting their behavior. One of the benefits of employing Dennett's technical terminology to discuss these matters is that it readily accommodates the fact that humans are so often indiscriminate in their attributions of intentionality. If not, upon reflection, in their assignments of minds to things in the world, then, at least, often in their *treatment* of many things, humans proceed not only as if inanimate things are agents but as if they are agents who understand what we say. This proclivity of the human mind manifests itself in everything from children's play to adults talking to, coaxing, even begging for cooperation from machines like cars and computers. The point is not so much that humans, even children, take the intentional stance toward inanimate things (though *that* is certainly noteworthy too) as much as it is that we so often feel compelled to do so (Mithen 1996, p. 55) and that we so often derive some comfort from doing so. In some ways, the adults' behaviors are more revealing than the children's. Children generally know when they are pretending, however steadfastly they may keep up the pretense for a time. Their

own on-line, i.e., unreflective, episodes of taking the intentional stance toward inanimate things, though, regularly seem *unremarkable* to adults.

Evolutionary psychologists have a ready account for these extravagances (Atran 2002; by contrast, see Harris 1994, p. 308). So long as the costs of false-positive signals are not too high, it pays to have an agent detection system that is easily cued. In a hostile, competitive world that is red in tooth and claw, the costs of false-negative signals are *prohibitively* high. All else being equal, the creature that is inattentive to the movement in the periphery, the shadow passing overhead, or the rustling in the leaves (let alone the sound in the basement) is less prepared to protect itself from predators, competitors, and foes. A mechanism with a low activation threshold for spotting agents may leave a critter a little jumpy, but, again, so long as the costs are not exorbitant, a hyper-sensitive agent detection device (HADD) is also more likely to leave it alive to be cautious another day (Barrett 2000 and 2004; Baron-Cohen 1995, p. 35; Buss 1999, p. 88).

Supplementing this basic equipment with a rich theory of mind equips an individual to manage in a complex social universe, where, among other things, people make alliances, have conflicts, cooperate, compete, joke, threaten, ameliorate, inform, trust, and deceive. Among social animals, human beings are unmatched in their appreciation of an entire social world fashioned by individual agents' actions. A HADD disposes them to look for agents and, thus, to deploy the categories of agent causality when things go bump in the night (an intruder?) or when an unexpected event occurs amidst complex social arrangements (a conspiracy?). This maturationally natural proclivity steers human minds away from inventing or investigating other causal conceptions (cf. Tomasello 1999, pp. 22-25) concerning *things* going bump (at any time of day) and, especially, concerning *human* affairs, where the detection of intentional agents is as unproblematic as it can *possibly* be.

The next section examines the implications for science and religion and for theology and commonsense explanations of the physical and biological world of people having minds that naturally mature in the ways that human minds do. Their maturationally natural systems equip human minds to readily generate, retain, deploy, and transmit religious representations. By contrast, the prominence of those maturationally natural systems is, usually sooner but always later, mostly an obstacle to the invention and the

investigation of alternative causal conceptions. Broadly speaking, this is why science is so hard to learn and why it is so hard to do.

3. Traditional Comparisons of Science and Religion Are Cognitively Misbegotten

Although discrete cells seem to imply differences in kind, both criteria that define the table in fig. 1 only gauge differences in degree. The table captures the comparative priority each venture places on these cognitive variables. The resulting array situates religion and science relative to theological reflection and commonsense understandings of the (non-social) world and illustrates two telling asymmetries.

Concerning cell 2: science is a reflective activity involving forms of thought and types of representation that depart radically from the pronouncements of our maturationally natural cognitive systems. Consequently, they also substantially constrain reliance on agent causality for the purposes of explanation, prediction, or control. The progress of science has gradually but steadily whittled down the range of areas in which the most accurate and comprehensive explanations for phenomena involve taking the intentional stance. The prohibition of agent causality from physical and biological science has, in effect, become a tacit methodological maxim. (McCauley 1988) Still, this contrast should not be exaggerated. The success of mechanistic modeling in the cognitive sciences notwithstanding, the psychological and socio-cultural sciences continue to call upon agents, their mental states, and their resulting actions in many of their explanatory theories. In fields such as social psychology, classical economics, and cultural anthropology, theories about intentional agents, their preferences, and their actions remain the standard mode of analysis and explanation. Thus, even in science the use of agent causality is unlikely to wither away completely, at least for the foreseeable future.

Concerning cell 4: not all of the verdicts of maturationally natural cognitive systems involve summoning agent causation or theory of mind. In fact, most do not (Frith (2003, e.g., p. 109) argues that even many social accomplishments may not rely on theory of mind). By school age, human beings seem to possess all sorts of detailed dispositions about matters as various as the basic physics of solid objects, grammatical form, fair distributions of resources, and the avoidance of contaminants. What makes

many of our commonsense understandings and explanations common is precisely that they arise, in part, from maturationally natural dispositions of mind that human beings share. Certainly, humans are not incapable of reflection about such matters, though it rarely occurs to them to undertake such musings. But in many situations, especially those that call for quick judgment or fast action, these intuitive systems and the accompanying emotions they often involve kick into gear before opportunities for conscious deliberation even arise. For example, when people feel cheated, it dominates their awareness and drives their actions. Sometimes such dramatic circumstances cue these cognitive systems' automatic operations, but far more mundane matters can trigger dispositions that also have nothing to do with theory of mind either. Michael McCloskey (1983) showed that large numbers of naive subjects attempted actions that were aimed at producing physically impossible motions in order to carry out a task that did not require such a wondrous accomplishment. So, for example, when asked to roll a ball in such a way that its path crossed both the entrance and the exit of a curved passage drawn on a flat surface, many of McCloskey's subjects tried to do so by attempting to impart a curving motion to the ball that would follow the arc of the curved passage.

Concerning cell 1: *nothing* I have said rules out off-line, reflective activity in domains that have no inherent restrictions on appeals to the intentional, like the restrictions that now reign in the physical and biological sciences. By no means is theology the only kind of intellectual project that falls within this cell. It also contains traditional moral philosophy and somewhat more rarefied areas of contemporary philosophy such as action theory. With respect to matters religious, though, such reflection is principally the occupation of theologians. In the literate cultures where they arise, theologians regularly carry out the same forms of inference (deductive, chiefly, but probabilistic too) that philosophers and scientists do, and they brandish representations that can sometimes be as counter-intuitive as those that scientists use. Boyer diagnoses the underlying cognitive bases for how and why the violations of intuitive ontology that dominate the representations of popular religion turn out to be quite limited. By contrast, theologians have, by now, been generating radically counter-intuitive representations for millennia. Attributing esoteric abstract properties such as omniscience, omnipotence, and omnipresence to some gods are

the sorts of examples that leap to mind, however, the conceptual recalibrations required, for example, of Christians to accommodate what are far more fundamental notions, historically, are plenty challenging enough. Understanding God as a triune entity (each person of which is alleged to have had temporary, divergent physical manifestations) presents all of the conceptual adjustments that the modern psychological account of multiple personality disorder demands and a good deal more.

Concerning cell 3: religion enlists humans' maturationally natural cognition and it engages theory of mind especially. Thus, it falls in cell 3. Folklore, fairy tales, and fantasy literature fall into this cell as well, but religion is the interesting case for present purposes. Popular religious forms, including icons, sacred spaces, rituals, priestly status, glossolalia, CI-agents with full access to people's thoughts, and more, variously activate mental systems that develop early on in human minds. Those mental capacities do not operate as they do in order to manage religious inputs, but, instead, arise in human cognitive development to handle problems of perception, cognition, and action that are far more basic to human survival. Particularly central to making our way in religious worlds are the automatic inferences and intuitive calculations about agents, their intentional states, and their actions that also happen to be particularly central to making our way in the everyday social world as well. These mental tools that humans routinely use are what make religious materials captivating for human minds. They are also what, by school age, equip human beings to grasp religious forms and enable them to acquire religion.

My aim here is not to restate my entire case for the cognitive naturalness of religion and the cognitive unnaturalness of science (McCauley 2000 and [in progress]), but rather to underscore how this analysis suggests that traditional comparisons of science and religion on epistemological and metaphysical grounds disclose little about the underlying cognitive factors that give them their shape. From the standpoint of *cognition*, science and religion are asymmetric on two crucial counts that correspond to the two cognitive criteria that define the table in fig. 1. First, they operate at wholly different cognitive levels. One, popular religion, is thoroughly dependent on the natural proclivities of human minds and, hence, recurs in every human culture, whereas the other, science, is a function of comparatively rare social

arrangements that require familiarity with both norms of reasoning and radically counter-intuitive conceptions and the public availability of the pertinent processes, products, and evidence. The second asymmetry hinges on their critically different default assumptions about the way the world works. Religions presume that the most penetrating accounts of the world will always, ultimately, look to agent causality. Science does not.

Nor, in all domains, do our commonsense understandings of the world. That observation hints at how the disinterest of conventional comparisons of science and religion in these cognitive and cultural considerations can obscure some revealing connections. For example, *both* science and popular religion are more similar cognitively to *both* theology and commonsense explanations of the non-social world *than they are to one another*. Consider science first. As I just noted, neither scientific nor commonsense approaches to accounting for the non-social world assume that agent causality, finally, provides the most telling explanations. On the other hand, both science and theology are reflective activities that are mostly pursued by highly trained specialists and that are most credibly pursued by highly trained specialists. Popular religion, by contrast, shares neither of these properties with science. On both of the cognitive considerations just reviewed, it too is more like both commonsense explanations and theology than it is like science -- though, of course, in exactly opposite ways. It is their mutual emphasis on maturationally natural cognitive capacities that link religion and commonsense understandings of the world, while it is the priority they set on agent causality in their explanations of things that religion shares with theology. There is a respect, then, in which the longstanding interest in the comparison of science and religion is, from the perspective of reflection on human cognition, somewhat misbegotten. Without systematic attention to these cognitive questions and explicit discussion of the place of theological reflection and commonsense views of the world as well, conventional comparisons of the metaphysical and epistemological statuses of science and religion seem a bit contrived.

A footnote: in his book *Inevitable Illusions*, Massimo Piatelli-Palmerini discusses findings from experimental psychology indicating humans' penchant for relying on the deliverances of their maturationally natural cognitive systems even when those deliverances are thoroughly contrary to the norms of deductive and probabilistic inference. 'We

have come to see that our minds spontaneously follow a sort of quick and easy shortcut, and that this shortcut does not lead us to the same place to which the highway of rationality would bring us'. A few pages later he adds that 'our spontaneous psyche is not a kind of 'little' or lesser reason, nor is it an approximate form of rationality' (Piatelli-Palmerini 1994, pp. 142 and 159). I stand by my comments in the previous paragraph about the greater similarity between either science and commonsense explanation, on the one hand, or theology and popular religion, on the other, than between science and popular religion. Still, Piatelli-Palmerini's observations counsel that the cognitive affinities between science and maturationally natural commonsense explanations should not be overestimated. Behind these two approaches to the world lurk differences that make a difference cognitively. The symmetries that fig. 1 displays suggest that if that is true, then neither should the cognitive affinities between theology and popular religion be overstated. Systematic reflection seems to generate intellectual working space beyond that which our maturationally natural tendencies supply. Karl Barth's famous and much revered rendition of 'Jesus Loves Me' notwithstanding, the maturationally natural cognitive processes and inferences that prevail in popular religion are no more a 'little' or lesser version of systematic theological reasoning than are the intuitive shortcuts of our commonsense explanations a 'little' or lesser form of scientific reasoning.

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