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Why Don't Americans Accept Evolution as Much as People in Peer Nations Do? A Theory (Reinforced Theistic Manifest Destiny) and Some Pertinent Evidence

Michael Andrew Ranney

“The Americans Are Different”

How people understand and learn about biological evolution has been the topic of many productive theoretical and empirical perspectives, spawning considerable informative pedagogical research (e.g., Bereiter, 2002; Ferrari & Chi, 1998; Reiser, et al., 2001; Sinatra, Brem, & Evans, 2008). For a variety of reasons, many such studies focus on “Americans,” residents of North America's most populous nation, the United States. Some of the reasons for this “U.S.-centric” focus, as noted herein, are directly, indirectly, or interactively related to power and its correlates, such as wealth; this is highlighted in the section's title, a noun-swap tweak for F. Scott Fitzgerald's phrase, “The rich are different” (and the United States *does* have the largest gross national income by far; also see Pew Global Attitudes Project, 2007, p. 41). But the United States truly is a dramatically atypical nation, perhaps for better *and* for worse (as explored in this chapter), and much of its uniqueness reflects an uncommon military/geopolitical history.

One of the reasons Americans' evolution beliefs are well studied is because Americans are also different from comparable nations in how they apprehend evolution.¹ For instance, consider two visiting Japanese² professors (also mentioned in Ranney & Thanukos, 2011) who each spent a semester or two in my Reasoning

¹ By “evolution,” I will mean macroevolution (and especially cladogenesis)—that is, changes at the species level or above. The concept of microevolution—changes in a population's gene frequency—seems rather unproblematic with most Americans, and especially if the word “evolution” is not used in its description.

² Japan serves as a central U.S.-contrastive exemplar nation for RTMD, and so it will be commonly revisited herein.

Research group. Although they visited a number of years apart, each was greatly surprised that not all U.S. residents accept evolution—especially when I indicated that polls show that fewer than half of American adults do (e.g., a 2009 Gallup poll: only 39% “believe in the theory of evolution,” while 25% do “not believe in evolution,” and 36% have no opinion either way). Such visitors sometimes need to be reminded of the Genesis stories when they are puzzled about what an alternative to evolution would be. When asked about Shinto creation stories, Japanese visitors (at least those raised after World War II) often labor to recall any specifics at all; consider the contrast with Americans recalling Genesis stories. Such instances illustrate what I term the *divergence question* (e.g., Ranney & Thanukos, 2011), an empirical conundrum that others have also mused about, as noted below. In short, the query is: Among some other salient dimensions, why are peer nations (e.g., industrial, and especially postindustrial countries³) so much more accepting of evolution than is the United States? A nascent, evidence-based theory is herein offered to answer this question. I call the theory Reinforced Theistic Manifest Destiny (RTMD) for reasons that will emerge as this chapter progresses.

Surveys and cognition research on reasoning about biology (e.g., Bishop & Anderson, 1990; Brem, Ranney, & Schindel, 2003) both exhibit America’s rather weak attachment to evolutionary theory. Perhaps most strikingly, Miller, Scott, and Okamoto (2006) reported that the United States ranked next to last, of 34 nations surveyed, in evolutionary acceptance.⁴ Non-Americans occasionally find this tenuous acceptance entertaining, but the divergence question transcends jokes about the median U.S. IQ or even more serious science-pedagogy questions. As this chapter attempts to explain, the divergence question may even engage the paramount international problem of humans’ acceptance of, and attitudes about, global warming⁵—another way in which the U.S. public clearly diverges from peer nations’ residents. Leiserowitz (2007) reports (1) Pew’s 2006 data that Americans are the least likely of 15 nations to worry about global warming, and (2) GlobeScan’s 2000 data that, of 34 nations queried, only three “non-peers”—Indonesia, South Africa, and Nigeria—had polled residents who were less likely than Americans to consider global warming a serious problem.

I hope to complicate—but ultimately help clarify—aspects of how and why people comprehend and/or accept evolution. The approach is considerably theoretical,

³ The term “peer nations” will be used with some latitude—as that practice seems common, will be used with some latitude. Like many concepts, it might have a “family resemblance” flavor herein, rather like: “nations that one might think are most like the U.S. on salient dimensions.”

⁴ It is worth noting that Miller et al. (2006) do not seem to provide the error data that would allow one to determine just which countries are statistically significantly more accepting of evolution than is the United States.

⁵ “Global warming,” “climate change,” and “global climate change” are used essentially synonymously herein. The author sees utility in each phrasing, yet recognizes that subgroups favor one or another (also see Leiserowitz, 2007).

but one empirically oriented in that it is inductive—and in that disconfirmable hypotheses, extant data, and some new findings are presented. Addressing chunks of the cognitive science of evolution, the work is broadly interdisciplinary, melding elements of psychology, geopolitics, philosophy, history, anthropology, military studies, biological cognition, and sociology (e.g., how groups impact encompassed individuals’ identities; Stets & Burke, 2003). Many past empirical results, from our laboratory and elsewhere, are consistent with RTMD’s conjectures about the rather diminutive U.S. acceptance of evolution—and especially regarding *human* evolution (e.g., Coyne, 2009).

Ranney and Thanukos (2011), for instance, reported a “human reticence effect,”⁶ as U.S. college students accepted human evolution less than evolution for some other organisms, such as plants. Other reticence-related beliefs were found in such students’ stances about if and/or how evolution and creation ought to be taught in American schools (e.g., Griffith & Brem, 2004; Schindel & Ranney, 2001). In these studies, many students exhibited a desire for self-determination (e.g., free will⁷), which represents a part of both this chapter’s main focus—RTMD theory—and represents another view that seems to be the dominant theory of U.S. divergence, which I call the “received view” (Ranney & Thanukos, 2011). As will be seen, RTMD’s account is intended to help explain why the U.S. population deems itself a unique one (and the United States is indeed an outlier nation on a number of dimensions; e.g., Norris & Inglehart, 2004; Paul, 2005; Pew Global Attitudes Project, 2007)—as well as why so many Americans seriously consider, or advocate for, the teaching of *both* creation and evolution in public classrooms (e.g., Ranney & Thanukos, 2011). Let us start by explicating the received view, followed quickly by a discussion and assessment of RTMD.

The Received View of U.S. Divergence and Some of Its Deficiencies

Evolution is, oftentimes, about history. Had we four billion years of video recordings (e.g., from parts of Africa), much about evolution (e.g., “What happened?”) would likely be resolved. It seems fitting, then, that responses to the divergence question posed above engage historical analysis, as does the received view. Although often implicit (cf. Scott, 2004, 2006), the received view of U.S. divergence roughly suggests six nonlinear elements in a rather tangled hierarchy of a causal system: Early U.S. society, resulting from (1a)⁸ the necessities of isolated frontier development

⁶ The effect is modulated by item character and one’s attitude toward evolution, but it coheres with others’ data; for example, only 27% of the United States population see evolution as at least a “mostly accurate” account for humans (People for the American Way Foundation, 2000).

⁷ The United States is close to ranking #1 in its acceptance of nonexternal determinants of success, of 47 nations polled (Pew Global Attitudes Project, 2007, p. 89).

⁸ Note a change of labels, compared to Ranney and Thanukos (2011), to enhance clarity.

and (1b) colonizers desiring spiritual (and expressive) autonomy, yielded (2) markedly localized control by religions and/or governments (e.g., school districts), leading to (3a) considerable Christian fundamentalism, (3b) antievolutionism regarding instruction, and—due to (2), (3a), and (3b), etc.—(3c) a modest U.S. acceptance of evolution (contra comparable nations).

As I have discerned by interviewing a variety of academics, including many scientists involved in evolution education, a good many of them implicitly or explicitly hold much of this received view. However, five or more difficulties attend the received view account: First, aside from (1a), the received view focuses largely on religion—but the reasons for the United States' religious assortment and unusual religious zeal (given its prosperity and safety; Norris & Inglehart, 2004; Pew Global Attitudes Project, 2007, p. 41) are murky and susceptible to alternative explanations. Furthermore, Norris and Inglehart's (2004) work undermines the received view's implication that religious pluralism and a paucity of national regulation produce more religiousness; usually, *less* religious pluralism and *stronger* governmental control yields greater religiosity, so the United States is again an outlier (also see: Paul, 2005; Pew Global Attitudes Project, 2007). Second, U.S. society has also had an unusual geopolitical and commercial development (as elaborated on below) that transcends frontier religiosity differences with peer nations; for instance, Canadians and New Zealanders have frontier roots, yet they accept human evolution more than do Americans (Paul, 2005). Third, the received view is far from fresh, in that its fundamentalist religious framing leaves off roughly 100 years ago (e.g., *The Twelve Fundamentals*; Scott, 2006). Fourth, fundamentalism (e.g., creationism, to the extent that they overlap) is hardly the only font of opposition toward scientific reasoning; individuals frequently try to satisfy *affective* epistemic goals (e.g., Griffin, 2007), rather than merely trying to satisfy goals to be accurate—revealing the interactions among a person's emotional and scientific propositions (cf. those who think of affect and science as overwhelmingly separable realms; on emotions and evolution, also see Sinatra, Brem, & Evans, 2008, Thagard, 2011, and Thagard & Findlay, 2010). Lastly, the received view mostly fixates on the United States, not on more evolution-accepting peer nations, essentially overlooking other ways to account for America's divergence/lag on aspects such as evolution, fundamentalism, personal autonomy, and so forth (while also overlooking additional dimensions of divergence). We ought to complementarily inquire as to why other industrial and postindustrial peers accept evolution more enthusiastically—and not just about the U.S. public's apparently backward standing; RTMD theory addresses such nations, which is one of its strengths.

It is an empirical question as to what portions of America's populace, academicians, and evolution educators ascribe to which parts of the received view. Of course, the received view aggregates over many locations (e.g., cascades of U.S. frontiers) and eras (e.g., from the latter part of the nineteenth century onward), and is thus, not necessarily an apt explanation for each part of the United States at every moment. Likewise, many Americans do not have a rich understanding of history

(and/or religion; Pew Forum on Religion and Public Life, 2010), so the more contemporary parts (2 through 3c) of the received view's account above are presumably more familiar than the historical predecessors (1a and 1b). But as cognitive science has shown many times, one is not necessarily able to articulate a theory, even if a theory accurately accounts for one's beliefs and behaviors (cf. Ranney, 1996). So, people may well act as if they hold the received view, even if they can consciously access only pieces of it (e.g., that churches are often independent, that school districts have considerable autonomy in deciding content, that fundamentalists often oppose teaching evolution, and that many in the United States doubt evolution).

Reinforced Theistic Manifest Destiny (RTMD) as an International Divergence Theory

A modest part of an answer to this U.S. divergence question was briefly suggested earlier (Ranney, 1998); that essence was described in Ranney and Thanukos (2011), and is much more fully explicated herein. I do not mean to replace wholly the received view, but to incorporate, augment, and transform it—and to yield predictiveness. Bluntly, in explaining the United States' (relative) arrested development, the received view mainly lacks a modernized international political vantage—one that includes countrywide feedback regarding deities and manifest destiny,⁹ and especially reinforcements about military and (somewhat) industrial successes. This vantage, herein introduced as RTMD theory (Reinforced Theistic Manifest Destiny), concentrates on how nations incorporate feedback (militarily, economically, etc.) regarding their implicit desires to surpass, dominate, or indoctrinate other nations—and on how these positive and/or negative reinforcements affect nations' theistically related communal beliefs.

World War II (WWII) and its “prelude,” World War I (WWI), jointly embody RTMD's main historical event(s), given the wars' dramatic effects on practically all 34 nations in the Miller et al. evolution survey (2006; which included 18 of the 21 postindustrial nations and 16 industrial nations, as classified by Norris & Inglehart, 2004). Because the United States ranked 33rd of 34 in accepting evolution (sandwiched by the only two surveyed countries with major Islamic presences—32nd Cyprus and last/34th Turkey), Miller et al.'s survey results represent core data—as RTMD seeks to accommodate prominent dimensions over which the United States diverges from its otherwise more analogous societal peers (e.g., Paul, 2005).

⁹ The reader may recall that “manifest destiny” refers to the nineteenth-century-triggered notion of a God-given right for the United States to expand (mostly regarding territory, although the notion is applicable to other realms), since many Americans believed that they were God's chosen people (Sullivan & Belton, 2010). The “pre-Darwinian” Mexican-American War was a high water mark for the explicit use of the notion, but many believe the policy essentially continues on (e.g., as, rather recently, regarding Iraq).

THE RTMD "STORY": THEORY-GIST, CONSTRUCTS, AND INTERCONSTRUCT LINKS

Let us now move to the heart of RTMD theory, to be followed by a few exemplars. In short, RTMD posits that: (1) Between 1859 (i.e., Darwin introducing the notion of natural selection) and 1917 (America's WWI entry) the United States may already have been more reluctant than Europe to accept evolution—as per the received view—but it was probably not alone in its sluggishness.¹⁰ (2) By 1945 the United States was (and arguably still is), relative to other nations, maximally reinforced as a military/economic winner—which helped continue the inhibition of U.S. evolution acceptance and increase Americans' interbolstering cognitions about God, afterlife beliefs, and national manifest destiny (as elaborated on below). (3) Consequentially, especially from 1945 onward, advances in the United States' evolutionary acceptance rate has continued only slowly, and the military/economic reinforcements from (2) may today even be retarding America's acceptance of—especially anthropogenic—global warming (for reasons discussed below). RTMD is elaborated below from this gist, but it generally reflects Figure 11.1's diagram of five main relationships (four positive and one negative) between six constructs.

The deity-creation-evolution trio toward the diagram's center incorporates the received view's essence (with its fundamentalist and pioneer-mentality mechanisms implicitly facilitating the links from "Creation"). Figure 11.1's other three (italized) constructs represent RTMD additions to the received view, with "Afterlife" (related to immortality; Thagard & Findlay, 2010) yielding a main motivation for a "Deity," which supports both "Nationalism" and "Creation," with the latter inhibiting "Evolution" acceptance—and indirectly or directly, "Global Warming." The afterlife-deity-creation-nationalism subcomplex (Figure 11.1's left side) generally characterizes a more spiritual realm, with the nationalistic spirit proposed to

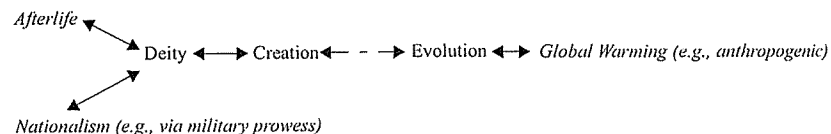


FIGURE 11.1 *The main relationships hypothesized by RTMD (Reinforced Theistic Manifest Destiny theory; note: the negative association between Creation and Evolution is the sole main negative relationship—indicated with a “-”*).

¹⁰ America was distracted from natural selection's articulations by descending toward devastating secessions, the Civil War, and Reconstruction (Moore, 1979). (See more below regarding how the Civil War relates to RTMD theory.) Beyond the war and Reconstruction, social Darwinism was hardly unknown, but its penetration into the general population is difficult to measure. Military/nationalistic metaphors were creeping into discussions about evolution, as per RTMD (Moore, 1979). However, several accounts of the early U.S. reactions to Darwin's ideas were rather mild—for example, presumptions that science would simply come to disconfirm them, rather like how cold fusion “just went away.”

result from the hopes and reinforcements regarding theistically supported manifest destiny.¹¹ Figure 11.1's right-side subcomplex subsuming “Evolution” and “Global Warming,” represents mutually supportive scientific beliefs (re: nonlinearities, small-change accumulations, etc.) that RTMD predicts will be (often) anti-associated with the elements of the more spiritual left side, due to the negative (i.e., competitive) association between creation and evolution.

This mutual support between evolution and global warming occasionally rises beyond the implicit in U.S. society, as when Arizona state senator Sylvia Allen recently promoted a uranium mine (June 25, 2009), saying “this Earth's been here 6,000 years... long before anybody had environmental laws, and somehow it hasn't been done away with” (Benson, 2009). Indeed, as RTMD might have predicted, those who would like creation to be taught in classrooms are now explicitly linking evolution with global climate change (Kaufman, 2010), and only about three-fifths of Americans think that global warming is happening (63% according to Leiserowitz, Smith, & Marlon, 2010; 58% according to Borick, Lachapelle, & Rabe, 2011). Rather like evolution, acceptance of global climate change is having difficulty getting traction with the U.S. public: (1) the percentage of Americans who worry about the latter a great deal has been basically flat since Gallup started polling about this in 1989 (in Leiserowitz, Smith, & Marlon, 2010), and (2) GlobeScan found that the United States ranked 23rd out of 25 nations (i.e., below South Africa and above only Nigeria and Indonesia) in the proportion of people (only about one-third) “totally convinced” that “human activities are a significant cause of changes to the Earth's climate and long-term weather patterns” (in Leiserowitz, 2007). Global warming will be more closely related to RTMD's other constructs in the remains of this chapter, but one way to consider the construct's connectedness is to think about how it conflicts with the notion of a benevolent deity; how could such a deity allow the deity's chosen species to “burn up” the wondrous planet that that species was bestowed?

RTMD ELABORATED: SOME CAVEATS, THEN MORE RICHNESS, MOTIVATION, AND DATA

RTMD comes with qualifications: The theory employs some intentionally informal, analogical, and probabilistic conceptions, such as (1) a nation incorporating “war feedback” rather as an individual would (as explicated shortly), (2) a nation's “deity” being credited for victories (e.g., the “U.S. god” vs. the “German god” from 1917 to 1945), and (3) the odds that a given resident will follow a nation's central trend

¹¹ Feygina, Jost, and Goldsmith (2010) recently also noted the inhibitory character of environmentalism and (general and/or economic) nationalism/patriotism, although some of their empirical results seem overstated to the author.

(as per social norms theory). Naturally, reinforcements regarding a national narrative are hardly identical to a rat receiving (or not receiving) a shock or a treat. Nations are rarely homogeneous cultures (e.g., containing multiple generations¹²), and a sovereign state might recognize a number of religions and/or “gods.” (NB: It may be apt to think about a nation’s “god” as its general “supernatural spirit.”) Furthermore, RTMD is caveated and qualified as (like evolution itself) both a significantly historical and induced theory and, as for all theoretical accounts (e.g., a specific atomic theory), it is likely to prove flawed in some details if not in its core. Time will tell; one hopes that it will (continue to) productively generate testable hypotheses.

Let us now return to an elaboration of RTMD and its empirical and (quasi-)logical support. Please recall the Japanese visitors’ surprise at the United States’ divergence. Recently, another visiting Japanese psychologist—who could not even recall Shintoism’s *human*-creation story—reported that Japanese textbooks deleted origin myths after 1945, once Emperor Hirohito (posthumously called “Showa”) essentially repudiated the throne-divinity link. (Imperial Shinto was strongly and increasingly tied to nationalism, patriotism, and militarism from 1868 to 1945.) According to RTMD, Japan comprehended that at least one of its most salient gods had been defeated, and Japan’s people were massively negatively reinforced regarding its aspirational, emperor-god-facilitated, manifest destiny. In essence, one might caricature part of the Japanese (and German, etc.) reinforcement in propositional logic with the premises (A) “If there is a God, then we win WWII” and (B) “We lost WWII” (with an *unconditional* surrender, like Germany)—leading to the *modus-tollens*-esque conclusion: (C) “There is no God.” This outcome feedback “B” (losing) and the resultant creation-myth vacuum facilitated greater evolutionary acceptance, according to RTMD—among other collective inferences.¹³ Japan now ranks fourth in public evolutionary acceptance, of Miller et al.’s (2006) 34 (largely European) nations.¹⁴ (Naturally, alternative explanations for evolution’s more rapid acceptance in Japan may emerge—explanations that may include, overlap, or exclude RTMD. For example, Japanese religious philosophies¹⁵ often have notably more inclusive, syncretistic, and dialectical aspects, compared to U.S. religious philosophies; Rosenstone, 1988.)

¹² Clearly, 85-year-old Germans, Japanese, and Russians have different senses of Hitler, Tojo, and Stalin than do respective 20-year-olds.

¹³ Outcome feedback such as this is incorporated in various cognitive models, such as models of when people choose to vote (e.g., Bendor, Diermeier, & Ting, 2003).

¹⁴ Evolution was not unknown in prewar Japan; Edward S. Morse promoted evolutionary ideas among Japanese intellectuals there by 1877—and, prewar, Hirohito was an avid marine biologist (Rosenstone, 1988).

¹⁵ Other cultural reasons may play a role, too. For instance, Inagaki and Hatano obtained preliminary data suggesting that Japanese elementary students often believe that humans evolved from monkeys—perhaps due to familiarity with Japan’s wild macaques (K. Inagaki, personal communication, January 18, 2008).

Near the start of our lab’s research about college students’ perceptions of evolution, I asked people, “Would you prefer the biological evolution theory to be false—that is, would you prefer a universe that has *not* experienced biological evolution?” Surprisingly, most respondents—including postbaccalaureate biology diplomates—preferred evolution (often sheepishly) to be “false.” The prototypical response to my “Why?” follow-up question was, colloquially: “Duh! Because ‘God!’—Who wants to just end up as worm food?” In essence, although not directly contradictory, an afterlife-facilitating creator competes with evolution in explaining speciation, as parsimony suggests that either one or the other is in force (and less likely both). This “simplicity” principle (from computational modeling; e.g., Harman et al., 1988; Ranney & Schank, 1998; Thagard, 1992) indicates that evolution’s plausibility competes, at least indirectly, with a deity’s plausibility and the plausibility of an afterlife (etc.)—resulting in the inhibition of the attractiveness of an evolving universe (this coheres with Dennett, 2007, p. 147, on atheism’s indirect support from evolution). The majority in this informal survey thus desired evolution to be false—perhaps as wishful thinking—because it unpleasantly coheres with a more blatant (or permanent) mortality. The survey led to Brem, Ranney, and Schindel’s (2003) related findings that undergraduates considered evolution (assuming it accurate) to be a relative “bummer” for each of five potential areas: negatively impacting one’s sense of (1) spirituality, (2) free will, and (3) purposefulness,¹⁶ while undesirably enhancing paradise-hindering (4) selfishness and (5) racism (e.g., selfishness/racism toward the “less evolved”—possibly suggesting eugenics or that the powerful are most deserving, etc.). These results suggest tacit connections to the reward of a life after death. Further, an evolutionary implication of a lack of self-control may conflict with one’s decision-making history—what Ranney and Thanukos (2011) call “human agential experience.” Combined with Ranney and Thanukos’s aforementioned human reticence effect that highlights human exemption (or specialness—much as pre-Copernicans preferred Earth at the universe’s center), these findings mark an affective note in those Americans who “root” for evolution to be “false.”

The interbelief competition aspects of RTMD cohere with even more extant data and some logical analyses. For instance, I noted that 13 countries (Japan, America, and the rest European) were common to Norris and Inglehart (2004) and Miller et al. (2006), and found that those higher in evolutionary acceptance are lower in accepting either God or life after death (r ’s = $-.8$; $p < .001$; note that all p ’s herein regard two-tailed tests); Paul (2005) exhibited a concordant theism-evolution scatterplot for 11 nations (six overlapping the 13 I correlated). Furthermore, I noted that 10 countries were common to Leiserowitz (2007, p. 5) and Miller et al. (2006), and found that those higher in evolutionary acceptance were marginally

¹⁶ This notion of purposefulness relates to both RTMD’s notion of a “just desserts” afterlife; Feinberg and Willer (2011), also like RTMD, note the incoherence between just-world beliefs and the acceptance of global warming.

significantly higher in believing that global warming is a very serious problem ($r = .612$; $p = .05997$). Each of these results coheres with RTMD (see Figure 11.1). In contrast, the received view seems quiet when it comes to addressing non-U.S. data (although some of its descriptive elements might extend to select nations other than the United States—at least circa 1914).

Now for some more logical support for RTMD's competition model: If the United States mostly sees God as the country's ally or copilot (e.g., compared to relatively vanquished nations abandoned by their "deities"), this theistic favoritism further effectively competes with the evolutionary perspective that is more associated with atheism. After all, creationists are almost never atheists; this null intersection is basically a void quadrant in the 2x2 table that results when "creation vs. evolution" is crossed with "theism vs. atheism." The emptiness where creationist atheists would tally helps yield the *theism-versus-evolution* competition (and negative correlation). Terming the competitive conflict "a dirty little secret in scientific circles," Coyne (2009) provided a similar view—analagizing that, just because some married people are adulterers does not mean that marriage and adultery are compatible.

Such logic has much empirical support, as undergraduates seem to commonly view evolution as inherently conflicting with creation (e.g.: Kaufman, Thanukos, Ranney, Brem, & Kwong, 1999; Ranney & Thanukos, 2011; Thagard & Findlay, 2010). Creationists, naturally, often also recognize the conflict (even if they find some grounds for proximal/distal coexistence; Legare & Gelman, 2008); some have even sued a university over a web page entitled "Misconception: 'Evolution and religion are incompatible'" (Burruss, 2009) that seems to follow a "party line" held by many evolution educators.

Returning to Japan's development, RTMD's theory dynamics suggest that losing some of Japan's religious underpinnings' plausibility should have inhibited Japanese citizens' afterlife beliefs. (Note that RTMD posits the desire for an afterlife as a main reason for theistic beliefs, in partial answer to a question posed by Dennett, 2007, p. 147). Indeed, after WWII, only 18% of Japanese believed in an afterlife when first polled in 1975 (Norris & Inglehart, 2004, p. 91). Similarly, only 33% of West Germans believed in an afterlife in 1975. It seems that Germany's "pre-world-war god"—or perhaps the "militaristic views of the inevitability of Teutonic triumph" (Scott, 2004, referring to its late nineteenth- and early twentieth-century ambitions, p. 93)—had similarly been relatively disconfirmed by *both* world wars (also see Rusc, 2005, pp. 113–114, re: concerning Nazism vs. evolution. NB: There do not seem to be prewar data on nations' evolutionary acceptance.) In contrast, in 1975 the United States had the highest rate of belief in an afterlife (69%)—of the nine nations' data presented by Norris and Inglehart (2004)—which was almost its lowest rate since WWII. (The U.S. rate was 73–74% in the 1960s and 76% in 2001, so the 69% may have been a post-1970 "Vietnam/Watergate dip" that ended by 1995—after the 1991 "U.S. victory" in the first Gulf War. It bears noting that many view the Vietnam War as a U.S. defeat, yet others see it as a strategic success in ultimately ending the Cold War—or that it could have *easily* been a tactical victory, had the United States

unleashed a swarm of nuclear weapons; in concert with this notion, an item's data from the third survey I present below suggests that most American undergraduates agree with the "easy victory in Vietnam" hypothetical.)

The reader has likely already inferred more specifics regarding RTMD's theory about U.S. divergence, given that prior notions of "manifest destiny" morphed into the further imperialist expansionism of the Spanish-American War. (Later, manifest destiny is thought to have turned into other forms of interventionism, including the rise of U.S.-based multinational corporations.) Having already established control from Cuba to the Philippines in 1898, and coming on the heels of The Twelve Fundamentals booklets of 1910–1915 (Scott, 2006), 1918 America could see WWI as being relatively "easily" won by the "U.S. god"—reinforcing the idea that God backed the nation. The country's WWI deaths were rather minimal compared to those of the other major combatants (Fischer, Klarman, & Oboceanu, 2007), and the United States' role was relatively brief (1917–1918), given its late entry in a 4-year bloodbath. The 1925 Scopes trial's milieu of religiosity (freshly reinforced by WWI, according to RTMD) left even less room for accepting a hypothesis (evolution) that competed with a bolstered counterpart (e.g., Abrahamic religions' creationism)—which was indirectly supported by the motivated belief that a deity benevolent to the United States preferentially ushers its citizens to a good afterlife. Indeed, William Jennings Bryan, the attorney prosecuting Scopes—and a past presidential candidate—was a dogged antievolutionist and worried about evolution's effect on the United States' purportedly special covenant with God (Sullivan & Belton, 2010).

According to RTMD theory, WWII further reinforced the United States' God-on-our-side notion, with personal identities incorporating even more glory from America's national identity. Total U.S. deaths increased beyond WWI's, but were a mere 11% beyond the Civil War mortalities, when the nation was 78% smaller (Fischer et al., 2007). America suffered the lowest per capita deaths of any major WWII combatant.¹⁷ In the 2005 documentary *Why We Fight*, Gore Vidal said, "We were the only unwrecked major power on Earth." In contrast, Japan and most European nations had been occupied by, or dominated by, foreign forces sometime during 1940–1945. The British Empire began unraveling, and England would likely have been invaded, had Germany not scuttled Operation Sealion and decided on the Soviet Union instead (Townsend, 1970).¹⁸ In 1975, Britain's afterlife belief rate was

¹⁷ As an illustration of RTMD-like elements in World War II, in George S. Patton's addresses to his troops weeks before D-Day (Blumenson, 1974), he asserted that America loves a winner, won't tolerate a loser, has never lost a war, and will never lose a war. He also referred to God multiple times (a few cursing, but other times as in "thank God"), and suggested that their deaths would be rather light—"two percent"—in a given major battle (p. 457).

¹⁸ Nations such as England are hardly devoid of national pride; however, many see such nationalism as more manifested regarding soccer matches than military or economic prowess (cf. "England" vs. the "UK," too). Indeed, many European countries no longer have sovereign currencies, having adopted the Euro.

only 43%, and its main imperial remnants, Australia and Canada (both seemingly frontier nations, like the United States) also stood modestly (48% and 54%, respectively; Norris & Inglehart, 2004). (Canada, the United States' culturally/militarily close neighbor, was understandably shifted toward the United States' 69%, relative to Britain; RTMD can explain the Australian data as part of an English-language gradient¹⁹—e.g., using the ANZUS pact and former colonial ties.) The remaining countries in the 1975 afterlife survey—France, Belgium, and Italy—were defeated and/or occupied during WWII and all had afterlife belief rates no higher than Australia's. Adding further grist for RTMD, the U.S. economy soared from 1941 to 1945, resoundingly ending the Great Depression.

At WWII's end, more than half of the world's industrial production occurred in the United States (Burns & Novick, 2006), home of Earth's largest economy since about 1910, when publication of "the fundamentals" began (Scott, 2006; Scott & Matzke, 2007). America went on a post-WWII nationalistic and religious high, possibly heightened by the Cold War—and the United States continues to lead most peer nations in a belief of cultural superiority (Pew Global Attitudes Project, 2007, p. 45). Religion and faith got closer to politics and patriotism, with spiritual revival being linked to the battle with communism: "under god" was added to the U.S. pledge of allegiance, and the first stamp to read "In God We Trust" (although ultimately all coins and stamps did) was printed during the Eisenhower administration. By 1960, church membership had never been as high, in contrast to the slowing church attendance exhibited during the prewar depression (Sullivan & Belton, 2010). RTMD holds that the faith-nationalism relationship continues strong to this day, with occasional modulations, even as communism has waned (for now, anyway) as a competitor to democracy for the "market share" of nations.

Naturally, RTMD should be applied to all nations, not just those in Miller et al. (2006) and Norris and Inglehart (2004). The theory is meant to expand the received view's account of U.S. divergence—or perhaps how Europe and other peer nations diverged *from the United States*—in evolutionary acceptance. There do not appear to be enough comparable historical data (yet) to disambiguate who diverged (more so) from whom (and when), but Norris and Inglehart (2004) indicate that the United States is again an outlier—like relatively noncombatant Brazil—in having a high belief-in-God rate after WWII.²⁰ Perhaps the United States is not yet far from

¹⁹ Other RTMD-predicted English-speaking gradients are noted—for instance, regarding the nations' sets of residents who are atheists, agnostics, or nonbelievers: Britain has more than (clustered rather closely) Canada, Australia, and New Zealand, yet the United States has the fewest (Zuckerman, 2007, pp. 56–57). Likewise, Benabou and Tirole (2006) show an RTMD-predicted gradient for luck determining income: The UK, then Australia, then Canada, and finally the United States. Finally, Furnham (1993) shows an RTMD-predicted gradient for just-world beliefs (regarding twelve nations, and in contrast with unjust-world beliefs): The United States (ranked near the top), then Australia and New Zealand, with Britain almost last.

²⁰ Feinberg and Willer (2011) discuss evidence that Americans are high in just-world beliefs, also, consistent with RTMD's prediction that they would be high in afterlife beliefs (as well as theism).

the historical baseline of acceptance (circa roughly 1914) that Europe and Japan have greatly diverged *from*. (The same might be said about Brazil, a nation that is also slow to embrace evolution.)

Since the War of 1812 (when Darwin was a little boy) the contiguous United States has not been invaded, and the nation has *never* had a national famine.²¹ RTMD suggests that this era of only minor instability threats, combined with the optimism bias found in human nature (e.g., Lovallo & Kahneman, 2003) has fostered the "deity's favorite" status underpinning manifest destiny—and has arrested U.S. development in accepting evolution. (Relatedly, Lombrozo, Kelemen, & Zaitchik, 2007, report a greater use of teleological explanations by both young children and Alzheimer's sufferers, and that this "sheds light on the intuitive appeal of creationism" p. 999; also see: Evans, Legare, & Rosengren, 2011; Poling & Evans, 2004.) Analogically, the United States might be seen as having the immature mentality of an adventurer (e.g., in lunar exploration) who has seemed rather invincible in battle—having been rarely and only modestly humbled. Thus, U.S. politicians are often referred to as engaging in "cowboy diplomacy, etc.," as if they "shoot first and ask questions later." RTMD, therefore, is a kind of supplement to historical/cultural accounts of why the United States sometimes seems to diverge in comparatively unscientific, evidence-ignoring, and emotional ways (Griffin, 2007; Hofstadter, 1963; Thagard, 2011). The United States' relative imperviousness to evolutionary evidence is an exemplar of this "winner" attitude that is often taken for arrogance.

RTMD SEEMS MUCH MORE PREDICTIVE THAN DOES THE RECEIVED VIEW

What the received view of U.S. divergence predicts is not clear, as it seems to describe (often old) events more than generate explicit, testable hypotheses (at least in its current form, with rather dated historical bases). In contrast, one of many RTMD predictions is that American evolutionary acceptance will increase either if (or when, as happened to Rome) the United States markedly declines in its internationally normed political, military, and economic power, or if (or when, as through the web or internationalism) the United States' general level of nationalism decreases such that more Americans view themselves as citizens of the world. Current trends suggest that America will no longer have the largest gross economy in a few decades (given China's greater population and growth rate), so a natural experiment may be in progress.²²

²¹ Even in the Great Depression (1930–1933), life expectancy rose and mortality dropped (Tapia Granados & Diez Roux, 2009).

²² The United States' recent "Great Recession" may also yield a bit of such an effect, compared to China's growth during it.

RTMD suggests that this projected economic, etc., decline (and the declining number of U.S. companies among the world's largest 500) would be linked to reduced U.S. religiosity and increased atheism, which seems to be accelerating (Kosmin & Keysar, 2009²³); the increase in atheism should also boost America's share of evolutionary acceptance, given the theism-versus-evolution competition (Evans, 2000). Further, RTMD predicts public levels of evolutionary acceptance in nations not yet surveyed (to my knowledge; see below). For instance, RTMD hypothesizes that nations with high literacy levels (which enable evolution instruction) that became atheistically communistic due to WWI or WWII military feedback would have public evolutionary acceptance rates that are higher than the United States'. Russia, for example, may exhibit a higher rate, (1) having been forced to sue for peace after suffering the highest WWI mortalities (effectively followed by 70 years of "disconfirming" God), and (2) having been significantly invaded in WWII. (Of course, the Soviet Union's dissolution and Russia's subsequent reduction in communism—and plausibly, atheism—complicates this prediction now; likewise, the role of Christianity—whether actual or merely perceived—in toppling various communist regimes similarly complicates the prediction.) Consistent with RTMD, various estimates indicate that the Soviet Union's WWII per capita fatalities were almost 50 times higher than the United States', and Russia now has roughly six times the atheists/agnostics/nonbelievers that the United States does (Zuckerman, 2007, pp. 56–57; indeed, of major WWII combatants, the United States has the smallest percentage of atheists, agnostics, or nonbelievers). Finally, RTMD predicts relationships that are empirically testable in the laboratory. For example, manipulating nationalistic emotions may even affect ratings of evolutionary acceptance. To start, though, along with Dav Clark, Daniel Reinholz, and others, I have begun by attempting to manipulate participants' acceptance of evolution and/or (e.g., anthropogenic) global warming (see below).

In the end, a fully successful RTMD theory would differentially account for every country's past—although we hardly have much reliable international evolutionary public acceptance data even now, let alone pre-1945. For the few (if any) countries similar to the United States—that is, industrialized nations that appeared to be major winners of the world wars (or even more recent wars) with relatively modest losses—RTMD posits that turn-of-the-twentieth-century ideas of people as unique (as a species or to one's national deity) received reinforcement (along with the aforementioned human optimism bias), and that these ideas likely retarded acceptance of both evolution and anthropogenic global warming. RTMD,

²³ Proportions of atheistic, agnostic, or nonreligious U.S. adults grew dramatically from 1990 to 2008, with the nonreligious soaring from 8.2% to 15.0%—growing in every state—while Christians declined from 86% to 76%. Based on stated beliefs, Kosmin and Keysar also infer that 12% of U.S. adults are atheists or agnostics, with the explicit atheist/agnostic rate more than doubling during 1990–2008; this seems to have followed a more modest prior drop in belief in God (during 1968–1990; Norris & Inglehart, 2004).

on the other hand, predicts that humans seem decreasingly special for residents of countries that were increasingly scarred by WWI and WWII (or more recently)—regarding military pride, war deaths, nationalist/expansionist/economic ambitions, and so forth—producing cultures that are increasingly likely to accept both evolution and the notion of anthropogenic global climate change. (As for noncombatants in the wars, RTMD offers intermediate predictions, each modulated by the circumstances of particular nations' relative nationalisms—e.g., whether they were neutral, weak, isolated, secretly collaborative, financial skills, unattractive as conquests, etc.)

When a nation collectively conceives of itself as having moral superiority and God's ear, that conception is likely to inhibit competitive notions like evolution—in order to maximize explanatory coherence (Ranney & Schank, 1998; Thagard, 1992; see also Evans, 2000; Lombrozo, Shtulman, & Weisberg, 2006; Thagard & Findlay, 2010). Such inhibitive influences are likely to be extreme for evolution regarding our own species,²⁴ enhancing human exceptionalism (e.g., Ranney & Thanukos, 2011; Scott, 2000). This theorizing partly motivated the prediction by Ranney and Thanukos that Americans would be less comfortable with explanations about human evolution than about plant evolution. Although their results offered considerably more than the human reticence effect noted earlier (see Thanukos, 2002), this RTMD prediction found support. (Goldberg & Thompson-Schill's 2009 results may also shed light on human exceptionalism). Regarding RTMD as well, please note that human exceptionalism (cf. Mead & Mates, 2009) has nationalistic parallels—notably American exceptionalism (especially after WWII; see Pew Global Attitudes Project, 2007, on exceptional U.S. values and beliefs).

RESPONSES TO SOME SALIENT POTENTIAL CRITIQUES OF RTMD

A potential criticism of RTMD is a suggestion that people did not lose faith in their god(s) after terrible wars that were not quite *world* wars. This is hard to assess, given (1) discrepancies between faith and religious affiliation, and (2) the lack of surveys from, say, the Roman Empire. Furthermore, *post-Darwinian* history is what should matter most, as Darwin changed the "watchmaker" analogizing/debate that William Paley triggered (Dennett, 2007, p. 135). For example, after the Thirty Years' War (1648), the *absence* of evolutionary theory meant that the losers still had no competitor to creationism to consider (unlike the world wars)—and the war was apparently more about power than Protestant versus Catholic "gods" conflicting. Similarly, the U.S. Civil War (1861–1865) took place shortly after Darwin's theory was published, so evolution was not a viable "market share" explanatory option for

²⁴ The influences may be *most* extreme for the closest part of our species—one's self and descendants, of course.

the South to turn to.²⁵ Additionally, both sides had the same (linguistic, religious, cultural, etc.) “god(s),” and this *intranational* war was seen as involving conflicting policies (e.g., involving slavery and, less so, states’ rights) much more than conflicting theologies.²⁶ (Other RTMD critiques might relate to slavery’s relatively late U.S. abolition, various U.S. reactions to the Civil War, Social Darwinism, and/or Catholic-Protestant dynamics, but space here does not permit a spirited defense of RTMD regarding these possible alternatives; Ruse, 2005.)

Another potential criticism is that, as the world wars fade in collective memory, nationalism will also fade. Few if any WWI veterans survive at this writing, and WWII veterans are dwindling. However, in a most recent survey, my laboratory found that most U.S. undergraduates believe that their nation continues to be a dominant military power; this finding coheres with data (Pew Global Attitudes Project, 2007, p. 44) that show Americans to be considerably militaristic. The speed with which the United States can successively invade nations and topple governments (disregarding its occupation abilities) still impresses. Yet even if the United States believed its military prowess were to be waning, our recent data (below) suggest that its past successes seem to continue to support general and economic nationalism. (One might contrast the United States now with the UK following its 1982 Falklands war with Argentina.) The world wars also transformed the United States’ scientific national pride: Coyne (2009) notes that pre-1930 Germany garnered seven times more Nobel science prizes than did the United States, yet over the last three decades, Americans garnered about 60% of *all* of the Nobel science prizes. Relative to peer nations, the United States seems to primarily oppose science that conflicts with religious beliefs directly (as some see evolution) or indirectly (as some see global warming)—but does not oppose science in general (e.g., superconductivity).

Methodologically, it may be that sophisticated mathematical/statistical modeling may well allow RTMD to be assessed more generally than it has been to date (but see results below), such that purchase can be gained on separating out the influences of say, war casualties, religious oppression, and one’s chronological age at the time of one’s religious indoctrination. Still, there is no (known) control group to history, so causal inferences will likely be tentative. As a further complication, military-diplomatic political systems change dynamically and perhaps with evolution-like punctuations in otherwise more equilibrating periods. For instance, in each military conflict, the U.S. public seems to implicitly demand operations that yield ever-higher enemy-versus-American “kill ratios.” It ought be noted that the recent U.S. presence in Iraq yielded less than a tenth of the U.S. military fatalities experienced in Vietnam, which was about one-seventh of those experienced in WWII.

²⁵ Robert E. Lee, for instance, could never understand how God let the “wrong side,” the Union, win (Zwonitzer & Samuels, 2011).

²⁶ In Lincoln’s second (1865) inaugural address, he noted, about the Union and the Confederacy: “Both read the same Bible and pray to the same God” (Sullivan & Belton, 2010).

Further, the conflict in Afghanistan, after nearly a decade, has resulted in only a fraction of the U.S. military fatalities experienced in Iraq—and a fraction of 1% of those from WWII. The use of remotely guided munitions, body armor, electronic disablements, battlefield robots, and drone or stealth aircraft, and so forth, have driven the kill ratio to great heights, such that the 2011 operation that resulted in Osama bin Laden’s death was performed without a U.S. casualty.

SOME FURTHER RTMD IMPLICATIONS RE: GLOBAL WARMING

As noted, a motivation for considering U.S. divergence involves global warming. The United States’ divergence from peer nations in evolutionary acceptance and theistically related beliefs may causally connect to its overrepresented contribution to global warming. The United States emits over one-fifth of humanity’s CO₂, yet holds less than 5% of Earth’s human population. Perhaps those who do not adequately comprehend or embrace organic evolution are relatively unmotivated to try to retard the demise of many species (Wake & Vredenburg, 2008; Hansen & Galetti, 2009; Wright et al., 2007, on future anthropogenic impacts)—possibly including *homo sapiens* (cf. comprehending dinosaur extinctions; Kaufman, Ranney, Lewis, Thanukos, & Brem, 2000). Rejecting evolution is probably not the sole cause of a country’s carbonic rapaciousness, yet RTMD predicts that nations’ residents who grasp more fully that environmental degradations facilitate extinctions should be more likely to reduce dramatic overrepresentations in greenhouse gas emissions more rapidly. Poling and Evans (2004) found that many American adults do not think that our species can become extinct, which may explain America’s markedly cavalier and unworried attitudes toward sustainability and global warming relative to peer nations (Leiserowitz, 2007); Brazil, another religious nation with strong afterlife beliefs—and which many think ought conserve its resources more—also exhibits a modest evolution-acceptance proportion. Given these evolutionary acceptance implications for global warming, the U.S. divergence (and Brazil’s divergence) from Europe and Japan, and so forth, might well worry humanity. Recent surveys (Pew Research Center for People and the Press, 2010) suggest that, although (1) most Americans believe that global warming is at *least* a somewhat serious problem (63%), and (2) most of the United States believes that there is solid global-warming evidence (59%), (3) only a third of the United States see *both* that evidence *and* that the warming is anthropogenic (34%). Unfortunately for conservationists, the Pew Research Center for the People and the Press (2009) found that, out of 20 possible top priorities for the U.S. congress and president, environmental protection tied for 16th (with immigration)—with global warming placing 20th; furthermore, global warming acceptance has stagnated or perhaps even dropped recently (Feinberg & Willer, 2011; Leiserowitz, Maibach, & Roser-Renouf, 2010; Pew Research Center for the People and the Press, 2010).

At least until quite recently, the U.S. government dragged its feet on global warming protocols (e.g., Kyoto), compared to other prosperous nations. Perhaps

America's high, RTMD-consistent religiousness (Norris & Inglehart, 2004) produced residents who largely ignore global warming's impending effects (e.g., by thinking the effects reflect God's wishes—or that God will/would correct them), thus inhibiting both the growth of sustainability and more immediate attempts to slow global warming. (Various websites suggest that some in the United States seem to even *prefer* a cataclysmic warming—contra stewardship ideas—as a revelatory path to apocalyptic rapture or a test of faith in God's rescue capacities.) Were RTMD correct, it appears crucial that educators accelerate ways to inform the United States about organic evolution—given that global warming might even yield/speed human extinction. As Earth's atmospheric carbon dioxide (CO₂) has already risen about 40% since the industrial age's dawn—with methane nearly tripling in that period—(e.g., National Oceanic and Atmospheric Administration, 2005, 2006, 2011) our planet risks an era of unpleasant biological evolution if its nations do not act quickly (Intergovernmental Panel on Climate Change, 2007). (Note that some countries besides the United States, e.g., China and India—often citing [in]equity concerns—also sidestepped the Kyoto protocol; China's 2006 per capita oil use was less than 9%—and India's less than 4%—of the United States' use.)

As with evolution (Thagard, 2011), thoughts about global warming yield abundant moral and affective aspects (and complications). Emotionally, many people explicitly or implicitly fear what lifestyles future generations will inherit, or wonder about what an overheated, “disfigured,” world implies about theism. Morally, it was easier for distant ancestors than for us to dine on fish species that now dwindle; Earth is less plentiful. But one might expect that the relationship between theistic and global-warming beliefs is more complicated than that between theistic beliefs and evolution. There are more strange-bedfellow elements in the former relationship; for instance, some religious groups clearly value shepherding the environment, even if one might reasonably believe that more religious groups see flora and fauna as slaves to human desire. (On the former, stewardship side, the Vatican recently released a report that requests that nations implement “policies to reduce the causes and impacts of climate change”; Working Group Commissioned by the Pontifical Academy of Sciences, 2011.) Therefore, one might expect weaker mean relationships among RTMD's six constructs (see Figure 11.1) for the five links involving global warming than the five links involving evolution.

MORE RECENT EVIDENCE ASSESSING RTMD: SURVEYS FROM “GERMANIES,” CANADA, AND THE UNITED STATES

Although RTMD is new, at least four recent evidence bases—one from Germany and four from my research—bear on it. First, consistent with RTMD's aforementioned predictions about Russia (vs. the United States), Kutschera (2008) recently reported that residents in the former East Germany accept evolution more often than those in the former West Germany. RTMD would have predicted this, especially given

that East Germany was under a greater foreign domination (some would say “a war-extending occupation”) decades longer than was West Germany. This finding represents solid, but hardly unassailable support for RTMD (e.g., with WWI-losing Russians/Soviets ironically “giving” rather atheistic communism to WWII-losing East Germany while inhibiting religious practices: an interpretation of a German's—Marx's—*Opium des Volkes* view).

The second source of evidence involves a string of studies—one experiment (discussed in a later section) and three recent surveys—that I have conducted with the help of many mentees (see Acknowledgments). Two surveys were of U.S. undergraduates, and one surveyed Canadian undergraduates (N = 229); the Canadian data were collected to gear up toward future studies comparing RTMD's interconstruct relationships across borders, but have already yielded intriguing results. Each survey was explicitly designed to assess predicted interconstruct associations. In particular, items that were used assessed five constructs regarding (1) belief in an afterlife, (2) belief in a deity (or deities), (3) acceptance of evolutionary origins of life (relative to creationism), (4) nationalism, and (5) acceptance of global warming (especially anthropogenic global warming). More data will be collected shortly, and while the following results are preliminary, the analyses to date indicate relationships among these five constructs that are largely consistent with RTMD offering “value added” to the received view.

While the received view is rather quiet about afterlife beliefs in people's thinking, both the Canadian sample (n = 52) and the initial U.S. sample (n = 105) showed strong negative correlations between one's belief in an afterlife and one's belief in evolution (relative to creationism; r 's about $-.6$; p 's $< .0001$). Also consistent with RTMD (Figure 11.1), both afterlife beliefs and creation (relative to evolution) beliefs are strongly related to theistic beliefs (r 's about $.75$; p 's $< .0001$). These data, naturally, reflect the prototypical “Duh!” verbalizations mentioned earlier, regarding why people do *not* prefer evolution to its (occasionally wishful-thinking) competitor(s)—consistent with the aforementioned findings by Brem, Ranney, and Schindel (2003).

More major predictive differences between RTMD and the received view (i.e., beyond afterlife considerations) are that RTMD hypothesizes relationships involving nationalism and global warming. (Naturally, the Canadian survey dealt with Canadian nationalism and the U.S. surveys with U.S. nationalism.²⁷) Interestingly, across the U.S.-Canada border, global warming and nationalism seemed to have different, yet RTMD-consistent (see Figure 11.1), relationships with the other constructs. For instance, Canadian nationalism was related to both beliefs in an afterlife and a supreme being(s) (r 's $> .3$; p 's $< .05$). In contrast, nationalism in the initial U.S. sample was negatively related to evolution (relative to creation) beliefs and

²⁷ The Canadian survey's items represented a subset of the U.S. survey's items, as U.S. participant time was less limited.

global warming beliefs (r 's about $-.25$; p 's $< .05$ and $.01$, respectively)—while being marginally related to theistic beliefs ($r = .17$; $p = .05$). In the U.S. sample, global warming beliefs were, additionally, related to evolution (relative to creation) beliefs ($r = .19$; $p < .05$), whereas that was not obtained in the Canadian sample.

Through RTMD's lens, these preliminary results suggest that Canadian nationalism may be even more associated with the afterlife than it is in the United States, and that global warming for Canadians is less associated with evolution/creation and nationalism than it is in the United States. (Perhaps Canada sees itself as more "green" than America, and the contrast reduces the link between nationalism and global warming to insignificance.) Looking at both samples separately, virtually all of the relevant correlations yielded RTMD-predicted valences, as the few contrapredicted correlations were all small and nonsignificant (e.g., r 's $< .1$); that is, were an association statistically significant, it was always RTMD-consistent, and in the rare cases that an association was not in directional concert with RTMD, it was diminutive and insignificant.

The initial U.S. sample's results interconnect the troika of evolutionary, nationalistic, and global warming beliefs (and, to a lesser degree, afterlife beliefs) that are at the heart of RTMD's augmentation of the received view. The troika is consistent with the RTMD components that suggest that (1) U.S. manifest destiny may have inhibited the nation's acceptance of both evolution and global warming, and (2) the modest U.S. acceptance of evolution, relative to creationism, may be independently (i.e., further) inhibiting the nation's acceptance of global warming. In contrast, no pair within the troika of constructs is significantly correlated in the Canadian sample; this suggests that, although Canadian nationalism is hardly disassociated from theistic or religious beliefs, compared to the United States: (1) Canadian nationalism interferes less with the assessment of scientific theories such as biological evolution and anthropogenic global warming, and (2) global warming is less politically connected to the Canadian evolution-creationism debate.

The first two surveys suggest that the Canadian sample's beliefs are deity-centric and partially consistent with what RTMD predicted for the United States (e.g., regarding afterlife and nationalism). The U.S. sample's beliefs seem even more consistent with RTMD (e.g., engaging global warming more and nationalism differently)—and are about as centered on evolution/creation notions as they are on theistic notions. Since Canada's geopolitical history is, of all other nations, arguably the most closely related to the United States'—yet noting that per capita more Canadians were lost in each world war (and Canada's much smaller gross economy)—it is perhaps not surprising that the Canadian data's pattern is alternately similar to and different from the U.S. results in ways that are RTMD-consistent (i.e., consistent when generalizing RTMD beyond the United States). For instance, RTMD predicts that Canadians' military/industrial history would lead them to accept human evolution more than do Americans, and that result obtains: 58% of Canadians do (83% among their Green Party—yet only 37% in the rather U.S.-like Alberta; Angus Reid, 2008), which is roughly double the U.S. acceptance

percentage (e.g., Coyne, 2009). Likewise, as RTMD would predict based on world war mortalities, economics, and so forth, Paul (2005) indicates that Canada falls between the United States and Great Britain on beliefs regarding human evolution, piety/religiosity, biblical literalism, and God vs. atheism/agnosticism. Further, as RTMD predicts, Canadians are more likely than Americans to agree that "there is solid evidence of global warming": 80% to 58% (Borick, Lachapelle, & Rabe, 2011). In short, the Canadian results generally follow a received-view-plus-afterlife-and-partial-nationalism model (i.e., the lion's share of the RTMD model for the United States), while the initial U.S. results more fully follow the RTMD relationships portrayed in Figure 11.1.

Recently, 72 U.S. undergraduates completed the third survey (in collaboration with Calida Martinez), an expanded one that experimented with many new items. Although somewhat limited in statistical power (e.g., due to some restrictions of ranges), the preliminary pattern of results again follows RTMD's predictions. For instance, all of the main 15 interconstruct correlations were numerically in the hypothesized direction: that is, 15 of the 15 correlations among the six constructs engaging beliefs regarding a deity, an afterlife, evolution, creationism, global warming, and overall nationalism (the last of which was only marginally associated with a conservatism [vs. liberalism] measure). This 15-for-15 pattern was also observed in the larger, original U.S. survey. The received view only addresses three of these 15 correlations (among "deity," "creation," and "evolution"), so all 12 of RTMD's 12 "value added" directional predictions obtained. In concert with findings from the initial U.S. sample, global warming beliefs were positively related to evolution beliefs ($r = .26$; $p < .05$). The new survey's results were also in concert with a number of findings that were common to both the aforementioned U.S. and Canadian samples. For instance, again relating to the "Duh!" vocalizations, afterlife beliefs were amply negatively correlated with evolution beliefs ($r = -.48$; $p < .0001$) and quite amply positively correlated with creation beliefs ($r = .76$; $p < .0001$). (Note that a conservatism measure did not negatively correlate with evolutionary acceptance as much as did the more religiously related constructs; including this measure, it further bears noting that 21 of 21 correlations were numerically in the directions predicted by RTMD.) These findings again underscore the perceived conflict between acceptance of evolution (along with, perhaps, global warming) and acceptance of the theistically infused concepts of creation, afterlife, and supreme being(s).

FUTURE RTMD EVIDENCE: EXPERIMENTS, INTERNATIONALITY, AND NEUROCOGNITION

As mentioned above, my laboratory is beginning to experimentally manipulate some of the six relevant RTMD dimensions (if/when possible; Figure 11.1). Such experiments (one described below) will be important in causally assessing the theory (e.g., at the extreme, whether persuasiveness about anthropogenic global warming

increases doubts about either the afterlife or one's nation). The manipulations²⁸ may include convincing essays and/or critical statistics—the latter of which can employ techniques from my laboratory's Numerically Driven Inferencing paradigm (e.g., Garcia de Osuna, Ranney, & Nelson, 2004; Ranney et al., 2008; Rinne, Ranney, & Lurie, 2006); toward this end, we have been developing four lists of true statistics that are designed to either cohere or (seemingly) incohere with either biological evolution or (especially anthropogenic) global climate change. Regarding future surveys, naturally those provided to people in more countries (and more locations within the United States) would also flesh out which parts of RTMD are most empirically justifiable and how strong the relationships are. However, the surveys implemented to date, and the extant data, seem to represent a promising start for RTMD theory.

Neuroscience may also yield evidence with which to assess RTMD. Recent research indicates that reduced anterior cingulate cortical (ACC) activity in response to error and uncertainty is associated with both religious zeal and a greater belief in God (Inzlicht, McGregor, Hirsh, & Nash, 2009); similarly, conservatism has been linked to less conflict-related ACC activity and a reduced sensitivity to changed circumstances (Amodio, Jost, Master, & Yee, 2007). Viewing global warming as an anthropogenic mistake (thus suggesting that a nonhabitual response to the problem is needed), RTMD would predict that individuals who are most cognitively connected with religion, theism, conservatism, nationalism, and creationism would be less likely to recognize global warming as an error; these hypotheses cohere with RTMD's predictions—and the data above—that such variables are related to difficulties in accepting the existence of (especially anthropogenic) global warming. Future neural imaging studies might address these predictions directly.

Evolution Education: Early and with Contrast

Many scientific concepts are difficult to master (e.g., inertia; Ranney, 1996), and even apparently simple ones leave traces of prior ideas. For instance, in the first 1,000 milliseconds of reaction time, even biology professors engage *movement*-based root ideas when they classify objects as living or not (Goldberg & Thompson-Schill, 2009). Given that decades of instruction and study cannot completely squelch this developmentally primitive idea, perhaps the later a child learns that many moving things are not alive (e.g., rivers and comets), the harder it is to dispel that misconception. It seems good, then, that parents and educators help debunk the "movement equals life" belief early on (e.g., using cacti or rivers as examples).

²⁸ Feinberg and Willer (2011) similarly recently predicted that reducing one's just-world beliefs might decrease skepticism about global warming.

In contrast, even today, most U.S. residents do not seem to formally receive evolution instruction until high school—if ever (see Kutschera, 2008, about Germany, as well); even though one of my undergraduate majors would become biology, I do not recall being taught evolution before attending college. Adolescence seems too late to deliver the impact that evolution ought to yield in the developing mind. By the time most students "discover" evolution, they have already made significant, if implicit decisions (e.g., about whether to use tobacco or own guns). Imagine the cognitive damage if we withheld from our children—until they were 17 years old or so—the knowledge that *not all* moving things are alive!

Unfortunately, much instruction about evolution results from selecting paths of least political conflict, such as the choice to *not* teach evolution early. Young children can understand that all living things are effectively our cousins (if distal ones), yet teaching evolution to them seems to many people rather like debunking Santa Claus for preschoolers. It seems that, partly by offering religious parents such epistemic latitude—and a gigantic head start—in shaping the "origins" beliefs in their premajority children (Kutschera, 2008), the United States has generated a society that appears developmentally delayed relative to what it might understand about evolution (and global warming—or even internationalism—as per RTMD).²⁹ This delayed development may even yield reduced understandings of materialism and reductionism (and possibly elements of determinism) in other realms of biology—and even the chemical and physical realms (Ranney, 1998). A bit more radically, RTMD suggests that the delay may even foster U.S. "clannishness," as nationalism *incoheres* with evolution acceptance; curriculum designers might be wise to foster a sense of international empathy to help societies address global warming's "tragedy of the commons" (Van Vugt, 2009).

Another effect of shrinking from political conflict regards whether evolution instruction should address whether some evolutionary and religious beliefs compete. A tacit bargain seems to have been struck in that most U.S. evolution instructors avoid addressing the competitive scientific-versus-religious accounts of biological origins (see Coyne, 2009, on the National Academy of Sciences' position). It seems that U.S. life science teachers think their pedagogical situations³⁰ so tenuous that their "licenses to teach evolution" will be revoked if epistemic criteria are applied to scientific and religious accounts simultaneously.³¹ (E.g., many classroom educa-

²⁹ In some respects, allowing this head start for creation is a bit like permitting children to smoke tobacco or discharge firearms without informing them of some of the societal and personal health consequences of tobacco use and gun ownership.

³⁰ For instance, many (even long-tenured) teachers are highly concerned about how students, parents, and principals will react to the ways they teach evolution (if at all).

³¹ A *Science* news story (Bhattacharjee, 2009) highlights this continued practical and/or epistemic bargaining, as evolution supporters were concerned by Texas science-standards language that seemed pro-creationist (e.g., in the context of contrasting multiple "theories"), yet from a neutral context seems virtually perfectly scientific. This aversion regarding "teaching the contro-

tors effectively say, “We’re afraid someone may rescind even the prospect of measly weekday evolution instruction, so we’ll cede a big head start, the weekends—and the vast majority of one’s childhood—to creationism.”) Similar issues arise for informal educators, such as those in “science museums.” Our students, though, often know better; they understand that there are evidential bases for accepting either evolution (fossils, DNA, etc.) or creation (e.g., “bible codes,” purported miracles, oral histories, complexity analyses, and documents/testaments with varying degrees of historical provenance or carbon-dating estimates, etc.). Indeed, Lombrozo, Thanukos, and Weisberg (2008) found that evolutionary acceptance correlates with understanding science’s nature, so formal and informal instructors may be acting counterproductively if/when they downplay critical tenets of science (e.g., the critique of evidence) while hoping for increased evolutionary acceptance (Thagard, 2011; Thagard & Findlay, 2010).

Pieces of evidence may have widely diverging degrees of epistemic support, reliability, and belief acceptability (Ranney, Schank, Hoadley, & Neff, 1996, on the nature of evidence), so they are hardly worthy of uniform weighting (Ranney & Schank, 1998). But creationists may be less likely to accept evolution if what they consider creationist evidence (even if most scientists see the evidence as massively dubitable; cf. Ranney et al., 1996) is ignored or summarily dismissed, by apparent fiat, by those teaching evolution. (See Coyne, 2009, on supernatural phenomena not being completely beyond science.) Although difficult to master, I suggest training biology teachers to explicitly evidentially and epistemologically compare evolution with creation for moments in which their juxtaposition arises in a classroom.³² We would ask no less of biology teachers when they contrast reproduction with spontaneous generation, let alone chemists when they contrast oxygen with phlogiston or physicists when they contrast models of motion (Ranney, 1996). We must let the evidence, hypotheses, explanations, competitions/contradictions, predictions, and control (i.e., engineering) speak for themselves if we are true to science. (On the other hand, for biology teachers who are weak on knowledge of either evolution or religion, and lack the training I suggest above, perhaps they should just focus on evolution; unfortunately, Berkman & Plutzer’s 2011 data indicate that just over 42% of public high school biology teachers have completed a course on evolution.)

To highlight some of these concerns, consider a personal story. I was recently speaking with a postdoctoral scholar (“Ulysses”) who had taught teacher education courses, and who volunteered that he told students at the outset of the course that he “*literally* didn’t care if they accepted evolution or not as long as they

versy” seems at odds with constructivist notions of how we ought teach (other) scientific concepts in relief to students’ alternative conceptions.

³² This may sound like a “teach the controversy” strategy to some biology educators, but if the teacher is skilled, the moments should end up rather like teaching a heliocentric versus a geocentric solar system; that was “the controversy” hundreds of years ago.

understood it” (and could pass tests about it).³³ He stuck to that position when I asked if he really meant that. Then I asked if he would care if the soon-to-be-teachers also merely understood gravity or a spherical Earth, photosynthesis, etc. Thus pressed, he confessed that, even when he taught them, he would have preferred that the preservice teachers both understand *and* accept evolution, rather than merely understand it. I then asked, “So why did you say something to the class that you knew to be untrue?” In sum, the response was essentially a Trojan horse notion that the “little lie” would allow some students to appreciate evolution so much that they would come to accept it, in spite of any prior reticence. As the reader might imagine, this disingenuity happens across the United States in many classrooms, raising two concerns. First, shouldn’t we, as science educators, be more truthful than that—that is, rather than telling falsehoods to students—especially if we want to foster the notion that scientists ought be trusted and science is the search for (approximate) truth? Second, even if we feel comfortable offering a falsehood, it seems quite plausible that students would not consider take-it-or-leave-it evolution as seriously or study it as vigorously—rather like those who are told that they must learn a polytheistic (e.g., pagan, Greek, etc.) mythology, even though they do not accept the gods’ existences, have no fear of them, and are not that keen on learning which sacrifices must be placed at which alters. It may well be that the combination of these two concerns fosters the counterproductive relationships (as explicated in the RTMD theory) that keep the United States an outlier in its median understanding of important scientific information (e.g., about global warming). Ulysses offered an anecdote to suggest that his Trojan horse might have worked for one student, but as a scientist, I value disconfirmation, and it may well be that for every such student there may be many more who might have come to accept evolution, had their instructor more honestly said, “I accept biological evolution due to the theory’s structure and the massive amount of coherent, predicted, data that evolutionary theory has continued to generate—and I hope you will come to accept it, as well.”

At least Ulysses *taught* evolution. Berkman and Plutzer (2011) recently revealed “a pervasive reluctance of [public high school biology] teachers to forthrightly explain evolutionary biology” (p. 404), including a “cautious 60%” who “may play a far more important role in hindering scientific literacy in the United States than the smaller number of explicit creationists” (p. 405). They go on to plausibly suggest that stronger evolutionary instruction for preservice biology teachers may gently encourage would-be teachers who do not accept evolution to ponder other careers (rather than perpetuating subpar instruction), especially those teacher-candidates who would otherwise end up in communities most reluctant to accept evolution.

³³ Virtually the same phenomenon was noted by Berkman and Plutzer (2011).

Evolutionary and Climate Sciences under Attack

It is not difficult to empathize with teachers like Ulysses, who are tempted to shade the truth about their own preferences, and who might believe (often accurately) that “the other side” is doing much worse—misrepresenting both theory and data regarding evolution. Such agnotology, the spreading of inaccurate or misleading information, honed by the tobacco industry, afflicts global climate change science at least as dramatically as it does evolutionary science (see Kaufman, 2010, for the instructional linkage). One need only transiently muse about the diverse and powerful corporations who fear profits will go elsewhere as people will wean themselves from fossil fuels (e.g., the oil, coal, and natural gas industries) and products associated with them (e.g., automobiles, traditional power). It is even more disturbing, albeit also RTMD-consistent, when political donations from makers of such products intertwine with legislative policies (e.g., “Drill, baby, drill!”) and nationalism (“Country First”). (It bears noting that, on May 3, 2007, three of ten Republican presidential candidates raised their hands when asked if any “did not believe in evolution.”)

In another parallel with evolutionary “controversy,” a measure of agnotology’s potency is that as many Americans (38%) choose “There is a lot of disagreement among scientists about whether global warming is happening” as choose (39%) “Most scientists think that global warming is happening;” likewise, 35% of Americans incorrectly believe that “In the 1970s, most scientists were predicting an ice age” (Leiserowitz, Smith, & Marlon, 2010). The misinformation and misleading information (Maron, 2011) being spread may help explain why the Republican-Democratic divide in the United States has become so great, and why one’s political party is the most important determiner of one’s global-warming stance (Borick, Lachapelle, & Rabe, 2011). A Pew Research Center for the People and the Press (2010) poll indicated that almost four times as many Republicans deny there is solid evidence for global warming (53% vs. 14% for Democrats), and that Republicans are about twice as likely to deny that scientists agree about anthropogenic warming (58% vs. 30%). This divide has potent policy implications. For two examples, Leiserowitz, Maibach, and Roser-Renouf (2010) report (among a host of RTMD-consistent findings) that: (1) Republicans, Independents, and Democrats respectively choose economic growth over environmental protection 77% to 23%, 59% to 41%, and 45% to 55%,³⁴ and (2) 52% of Republicans think that global warming should be a low priority, whereas only 6% of Democrats do—and only 5% of Republicans think it should be a very high priority, whereas 20% of Democrats (and 19% of Independents) do. Regardless of the agnotology occurring, though, it seems critical that, ethically, both evolutionary and global climate change scientists—as well as teachers like

³⁴ The vast majority of peer nations are more “green” than the United States regarding this choice (Pew Global Attitudes Project, 2007, p. 19).

Ulysses—ought to aspire to “Caesar’s wife” levels of trust in the competition for hearts and minds.

Global Warming Education and/versus Evolution Education: The Latest Data

It seems plausible that instruction about global warming ought to be dramatically different from that for evolution in character, and not just content. To illustrate this, I ask the reader to answer two “mechanism” questions: (1) How does global warming (or the Earth’s greenhouse effect, in general) work? (2) Are all gases greenhouse gases, and if not, what distinguishes greenhouse gases from non-greenhouse gases? Please take a minute or two to generate your responses before reading on. If you are like most people, even like most of the many academics I have queried, you may feel sheepish at your relative ignorance (and/or that you had not problematized the topic), as I did when I posed the two questions to myself. How is it that Earth’s surface and troposphere are not dissipating heat in the same way they did in 1750? If CO₂ is a greenhouse gas, are molecular oxygen (O₂) and/or nitrogen (N₂), as well?

As it turns out, the key to both of the above questions is infrared light, as per the following “nutshell” explanation. Sunlight (comprised mostly of visible light) that is not reflected by the Earth is absorbed, and then radiated later as infrared light. Greenhouse gases (like CO₂) generally absorb infrared light, but not sunlight. This absorption retards that energy’s return to space, thus heating up Earth’s air, water, and ground. Non-greenhouse gases (like O₂ and N₂) generally don’t absorb infrared light—because they largely have symmetric charge distributions, even when vibrating (unlike CO₂, methane, water vapor, and nitrous oxide etc., which can vibrate in asymmetrical ways). As humans have emitted greenhouse gases into the atmosphere, the historical greenhouse effect (which kept the Earth pleasantly warmer than the moon, on average) has become more potent in retaining heat near/on Earth’s surface—causing global warming. Due to greenhouse gases’ absorptions, to maintain Earth’s temperature, only about 10% of the energy radiating from Earth’s surface should go directly into space (as I calculate from Lindsay, 2009). I suggest the term “Goldilocks tithe” for this 10%, because a smaller percentage yields global warming, while a larger percentage would yield cooling.³⁵

The prior paragraph takes less than a minute to read, but once one understands it, one is forever changed. Is it not shocking that mechanistic ignorance about what

³⁵ Unfortunately, researchers who study perceptions of the “causes of global warming” often focus not on the mechanism, but what *produces* greenhouse gases. For instance, in the Leiserowitz, Smith, and Marlon’s laudable (2010) piece, the words “infrared,” “visible,” “sunlight,” and “radiation” never appear; also, their survey relied almost exclusively on recognition and choice, not recall, which likely inflated estimates of Americans’ climate knowledge.

seems so mysterious and technically daunting so as to engender widespread doubt can be rather obviated in well under 200 words? Why is it that educators, scientists, and journalists (Ranney et al., 2008) have done a poor job in informing the populace of this simple, mechanistic, information—rather than focus *overwhelmingly* on the volume of actual or projected effects (e.g., melting glaciers, sea levels, and weather catastrophes)? Certainly, the effects of global warming are both empirically and politically important to publicize. However, it strikes me that not knowing the *mechanism* of global warming is rather like not knowing how animals procreate: the former ignorance acts as an inhibitory agent regarding global climate change acceptance, just as the latter ignorance inhibits accepting evolution (cf. “reproduce” in Thagard’s nice 2011 description of natural selection’s mechanism). But we now know how to modulate the greenhouse effect (via emissions, etc.), in the same way we know how to modulate speciation in animals (e.g., via isolation, selection pressures, breeding, etc.).

Understanding the greenhouse effect hinges, plausibly, on one main conceptual hurdle to be overcome: How is it that “stuff” (radiation) coming from the sun can often get through our atmosphere, but cannot as easily get *out* through our atmosphere? In other, anthropomorphized, words, how does our atmosphere “know” whether light is coming from above or below? The answer (or perhaps requisite “conceptual change”) is that greenhouse gases act as a kind of partially effective one-way valve because the stuff coming in (sunlight) is different from the stuff going out (infrared light), and the greenhouse gases don’t absorb the incoming stuff but do absorb the now-different outgoing stuff.

In contrast, the conceptual landscape of evolution appears to be much more complicated—beyond the more obvious complication that evolution seems to conflict with literal scripture(s), but that global climate change does not. Barring secondary and tertiary effects (e.g., more clouds that yield greater albedo/reflection), we can generally say, “More greenhouse gas emissions yield a warmer planet.” But we can’t obviously as generally say, “More isolation yields more evolution” because the particulars of the isolation and how one might measure evolution matter quite a bit. (Likewise, it is difficult to predict specific evolutionary changes “in the wild”—e.g., when sharks, or even humans, might develop blowholes.) Fortunately, ignorance regarding evolution may be less worrisome for society than ignorance regarding global climate change. That is, humans have significantly grappled with biological evolution for over 150 years, and misunderstandings about it have not as obviously threatened multitudes of us with starvation in the same way that global warming seems to offer such a threat—should we continue to misunderstand climate change and vote on the basis of that misunderstanding.

Empirically, my laboratory has just been experimentally assessing the hypothesis that simply describing the mechanism of global warming, rather as was done above (but using 400 words), will increase the rate at which participants accept (possibly even anthropogenic) global warming. The vast majority of people don’t know that greenhouse gases absorb infrared light emitted by Earth’s surface; indeed, virtually

none of the roughly 200 undergraduates or 300 park visitors we have assessed spontaneously mentioned infrared light. (Fortunately, the situation is dramatically different after the undergraduates read the 400-word mechanism description, but space here does not permit further elaboration.) The finding would seem to markedly contrast with Americans’ self-perceptions, as about 63% believe that they are at least fairly well informed about how Earth’s “climate system” works and about global climate change’s causes (Leiserowitz, Smith, & Marlon, 2010). A bit disconcertingly, preliminary results indicate that even people who accept global warming rarely have even a moderately articulate understanding of the mechanism. Rather, those accepting global warming seem to mainly just trust the scientists who study the phenomenon to understand the mechanism. This is true of many university faculty, as well; no one I have yet asked (including myself, upon self-querying)—except for one zoologist, plus the physical chemist I initially sought wisdom from—could explain the aforementioned reason that distinguishes a greenhouse gas from other gases. To accept (or assume) a mechanism out of deference to authority, however, seems at least partially akin (but not identical) to accepting a mechanism from one’s clergy on faith. Analyses of this experiment are quite preliminary, but initial analyses suggest that the mechanism description yields greater acceptance, regarding global warming.

Conclusions, Limitations, and More Implications

The preceding variety of empirical and historical evidence, both noted and reported, may surprise some in how interconnected evolution seems to be with concepts that relate to Americans’ senses of personal meaning (apparently including afterlife, nationalism, and even global warming; also see Brem, Ranney, & Schindel, 2003). Beyond the constructs discussed above, Ranney and Thanukos (2011) cite a number of other factors (particularly “consistency with worldview”) that influence the acceptance of evolutionary explanations for biological features—and these factors are largely either directly or indirectly related to the presently proposed RTMD (Reinforced Theistic Manifest Destiny) theory (as in Figure 11.1).

By markedly broadening the focus to other nations, RTMD subsumes and expands on the received view about why the United States differs from peer countries in its rather modest “market share” with respect to evolutionary acceptance (especially regarding human evolution). In so doing, RTMD might help explain other geopolitically tinged issues that are beyond the scope of this piece (e.g., gun control divergence—or the “climate gap” between U.S. subgroups and how it relates to diversity, human rights, and social justice; e.g., Morello-Frosch, Pastor, Sadd, & Shonkoff, 2009). Even though the evidence cited herein often regards North American university students, the findings—and RTMD—have entailments extending well outside of both the continent and the samples surveyed. In particular, how a nation’s residents understand information about the physical and social environment impacts their thoughts about global environmental problems (Van Vugt, 2009); biological

evolution would seem to be a linchpin in that understanding. Thus, in terms of the societal importance of humanity's influence on the biosphere, one might twist Dobzhansky's decades-old famous quote³⁶ by suggesting that "nothing in evolution currently makes sense except in the light of anthropogenic species destruction."

Ranney and Thanukos (2011) also cite familiarity as a factor influencing the acceptance of specific evolutionary explanations. This may encourage evolution's promoters, suggesting that more efforts to explain evolution may yield more acceptability—although understanding evolution is hardly *perfectly* related to its acceptance³⁷ (compare Shtulman & Calabi, 2008, with: Bishop & Anderson, 1990, and Sinatra, Southerland, McConaughy, & Demastes, 2003); by analogy, many know a great deal about Santa Claus's "life," yet do not accept him "as a hypothesis." Ranney and Thanukos's experiments and surveys also highlight an American culture dominated by time-honored tenets of freedom, equity, and choice. However, choosing creation today is not nearly as epistemically defensible as it was even a decade ago, given increasing fossil evidence and DNA sequencing; creation seems more akin to phlogiston and luminiferous aether, which we no longer teach as viable theories (cf. Griffith & Brem, 2004, on teachers' perspectives on teaching evolution). This epistemic asymmetry in justification between evolution and creation should, one would hope, be reflected in the design of classroom curricula—as well as zoo signage.

Although the scientific study of evolution is more than "mere" history, it represents the study of change—and history is *still* at the hub of public controversies about evolution. (Please recall the four-billion-year video idea from before.) Likewise, RTMD tries to account for change (and/or intransigence), albeit by employing psychological and societal analyses. The nascent theory offers some potentially surprising entailments—as detailed in the preceding—for instance, that many of the same causes might explain both the United States' evolutionary divergence and its current lack of a vigorous response to global climate change. RTMD hardly pretends to "explain all the variance" in how the United States differs from its peers, or even just regarding evolutionary acceptance. It is hoped, though, that the theory can both (1) explain markedly more evidence than does the received view and (2) help fuel a robust dialogue about the twenty-first-century importance of evolution—as a litmus test for a society's conceptualizing (e.g., about the environment). To date, the empirical results provided above show promise regarding at least the first of these. If this promise continues, perhaps RTMD can expand its analyses from (a) how (individuals within) nations differentially conceive of evolution to (b) how both international

³⁶ "Nothing in biology makes sense except in the light of evolution."

³⁷ The author believes that the difficulty many researchers experience in finding correlations between knowledge and acceptance is due to range restrictions on the participants' knowledge among most samples studied. (Few samples include, e.g., evolutionary biologists or climatologists, along with those who've never studied the subjects.)

and subcultural populations employ group identity when incorporating evolution-associated concepts such as global warming.

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