

## Afterword

### VISUALIZING VISIONS AND VISIONERS

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#### New Visions?

In the foregoing essays, a diverse array of scholars has engaged with visions of nature, science, and religion. Has there been any commonality in their conclusions concerning this trilogy, or do the essays simply represent fourteen differing points of view, nothing more? And, perhaps more presumptuously, where is the space for new visions of nature, science, and/or religion amid these critical accounts?

Consider this brief essay to be not so much a conclusion as an invitation to reread the foregoing essays with an eye toward how they relate to each other, and ultimately what sorts of new visions possibly arise as a result. We want to create for the reader an opening rather than a closing. It proceeds from three assumptions. The first is that, for all their limitations, the five visions of nature presented as our point of departure—evolutionary

nature, emergent nature, malleable nature, nature as sacred, nature as culture—enjoy significant scholarly and popular resonance, a strong degree of de facto legitimacy. Thus, any “new visions” we wish to discover or proclaim will necessarily entail some creative weaving of these, and possibly other, existing visions. Visions are not built *ex nihilo*, even by visionaries. The connections and differences between these visions, then, offer key insights toward situating ourselves in, and possibly beyond, them.

The second assumption is that, as there can be no vision without a visioner, comparison of visions are enhanced by comparing the visioners as well. Visions aren't free-floating ideas: They relate not only to each other, but to the preconditions of their own existence, which minimally entail a visioner—though whether this visioner is a visionary is up to others to judge. Our volume features five point-of-departure visions, but fourteen visioners—fourteen scholars who gave the best part of three years to engage with each other over nature, science, and religion. How they relate to each other matters as much as the ideas they embrace.

A third assumption is both methodological and metaphorical: New light may be shed on visions, and visioners, by means of visualization techniques, or methods of graphic representation. If a vision is a view, it seems difficult to capture or compare visions in the form of text alone—despite our textual efforts in this volume.

Visualization played an early role in this collaborative project: Our Website<sup>1</sup> and project graphics featured a spherical brain/earth image, representing biophysical and human nature, cast in the form of a dodecahedron, a twelve-sided geometric shape composed of pentagons, which approximates a sphere via these flat surfaces. A dodecahedron may be an appropriate symbol for the totality of human understandings of reality, as it has fascinated mathematicians and mystics alike since the time of the classic Greek philosophers. Mathematically, it is known as a regular polyhedron or Platonic solid; for ancient mystics, the dodecahedron represented the “fifth element” (after earth, air, fire, and water) of ether from which the universe was made.<sup>2</sup> In a three-dimensional world, one can only imagine three possible independent perspectives, as famously symbolized by the book cover of *Gödel, Escher, Bach*.<sup>3</sup> A cube, for instance, has six faces defining three planes of orientation (e.g., the top and bottom face of a cube define parallel planes of similar orientation); each plane corresponds to one of the

three dimensions of ordinary space. But if orthogonality (right angles) is removed as the criterion of dimensionality, then the dodecahedron represents a doubling of perspectives relative to our ordinary perception of space, with twelve faces defining six planes of orientation.

Our means of visualization presented here relies in part on correspondence analysis, a method commonly used to represent in two-dimensional form how two variables relate to each other. Correspondence analysis is a complicated tug-of-war, in which each player holds a rope connecting to every player on the other side, and the final position of each player is based on the outcome of all tug-of-wars. Thus, the important result of correspondence analysis is the overall pattern more than the precise location of any individual element. We are working with a small amount of data, given only fourteen authors, as distinguished from one of the classics in applying this technique, Pierre Bourdieu's *Distinction*.<sup>4</sup> Nonetheless, the results suggest interesting patterns of alliance and difference between visions and visioners, and serve well our purpose of visualizing these patterns to provide readers with an incentive for further exploration.

## Visions and Visioners

### *Points of Departure*

As a point of departure, we know that the scholars participating in this volume represent a wide range of disciplinary specialties: theoretical ecology, biological anthropology, cultural geography, history of science, Christian theology, and so forth. But many of our contributors have significant advanced backgrounds in multiple fields: for example, Nicolaas Rupke's training includes both history of science and marine geology, and Willem Drees builds on advanced degrees in physics and theology. So it was not only the disciplinary connections between, but within, our contributors that offered important means of bridging fields.

The correspondence analysis result in Figure 1 is built on a survey in which we asked all authors to rate their level of disciplinary expertise in each of four general fields contributing to our collaboration. The benefit of correspondence analysis is that the result suggests not only which contributors broadly resembled each other in their suite of disciplinary backgrounds, but how the classes of disciplines related as a result. Like

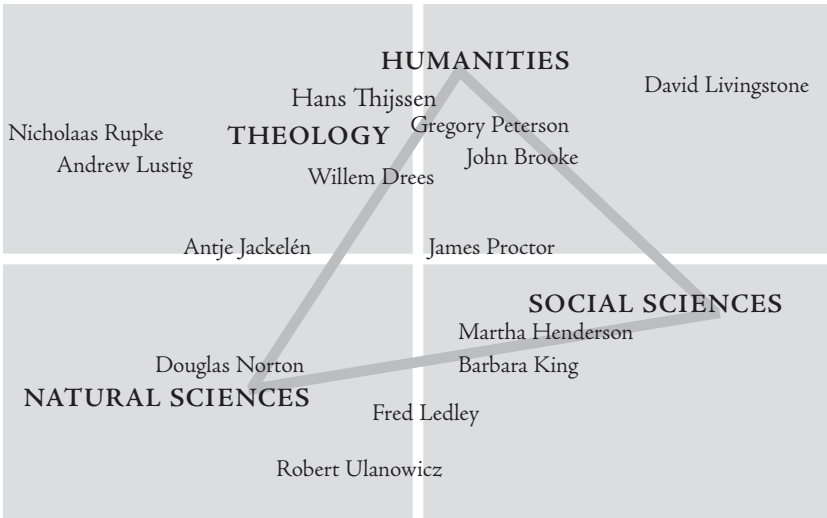


Figure 1. Correspondence analysis of contributors to this volume in terms of their disciplinary backgrounds.

other correspondence analysis results, the placement of each label should be understood with respect to all labels in the paired dataset: Those near the periphery (as defined by the intersecting horizontal and vertical lines) are marked as much by their distance from certain labels as their proximity to others. So, in Figure 1, David Livingstone resides in a common space occupying the humanities and social sciences and distant from the natural sciences, whereas Robert Ulanowicz is at once proximate to the natural sciences and (in terms of disciplinary expertise) relatively distant from the humanities.

Based on this visualization, we can reconstruct something of the raw intellectual material out of which our collaboration was built. The effort enjoyed expertise in all four of these overarching disciplinary classes, with a preponderance of backgrounds in the humanities and theology but with sufficient representation in all areas to afford engagement with related visions of nature. Yet no one of us possessed a complete background in all these areas: This would have placed such a participant in a position toward the center. We needed each other to arrive at a more complete picture.

The disciplinary areas themselves are arrayed in an interesting manner. First, the proximity of the humanities and theology is apparent, which may strike the American reader as odd, given that these two areas are no longer commonly associated with each other in higher education, but many of our European participants are found here, and some of our American contributors with expertise in theology also maintained expertise in related humanities fields, such as history or philosophy. Second, the general domains of the natural sciences, social sciences, and humanities are not arrayed in a linear fashion, as assumed in how our visions of nature were introduced, running from natural-science visions to social-science visions and ultimately to those diffuse in the humanities. In this result, the natural sciences are as close to the humanities as are the social sciences, yet each maintains its distinctive domain and, presumably, a distinctive contribution to envisioning nature, science, and religion. Additionally, none resides in the center: All are more or less equally “peripheral” to our joint intellectual backgrounds.

An invitation to reread the foregoing essays could proceed from this map of disciplinary expertise: Do those contributors with similar backgrounds have similar positions on nature, science, and religion? What of those with apparently differing backgrounds? Do those most distant from certain disciplinary areas maintain this distance from their affiliated visions—evolutionary nature, for instance, for the natural sciences, or nature as culture for the humanities?

#### *Visions According to Visioners*

A different picture emerges when considering the general level of agreement the contributors maintained with each of the five visions of nature (Figure 2). Bearing in mind that each author’s placement in correspondence analysis reflects not so much an affinity with the proximate vision of nature as one piece of a larger pattern, we can nonetheless see some interesting differences among authors, and consequent differences among visions as viewed by these authors. Some near the periphery, like Willem Drees or me, are located as much by their concerns about certain visions (Willem’s concerns about sacred nature and mine about evolutionary nature) as by their approval of others. Many of our authors are located quite close together in spite of disciplinary differences as revealed above; thus, for

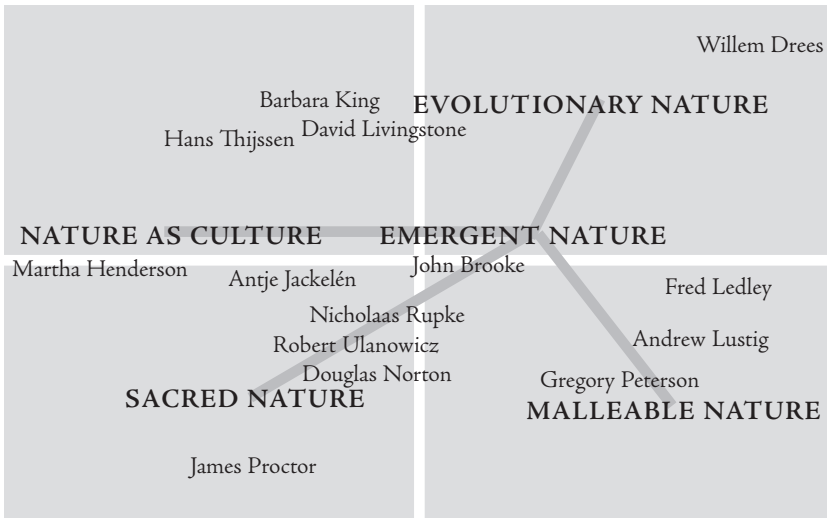


Figure 2. Correspondence analysis of the general level of agreement regarding our five visions of nature among contributors to this volume.

instance, Nicolaas Rupke and Robert Ulanowicz, or Barbara King and David Livingstone, are proximate. There is thus no tidy pattern between disciplinary backgrounds or specialties and the authors' take on these five visions, which is clearly underdetermined by disciplinary expertise. The reader may be interested in comparing the essays of near and distantly placed authors to consider how they relate to a particular vision.

A potentially provocative lesson is suggested by the placement of the five visions, remembering that this placement is a function only of what our contributors thought about them. There is something about emergent nature that led to a more shared sense of support among our authors, thus placing it near the center of the correspondence analysis diagram, while the other four radiate out from emergent nature in distinct patterns: evolutionary nature on the opposite end of nature as sacred, malleable nature in its own sector, and nature as culture likewise. Indeed, there was among a core group of contributors quite strong interest in emergent nature early on in our collaboration, with some seeing it as having the potential to bring together the other visions. Yet this view was not universally held; as a result,

in related essays, such as those by Willem Drees or Antje Jackelén, we can see a healthy give-and-take with respect to emergent nature.

As suggested in the Introduction, some of these visions are more provocative than others, leading to both strong support and strong opposition among academics; two examples are evolutionary nature and nature as culture. In our case, many of the contributors were relatively comfortable with nature as culture, so the pattern that results between visions and authors is not necessarily indicative of the pattern among scholars or people in general.

### *Mixing Nature, Science, and Religion*

Figures 1 and 2 compare the authors in terms of their disciplinary backgrounds and views on visions of nature. An entirely different way to compare them was adopted in the following graphic, which was based on the actual words they used in their essays. The process involved performing a count of the most frequent key terms from their essays, then asking them to examine each of these words in terms of their resonance with science, religion, and/or nature, all as broadly defined in this volume. Based on the resonance of their key terms with these three domains, each essay suggested a certain proportionality of emphasis, which is indicated as a point in Figure 3.

To understand each point of Figure 3, one must trace it back to the nature, science, and religion sides: An essay, for instance, whose key terms were exclusively engaging with science yet had little to do with nature or religion would be located at the lower-left corner, with a science score of 10 (100 percent), and nature and religion scores of 0. Thus, the more specialized the essay's key terms were along one or two of these domains, the more it could be expected to be located toward the periphery, while the more nature, science, and religion were all substantively engaged via essay key terms, the more likely it was to be located near the center of the triangle.

A major argument we are collectively making is that these domains are hard to separate; but are the actual words we use to make this argument similarly entangled? Figure 3 suggests that this is, to a large extent, true: Many of our essays utilized key terms that, individually or collectively, mixed nature, science, and religion. Some did not: Robert Ulanowicz placed many of his frequent key terms—*action*, *causal*, *complexity*, and

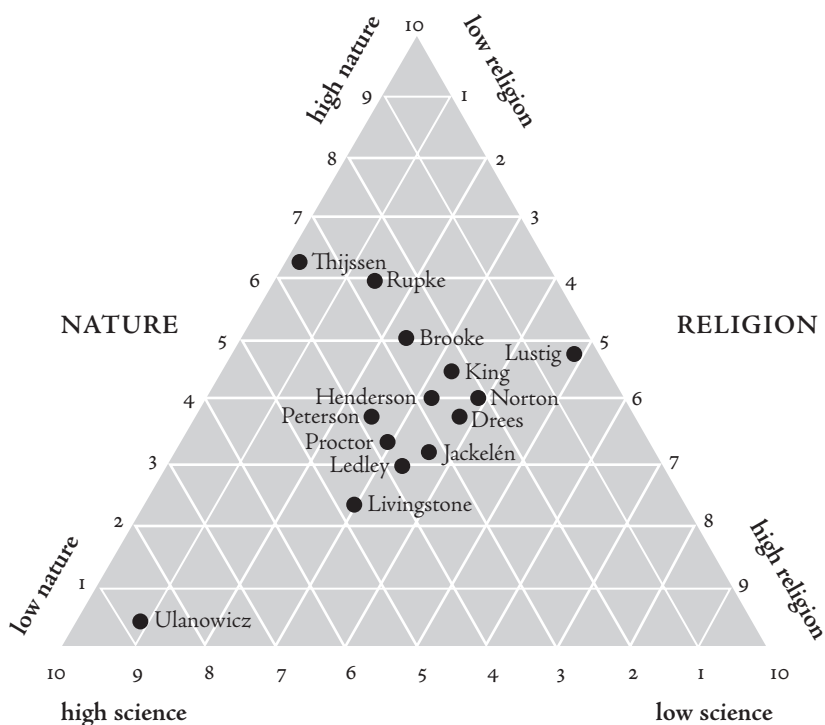


Figure 3. Diagram showing emphasis on nature, science, and/or religion of key terms in essays from this volume.

process are examples—in the domain of science alone, though his essay’s argument engaged nature and religion from the vantage point of science. As another example, Johannes Thijssen’s most common key terms—*animal*, *creature*, *human*, *reason*, and others—generally mixed nature and science, but did not immediately engage religion, though the implications of his study of human nature are of clear religious relevance. Yet these and other exceptions aside, not only did all essays have something of significance to say about nature, science, and religion, but the most important terms defining these essays were themselves entangled in many cases. We explored nature, science, and religion from differing disciplinary points of departure and with differing outlooks, but in a broader sense we utilized a similarly interwoven vocabulary.<sup>5</sup>



## The Way Forward

### *Nature/Antinature Worldviews*

What hope do we have for new visions of nature, science, and religion coming from this series of essays? The first assumption noted at the outset is worth repeating: Our conversations suggest that any “new” vision would by necessity and respect be crafted out of some features of existing visions. We do not propose some neologism for envisioning nature, from which some entirely new notion of the interrelationship of science and religion would emanate. There are plenty of popular volumes competing for this claim on the shelves of one’s local bookstore, and we do not wish to enter the prophetic fray.

Consider, for a moment, that the substrate out of which any “new” vision would be created may already exist, as manifested in the tensions between existing visions. Evolutionary nature, emergent nature, nature as culture, and others are not merely different: They potentially differ in certain significant ways, and these specific axes of difference suggest paradoxes that should be explored, perhaps even embraced as a testament to the healthy tension between them. Paradox may be what one ultimately discovers when the search for truth arrives at last at its foundations, as suggested in the famous Niels Bohr quote: “The opposite of a correct statement is a false statement. The opposite of a profound truth may well be another profound truth.”<sup>6</sup>

Perhaps, then, what we see emanating from these essays in terms of a way forward is a playful yet tense interplay around certain key themes, and these key themes will remain no matter how new the vision. Building on the inspiration of John Hedley Brooke’s essay, we decided to describe these themes in terms of four key binaries related to philosophical dimensions of worldviews founded on nature versus antinature, including ontology (what is real), epistemology (how we know), and ethics and aesthetics (what is good and beautiful). Each binary consists of a nature/antinature pair: a “naturalistic” ontology, epistemology, and ethics/aesthetics versus an “antinaturalistic” version. We gave the latter specific names to represent their antinature position. So, in the case of ontology, a naturalistic worldview understands reality as rooted in physical nature alone, whereas the embrace of most versions of *theism* rejects this strong nature pole. There are a myriad of ways scholars have written about whether or not a

naturalistic ontology and theism are compatible, yet the tension between the two polar viewpoints may convey something important about how views of nature constrain our understandings of reality.

Epistemology is slightly more complex, as two key approaches related to knowledge must be somewhat distinguished from each other. The first roots knowledge in objectively determined nature, which has processes and properties independent of the cultural and other filters through which we know it, and is the basis of epistemological realism. An antinaturalistic position in this first sense is broadly *constructivist* in arguing that knowledge is a cultural product with little discernable correspondence to objective nature. Whereas constructivism challenges the objectivity of naturalistic approaches to knowledge, the second antinature approach, *particularism*, challenges their claims to universality. The unity, hence universality, of nature is key to propounding scientific knowledge as itself generalizable, whereas epistemologies of a more situated, particularist bent find too much plurality in how reality unfolds in particular times, places, and other contexts to strive toward universal accounts of knowledge. Constructivist and particularist accounts overlap but are not entirely the same: A particularist claim can, for instance, be quite realist within its given context.

Finally, in the realms of ethics and aesthetics, nature has often been invoked as a way to root discourse on the good (or the right) and the beautiful. Here, what can generally be described as *antinaturalism* asserts that what is found in nature is not relevant to deciding what is good/right or what is beautiful. Antinaturalism suggests that we should not follow nature as a moral or aesthetic guide.

#### *Author by Worldview*

Given these worldview elements, contributors were asked to locate themselves along a continuum from nature to antinature for each of the four binaries—assuming that mixtures and creative combinations potentially existed in between each set of poles. Figure 4 summarizes the results of a correspondence analysis of their responses. As with other CA results, their positions should be understood relative to all other author positions, and to the location of the four antinature poles as represented on the diagram. Thus, for instance, Johannes Thijssen's position at the bottom is as much a function of his comparison to other authors' positions regarding

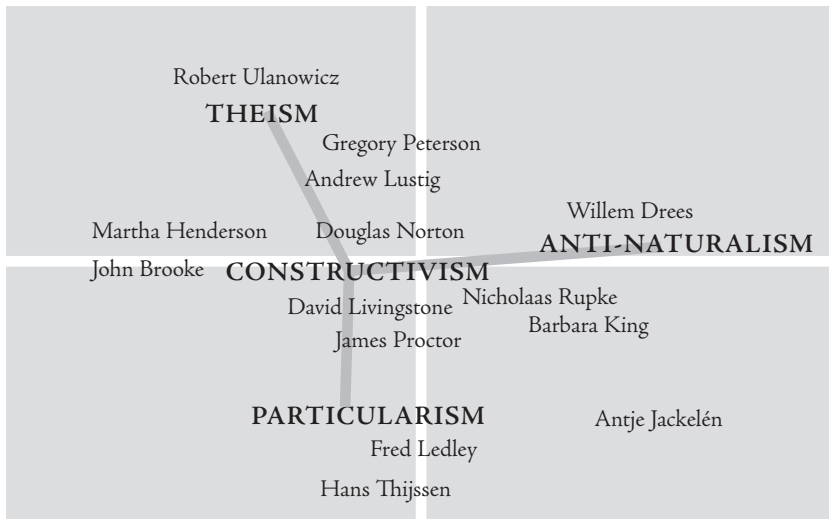


Figure 4. Correspondence analysis of support for antinature worldview elements among contributors to this volume.

the theism pole at the top as a strong embrace of the particularism pole close to him.

One immediate observation comes from comparing Figures 1 and 4: There is some, but relatively little, connection between the disciplinary specializations of our contributors and their proclivities with respect to these worldview elements. Worldviews mix them up, offer distance and proximity, in quite different ways. Thus, for instance, Fred Ledley is close to Johannes Thijssen in terms of worldview, as are Robert Ulanowicz and Gregory Peterson, in spite of differing academic backgrounds.

Examining the pattern of worldviews resulting from this correspondence analysis, constructivism seems to have been the least divisive of the four elements, given its location near the center, whereas theistic ontologies, antinaturalistic moralities/aesthetics, and particularist epistemologies seem to provoke more difference among authors. To some extent, theism and particularism appear to have defined an axis of difference, suggesting interesting questions around whether each is tied to the nature pole of the other (i.e., theism corresponding to universalist epistemologies, and par-

ticularism corresponding to materialist ontologies). The reader may find specific traces of the four abstract philosophical positions, and come to her own conclusion on these larger questions, upon reexamining and comparing the essays based on Figure 4.

### *Vision by Worldview*

In Figure 5, our contributors' embrace or rejection of the five initial visions and four worldview elements are then correlated with each other to search for preliminary patterns between these worldview tensions and visions. In this figure, the + lines refer to statistically significant positive correlations, and the – lines to significant negative correlations.<sup>7</sup>

These correlations refer only to our authors' viewpoints, and are not intended to represent any pattern beyond this group of contributors. Nonetheless, the connections between vision and worldview elements are both surprising and expected. The positive correlation between emergent nature and theism tells us that authors' interest in this vision rose or fell along with the strength of their theistic outlook. Similarly, the negative correlation between evolutionary nature and constructivism was expected, as objective, nonconstructivist epistemologies are much more prevalent in those areas of the life and behavioral sciences most closely associated with evolutionary processes. But the negative correlations between malleable nature and both constructivism and particularism are not immediately intuitive. And the positive correlation between evolutionary nature and antinaturalism is surprising as well: This suggests a worldview built on an evolutionary approach that stops short of endorsing any naturalistic foundation for moral or aesthetic judgments.

There are some interesting larger patterns between visions and worldviews worth further exploration. As an example, endorsement of evolutionary nature and nature as culture turned out to be (weakly) negatively correlated, as one would expect, given their differing epistemologies. But their corresponding worldview elements did not similarly contradict one another in the epistemological domain that would presumably separate these two visions. As Figure 5 suggests, embrace of evolutionary nature among our contributors involves a rejection of constructivism, but embrace of nature as culture involves support for particularism more than constructivism, of situating truth versus putting it in endless quotes. The assumed epistemo-

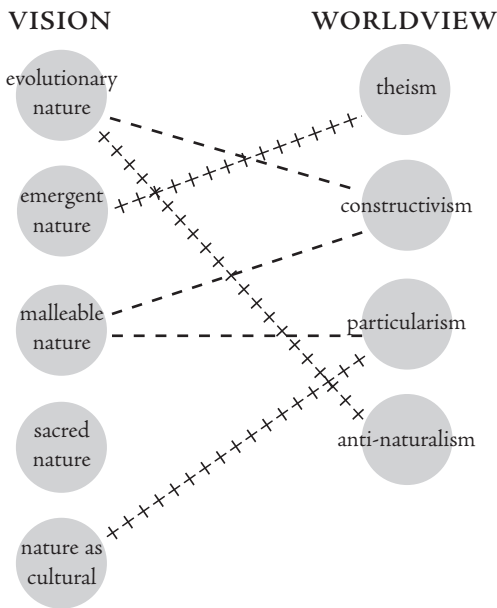


Figure 5. Statistically significant correlations (alpha = 0.05) between attitudes toward visions of nature and worldview elements among contributors to this volume.

logical divide between adherents of evolutionary nature and nature as culture is thus more subtle than generally believed, and indeed there may not be much of a divide after all, once greater clarification is obtained regarding the respective epistemological commitments and boundaries of these two positions.

What Figure 5 ultimately suggests is that the assumed worldview elements of each vision presented in the Introduction—say, evolutionary nature being antitheist or nature as culture being constructivist—are not monotonically reproduced among their scholarly adherents. There are indeed important nature/antinature binaries at work as nature, science, and religion are brought into conversation, but they do not parse out in entirely predictable ways, at least among our contributors. This suggests opportunities for dialogue and consensus along unexpected lines.

### *An Invitation*

We urge you, then, to consider the findings above as less a conclusion than an invitation to reread the diverse essays constituting this volume, now with

an eye toward envisioning nature in possibly new ways, new combinations of what had seemed to be irreconcilable differences. We have seen in this brief Afterword how the predictable becomes unpredictable, how familiar disciplinary boundaries fail to consistently define the distinctions between our contributors. We have seen how, in their own way, many of our contributors mixed significant doses of nature, science, and religion in their essays. We have seen important differences involving key nature/antinature binaries defining fundamental elements of a philosophical worldview, and yet these differences failed to parse out as they should have when considering implications for support or rejection of particular visions of nature.

In short, there is plenty of space here for you to creatively draw on the scholarly resources offered in this volume and recombine them in possibly new ways. It is not so much a matter of choosing whether to accept or reject a given vision, or where to place yourself along a given nature/antinature binary. The challenge instead may be much more to appreciate the richness and multivalence of our larger conversation, one in which we hope you will find a similarly rich and multivalent space for your own visions of nature, science, and religion.

## Acknowledgments

I am grateful to Jennifer Bernstein for extensive data analysis and preparation of graphics for this essay.

## Notes

1. See [www.newvisions.ucsb.edu](http://www.newvisions.ucsb.edu).
2. Peter R. Cromwell, *Polyhedra* (New York: Cambridge University Press, 1997).
3. Douglas R. Hofstadter, *Gödel, Escher, Bach: An Eternal Golden Braid* (New York: Basic Books, 1979).
4. Pierre Bourdieu, *Distinction: A Social Critique of the Judgement of Taste* (Cambridge, Mass.: Harvard University Press, 1984).
5. It is worth noting, in passing, that we spent considerable time exploring commonalities in these key terms across essays, yet discovered that there is such an abundance of key terms that, in general, only the most banal were shared, and other specific terms that were shared did not always seem to emanate from a common thematic use in the essays, so we discarded some hard work we had done on the resultant visualizations.
6. See James D. Proctor, "Geography, Paradox, and Environmental Ethics," *Progress in Human Geography* 22, no. 2 (1998); and James D. Proctor, "Solid Rock and Shifting Sands: The

- Moral Paradox of Saving a Socially-Constructed Nature," in Noel Castree and Bruce Braun, eds., *Social Nature: Theory, Practice and Politics* (Oxford: Blackwell Publishers Ltd., 2001).
7.  $\text{Alpha} = 0.05$ . Given the small number of contributors, only very high correlations (those above approximately 0.5) were significant. Other interesting correlations are not included in this discussion due to the small size—even though our contributors do not, of course, represent a population sample.

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