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Analogical Reasoning and the Content of Creation Stories

Quantitative Comparisons of Preindustrial Societies

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A long-standing question in sociology concerns preindustrial societies and the relationship between their subsistence technology and ideas about god. This article proposes a shift from questions regarding gods who now and then create to questions about creations that sometimes involve a god. For preindustrial societies, it addresses the relation between their subsistence technology and the content of their creation stories. This article's answer combines Hume's general hypothesis that people reason by analogy with Topitsch's specification that invokes vital, technical, and social analogies. This conjunction yields concrete hypotheses about the substance of creation stories in societies with varying levels of subsistence technology according to Lenski's typology. To test these hypotheses, the authors used Murdock's *Standard Cross-Cultural Sample* and the Human Relations Area Files. Field reports were coded for 116 preindustrial societies. The findings show that people use different thought models to explain the unknown, depending on the society's level of subsistence technology.

Keywords: creation stories; creators; religion; evolution; analogical thinking

Ancient texts (Bachofen, 1861), eye-witness testimonies (Snouck Hurgronje, 1889), questionnaires completed by colonial administrators (Frazer, 1890), stories recorded during expeditions (Jensen, 1939), and

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Table 1
**Preindustrial Societies' Particular Idea of God in Relation to
That Society's Subsistence Technology, Percentages**

Societal Subsistence Technology	No Idea of a Supreme Creator	Idea of an Inactive or Unconcerned Supreme Creator	Idea of an Active Supreme Creator not Supportive of Human Morality	Idea of an Active Supreme Creator Supportive of Human Morality	Number of Cases
Hunting and gathering	60	29	8	2	85
Simple horticultural	60	35	2	2	43
Advanced horticultural	21	51	12	16	131
Agrarian	23	6	5	67	66
Fishing	69	14	7	10	29
Herding	4	10	6	80	50

Source: Lenski (1970, p. 124).

fieldwork diaries filled with casual remarks made by natives (Evans-Pritchard, 1956) all suggest that ideas about gods differ markedly from one preindustrial society to another. Furthermore, the content of these ideas appears linked with pivotal societal properties. Quantitative comparisons add credence to this notion (Swanson, 1960; Underhill, 1974), and recent comparisons draw on Swanson's (1960) catalog of godly images (Peregrine, 1996; Roes & Raymond, 2003). A key finding is that the image of one god that created the world and now punishes evil and rewards virtue is most likely found in agrarian and herding societies. Sociologist Lenski (1970, p. 134) first reported this observation, referring to 404 societies in Murdock's (1962) *Ethnographic Atlas.* Table 1 reproduces these findings.[1] Sociobiologist E. O. Wilson (1975, p. 561) accepted them, and they became part of "ecological evolutionism" (Lenski, 2005), which is one of sociology's few comprehensive theories.

Lenski (1970, p. 124) distinguished six modes of subsistence in human history before the Industrial Revolution, and these return in Table 1.[2] Populations that chase and trap animals and also forage fruits, roots, and seeds are called *hunting and gathering societies*. Populations that grow plants in gardens and use digging sticks or hoes to do so bear the name *horticultural societies*. They do not merely collect food, but produce it, and so intervene in nature to reach what Lenski (1970) labels a "higher-technological

stage." Simple horticultural societies, such as hunting and gathering ones, only have tools of bone, stone, and wood; advanced horticultural societies also have metal implements. The use of these latter marks a new level of technological development, because metals are not found ready for use in the natural environment, and skills are required to attain the high temperatures needed to smelt ores. Societies that plow fields are termed *agrarian*. Whereas horticulturalists abandon small plots if yields drop, agrarian populations renew the earth's fertility, thereby invoking more advanced technology. Fishing societies and herding societies are environmentally specialized. On the yardstick of technology, fishing is close to hunting and gathering, whereas herding resembles advanced horticulture and agriculture (Lenski, 2005, pp. 93, 103).

Lenski's (1970) spin of Table 1 is that the more interventions in nature a society's subsistence technology comprises, the more that society's gods control human life. In this article, we gird that macro-thesis with the venerable micro-thesis that the members of any society comprehend the faraway and unknown by crafting analogies with things that are near and known to them and crucial for their survival. We take the origin of the world as a major case of the unknown and people's subsistence technologies as one instance of the familiar and important. The sociologist Topitsch (1954) pinpointed three kinds of everyday matters on which people model unknown things: (a) they liken them to vital processes, (b) to societal arrangements, and (c) to technical achievements. To advance the issue of the relation between a society's ideas and its other features, we link Lenski's (1970) six technological levels to Topitsch's (1954) three types of thought models. We then test these hypotheses by classifying the content of creation stories for 116 preindustrial societies. To embed this article's theoretical thrust, we finish by showing that Topitsch's (1954) ideas combine notions from classical sociology, and that Lenski's (2005) amplified ecological evolutionism goes beyond contemporary Darwinian hypotheses on religion.

Until now, comparisons of preindustrial ideas aimed to learn about the prevalence of specific godly images. The analogy thesis, however, raises questions about ideas in general and thus upgrades the study of creation stories. After all, why examine the incidence of the idea that a god created the world? Certainly, this notion fills a *vacuum*, and people abhor voids. But other ideas fill other gaps, and there are lots of blanks. In this article, we hold that a prime void involves origins, because no living member of a society was around at the time of its nascence. So to press the ideas-and-societies issue, we dissect creation stories,[3] which occasionally involve a god, as distinct

from analyzing images of gods that now and then create and sometimes do things afterward. We classify these stories by (a) the creative force mentioned, such as an inanimate natural object, an animal, or a human being; (b) the designation of this generator as parent or as ruler; (c) the gender assigned to this agent; and (d) the declared character of this agent's creative act, such as a sexual deed, a technical feat, or a verbal command.

We avoid the word "myth" and instead speak of "creation stories," as the term myth may miscast questions. The foremost issue is not the glaring inconsistencies in so many religions. It is unfortunate that several theories of religion address this minor matter, a point missed in Dow's (2006) vetting of contemporary evolutionary hypotheses about religion. Crucial questions regard the diversity in the content of ideas about the unknown prevalent in preindustrial societies: (a) Given that a relation has been established between a society's subsistence technology and its godly ideas, is its technology also linked to the content of its creation stories? (b) To what extent does the thesis that human beings comprehend the unknown by drawing particular analogies explain the relation between a society's subsistence technology and the substance of its creation stories?

General Hypotheses

Ecological Evolutionism

Tylor (1871) and Frazer (1890) raised questions about religious diversity, and according to their answer, all societies go through the same series of stages, each with specific technological, organizational, and religious traits. Boas (1911, pp. 174-196) rejected such an evolutionary scheme and held that each society has a unique history. Sociology is now witnessing a revival of evolutionism. Yet new theories—with Lenski's ecological evolutionism as an exemplar—allow for bypaths from the main line (Nolan & Lenski, 2006, p. 64) and explain features of societies by invoking their environment (Lenski 2005, p. 84). They also incorporate effects of their past (Lenski, 2005, pp. 187-201). This is done with the hypothesis that human beings' innate capacity to learn and to speak contributes to their society's stock of materials and store of information (Nolan & Lenski, 2006, pp. 30-38). In addition, these theories discard the moral overtones of the word "progress" by showing that new technologies may lead to violence and a lower quality of life for a society's underclass (Nolan & Lenski, 2006, pp. 116, 133, 331). Last, because ecological evolutionism highlights issues of population size, density, and growth (Nolan & Lenski, 2006, pp. 68, 83,

109, 336), it is close to biologists' recent applications of Darwinian theories to human societies (Diamond, 1997) rather than, say, to flocks of finches.

The "ultimate" causes in ecological evolutionism's explanations are environmental factors. Certain biophysical environments rule out specific subsistence technologies; and other technologies thrive only in certain niches (Meggers, 1952). As more "proximate" causes, changes in subsistence technology bring forth craft specialization (Nolan & Lenski, 2006, p. 69), shifts in labor division between men and women (p. 113), formal leadership (p. 95), and states (p. 125). Ecological evolutionism, in D. S. Wilson's (2002, p. 45) terms, takes religion foremost as a by-product of inventions in subsistence. Technological advances, through their resultant more abundant supply of life's necessities, are thus viewed as directly contributing to a society's reproductive success (Nolan & Lenski, 2006, p. 57). In addition, societies supportive of technological inventions survive at the expense of those that resist them (Nolan & Lenski, 2006, p. 55). This implies that insofar as religions encourage invention (Lenski, 2005, p. 81), they contribute to what D. S. Wilson (2002, p. 45) calls "group selection." Yet a religion on its own does not increase reproductive success; it does so only if a society's subsistence technology allows for population growth.

Levels of Technology and Models of Thought

Topitsch (1954) holds that people reason by analogies. They thus fall back on the things that are familiar in and crucial to their society. Topitsch (1958) shows that Western metaphysicians applied thought models also present in texts of archaic civilizations and stories from nonliterate societies. Topitsch (1988) suggests social conditions under which the types of analogical thinking are practiced.

In societies with *biomorphic* thinking, people explain the unknown as a reproductive act. In the *Code of Manu* of the Hindu, Brahma broke out of a golden egg, half of the shell becoming the sky and the other half the earth. In societies with *sociomorphic* analogies, people view the unknown as a result of social phenomena, such as leadership. The book of *Genesis* of the Israelites recounts that on each of the first 5 days of the creation, God commanded that there should be certain things, and they appeared immediately that day. Finally, people make *technomorphic* analogies. In that case, people account for the unknown by parallels with manual skills. On the 6th day of the creation, as recounted in *Genesis*, God took a mound of clay, shaped it, and blew air into it. Those acts resulted in the first human being.

We now propose general hypotheses about societal diversity in creation stories by stating at which level of technology particular thought models

dominate. We expect biomorphic thinking about the unknown to be most frequent among hunters and gatherers and among fishers. In these societies, people intervene in their surroundings to a limited extent and strongly depend on the resources of their natural niche. Also occupational and political specialization is almost absent. The known and important, for that reason, consists of vital processes such as sexual reproduction. Biomorphism will also be important in *simple horticultural societies*. At this stage, people intervene more in nature, but they do not renew soil fertility, and they deplete natural resources (Nolan & Lenski, 2006, p. 106).

Although biomorphism persists in *advanced horticultural societies*, *technomorphism* begins to blossom there. These societies are even less dependent on nature, and full-time craft specialization has emerged (Nolan & Lenski, 2006, p. 69). In agrarian and herding societies, technomorphism gradually replaces biomorphism. Here, people shape their environment even more: They plow and fertilize fields and they domesticate animals. The known in these societies comprises human inventions.

Sociomorphism is expected to be present in *all human societies*, because every society is a group of people. However, in the course of history, bonds between human beings change in two important ways, each leading to different analogies. To begin with, technological progress adds authority relations to kinship ties. Among hunters and gatherers, fishers and horticulturalists, the main links between persons are those of kinship. Although these relations persist in agrarian and herding societies, their populations also submit to armies, courts, and offices. State-building commences in advanced horticultural societies (Nolan & Lenski, 2006, p. 125), and agrarian and herding societies have soldiers, judges, and rulers. They punish persons who trespass edicts and they reward loyalty (Nolan & Lenski, 2006, p. 139). At higher levels of technology, ruler analogies steadily replace kinship analogies.

The second change involves gender. Although women in preindustrial societies rank below men, the degree to which they do depends on the subsistence technology used by these societies, with the rank of a gender proportionate to its contribution to the food supply. In hunting and gathering societies, women collect while men hunt highly appreciated meats (Nolan & Lenski, 2006, p. 90). In horticultural societies, men clear and women cultivate gardens. In herding societies, the basic economic activity, herding, is men's work; women milk and process dairy. Plowing is a male activity in agrarian societies, whereas women help with planting and harvesting (p. 113). Because the female contribution to the food supply is largest in horticultural societies, in those societies, analogies involving females are most likely to occur.

We attach one rider to this list of thought models. Topitsch (1958, p. 18) remarked that biomorphism presupposes knowledge about human reproduction that is not always present at lower levels of technology. Malinowski (1929) showed that the Trobiands of Kiriwina Island of Papua New Guinea, who are simple horticulturalists and strongly depend on fishing, do not regard male ejaculation during intercourse as a condition for female pregnancy.[4] Similar nescience prevailed among the Arunta and other hunters and gatherers of Central Australia (Montagu, 1937) and among the Lunga and other hunters and gatherers of Western Australia (Kaberry, 1939). Indeed, according to Cobb (2006, pp. 10, 16), Aristotle from ancient Greece asserted the spontaneous creation of lower animals from decay, with medieval Arab and Chinese scholars being even more off the mark, and in 1664, London's Royal Society of foremost scientists discussed how to generate vipers from dust.

The finding of dim procreation beliefs in some societies at lower levels of technology calls for a detailed examination of biomorphism in creation stories. Lukas (1894, p. 242) wound up a review of creation stories with a narrative from Samoa. It recounts that the earth was filled with plants, and goes on to state that the first worms arose from their rotting stalks. The story finishes with a snipe picking the worms apart, making the first human beings appear. So biomorphism can refer to both sexual reproduction models and spontaneous creation models. We expect spontaneous creation models to be most likely at lower levels of technology, with their importance declining as technology advances.

Table 2 summarizes propositions. Horticulture turns out to be a bit of a transition stage, as technomorphism occurs next to biomorphism and ruler models occur alongside kinship models. Table 2 also contains simplifications, the main one being that our hypotheses bypass the stabilization of ideas by writing and printing. But then, Table 2 does not deal with technological differences between agrarian societies, which applied these inventions, and it specifies some stability of biomorphism.

Specific Hypotheses About the Content of Creation Stories

From our general hypotheses linking technology to thought models, we derive specific ones about the relationship between subsistence technology and the content of creation stories. We first present propositions on the type of creative forces mentioned, and then on their designation as parents and

Table 2
Hypothetical Link Between a Preindustrial Society's Level of Technology and Its Thought Models

A Society's Level of Subsistence Technology	The Main Thought Models in a Society's Creation Stories
Hunting and gathering	• Spontaneous creation analogies, sexual reproduction analogies • Kinship analogies, female influence analogies
Fishing	• Spontaneous creation analogies, sexual reproduction analogies • Kinship analogies, female influence analogies
Simple horticulture	• Sexual reproduction analogies • Kinship analogies, female influence analogies
Advanced horticulture	• Sexual reproduction analogies • Technical analogies • Kinship and ruler analogies, female influence analogies
Agriculture	• Technical analogies • Ruler analogies, male dominance analogies
Herding	• Technical analogies • Ruler analogies, male dominance analogies

as rulers. We follow with hypotheses about the gender assigned to creative entities and finish with predictions on the character of an agent's creative act. Quotes from creation stories lard this section.

Type of Creative Entity

One obvious proposition about creative forces recalls the familiarity and vital importance of animals for hunting and gathering societies as well as for fishing societies:

> *Hypothesis 1:* Animals as creators are most common in creation stories from societies where hunting and gathering or fishing provide the main means of subsistence, and their prevalence declines with technological progress.

An example of a creation story featuring an animal is that of the Crow Indians of North America. In that account, a coyote does the trick (Leeming

& Leeming, 1994, p. 63). Of course, animals are also important for survival in agrarian and herding societies. However, the crucial difference is that the members of these latter societies domesticate animals, and use them for purposes such as plowing, transport, and waging war, and also as a substitute for the energy of human muscles. The familiar in that case does not consist of the animals as such, but of human beings with techniques to discipline them.

Now, if in simple horticultural societies, animals lose their familiarity and importance for survival, and if simple horticulture yields few new potent thought models, then, given that the nearby earth on the face of it spontaneously brings forth life, origin stories will likely feature inanimate objects. So our second concrete proposition reads as follows:

> *Hypothesis 2:* A natural trigger is most common in the creation stories of simple horticultural societies, but not much more common than in those of hunting and gathering societies and fishing societies, and creation stories featuring a natural trigger are less likely in stories from advanced horticultural societies, dropping even lower in stories from agrarian and herding societies.

The best-known example is the story of ancient Babylon, in which the trigger consists of two oceans: Apsu, the primordial freshwater ocean "commingled" with the saltwater of Tiamat (Leeming & Leeming, 1994, p. 25).

Earlier, we stated that both personal kinship ties and formal ties involving state institutions yield sociomorphic analogies. A special case of a kinship tie is having an ancestor. An example of a creation story with an ancestor is that of the Ngurunderi in Australia:

> The great ancestor Ngurunderi canoed down the Murray River in search of his two runaway wives. A giant fish swam ahead of the ancestor, creating the present river out of the tiny stream that it used to be. When Ngurunderi tried to spear the fish, he missed, but the spear became Lenteilin, the Long Island. Later, when the ancestor succeeded in spearing the fish, he cut it up, forming all the different fish the people find today. (Leeming & Leeming, 1994, p. 212)

Another social bond in creation stories involves heroes from days gone by. These creators differ somewhat from ancestors. Stories about them provide a personal link, but the relations do not entail descent. In addition, there is nothing formal about these links, so they are in-between kinship ties and authority relations. An example is the culture hero Karusakaibo from the Munduruc Indians of Brazil, who discovers people in a hole in the ground (Leeming & Leeming, 1994, p. 197).

Given our general hypotheses, we expect ancestor-hero creators to be most likely in technologically less advanced societies, where kinship is the main bond. We have one emend. Seas are less likely to be overexploited than hunting grounds (Hewes, 1948), and as a result, permanent settlements are more likely in fishing societies (Nolan & Lenski, 2006, p. 174). They are even more likely in horticultural societies. So fishers will remain in closer proximity to their dead family members than hunters and gatherers, and horticulturalists will have an even greater tendency to remain close. Nolan and Lenski (2006, p. 114) invoke Sheils (1975), who reported that ancestor worship is most probable in horticultural societies and less so in hunting and gathering populations and agrarian societies. We therefore propose the following hypothesis.

> *Hypothesis 3:* A recent ancestor or old hero as creator is most common in horticultural societies, less so in fishing societies, and even less so in hunting and gathering societies. Given the availability of other thought models, ancestor and hero creators will be less frequently found in advanced than in simple horticultural societies, and even less in agrarian and herding societies.

States emerge in advanced horticultural societies, and in agrarian and herding societies kinship ties are no longer the prime bonds (Nolan & Lenski, 2006, p. 165). State institutions oversee, tax, and judge people. In those societies, the creator may be less personal and more distant, even elusive.

> *Hypothesis 4:* A distant human being as creator is most prevalent in stories from herding and agrarian societies, and least prevalent in creation stories from hunting and gathering societies and fishing societies.

Creators as Parents and as Rulers

In several creation stories, a mother or father brings forth the world. According to the Zuni from New Mexico, the universe evolved from a union of father sky and mother earth (Leeming & Leeming, 1994, p. 287). The idea that parents create the world will be likely in societies where kinship ties predominate, that is, in hunting and gathering, fishing, and simple horticultural societies. In advanced horticultural societies, where state formation is under way, we expect ruler analogies to gain ground. Thus,

> *Hypothesis 5:* A parental creator is most common in creation stories from hunting and gathering, fishing, and simple horticultural societies, and their prevalence declines with technological progress.

Like kings conquer territories and subject people, so too did commanders once make the world and steer it. Although state-building commenced under horticulture, sovereign leadership became standard in agrarian and even more pronounced in herding societies (Nolan & Lenski, 2006, p. 176). This leads to the following hypothesis:

> *Hypothesis 6:* Ruler creators are most common in stories from agrarian and herding societies, and least frequent in those of hunters and gatherers, fishers, and simple horticulturalists.

Female Creators

Our data show that the idea of a male creator occurs in almost every preindustrial society. We therefore present hypotheses about female creators only. Sullerot (1970) showed that female gods occur in societies with fewer gender inequalities and Sanday (1981) found that the larger the female contribution to food supply, the greater the chance of female creators. However, Sullerot and Sanday did not bring in the distinction between horticulture and agriculture. One of our propositions therefore reads as follows:

> *Hypothesis 7:* A female creator is most common in horticultural societies, less common among hunters and gatherers and fishers, and least likely in agrarian and herding societies.

This hypothesis is prompted by the assumption that an important female contribution to a society's food supply yields sociomorphic analogies. Hope and Stover (1984) and Gray (1987) reported differences *between* hunting and gathering societies in female status and the idea of one god. If a large female contribution to a society's food supply yields sociomorphic analogies, we also expect the following:

> *Hypothesis 8:* The more hunting and gathering societies depend on hunting for subsistence, the less common female creators will be.

We present two contrary hypotheses about the presence of female creators at the end of the next section. They answer the question of whether people arrive at the idea of a female creator by way of sociomorphic or biomorphic analogies.

Characteristics of the Creative Act

Although we expect sexual reproduction models to be more common at lower-technological stages, we exempt hunters and gatherers and fishers. As already stated, some hunters and gatherers do not regard ejaculation as necessary for pregnancy, and for these persons, life in their environment sometimes seems to come out of nothing. Thus, our hypotheses read the following:

> *Hypothesis 9:* Spontaneous creation is most likely in stories from hunting and gathering plus fishing societies, and its likelihood declines with technological progress.

As well as

> *Hypothesis 10:* Creation through sexual reproduction is less likely in hunting and gathering and fishing societies than in horticultural societies, and even less so in agrarian and herding societies.

When setting apart spontaneous creation analogies, we presented a pertinent creation story from Samoa. The creation story of the Djanggawul in Australia invokes sexual reproduction:

> The prehuman ancestors of humans did exist, and these were called the Djanggawul. There were three of these beings—Djanggawul himself and his two sisters, Bildjiwraroiju and Miralaidj. Djanggawul had a very long uncircumcised penis decorated with notches. The sisters had long clitorises. The sex organs of all three dragged along the ground leaving sacred markings. Wherever the ancestors beached their canoe, they left children made by the brother and the older sister, and later the younger sister as well. They conceived the children in the normal way, but it was necessary for Djanggawul to lift the long clitorises of his mates to do so. (Leeming & Leeming, 1994, pp. 69-70)

In societies with full-time craft specialists, people will regard gods as artisans. This tendency commences in advanced horticultural societies and becomes even more widespread in agrarian societies (Nolan & Lenski, 2006, p. 69). Of course, people in other societal types also make tools. However, strong specialization makes the difference here.

> *Hypothesis 11:* A manual skill or technical achievement as the creative act is most common in agrarian societies, less so in advanced horticultural societies and herding societies, and least likely in simple horticultural societies, hunting and gathering societies, and fishing societies.

The creation story of the Yuma Indians of Arizona features manual skills:

> Bakotahl was angry at his twin, but sat down next to him. Secretly he made a little human figure out of mud, but it was imperfect. . . . Kokomaht himself decided to make a new being, and he made a perfect man, who got up and walked. Then he made a perfect woman. Bakotahl continued his imperfect work as well and told his twin that what he made were people. Kokomaht pointed out the imperfections of this brother's work—no hands, no feet. Bakotahl was so angry that he dove back into the depths and sent up storms, which Kokomaht stomped out, but not before sickness slipped into the world. (Leeming & Leeming, 1994, pp. 300-301)

The world can be created by an agent's orders as well. This idea will be most likely in societies with agriculture and herding, where the analogy is provided by the directives of strong rulers.

> *Hypothesis 12:* Creation by an agent's command is most common in stories from agrarian and herding societies, and least likely in those from hunting and gathering societies and fishing societies.

Our final concrete hypothesis compares the effect of two phenomena on the presence of a female god. The first is the presence in a society of the idea of creation through sexual reproduction. The second is the female contribution to a society's food supply. Although previous research tested hypotheses on sociomorphic analogies and female gods, we expect biomorphic analogies to be more important when accounting for the content of origin stories. This leads to Hypothesis 13a and its opposite Hypothesis 13b:

> *Hypothesis 13a and b:* In preindustrial societies, the relationship between the idea of creation through sexual reproduction and the occurrence of a female creator is weaker (stronger) than the relationship between the female contribution to the food supply and the presence of a female creator.

Data

The *Standard Cross-Cultural Sample* and the *Human Relations Area Files* (HRAF)

To answer our questions, we use the *Standard Cross-Cultural Sample*, a subset of the *Ethnographic Atlas* now digitally available as *World Cultures*. It consists of 186 preindustrial societies specified at a particular place and time. To pre-empt diffusion questions, no two societies in this sample are

Table 3
Absolute Frequencies for the Level of Technology
of 116 Preindustrial Societies

Standard cross-cultural sample	186
Of which also in Human Relations Area Files	138
Of which in addition creation story available	116
Subsistence technology	116
Hunting and gathering	34
Fishing	8
Simple horticulture	13
Advanced horticulture	31
Agriculture	18
Herding	12

neighbors (Murdock & White, 1969). The sample is representative of the world's societies known through reports by persons who lived in them for some time. Most reports are dated between 1800 and 1950. Murdock (1962) converted the reports into codes. The data set was expanded in later years.

World Cultures did not code creation stories. However, the HRAF (Ember & Ember, 1988) provide field reports for 330 societies, and 138 of them belong to the standard sample. For these societies, we retrieved from the HRAF the text pages for categories 773 and 776, where we found creation stories for 116 societies. Table 3 presents the steps toward our sample, as well as frequencies for the pertinent codes of subsistence technology.

Measurements for Subsistence Technology

To measure the level of subsistence technology for our 116 societies, we mainly followed Nolan and Lenski (2006, pp. 366-367). In their exercise, societies that score equally high on two modes of subsistence were taken as missing. We coded these societies according to their technologically *lowest* mode. This allowed us to save all cases without overestimating the relation between technology and creation stories. Because the number of fishing societies turned out to be low, we added them to our hunting and gathering category. We also merged the herding and agrarian codes. We do not consider this problematic, because most of our hypotheses do not differentiate between the combined categories.

To make Table 6 about the effects of a society's dependence on fishing, we used v205 from the standard sample. We employed v203 on a society's dependence on hunting for Table 9. For Table 11, the female contribution to subsistence

technology was measured with v890. This variable, which presents categories of percentages, was converted into a continuous variable by taking the mean score of each category. By dividing the variable by 100, we obtained proportional scores ranging from 0 to 1. Because there are no societies where women alone are responsible for subsistence, we adapted the variable in such a way that the maximum score in our data set (0.70) equals 1.

Coding Creation Stories

This article's first author and three assistants independently scored creation stories according to a fixed scheme, reproduced in the appendix.[5] They did so without knowing the technology of the society from which a story stemmed. In case of disagreement, the first author assigned the final code.

Our coding instructions for the content of creation stories stipulated multiple coding rather than exclusive coding. Multiple coding is the equivalent of allowing people to mark several boxes from one list in a questionnaire. Multiple coding was called for in this case because the world may have been created from several entities, by a man and a woman, and by way of at least two acts that differ in character but were performed by a single creator. In addition, some societies had long creation stories, with different creators being responsible for various phases of creation. We therefore applied our classifications to substories: On the very first beginning, on the creation of the things in the world and on the creation of humankind. We then merged the three sheets into one sheet for each of the 116 societies. That sheet might contain multiple codes. Also when two or more stories pertaining to one society were available for, say, the creation of humankind, each story was coded, but the two sheets were merged once more into one sheet, possibly with multiple codes.

Because we allowed for multiple coding, our research units remained societies. We deemed this desirable, because a choice for (sub)stories as research units would yield a data set with interdependent observations. Conventional tests of statistical significance call for independent observations. The *N* for all of our tables (except the special Tables 4 and 5) therefore is 116.

We coded features of creative acts without difficulty. We distinguished several creative forces: an inanimate natural entity, an animal, a plant, an ancestor, a hero, a distant human being, and a spirit. However, it turned out to be difficult to tell ancestors and heroes apart, so we merged these categories.

Where the HRAF provided no information about a certain aspect of a society's ideas about how the world was created, we took it that its inhabitants had no idea about it. Here, we assumed that ethnographers related a

Table 4
Absolute Frequencies for the Content of Creation
Stories of 116 Preindustrial Societies

	Yes	No
Appearance of creator(s)		
Inanimate natural entity	21	95
Animal	20	96
Ancestor or hero	41	75
Distant human being	60	56
Creator(s) as parent or ruler		
Parent	33	83
Ruler	22	94
Gender of creator(s)		
Female	30	86
Male	105	11
Creative act(s)		
Spontaneous creation	22	94
Sexual reproduction	34	82
Technical achievement	37	79
Command	22	64

Figure 1
The Percentage of Creation Stories for Societies
With a Particular Subsistence Technology Mentioning
a Specific Creative Force
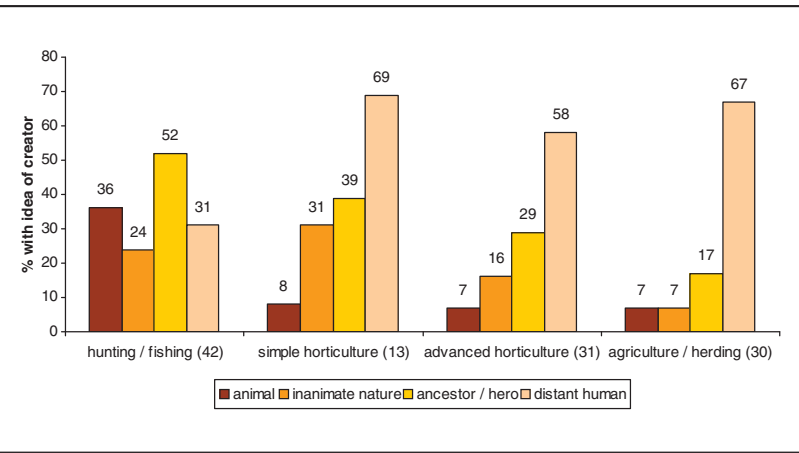
society's creation story in as detailed a manner as possible. However, for 26 societies, the HRAF portrays only a creator, and no details of their creative act(s). For this reason, we tested Hypothesis 9 through Hypothesis 12 in two ways. Once we coded that in the creation stories of these societies all specific creative acts were absent, and once we excluded these societies wholesale. Table 4 presents frequencies for the pertinent codes for the content of the creation stories of our 116 societies.

Results

In this section, we show for each technological level the percentage of societies with particular substantive items in their creation stories. To obtain significance levels in Tables 4, 5, 8 to 11, we applied Fisher exact probability tests. In all tests, we created two-by-two tables, comparing hunting and gathering plus fishing societies pairwise with simple horticultural societies, advanced horticultural societies, and agricultural plus herding societies. The results show whether hunting and gathering plus fishing societies differ significantly from a society of a different technological type in the content of their creation stories. To give readers an idea of the small number of cases in the cells of Tables 4, 5, 8 to 11, these tables present percentages as well as absolute numbers.

Figure 1 provides a first impression. Creative forces are least diverse in agrarian/herding societies. These societies regard their creator as a distant human being, whereas technologically less developed societies also think of their creator as an animal, natural entity, or ancestor/hero.

Hypothesis 1 is about animal creators, and Table 5 demonstrates that this idea is most common among hunters and gatherers and fishers. The 36% for these societies are significantly higher than the 7% or 8% for the other societal types, supporting Hypothesis 1. Hypothesis 2 is about a natural trigger for creation. Table 5 shows that a natural trigger is most likely in simple horticultural societies and least likely in agrarian and herding societies. Agrarian societies turn out to be significantly different from hunting and gathering societies. Although advanced horticultural societies do not differ significantly from hunting and gathering plus fishing societies, Hypothesis 2 is largely confirmed. Hypothesis 3 is about ancestor-hero creators. According to Table 5, 52% of hunting and gathering plus fishing societies portray their creator in this way, and 17% of agrarian plus herding societies do so. This difference is significant. Contrary to our expectation that the ancestor-hero creator would be most common in horticultural societies, it

Table 5
Type of Creative Force Mentioned in Creation Stories of 116 Preindustrial Societies According to the Subsistence Technology of These Societies, Percentages

Subsistence Technology	Animal		Natural Entity		Ancestor Hero		Distant Human Being	
	Yes	No	Yes	No	Yes	No	Yes	No
Hunting and gathering/fishing	36 (15)	64 (27)	24 (10)	76 (32)	52 (22)	28 (20)	31 (13)	69 (29)
Simple horticulture	8** (1)	92 (12)	31 (4)	69 (9)	38 (5)	62 (8)	69**** (9)	31 (4)
Advanced horticulture	7*** (2)	94 (29)	16 (5)	84 (26)	29** (9)	71 (22)	58** (18)	42 (13)
Agriculture/herding	7*** (2)	93 (28)	7** (2)	93 (28)	17*** (5)	83 (25)	67** (20)	33 (10)

Note: Absolute frequencies in parenthesis.
*p < .10. **p < .05. ***p < .01 (one tailed), according to a Fisher exact test with hunting and gathering/fishing as reference category.

Table 6
Presence of an Ancestor-Hero Creator in Creation Stories of 42
Hunting and Gathering Plus Fishing Societies According to
Dependence of These Societies on Fishing, Percentages

Dependence on Fishing	Ancestor Hero	No Ancestor Hero
Less than 25% fishing	48 (11)	52 (12)
More than 25% fishing	58 (11)	42 (8)

Note: Absolute frequencies in parenthesis.

Table 7
Presence of a Creator Who Is a Parent or Ruler in Creation Stories
of 116 Preindustrial Societies According to the Subsistence
Technology of These Societies, Percentages

Subsistence Technology	Parent		Ruler	
	Yes	No	Yes	No
Hunting and gathering/fishing	41 (17)	49 (25)	17 (7)	83 (35)
Simple horticulture	31 (4)	69 (9)	8 (1)	92 (12)
Advanced horticulture	26 (8)	74 (23)	23 (7)	77 (24)
Agriculture/herding	13** (4)	87 (26)	23 (7)	77 (23)

Note: Absolute frequencies in parenthesis.
*$p < .10$. **$p < .05$. ***$p < .01$ (one tailed), according to a Fisher exact test with hunting and gathering/fishing as reference category.

turns out to be so at the lowest level of technology. Hence, Hypothesis 3 is only partly confirmed. Last, Hypothesis 4 is about distant human creators. Table 5 shows that this idea is least widespread among hunters and gatherers and fishers. It is significantly more so in the other types. Additional analyses show that there are no significant differences in this regard between horticultural societies and agrarian plus herding societies. Hypothesis 4 is thus weakly corroborated.

Table 6 shows results for the clause in Hypothesis 3 about hunting and gathering relative to fishing. Because we have only 7 fishing societies, we did not contrast them with our 34 hunting and gathering societies. Instead, we compared the 23 societies that are less than 25% dependent on fishing with the 19 societies that are 25% or more dependent on fishing. In the latter societies, the idea of an ancestral or heroic creator is not significantly more frequent. This finding refutes Hypothesis 3.

Table 8
Presence of a Female Creator in Creation Stories of 116
Preindustrial Societies According to the Subsistence
Technology of These Societies, Percentages

Subsistence Technology	Female Creator Present	Female Creator Not Present
Hunting and gathering/fishing	36 (15)	64 (27)
Simple horticulture	23 (3)	77 (10)
Advanced horticulture	29 (9)	71 (22)
Agriculture/herding	10** (3)	90 (27)

Note: Absolute frequencies in brackets.
*$p < .10$. **$p < .05$. ***$p < .01$ (one tailed), according to a Fisher exact test with hunting and gathering/fishing as reference category.

Table 9
Presence of the Idea of a Female Creator in 34 Hunting and
Gathering Societies, by Dependence on Hunting, Percentages

Dependence on Hunting	Female Creator Present	Female Creator Not Present
Less than 25% hunting	17 (2)	83 (10)
More than 25% hunting	27 (6)	73 (16)

Note: Absolute frequencies in parenthesis.

Table 7 shows that agriculturalists and herders portray creators as a parent significantly less frequently than do hunters and gatherers and fishers. This seems to support Hypothesis 5. Table 7 also shows that creators as rulers are most frequent in agrarian plus herding societies and least likely in simple horticultural societies. However, this difference is not significant. Moreover, rulers-creators are unexpectedly frequent at the lowest level of subsistence technology. Hypothesis 6 is therefore not supported by the findings.

Table 8 tests Hypothesis 7. Female creators are most likely among hunters and gatherers and fishers, but horticulturalists do not differ significantly from them. Female creators are significantly scarcest in agrarian and herding societies. All in all, Hypothesis 7 is not upheld: Female creators are not observed predominantly in horticultural societies.

Table 9 pertains to hunting and gathering societies only and tests Hypothesis 8. For societies with a stronger dependence on hunting, we expected a lower likelihood of a female creator. We find the opposite, although the difference is not significant. Hypothesis 8 is thus rejected. This

Table 10
Type of Creative Act in Creation Stories of Preindustrial
Societies According to the Subsistence Technology of
These Societies, Percentages

Subsistence Technology	Spontaneous Creation		Sexual Reproduction		Technical Achievement		Command	
	Yes	No	Yes	No	Yes	No	Yes	No
Panel A								
Hunting and gathering/fishing	21 (9)	79 (33)	33 (14)	67 (28)	33 (14)	67 (28)	14 (6)	86 (36)
Simple horticulture	23 (3)	77 (10)	46 (6)	54 (7)	46 (6)	54 (7)	39** (5)	61 (8)
Advanced horticulture	10* (3)	90 (28)	32 (10)	68 (21)	26 (8)	74 (23)	23* (7)	77 (24)
Agriculture/herding	23 (7)	77 (23)	13** (4)	87 (26)	30 (9)	70 (21)	30** (9)	70 (21)
Panel B								
Hunting and gathering/fishing	26 (9)	74 (26)	40 (14)	60 (21)	40 (14)	60 (21)	17 (6)	83 (29)
Simple horticulture	25 (3)	75 (9)	50 (6)	50 (6)	50 (6)	50 (6)	42** (5)	58 (7)
Advanced horticulture	16 (3)	84 (16)	53 (10)	47 (9)	42 (8)	58 (11)	37** (7)	63 (12)
Agriculture/herding	29 (7)	71 (17)	17** (4)	83 (20)	38 (9)	62 (15)	38** (9)	62 (15)

Note: Panel A: All 116 preindustrial societies; Panel B: 90 preindustrial societies with a story mentioning some type of creative act (absolute frequencies in parenthesis).
*$p < .10$. **$p < .05$. ***$p < .01$ (one tailed), according to a Fisher exact test with hunting and gathering/fishing as reference category.

finding feeds the suspicion that a female creator has less to do with sociomorphism than with biomorphism.

In Table 10, we first look at Panel A. Column 1 shows that the idea of spontaneous creation is least frequent in advanced horticultural societies. It occurs in these societies significantly less frequently than in hunter and gatherer and fishing societies. Although this corresponds with Hypothesis 9, the percentage for agrarian and herding societies is far too high to fully accept Hypothesis 9. Column 2 makes clear that the idea of creation through sexual reproduction occurs most in simple horticultural societies and least in agrarian and herding societies. The highest and lowest levels of technology differ significantly from one another. These findings correspond to Hypothesis 10. However, although biomorphism seems less frequent among hunters and gatherers than among simple horticulturalists, this difference is not statistically significant. Column 3 in Table 10 is about creation by technical achievement. Technomorphism seems more likely in simple horticultural

Table 11

Logistic Regression Models for the Presence or Absence of a Female Creator in Creation Stories of 116 Preindustrial Societies

	Model 1		Model 2		Model 3		Model 4	
	B	SE	B	SE	B	SE	B	SE
Constant	−0.59**	0.32	−1.33*	0.69	−1.84***	0.48	−3.84***	1.11
Subsistence technology								
Hunting-gathering/ fishing (ref.)								
Simple horticultural	−0.62	0.73	−0.74	0.75	−1.52**	0.91	−1.61**	0.92
Advanced horticultural	−0.31	0.51	−0.44	0.53	−0.47	0.67	−0.75	0.70
Agricultural/herding	−1.61**	0.69	−1.59**	0.69	−1.37*	0.83	−1.35*	0.88
Female contribution to subsistence			1.50	1.22			3.68**	1.68
Creation by sexual reproduction					3.20***	0.58	3.55***	0.65
Chi-square	6.96		8.51		46.79		52.17	
Nagelkerke R^2	0.086		0.104		0.487		0.532	
Number of cases	116		116		116		116	

*$p < .10$. *$p < .05$. ***$p < .01$ (one tailed).

societies than in hunting and gathering societies, but the difference is not statistically significant. Otherwise, the figures do not at all show the expected pattern. This leads us to reject Hypothesis 11. Column 4 reveals that, contrary to Hypothesis 12, creation by command is most frequent in simple horticultural societies. But the idea of creation by command is significantly less likely among hunters and gatherers than among simple horticulturalists. For this reason, Hypothesis 12 is partly supported.

We now look at Panel B of Table 10. It bypasses societies with stories that provide no information on the type of creative act. The results turn out to be similar. Nonetheless, we see in the case of spontaneous creation that the difference between advanced horticultural societies and hunting and gathering plus fishing societies is no longer significant.

To finish, we present data bearing on Hypothesis 13a and Hypothesis 13b: Are female creators more likely in societies where women contribute more to subsistence, and are they more likely if the creative act is sexual?

Table 11 shows multivariate logistic regression models. The first model confirms that in agrarian and herding societies, a female creator is significantly less common than in technologically less developed societies. Model

2 adds the predictor "female contribution to subsistence," and its parameter turns out to be insignificant. The effects of subsistence technologies remain unchanged. Model 3 adds to Model 1 the predictor "creation through sexual reproduction." It turns out that societies in which sexual reproduction is the creative act are more likely to have a female creator than societies in which this is not the case. We also see in this model a smaller difference between agrarian and herding societies and the reference category. Apparently, female creators are less common in agrarian and herding societies, because the idea of creation through sexual reproduction is less likely in these societies.

Model 4 adds to Model 1 the predictor "female contribution to subsistence," as well as the predictor "creation through sexual reproduction." Both parameters are significant and comparable in size. Thus, the findings support neither Hypothesis 13a nor Hypothesis 13b. Female creators are indeed more common in societies in which women play a more important role in subsistence. Besides this, female creators are more likely in societies in which sexual reproduction is the creative act.

Discussion

As to the data collected and analyzed for this article, it is worth repeating that it proved doable to code creation stories for the presence of ideas prompted by particular analogies. Regarding our results, we may have found insignificant differences only because of the low number of cases. Therefore, a main task for future research will be to increase the number of preindustrial societies. Because the HRAF is weak on field reports in languages other than English, the addition of creation stories recorded in Dutch, French, and German might help. Nonetheless, our number of societies were not low compared with other studies addressing similar questions, such as D. S. Wilson (2005). Unfortunately, our limited number of societies prevented us from estimating multivariate models, with one exception.

Despite the low number of preindustrial societies involved in our tests, our findings upheld several concrete hypotheses on the relation between subsistence technology and the content of creation stories. Moreover, the predictions that did not hold display a pattern. We mostly predicted that higher levels of technology lead to gradual changes, while we found several breaks. This indicates a weakness in our application of the thesis that in all societies, people comprehend the unknown by analogies with things that are known, nearby, and important for their survival. Exactly when is something known? We assumed that technomorphism would become important

in advanced horticultural societies, because full-time craft specialization is infrequent in simple horticultural societies. However, part-time artisanship occurs in the latter societies, and that phenomenon might already boost technomorphism, particularly in societies with few members, like simple horticultural societies. We also held that ruler analogies would be more common in agrarian than in advanced horticultural societies, because leadership in the latter societies is less formal. Yet perhaps informal leaders already make for sociomorphism.

As to our general hypotheses, our concrete predictions indicate their fruitfulness. We also underline our finding that the presence in a society's creation story of female creators is related to both women's contribution to food production, sociomorphism, and to sexual reproduction, biomorphism. It is too early to say whether our itemization of Topitsch's (1958) biomorphism into spontaneous creation models and sexual reproduction models yields important new predictions.

In this article, we proposed a shift from questions about gods who now and then create to questions about the origin of the world, which sometimes involves a creative god. It is not surprising that "god questions" were raised by scholars originating from societies where Christianity held sway and that these questions referred to a moral creator god. We argued that "origin questions" are more to the point given general questions on diversity and encompassing theories like ecological evolutionism.

We raised origin questions only for preindustrial societies, and might be faulted for that decision. Our defense is not that the *Standard Cross-Cultural Sample* and the HRAF pertain only to preindustrial societies. Rather, our argument is that better data are available for addressing questions about the content of ideas on the origin of the world held by various members of industrial societies. Sociologists have interviewed random samples of the populations of all major industrial nations for decades now. They have not only studied these people's notions about god (Norris & Inglehart, 2004) but recently they also looked into public acceptance of the idea that human beings arose through natural evolution rather than by God's creation. Miller, Scott, and Okamoto (2006) report on the percentage of the population in 32 European countries plus Japan and the United States who accept the idea of evolution as true, as false, and who are unsure.

A worthwhile follow-up to this article's origin question pertains to a society's ideas on the future and human destiny. Here is a genuine gap to be filled. This lacuna need not involve people's ideas about life after death and the end of time. Weber (1920, pp. III-336) argued that the prophecy in ancient Judaism that the kingdom of peace is near was prompted by the

destruction of the Jewish temple in Jerusalem and the deportation of Jews to Babylon. Albert (2000, p. 154) added to the list of elements making up a religion, promises of protection and happiness during an adherent's life.

In this article, we avoided the term "myth," and raised questions about the content of ideas, and not their truth and coherence. It may now be clear why we did so. As Horton (1967) argued, many supposedly glaring inconsistencies in accounts given by members of preindustrial societies lose that character once it is accepted that the people living in any society arrive at ideas about the unknown through analogies (p. 64). We must also consider that preindustrial societies do not have the means for testing that are available in industrial societies. These instruments comprise not only experimental methods (p. 172) but also books. The oral transmission of ideas becomes less important with technological advancement, and the written diffusion of ideas more so (p. 180). Simply stated, for a scholar, it is easier to spot inconsistencies when sitting in an armchair reading a book, leafing back and forth, than for a native listening in company to a storyteller.

Ecological Evolutionism and Classical as Well as Contemporary Scholars

Topitsch (1988) mentions the philosopher Hume and the sociologists Durkheim and Weber as forerunners. To highlight the tenets of sociology's ecological evolutionism, we here review pertinent sayings of those classical scholars. To this effect, we also contrast our hypotheses on technologies and thought models with theories on mind and religion as presented to the general public by contemporary Darwinians such as the biologists Wilson and Dawkins and the psychologist Pinker.[6]

Hume (1757, p. 17) pointed out the human propensity to see "faces in the moon, and armies in the clouds," and proposed that human beings make gods in their own image. Considering people's propensity to wage wars and manufacture things, Hume suggested that they attribute their own intentions to their gods. Hume's notions became known as the anthropomorphism thesis.

Durkheim (1897, pp. 244-245) argued that the anthropomorphism thesis only is valid for societies with religions like Christianity, in which people have duties toward god, and succinctly stated that people are only capable of representing the world after the image of the small social world in which they live. Hume had welded the thesis that people reason by analogy with the known to the idea that the familiar consists of human intentions;

Durkheim (1897, 1912) combined the analogy thesis with the notion that society is the great known.

Durkheim (1912, p. 95) showed that the anthropomorphism thesis did not hold for the Arunta from Australia. These hunters and gatherers comprehended their origin as descending from animals and plants, and Durkheim (1912, pp. 212, 236) added that human societies gradually discard their sanctity. Durkheim (1912, pp. 334-335) also explained that most Arunta emblems are animals and plants. These animals and plants are the quintessence of Arunta livelihood, and animals are invoked as signs more frequently than plants because plants are not cultivated and hunting yields close bonds. The finding that grounds where totemic animals and plants are widespread form meeting places for the Arunta corroborates this explanation, so says Durkheim (1912). It is a moot point whether these analogies are biomorphic or sociomorphic. They are both, because they invoke not simply plants and animals, but a society's food supply, that is to say, a relation between a society and its natural environment. Durkheim's (1912) ideas about the small world in which people live are more detailed than Hume's (1757) assumptions about the image people have of themselves.

In charting religious evolution, Weber (1921, pp. 249-250) listed regularities about societal features and the content of religions prompted by analogies with these features. For example, in durable communities, a god no longer transfigures but becomes one person; in societies that cultivate fields, the goddess Mother Earth is more likely to occur; strong household leadership yields a tendency for ancestor worship; on sedentary life, deities become local; the relations between a pantheon's gods are as unstable as the competencies of a state's servants; and if a society's lords are benign, their subjects will praise their gods (Weber, 1921, pp. 250-258). So Weber's (1921) thoughts about the link between societal characteristics and the content of religions went beyond those of Durkheim (1912).

Weber (1921) also volunteered that in religious evolution, analogies gradually make way for syllogisms. Weber's (1921) explanation is not that the need to systematize is weaker among Australian hunters and gatherers than among Westerners. Durkheim (1912, p. 237) had argued that way. Weber (1921, pp. 279-284) holds that societies without writing lack an option to make notions more coherent. If religious specialists—persons who read and write—emerge, more implications are drawn from analogically obtained ideas, and so riddles arise, for instance, how it is possible that the human world is full of want and sorrow and that god at the same time is almighty and good. Weber (1921, p. 315) also pointed out that in questionnaires completed in around

1910, German workers stated that they did not believe in God because divine providence did not square with the world's injustices.[7]

Weber (1921) implied, and Topitsch (1958) stated, that in the course of time, the analogies leading to various conundrums die off. Topitsch (1988, p. 242) also held that preindustrial thought models lose their nearness in industrial societies. Machines take over from artisans the production of goods, and democratic governments replace hereditable hierarchies. Yet Topitsch (1988) skipped the question of whether these new technologies and societal forms provide new analogies.

Although present-day Durkheimians tend to talk about religion in the singular, the Darwinian Wilson (2002, pp. 177-179) holds that fruitful questions should not be pitched at such a high level of aggregation. The Durkheimian question is about the universality of religion, whereas Wilson's (2002) questions tackle religions in the plural. According to sociology's ecological evolutionism as well, the questions of the "sociology of religion" should turn into questions about religious diversity.

D. S. Wilson (2002, p. 45) distinguishes brands of Darwinian theories of religion. One major kind states that religions are adaptive, with one subtype for religions as contributing to individual survival and another for religions as contributing to group survival. The other main class takes religions as nonadaptive, with a subcategory holding that religions were adaptive to past environments, and another saying that religions are by-products of otherwise adaptive traits.

When detailing these theories, D. S. Wilson (2002, pp. 52-55) states that according to Durkheim (1912), religions emerge because they contribute to group survival. However, so says Wilson, contemporary sociologists dismiss Durkheim's explanation. They do so with the argument that it invokes later effects, whereas it should adduce prior causes. Wilson (2002) defends Durkheim (1912) against this charge by pointing out that Darwinian biology reasons in this way too. That counterargument seems weak, because classical sociologists and contemporary biologists might just commit similar mistakes. More importantly, it may be doubted whether Durkheim (1912) held that religion contributes to *group* survival. Durkheim (1912, p. 23) posited that meetings sanctify ideas, and that people who partake in rites later surpass their old selves in thinking and acting. So religion supposedly fosters *individual* survival.

In addition, Wilson (2002) does not list technologies people apply to survive. So the idea of Lenski's (2005) ecological evolutionism that in the course of history, human intervention in nature increased does not form a pillar of the cathedral Wilson (2002) seeks to erect on Darwinian foundations. Neither

does the analogy thesis form a pillar of Wilson's (2002) cathedral. When elaborating by-product explanations, D. S. Wilson (2002, p. 51) states that in some cases, adaptive features of religions evolve by an ongoing process of blind variation and selective retention. However, the analogy thesis is an alternative for the idea of *blind* variation. In addition, the analogy thesis has been spotted by contemporary Darwinians. For instance, evolutionary psychologist Pinker (2002, pp. 435-439) argues that people are not born with a blank slate, and presents a list of human universals. One item states that reasoning in analogies is inherent to human nature. Given Durkheim's rejection of anthropomorphism, it is worthwhile to out the hidden clause in Pinker's proposition: Human beings, in any society whatsoever, reason by analogy. The follow-up task is to link types of subsistence to kinds of analogies. One arch in *Darwin's Cathedral* should connect the pillar that people reason in analogies and the pillar that populations differ in subsistence technologies.

Dawkins (2006, pp. 168-169) distinguishes proximate and ultimate explanations, and claims little interest in a proximate question of evolutionary psychologists. That is the question of where the "god center' in the human brain is located, if it exists—or, we add, the capacity to think in analogies. Dawkins's question is rather an ultimate one: Which natural selection pressure brought about that center? Dawkins also holds that sociological explanations such as "religion is a tool used by the ruling class to subjugate the underclass" are proximate, because they miss out on environmental factors. We beg to differ. Durkheim (1912) held that human beings necessarily think in analogies and cannot escape sociomorphism, because they by nature belong to societies and societies pressure them. That hypothesis invokes the link between the environment of individuals and the analogies they make, and therefore is ultimate. It is part of ecological evolutionism.

Invoking the frequency of religious wars, Dawkins (2006, p. 172) rejects group survival explanations. He rewrites the question of the survival value of religion as the possibly more helpful question of which phenomena with survival value yield religion as a by-product. Dawkins answers it with the thesis that religion is a by-product of misfiring modules in the human brain (p. 179). These modules program people to impute intentions to entities that matter to them (p. 183), and most of the time contribute to survival. Dawkins buttresses the assertion that people take an intentional stance with findings showing that children and members of societies at lower levels of technology impute intentions to the weather, waves, and falling rocks.[8] These Darwinian thoughts do not yet answer the question of the diversity in religions and creation stories. Anyway, sociology's ecological evolutionism is richer.

Appendix
Content Classification Scheme as Applied to
Stories About the Very First Beginning, About the Creation of All
Things in the World, and About the Creation of Human Beings

	Present	Absent
Which creator(s) are present in a story?		
Nature: distant object (celestial body)		
Nature: near object		
(earth, rocks, mountains, water)		
Nature: plants		
An animal		
Human: an ancestor		
Human: a culture hero		
Human: an ancestor/culture hero		
Human: distant/less personal		
Spirit (personal force)		
Impersonal force		
Something else, namely		
Not mentioned		
Does this creator have a specific social role?		
Parent		
Ruler		
Something else, namely		
Not mentioned		
What is this creator's gender?		
Male		
Female		
Hermaphrodite		
No gender specified		
Not mentioned		
How did this creation take place?		
Transformation (spontaneous creation)		
Sexual reproduction: only bearing		
Sexual reproduction: having sex and bearing		
Technological achievement: craftsmanship		
Technological achievement: plan		
Sowing/planting		
Diving		
By command		
Something else, namely		
Not mentioned		

Notes

1. Lenski's (1970) reading of this table was restricted to its last column and neglected its two bottom rows. Moor, Ultee, and Need (2007) accounted for the full table, tested an analogy explanation of the link between subsistence technology and godly images for 150 societies, and did so with multivariate statistical models.

2. Lenski's (1970, p. 124) typology of subsistence technologies is richer. Hunting and gathering societies are divided into simple and advanced, as are agrarian societies. The best weapon of simple hunters and gatherers is a wooden spear; advanced hunters and gatherers have the spear-thrower or bow and arrow. All hunting and gathering societies in the *Ethnographic Atlas* are advanced. Advanced agrarian societies have iron tools, though it is not possible to code the agrarian societies in the *Ethnographic Atlas* after the possession of this item. Lenski (1970) also distinguishes maritime societies. They are too rare to merit attention in this article.

3. Although the expression "creation stories" smacks of technomorphism, it here refers to all stories about the origin of the universe, world, and humankind. The term is taken from Sanday (1981).

4. The virgin birth controversy initiated by Leach (1966) was infertile. At issue was not so much the veracity of field observations made by Malinowski and others. Leach adduced circumstantial evidence against these observations. However, Leach tried to devalue them by juxtaposing them with the idea prevalent in industrial societies that Mary gave birth to Jesus without having been fertilized by an ordinary man. After the debate was concluded, Monberg (1975) showed that before contact with the outside world, the Bellonese of one of the Solomon Islands held that men were not genitors.

5. We constructed our classification scheme after reading several substantive studies on creation stories and several popular collections of creation stories. Mainly for reason of the small numbers involved, in this article, we do not use every bit of information yielded by applying our coding scheme.

6. Because this article aims to build bridges between general sociology and Darwinian literature on religion, it does not enter the side issue of why certain ideas from general sociology have not yet found their way into that literature. Our first guess is that in academia, language barriers create isolated niches and slow progress.

7. Weber (1921, p. 315) refers to Levenstein (1912, pp. 323-353). Of 8,000 questionnaires sent out to workers in the iron, mining, and textile industry, 63% was returned. Of the 3,198 workers who replied to the question of whether they believe in God, 79% answered no. Of the 1,990 persons who replied to the open question of why they did not, 33% gave answers Levenstein abbreviated as "the properties assigned to God are incompatible with social reality."

8. Knight, Sousa, Barrett, and Atran (2004) go against the anthropomorphism thesis and maintain that children ascribe intentions to god before ascribing them to human beings, but Makris and Pnevmatikos (2007) show that they do so only on acquiring the stable and robust understanding that human beings have intentions.

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