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Faith in Science in Global Perspective: Implications for Transhumanism

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Faith in Science in Global Perspective: Implications for Transhumanism

Abstract:

While citizens can know scientific facts, they also have faith in science – with faith defined as a firm belief for which there is no proof. Using national public opinion surveys from twelve nations from 1993 to 2010, I examine three different types of faith in science that citizens could hold. I examine temporal changes in levels of faith in science as well as the social determinants of each type of faith. I focus on the implications of these levels of faith for the transhumanist movement, which is particularly dependent on faith in science. I find that two of three types of faith in science are on the rise across the West, and that the social determinants of these types of faith suggest particular challenges for the transhumanist movement.

Faith in Science in Global Perspective: Implications for Transhumanism

Scholars have been concerned with many aspects of the public's view of science. One is the level of scientific knowledge held by the public, which has classically been thought to be related to the public's "support" of science (Bauer, Durant and Evans, 1994). Other studies have examined whether particular sub-publics, like religious groups, are disproportionately uninvolved and un-knowledgeable about science, or are in moral competition with science (Evans, 2011).

Science is often thought of as a method of providing evidence for facts. However, science is more than simply facts. It can also be a source of societal hope – a way to save our society from its troubles, in the same way that societies have looked to other saviors, like

religion. That is, people have “faith” in science with faith being defined as a “firm belief in something for which there is no proof.” (Merriam-Webster online). There is a lot of proof offered that molecules are made of atoms but very little proof that science will solve the world’s problems. To believe that science will solve the world’s problems, people have to rely upon faith in science as an institution, and there are competing institutions that they could have faith in. There are also many modes of faith in science that people could have.

The extent to which a population has such a faith in science obviously has important ramifications. For example, if people have faith in science to provide a source of direction that humans should aspire to, then scientists would be looked to to set societal goals. If people have more faith in science, then they will try to solve social problems through scientific solutions, not through social action. For example, the eugenics movement was an attempt to solve social problems through science. In this paper I use the term “science” in a very broad sense to include technology.

Faith and Transhumanism

While willingness to fund scientific research, or to rely on technological instead of social solutions, depends in part on having faith in science, other social movements also depend upon this faith. I will look at the implications of faith in science for Transhumanism (TH) because TH presents an extreme case of faith in science, and in extreme cases the assumptions of the less extreme cases can come into perspective. Moreover, while TH is not a very large social movement in the general public as of yet, it has a good number of highly influential members and often stands in for scientific extremism in public debates. Thus, people are

disproportionately concerned about the movement compared to its actual following or its ability to actually meet its goals. Finally, using TH as an example demonstrates the relevance of the public's faith in science.

TH is “the belief that the human species can and should transcend itself ‘by realizing new possibilities’ of and for human nature” (Hauskeller, 2012, p. 39). Put simply, TH wants to replace humanity 1.0 with a new and improved humanity 2.0. The modern utopia envisioned by TH “rests on a strong belief in the transformative and salutary power of science and technology” (Hauskeller, 2012, p. 42). To believe in TH a person needs a very strong faith in science.

In this paper I do not investigate TH directly, but rather investigate the public's faith in science as a pre-requisite for acceptance of TH. I investigate the geographic distribution of faith in science, whether faith in science is increasing with time, and which social groups may be the vanguards of support or opposition to TH due to their level of faith in science. Given that transhumanists want to fix what they see as a flawed human species, I also examine whether those who think human nature is flawed have higher faith in science. If not, then this suggests that those most likely to support the motivation for TH are the least likely to accept its scientific method of achieving its goals.

Varieties of Faith in Science

The public could have “faith” in science's ability to do a number of things. The possibilities are endless, and I will pragmatically limit my discussion to those aspects which are relevant to TH and for which I have data. The first is faith in science to provide meaning for society. In recent decades many scientists have claimed that since religion has been shown to be false, science must step in and provide meaning for society (Evans, 2012, p. 3-32). For example, Robert Edwards, the first scientist to engage in in-vitro fertilization, complained that

“many non-scientists see a more limited role for science, almost a fact-gathering exercise providing neither values, morals, nor standards. . . . My answer . . . is that moral laws must be based on what man knows about himself, and that this knowledge inevitably comes largely from science” (Evans, 2012, p. 5). This is also a faith that is one of the bedrock assumptions of TH. As Cady writes, TH “is the ‘passionate belief in the transcendence of human limitations – not through religion or politics, but through science’” (Cady, 2012, p. 86).

A second type of faith in science would be a faith that science effectively solves any problem. Society has defined certain goods to pursue, such as the relief of suffering and the conservation of the resources of the planet. People could have faith that, irrespective of the problem at hand, science is capable of solving the problem. For example, whether starvation is viewed as a political problem or an agricultural science problem, science is the answer. TH depends upon this generalized faith in that TH assumes that current humans’ lack of super-intelligence (a social problem) is amenable to a scientific solution.

A final type of faith in science is faith in science to solve problems in the physical world with technology. Some issues that could be considered social in origin have been defined as problems in the physical world that science can solve with technology. For example, the medicalization literature shows us that many social problems have been defined as a problem with the physical world (e.g. human bodies) to be solved with technology (Conrad, 2000). From a medicalized perspective, hyperactivity in boys is not a reaction to the social design of schools, but a physiological disease of the body to be solved with pharmaceutical technology. Since TH is the transference of social desire into a technological problem to solve, TH relies heavily on this type of faith in science.

HYPOTHESES FOR THE SOCIAL DISTRIBUTION OF FAITH IN SCIENCE

The amount of these different aspects of faith in science are expected to vary by person. We can look to existing research to generate hypotheses for how faith in science will be distributed. When existing knowledge is specific enough to allow it, I will distinguish between the types of faith in science. Otherwise, the distinctions between types of faith in science will emerge from the data.

National Wealth

Wealth is not simply an individual characteristic, because even the less well off in wealthy countries have access to all sorts of social features paid for by the general wealth of the society. While we might think that the poor societies would have faith that science will save them from their misery, there is a general trend, at least among European countries, for the wealthiest countries to have the most positive general attitudes toward science (Bauer, Durant and Evans, 1994, p. 175). Therefore:

H1: Nations with Higher GDP per capita will have more faith in science

Time

If faith in science is indeed replacing faith in God (see below), and there is then a general trend of secularization in the West (Norris & Inglehart, 2004), over time faith in science should be growing. Moreover, as the world appears to continuously benefit from scientific research, such as with the invention of new communications devices, people could have increased faith in science. The limitations of science might not be attributed to science itself, but rather to the intractability of some problems or the unwillingness of people to follow the suggestions of science. On the other hand, people could perceive the world's problems, like global warming, to

be the result of scientific activity, and thus there could be a decreasing faith in science with time.

Therefore:

H2: Over time, the amount of faith in science has increased.

The Religious

Religious people are particularly relevant to the future acceptance of TH. TH positions itself as “the apotheosis of science and technology,” and thus represents the ultimate form of faith in science, but also as “a secularist project that displaces religion” (Cady, 2012, p. 83). For example, one influential proponent of TH writes that “we have reached the point in history at which fundamental changes in our very natures have become both possible and desirable. . . . [H]umans could become like gods, and in so doing may put conventional religion out of business. Thus it is in the vital interests of Christianity and the other great world faiths to prevent human technological transformation” (Bainbridge, 2005, p. 91).

Many outside analysts have also noted that the ideas in TH are analogous to the ideas in many religions, and thus TH can be seen as a replacement for religion (Hopkins, 2005; Geraci, 2008; Brooke, 2005). For example, theologian Brent Waters writes that TH “represents a late modern religious response to the finite and mortal constraints of human existence” (Waters, 2011, p. 164).

An additional reason for religious opposition to TH may be a lack of faith in science by religious people. There is strong evidence to suggest that religious people will have less of some types of faith in science (and thus, by extension, less support for TH). Note that I will only be discussing and analyzing Christian groups because these are the only groups that exist in large enough numbers in my sample to allow for statistical analysis. While I am not aware of studies in European countries, studies of Americans show that even the most distinctively religious

people (Protestant fundamentalists) are equally knowledgeable about science and equally likely to have scientific occupations as they non-religious. They dissent on only a few scientific knowledge claims, like the origins of the earth and humans. Fundamentalists are, however, opposed to the social and moral influence of scientists (Evans, 2011; Evans, 2013). In general, religious Americans support science, but a science dedicated to solving concrete problems, not determining moral values or determining the purpose of humanity.

In general, we would then expect to find active Christians to have less faith in science as providing meaning. One exception could be liberal Protestants. At its extreme, liberal Protestantism holds that humans are to create the heaven on Earth through their own actions (Wuthnow & Evans, 2002, p. 1-26). Thus, for liberal Protestants, having faith in science may be synonymous with having faith in God. Therefore:

H3: Conservative Protestants and Catholics will have less faith in science's ability to provide meaning than will the non-religious

H4: Liberal Protestants will have the same amount of faith in science's ability to provide meaning than will the non-religious

The pattern is predicted to be the same for faith in science solving general problems, but for different reasons. Previous research has shown that conservative Protestants, at least in the U.S., think that science causes moral harm, and that they tend to not want scientists to be involved in public debates (Evans, 2011). Catholics and liberal Protestants do not have this tendency. This has been portrayed as a social, not epistemological, conflict or competition with science (Evans & Evans, 2008). Therefore, it is unlikely that conservative Protestants would want scientists to solve all problems, including social problems. Therefore, given this general

faith in solving social or scientific problems, we can expect:

H5: conservative Protestants will have less faith in scientists ability to solving general problems than will the non-religious.

H6: Catholics and liberal Protestants will have the same amount of faith in science solving general problems than will the non-religious

Finally, research on the U.S. shows that even the most conservative religious people are equally involved with science that is focused on technological manipulation of the physical world (Evans, 2011). Therefore:

H7: All religious groups will be no different from the non-religious in their faith in science to solve problems in the physical world through technology.

Age

Younger people, who are more exposed to science and have been socialized in a more technologically advanced society, may have more faith in science. If younger people have greater faith in science, the result may be that faith in science would increase with time as the younger people replace the older. The young would then be the vanguard of TH. Of course, if the young have greater faith in science, this may be a life-course effect, with younger people having greater faith only to be disabused of this faith with maturity. Unfortunately, the data used for this paper do not allow for the de-tangling of age, period and cohort effects. There is also not a preexisting literature with which to generate strong hypotheses, so this aspect of the analysis will be exploratory. I will tentatively propose the following hypothesis:

H8: younger people will have greater faith in science than will older people

Education

The relationship between level of education and faith in science is similarly unclear. On the one hand, education in the West is based upon enlightenment reasoning, which would generally see science as the proper method for developing knowledge. Therefore, with greater exposure to education, people would have more faith in science producing meaning. On the other hand, it is possible that with greater education will come the realization that not all social problems can be solved with science or that science has limits. This may especially be true for science developing technologies to modify the physical world, such as nuclear power. Or, it may be that since those with more education are more exposed to science, they may have more faith in scientists' abilities to solve general and technological problems. Therefore, I will just state a general exploratory hypothesis:

H9: those with higher levels of education will have more faith in science

Lack of Satisfaction with the Human Condition

The final hypothesis is generated solely to examine the relationship between faith in science and TH. It has been suggested that TH appeals to the idea that the human present is bleak, and therefore the utopian future is appealing. "In comparison with such a future, our present life is bound to appear rather miserable," writes Hauskeller (Hauskeller, 2012, p. 44). If those who are currently unsatisfied with the nature of humanity are also those who have more faith in science, then TH as a scientific project will be seen as a logical goal. However, if those who are unsatisfied with humanity are those who have less faith in science, then TH will have less appeal to those unsatisfied with humanity 1.0 because TH relies so much on a faith in science. I will take the TH ideal as the null hypothesis:

H10: those with greater dissatisfaction with human nature will have more faith in science

DATA

Countries

To examine these hypotheses I use the environment modules of the 1993, 2000 and 2010 International Social Survey Programme (ISSP), as well as the U.S. General Social Survey (GSS) which asks the same questions. The ISSP is a coordination of survey modules across countries so that international comparisons can be made. For the 1993 environment survey there were 20 participating countries. In 2000, there were 25 countries, and in 2010, 32 countries or regions.

For the basic analyses of the comparative faith in science across geography and time, I examine the countries where the faith in science questions were asked in all three years. These countries are Bulgaria, Canada, Czech Republic, Germany, Israel, New Zealand, Norway, Russia, Slovenia, Spain, UK and the U.S. I could have also included Japan and the Philippines, but I excluded both Asian countries to keep focused upon Western cultural traditions.

I lack the space to conduct in-depth analyses of each of the faith in science questions for each of these twelve countries. I therefore selected five exemplar countries to examine with the 2010 data: Spain, Germany, Norway, the UK and the U.S. The U.S. is selected due to its influence on global political debates and level of scientific research. The others were selected as relatively comparable European countries with the highest GDPs of those countries with complete data.

Dependent Variables: Faith In Science Questions

Three questions measuring faith in science were asked in each of the three waves of the ISSP. Other studies have used these or similar questions to measure “general attitudes toward science” (Bauer, Durant and Evans, 1994, p. 174; Hayes & Tariq, 2000). I parse the meaning of each of these questions more closely and consider them to measure different types of faith in science. It is important to note that preliminary analysis reveals that the three questions cannot

be merged into an index because the responses are largely uncorrelated, reflecting different aspects of faith in science.

The survey contains a block of questions which have five point Likert scale responses ranging from “strongly agree” to “strongly disagree.” These are prefaced by the statement: “How much do you agree or disagree with each of these statements?” The first statement is “we believe too often in science, and not enough in feelings and faith.” This is a measure of faith in science’s ability to provide meaning. This interpretation is bolstered by the wording comparing “science” to “faith,” by which I think people understand this to mean “religion.” The respondent is being asked the extent to which they agree that “science” fulfills the role of religion, further suggesting the “meaning” interpretation. This interpretation is also supported by the “believe in” wording. To “believe in” something indicates faith.

The second statement is “overall, modern science does more harm than good.” The vagueness of this question queues the respondent to think about science’s abilities for an unstated problem. All scientific problems begin with social concerns, and science is asked by society to solve some of them (e.g. cancer) and not asked to solve others (e.g. crime). I therefore take this question to be a measure to the extent the respondent has faith in science’s ability to solve either social problems or problems with the physical world.

The third statement is “modern science will solve our environmental problems with little change to our way of life.” The respondent is primed to think of this as science solving a problem with the physical world using technology. This is because there is no public discourse of which I am aware that proposes that science will solve environmental problems through behavior modification – which is the other logical possibility. The respondent is primed to think of technology solutions such as solar panels, electric cars and carbon sequestration systems.

Therefore, this is a measure of the respondent's faith in science in solving a problem with technology that acts on the material world.

Of course, this question also refers to "environmental problems," for which respondents will have a lot of non-faith based information about scientists' abilities. This non-faith based information can be expected to vary greatly by country based upon the country's experience with environmental problems and the success of scientists in solving them.

Independent Variables – Demographics

In the analyses of individual countries, gender, income and political party are included merely as controls as I have no hypotheses about these demographics, but they co-vary with other variables. The coding of age, gender and years of education are retained from the ISSP and the GSS. The exception is that those few respondents in the ISSP who claim more than 26 years of education are coded as having 25 on the premise that they are simply indicting an ongoing education or being hyperbolic about their advanced education. Those who claim they are still at university are coded as having 14 years of education. For income, each country either asked for an exact household income in the local currency, or asked the respondent to place themselves in a range, with the respondent given the value at the median of the range. Countries that asked for monthly income were converted to yearly income. The ISSP codes identification with political party into far left and left, which I combined into a dummy variable for "left." "Liberal/center" was coded into a dummy variable for "center," and "right" and "far right" coded into "right. No party identification was coded into "none." These terms have quite different meaning in each country, so each model must be interpreted separately.¹

1 In the U.S., the responses "strong democrat," "not very strong democrat" are coded as "left." "Independent, close to Democrat," "Independent" and "Independent, close to Republican" coded as "center." "Not very strong Republican," and "strong Republican" are coded as "right." "Other" U.S. parties are part of "none/other." In the U.S. the "none" impulse is satisfied through calling oneself "independent," which is the ISSP scheme is identified with the center. In the UK,

Independent Variables – Human Nature

To measure dissatisfaction with the current state of human nature, there are two questions in the ISSP that ask whether people are trustworthy. The first asks: “generally speaking, would you say that most people can be trusted or that you can’t be too carefully in dealing with people?” The second asks: “generally speaking, do you think that most people would try to take advantage of you if they got the chance, or would they try to be fair?” Both had five point responses and, for the five countries under close examination in this paper, the responses were highly correlated with a Cronbach’s alpha of .722. I therefore created an additive index of these two variables with a range of 2-10.

Independent Variables – Religion

I created a religion dummy variable when more than 5% of a country’s population identified with the religion. In each country analysis, respondents who either had no religion, or who had a religious identity but did not participate in religion, are the reference group. In all countries an “other religion” variable was created for groups below the 5% threshold which was included in models in order to create the proper comparison between the non-religious and the main religious groups. I do not interpret the other religion variable because it is a mix of small

Green and Labor are “left.” Liberal Democrats–SLD are center. “Conservatives” are coded as “conservative.” About 20% of the sample are either “no party” or “other,” and these are coded as “other/none.” In Germany, “the left,” “Social Democratic Party” and “Alliance 90/The Greens” are coded as “left.” The ‘Free democratic party’ is “center liberal.” The “Christian Democratic Union/Christian Social Union” and the “National Democratic Party” are coded as “right.” “Would not vote,” “not eligible,” the “Pirate Party” and others are coded as “none/other.” In Spain, the Spanish Communist Party, the Catalanian Greens, the Catalanian Republican Left, the Galician Nationalists Party and the Spanish Socialist Workers Party” are coded as left. The Catalanian nationalist parties, convergence and union” and a few others are coded as “center, liberal.” The Popular Party is coded as “right.” Spain is noteworthy for 65% of the sample claiming “no party affiliation.” In Norway, the “Party Red,” Labour Party” and “Socialist Left Party” are left. The Christian Democratic Party, Centre Party and Liberal Party are “center, liberal.” The “Progress party and conservative party are coded as “right.” The very few Norwegians who identified with another party or who lacked party identification were coded as “none/other.”

Christian sects, Muslims, Hindus and others. With these criteria in place, in Germany, dummy variables were created for “Roman Catholic” and the “German Protestant Church;” in Spain, “Roman Catholic;” in the UK, “Christian – no denomination,” “Roman Catholic” and “Anglican;” and in Norway, the “Church of Norway.”

The U.S. allows for more detailed religious comparisons not only because of the religious heterogeneity and higher participation, but also because the GSS has more religion questions. Specifically, I sorted U.S. respondents into dummy variables for each religious tradition using a modified version of the RELTRAD scheme (Steensland et al., 2000). RELTRAD sorts respondents into conservative Protestants, mainline Protestants, black Protestants, Catholics, Jews, “others” and the nonreligious.² I combine Jews into “others,” because there are so few Jews in the sample.

There is a sociological literature examining the relationship between religion and science in the U.S., and this literature makes a distinction between evangelical and fundamentalist Protestants. Following Evans (2011) I use views of biblical literalism to do so. I therefore consider respondents who claim that the Bible “is the actual word of God and is to be taken literally, word for word,” and who regularly attend a church in a conservative Protestant denomination to be fundamentalists. Those who claim that “the Bible is the inspired word of God but not everything in it should be taken literally, word for word,” or weaker statements, but who regularly attend a church in a conservative Protestant denomination, I label as evangelicals. While obviously many of the respondents I code as fundamentalists would call themselves conservative evangelicals, this scheme effectively demarcates literalist and non-literalist conservative Protestants and generally reflects the somewhat less literalist approach of self-

² Since the article by Steensland and his colleagues was published, new denominations have been identified in the GSS. I sorted the few respondents who did not fit into existing categories through examination of web pages for the new denominations.

identified evangelicals (Smith, 1998, p. 23).

It does not make sense that the level of faith in science would be derived from simply having a religious identity. Rather, one needs to also be immersed in religious discourse that presumably influences one's view of science. Therefore, immersion is represented by religious service attendance, and each of these dummy variables also has an attendance threshold associated with it, only capturing those who participate in the religion they identify with. If I were limiting my analysis to the U.S. I would create a higher threshold of church attendance. However, in Europe, the large numbers of non-religious, and the low rate of attendance among those who identify with religion, requires that I use a more generous threshold or the dummy variables will not have enough variance.

To identify a group of sufficient size in the UK the threshold must be set at people who attend services once a year as "active," and even then this results in active Catholics being 6% of the population and active Anglicans being 9% of the population. The same threshold in Norway results in 33% of Norwegians being "active" Church of Norway participants. Close examination of the data suggest that many Norwegians go to church once a year, but not more than that. Of course, the U.S. has much higher participation, so this threshold would result in the vast majority of Americans being "religiously active."

Therefore, what it means to be "actively religious" varies by country, and this must be kept in mind in interpretation. In the UK and Germany, the threshold is participating "once a year or more," and therefore the religion variables in these models reflect a very limited religious experience. In Norway the threshold is "several times a year." In Spain and the U.S. the threshold is "once a month or more."

RESULTS

National Wealth and Faith in Science

For this hypothesis I conducted a simple regression predicting the mean of the faith in science question for a country by the year 2000 per-capita purchasing power-adjusted GDP, (taken from Franzen and Meyer (2010, p. 224)). As suggested by earlier research (Bauer, Durant and Evans, 1994), there is a fairly close association between GDP and “science providing meaning,” and a “science solving general problems.” The OLS model for the first has an R-squared of .472 and second .728. (Not shown). That is, the higher the GDP the higher the faith in science in these abstract senses. On the other hand, there is a very small and negative relationship between GDP and faith in science solving a problem with technology that acts on the material world (with an R-squared of .17).

This suggests that while wealthier countries are more amenable to looking to science for meaning (or at least not looking to feelings or faith), and faith in science solving problems in general, increased wealth does not lead to the belief in the technological prowess of science. This final relationship may be due to awareness of the intractability of the environmental problems.

Change Over Time By Country

Figure 1 shows change over time between the three waves of the ISSP in each of the three faith in science questions for each country. The X axis is the year of the survey and the Y axis is the mean response within the country when the responses to each question are scored 1 through 5. Higher numbers represent more faith. Table 1 shows the mean value of each variable for each country for the 2010 data, allowing for a comparison of which countries have more faith in

science than others. Table 1 also shows a time coefficient from each country for a ordered logistic regression model with the faith in science response as the dependent variable and year as the independent variable. These coefficients show which of the lines in the sub-figures in Figure 1 depict a statistically significant change in faith in science over time.

Insert Figure 1 and Table 1 Here

The second column in Table 1 shows that the top five countries in terms of having faith in science providing meaning are Norway, Canada, UK, New Zealand and Israel. The bottom five are: Spain, Bulgaria, Russia, US and the Czech Republic. What is striking in Figure 1 and Table 1 is that this type of faith is growing in almost all countries, and comparing coefficients in columns 3, 5 and 7 reveals that it is growing the fastest of any of the aspects of faith in science. Faith in this aspect of science is growing in the UK, US, Norway, Czech Republic, Slovenia, Bulgaria, New Zealand, Canada and Spain. Germany, Russia and Israel are the only exceptions, with there being no change over time in those nations. There is no country declining in this type of faith. Therefore, to the extent that TH relies upon science providing meaning, the ground is rapidly becoming more fertile across the surveyed countries for TH thought. It should also be noted that the English speaking world is engaged in the most rapid change, with the UK, US, New Zealand and Canada having particularly large coefficients.

For faith in science solving general problems, the countries with the highest levels of faith are Norway, Canada, US, Germany and Israel. The countries with the lowest faith are largely Eastern European: Slovenia, Bulgaria, Russia, the Czech Republic and the UK. Change in this level of faith across countries is mixed, only increasing in 5 countries (Germany, UK, Norway, Bulgaria and Spain), declining in 3 (Slovenia, Russia, Israel) with the remaining 4

unchanged. The average ground is fertile for TH in many of the wealthier European nations that debate TH – although notably not in the U.S. – but it is only becoming more fertile in some of the countries.

The countries with the highest level of faith in science solving problems in the material world through technology – in this case the environment – are Russia, Bulgaria, Israel, Spain and Norway. Countries with the lowest faith are Canada, Slovenia, New Zealand, the Czech Republic and the US. There is no obvious regional pattern to these levels of faith. Faith in this aspect of science is increasing over time in many countries: the UK, US, Norway, the Czech Republic, New Zealand and Israel; and declining in Bulgaria and Spain (with the remainder unchanged). Again, the wealthy English speaking countries (UK, US, New Zealand) are over-represented among those growing in this type of faith.

In sum, faith in science producing meaning is growing the most rapidly within countries and the most consistently across countries. Faith in science to solve problems in the material world is also on the rise, albeit not as consistently or as strongly. Faith in science solving general problems is not clearly on the rise.

Determinants of Faith in Science Providing Meaning

I also examine the particular determinants of faith in science for select countries. Starting with faith in science providing meaning, columns 2 through 6 in Table 2 show the coefficients from ordered logistic models for Germany, UK, Norway, Spain and the U.S.

Insert Table 2 Here

First, in Germany, Norway and the U.S., women have less faith in science providing meaning than do men. This suggests one reason for the disproportionately male nature of TH –

women have less of this type of faith in science. In all countries but Norway and Spain, those with more household income have more faith than those with less income. In all countries but the U.S., younger people have a greater degree of this type of faith in science than do older people.

Political party is difficult to interpret across countries because “center” and “none/other” have different meanings. However, “right” and “left” have fairly consistent if relative meaning. “Left” is the reference group, so the “right” variable is of interest, and indicates the different faith in science between those who identify with the left and right. In Norway, Spain and the U.S. the right has less faith in science producing meaning than does the left. In all five countries those with higher education have more faith in science. In all countries but Spain (and the Spain coefficient has a $p=.09$), those with greater faith in human nature have more faith in science, which is the opposite of the TH ideal.

The general pattern for religion is clear. In every country, every religious group (with the exception of German Protestants) has less faith in science producing meaning than do the non-religious. In countries that have measurable conservative Protestant populations (UK and US), it is conservative Protestants who have the least amount of faith in science compared to the non-religious. In countries that have measurable Catholic populations, Catholics are also strongly opposed. Therefore, in general, H3 is supported in that it is the Catholics and conservative Protestants who have the least faith.

I interpret the mainline Protestants of the U.S., the Anglicans in the UK, the Church of Norway in Norway, and the Protestants in Germany to all be liberal Protestants. Contrary to H4, all but the German liberal Protestants have less faith in science producing meaning than do the non-religious. Across the countries, the degree of difference with the non-religious is, however,

less than the degree of difference between conservative Protestants and Catholics and the non-religious. Note that the black Protestant effect in the U.S. is not a religion effect per se. Since essentially all members of black Protestant denominations are racially black, I added black as a control variable (not shown) and this effect transferred to the race variable. It is also notable that by far the largest religion coefficients are found in the U.S. and UK models, and thus the divide between the religious and the non-religious is the most extreme in those two countries.

Determinants of Faith in Science Solving General Problems

Table 3 reports the coefficients for faith in science solving general problems. First, in every country but the UK, women have less of this type of faith in science than do men. In all countries but Norway and the UK, those with more household income have more faith than those with less income. Only in the UK and Norway do younger people have more faith in science solving problems than do older people. Only in the U.S. does the political right has less faith in science than the left. However, in all of the European countries the “none or other” parties have less of this type of faith than the left. As in the previous models, in all five countries those with higher education have more of this type of faith in science. In all five countries, as with the first type of faith in science, those with greater faith in human nature have more faith in science. In contrast to the previous dependent variable, there are no religion effects in Europe, except for evangelicals in the UK. The U.S. is quite different, with Catholics, fundamentalists and evangelical attenders all having less of this type of faith in this science.

Insert Table 3 Here

Determinants of Faith in Science Solving Problems in the Physical World

For the faith in the ability of science to solve problems in the physical world with technology, we see results (Table 4) quite different from the previous sets of models. Only Norway and Spain have gender effects, with women having less faith than men. There are no income effects. Only the UK has the age effect we saw for the other types of faith. It is only in Norway that the right has a different view than the left, and the right in Norway has more of this sort of faith in science. Only in Spain do those with greater faith in human nature have more faith in this aspect of science. There are strong education effects in every country, but they are the opposite of those reported in the previous sets of models. That is, those with greater amounts of education have less faith in science's ability to solve environmental problems.

Insert Table 4 Here

There are very few religion effects. Among European countries, only German Protestants have less of this type of faith in science. Spanish Catholics have more of this type of faith in science than the non-religious. While there are very strong religion effects in the U.S. for the other types of faith in science, for faith in solving problems in the physical world, U.S. religious people are no different than the non-religious. (Again, the Black Protestant affect is an artifact).

DISCUSSION

Across each type of faith in science, H1 is supported – nations with higher GDP have more faith in science. This suggests that this basic pre-requisite of TH is strongest in the wealthiest countries. We would then expect, all else equal, that TH will be strongest in those countries.

A critical question is whether the cultural underpinning of the TH movement, faith in

science, is increasing. In general, faith in science has increased, and H2 is supported, although this differs by nation. However, the lessons for the growth of TH from the public's faith in science depends upon which aspect of faith is highlighted by the leaders of the TH movement. If TH is framed as concerning providing meaning for humanity, then given that "science as meaning" is growing with time, then support for TH will grow. If TH is dependent on the faith that science is a "generally effective problem solver," then the conditions for growth in TH are not clear given that the public's view of this aspect of faith have generally remained unchanged over time. If TH is actually portrayed as solving problems in the physical world with technology then the background conditions for the support of TH is on the increase.

Beyond the general conditions for growth in TH, we can expect that certain sub-populations will be more supportive than others. While H8 predicted that younger people would have more faith in science than older people, this was generally not supported. This does differ by which faith in science is invoked. For faith in science producing meaning, younger people do have more faith. For the other aspects of faith, there is generally no difference by age. This suggests that as long as TH remains a philosophical attempt to generate meaning, it will be more popular among the young (and more strongly opposed by the old). If TH is an attempt to actually solve a problem through science, different ages will react similarly to it.

The conclusions about the faith in science of those with different education levels (H9) is mixed. For faith in science producing meaning and generally solving problems, more education leads to more faith. This suggests that those with more education will be the supporters of TH as it is currently operationalized. However, those with greater amounts of education have less faith in science's ability to solve problems in the physical world. This may be because education causes greater familiarity with science, which in turn makes one more realistic when describing

the probability of solving a concrete problem. Therefore, were TH to get to the level of requiring faith in science's ability to change the world with technology – like increasing human longevity by 30 years – the more educated people will be less supportive.

TH portrays itself as an opponent of traditional religion. Given how TH is currently framed, the data show that religious people would agree. Conservative Protestants and Catholics have less faith in science as providing meaning than do the non-religious (H3 is supported). While it was expected that liberal Protestants would not be different than the non-religious in this regard, they also lacked this faith in science, albeit not to the same extent as conservative Protestants and Catholics (H4 is not supported). So, to the extent that TH is framed as a source of meaning derived through science, most types of religious people will be more opposed than the non-religious.

However, were TH to be portrayed as a solution to some general problem, then religious people would not be disproportionately opposed. (H5 is not supported and H6 is supported). The U.S. is the exception, where Catholics and conservative Protestants have less of this type of faith in science. This may be because religious groups have a longer history of social conflict with science in the U.S. than in other countries (Evans & Evans, 2008), so American religious conservatives do not want scientists to be influential in any area that is not consensually defined as a scientific issue (like ameliorating environmental problems). In all countries, were TH to be defined as solving problems in the physical world with technology (like the environment), then there would essentially be no distinct religious opposition (H7 is supported).

Finally, I examined whether people who were dissatisfied with human nature have less faith in science. The TH movement is dissatisfied with the current nature of humanity, but the data show that those who are dissatisfied have less faith in science (the opposite of H10 is

supported.) For faith in science solving problems in the physical world through technology, there is no effect of views of human nature. This creates a tension for TH, in that those who would be attracted to the message of a dissatisfaction with humanity 1.0 are also those who have the least faith in science.

CONCLUSION

Citizens can understand science and have scientific knowledge. However, citizens can also have faith in science. This faith will impact a number of decisions. On a basic level, faith will determine the funding of science, because society will only fund those institutions it has faith in. Faith will also determine which institution is followed when it comes to social decisions.

Faith in science also will influence the social reaction to social movements that depend upon this faith. The most extreme case of dependency upon this faith is TH, which advocates improving the human body through scientific engineering of various sorts. TH has faith that such designed improvements can be done without introducing errors or damaging the human species.

The general tension for TH is clear. As long as TH remains akin to a religion and a way of providing meaning, then its future looks bright as growth in faith in science as producing meaning is strong. However, if TH appears to be trying to intervene in problems in general, its future is less clear as that type of faith is generally not raising or falling. However, if TH becomes framed as using technology to solve problems in the physical world – if it gives up its transcendent qualities – then conditions for TH are improving since this type of faith in science is on the incline.

The groups that would be least expected to adopt TH beliefs are the religious. However, that is primarily true if TH is based upon a faith in science producing meaning. If TH becomes a concrete solution to a consensual physical problem like human health, then religious people would be no different from others in their support of TH.

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3Table 1: Mean Response and Regression Coefficients for Year Variable, by Country, ISSP 1993-2010.

<u>Country</u>	<u>Science Solves Problems in the Material World with Technology</u>		<u>Science Solves General Problems</u>			
	<u>2010 Mean</u>	<u>Year Coefficient</u>	<u>2010 Mean</u>	<u>Year Coefficient</u>	<u>2010 Mean</u>	<u>Year Coefficient</u>
Germany						
UK	2.91	.008	3.58	.010**	2.81	-.002
US	3.06	.048***	3.41	.019***	2.86	.034***
Norway	2.86	.037***	3.61	.005	2.69	.021***
Czech Republic	3.28	.050***	3.96	.025***	2.86	.038***
Slovenia	2.86	.040***	3.35	-.007	2.68	.031***
Bulgaria	2.80	.011*	2.96	-.029***	2.46	-.006
Russia	2.68	.026***	3.05	.010*	2.97	-.041***
New Zealand	2.75	-.03	3.19	-.021***	3.28	.002
Canada	3.02	.047***	3.44	-.006	2.64	.032***
Israel	3.23	.056***	3.70	.011	2.38	.010
Spain	2.93	-.000	3.53	-.017***	2.98	.016**
Average Coefficient	2.65	.025***	3.47	.018***	2.87	-.014***
	2.91	.0265	3.44	.0015	2.79	.010

Note: Models are ordered logistic. Standard error in parentheses. *p<.05, **p<.01, ***p<.001 (two-tailed tests).

4Table 2: Regression Coefficients, ISSP and GSS 2010, Faith in Science as Meaning

<u>Independent Variables</u>	<u>Germany</u>	<u>UK</u>	<u>Norway</u>	<u>Spain</u>	<u>U.S.</u>
Age	-.009* (.004)	-.024*** (.006)	-.012** (.005)	-.009** (.003)	-.006 (.004)
Woman	-.262*	-.303	-.255*	-.108	-.248*

	(.125)	(.162)	(.118)	(.094)	(.126)
Education	.061** (.019)	.106** (.031)	.118*** (.018)	.031** (.011)	.141*** (.027)
Income	.000* (.000)	.000* (.000)	-.000 (.000)	.000 (.000)	.006*** (.002)
Party ID = Center	-.082 (.224)	.002 (.244)	-.142 (.169)	.042 (.344)	-.189 (.144)
Party ID = Right	-.204 (.160)	-.023 (.203)	-.310* (.138)	-.356* (.171)	-.660*** (.169)
Party ID = None/Other	-.223 (.182)	-.566* (.242)	-.267 (.368)	-.169 (.124)	.055 (.670)
Faith in Human Nature	.122*** (.034)	.148*** (.034)	.082* (.038)	.045 (.027)	.074* (.033)
Catholic Attender	-.347* (.168)	-.971** (.323)	---	-.289** (.113)	-.697*** (.198)
Liberal Protestant Attender (a)	-.144 (.194)	-.651* (.277)	-.385** (.150)	---	-.724** (.231)
Other Religion Attender	-1.12** (.337)	-1.69*** (.403)	-.587* (.273)	-.886** (.314)	-.206 (.175)
Fundamentalist Attender	---	---	---	---	-1.24*** (.233)
Evangelical Attender (b)	---	-1.25** (.402)	---	---	-.762*** (.238)
Black Protestant Attender	---	---	---	---	-1.38*** (.276)
N	879	701	1013	1581	1186
Pseudo R-squared	.037	.076	.038	.018	.071

NOTE: a = In Norway, this variable indicates the Church of Norway; in the U.S., mainline Protestant; in Germany, "Protestant;" in the UK, Church of England. b= in the UK, this variable indicates "Christian." Models are ordered logistic. Standard error in parentheses. Cut points not shown. *p<.05, **p<.01, ***p<.001 (two-tailed tests).

5Table 3: Regression Coefficients, 2010 ISSP and GSS, Science Solves General Problems

<u>Independent Variables</u>	<u>Germany</u>	<u>UK</u>	<u>Norway</u>	<u>Spain</u>	<u>U.S.</u>
Age	-.004 (.004)	-.014* (.006)	-.015** (.005)	.003 (.003)	.002 (.004)
Woman	-.454*** (.128)	-.022 (.164)	-.486*** (.126)	-.196* (.098)	-.416** (.133)
Education	.060*** (.018)	.091** (.030)	.114*** (.019)	.065*** (.011)	.168*** (.024)
Income	.000* (.000)	.000 (.000)	-.000 (.000)	.000*** (.000)	.003* (.002)
Party ID = Center	-.048 (.241)	-.227 (.251)	-.367 (.190)	-.451 (.328)	-.177 (.150)
Party ID = Right	-.219 (.149)	.107 (.197)	-.201 (.142)	-.243 (.178)	-.372* (.170)
Party ID = None/Other	-.486* (.211)	-.748** (.239)	-.688* (.327)	-.398*** (.122)	-.263 (.571)
Faith in Human Nature	.119*** (.036)	.207*** (.035)	.190*** (.041)	.090*** (.027)	.119*** (.033)
Catholic Attender	-.278 (.152)	-.448 (.352)	---	-.209 (.123)	-.743*** (.186)
Liberal Protestant Attender (a)	-.001 (.189)	-.012 (.287)	-.237 (.173)	---	-.105 (.240)
Other Religion Attender	-.457 (.305)	-.506 (.273)	-.956** (.322)	-.455* (.214)	.047 (.193)
Fundamentalist Attender	---	---	---	---	-.611** (.217)
Evangelical Attender (b)	---	-1.48*** (.442)	---	---	-.684* (.300)
Black Protestant Attender	---	---	---	---	-1.03*** (.270)
N	881	694	1003	1584	1174
Pseudo R-squared	.036	.059	.055	.035	.074

NOTE: a = In Norway, this variable indicates the Church of Norway; in the U.S., mainline

Protestant; in Germany, “Protestant;” in the UK, Church of England. b= in the UK, this variable indicates “Christian.” Models are ordered logistic. Standard error in parentheses. Cut points not shown. *p<.05, **p<.01, ***p<.001 (two-tailed tests).

6Table 4 Regression Coefficients, 2010 ISSP and GSS, Science Solves Problems in Material World

<u>Independent Variables</u>	<u>Germany</u>	<u>UK</u>	<u>Norway</u>	<u>Spain</u>	<u>U.S.</u>
Age	-.002 (.004)	-.018** (.006)	-.006 (.005)	-.006 (.004)	-.005 (.004)
Woman	-.104 (.126)	-.092 (.165)	-.428*** (.120)	-.195* (.097)	-.010 (.131)
Education	.042* (.018)	-.095* (.038)	-.052** (.018)	-.028* (.011)	-.089** (.028)
Income	.000 (.000)	-.000 (.000)	.000 (.000)	.000 (.000)	.001 (.002)
Party ID = Center	.062 (.209)	-.376 (.270)	-.418* (.184)	-.478 (.407)	.134 (.148)
Party ID = Right	.300 (.164)	.243 (.192)	.420** (.139)	-.278 (.175)	.157 (.177)
Party ID = None/Other	.231 (.185)	.040 (.260)	.139 (.281)	-.129 (.120)	.204 (.417)
Faith in Human Nature	-.058 (.037)	-.020 (.038)	.032 (.042)	.077** (.027)	-.040 (.032)
Catholic Attender	.184 (.176)	.304 (.359)	---	.301* (.129)	.237 (.198)
Liberal Protestant Attender (a)	-.564* (.219)	-.128 (.308)	-.118 (.151)	---	.049 (.226)
Other Religion Attender	.223 (.341)	-.469 (.334)	-.444 (.334)	.157 (.338)	.120 (.172)
Fundamentalist Attender	---	---	---	---	-.337 (.244)
Evangelical Attender (b)	---	.361 (.400)	---	---	-.493 (.268)
Black Protestant Attender	---	---	---	---	.726* (.309)

N	857	688	961	1509	1159
Pseudo R-squared	.013	.024	.021	.007	.018

NOTE: a = In Norway, this variable indicates the Church of Norway; in the U.S., mainline Protestant; in Germany, "Protestant;" in the UK, Church of England. b= in the UK, this variable indicates "Christian." Models are ordered logistic. Standard error in parentheses. Cut points not shown. *p<.05, **p<.01, ***p<.001 (two-tailed tests).