A Cross-Disciplinary Survey of Beliefs about Human Nature and Culture.

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Special Section:
Beliefs about Human Nature, Culture, and Science:
Survey and Symposium

This special section is designed to illuminate the degree to which the social sciences and humanities agree or disagree on two central issues: affirming the biological underpinnings of human behavior and affirming the epistemic validity of science. The survey article offers an analysis of more than 600 responses to a survey questionnaire. For the symposium, the editors of ESIC invited a distinguished set of scholars and scientists to write short essays (about 1,500 words) reflecting on the issues in the questionnaire. Contributors to this symposium were chosen to represent a wide range of disciplines and diverse theoretical perspectives.
A Cross-Disciplinary Survey of Beliefs about Human Nature, Culture, and Science

Joseph Carroll, John A. Johnson, Catherine Salmon, Jens Kjeldgaard-Christiansen, Mathias Clasen, and Emelie Jonsson

Abstract

How far has the Darwinian revolution come? To what extent have evolutionary ideas penetrated into the social sciences and humanities? Are the “science wars” over? Or do whole blocs of disciplines face off over an unbridgeable epistemic gap? To answer questions like these, contributors to top journals in 22 disciplines were surveyed on their beliefs about human nature, culture, and science. More than 600 respondents completed the survey. Scoring patterns divided into two main sets of disciplines. Genetic influences were emphasized in the evolutionary social sciences, evolutionary humanities, psychology, empirical study of the arts, philosophy, economics, and political science. Environmental influences were emphasized in most of the humanities disciplines and in anthropology, sociology, education, and women’s or gender studies. Confidence in scientific explanation correlated positively with emphasizing genetic influences on behavior, and negatively with emphasizing environmental influences. Knowing the current actual landscape of belief should help scholars avoid sterile debates and ease the way toward fruitful collaborations with neighboring disciplines.

Keywords: human nature, culture, science, science wars, cultural construction, evolutionary social science, social science, humanities, biocultural theory

INTRODUCTION

How much have evolutionary ideas penetrated into the various disciplines? To what extent, if any, do the social sciences and the humanities form separate, internally cohesive blocs—blocs defined by shared ideas about human nature and culture, and by shared attitudes toward science? To what extent do evolutionists in the social sciences and humanities converge in beliefs and attitudes? If the evolutionists stand together, to what extent do they stand apart from scholars and scientists publishing in journals that are not explicitly evolutionary? Do scholars and scientists in different disciplines vary in the degree to which they share views with the evolutionists? For instance, are psychologists and political scientists closer in their views to evolutionists or to anthropologists and sociologists? Are anthropologists and sociologists closer to literary scholars and historians or to psychologists and political scientists? Do certain disciplines in the social sciences and humanities cluster together in emphasizing culture’s independence from biology, or in adopting skeptical attitudes toward the validity of scientific knowledge? Do other disciplines cluster together in emphasizing biological constraints on culture, or in affirming the validity of scientific knowledge? To what extent, if any, do beliefs about the validity of scientific knowledge correlate with a belief that human behavior is heavily influenced by biology?

Questions such as these characterize major controversies in academic intellectual life. Within the social sciences, for over a century, the deepest
conflict has been between contrasting claims for biological or environmental causes of behavior. That conflict blazed up in the sociobiology wars of the 1970s, and has never since subsided (Fox 1989; Degler 1991; Tooby and Cosmides 1992; Segerstråle 2000; Alcock 2001; Pinker 2002; Kendrick 2011; Horowitz, Yaworsky, and Kickham 2014). Antagonism between the sciences and humanities has been smoldering at least since the debate between T. H. Huxley and Matthew Arnold in the late Victorian period. In the middle of the twentieth century, it flared up in the “two cultures” debate between C. P. Snow and F. R. Leavis; and in the 1990s, it flashed into open warfare—“the science wars” (Huxley [1880] 1898; Arnold [1882] 1974; Snow [1959] 1993; Leavis [1959] 1972; Gross and Levitt 1994; Aronowitz 1996; Koertge 1998; Sokal and Bricmont 1998; Brown 2001; Weinberg 2001; Parsons 2003; Boghossian 2006; Smith 2006; Carroll 2011; Smith 2016).

In recent decades, the conflict over scientific knowledge has been closely intertwined with the conflict over the causes of human behavior—closely intertwined, but not simply reducible one to the other. Even without support from hard data, one might be confident that theorists who deprecate biological influences on behavior range from social scientists who adopt rigorous empirical methods to philosophers and historians of science who regard science as a medium for ideology. Is it nonetheless true that describing science as socially constructed correlates with minimizing biological influences on human behavior? And if that correlation does exist, does it cross the boundary between the social sciences and the humanities? One might guess, and dispute. Instead, we gathered systematic survey data to help answer these questions.

To assess basic beliefs and attitudes about biology, culture, and science, we developed a survey questionnaire that deployed four main groups of statements: (1) statements about human universals and cultural diversity; (2) statements about the relative causal force of evolved and genetically transmitted characteristics, on the one side, and environmental causes, including cultural conventions, on the other; (3) statements about the interactions between culture and evolution over evolutionary time scales—that is, statements about gene–culture coevolution, cultural autonomy, and cultural evolution; and (4) statements about the validity and scope of scientific explanation. Respondents were asked to indicate the degree to which they agreed or disagreed with these statements.

The survey was designed to give an up-to-date map of the current academic landscape of belief. Any such map has intrinsic interest, and it can also contribute to research. It can enable intellectual historians to orient themselves more accurately toward current beliefs and attitudes. Knowing what researchers in other disciplines actually think can help scientists and scholars formulate hypotheses that isolate real issues at contention and thus avoid sterile controversies generated by unintentional straw-manning. Conversely, having data on actual beliefs can help forestall evasions or obfuscations produced by an inconsistent use of terms. On the more positive side, finding that contiguous disciplines are closer in belief than one supposed could ease the way toward cross-disciplinary collaboration and synthesis.

For many researchers, synthesis, integration, and comprehensiveness have inherent value (Wilson 1998; Slingerland and Collard 2012; Carroll, McAdams, and Wilson 2016). A chief motive in conducting this survey was to find out how far we have come in achieving a consensus based both on a shared reliance on scientific knowledge and on shared ideas about the biological underpinnings of human behavior—how far we have come, and how far we still have to go.

**METHODS**

**SELECTING AND CATEGORIZING DISCIPLINES**

Potential respondents were selected by balancing two criteria for inclusion: (1) approximating to the proportions of PhDs awarded
in the various disciplines of the social sciences and humanities; and (2) obtaining fairly equal numbers of respondents among evolutionary social scientists, nonevolutionary social scientists, and nonevolutionary humanists. (The much smaller target number of evolutionary humanists was determined by the small number available. A search for journal articles by evolutionary humanists produced a list of 79 potential respondents.) A table created by the National Center for Education Statistics provided information on numbers of PhDs awarded.1 Beginning with information provided by this table, a list of disciplines was compiled and target numbers of potential respondents assigned to each discipline.

In addition to evolutionary social scientists and evolutionary humanists, 20 specific disciplines were identified as relevant to the survey. Humanities disciplines that are not explicitly designated as evolutionary include drama and theater, ethnic studies, film studies, history, history and philosophy of science, literary study (Anglophone, European, and comparative), music, philosophy, religious studies, and the visual arts. Disciplines in the social sciences that are not explicitly designated as evolutionary include anthropology, communication/media studies/journalism (hereafter “communication”), criminology, economics, education, empirical study of the arts, political science, psychology, sociology, and women’s or gender studies.

Sixteen of the disciplines not designated as specifically evolutionary could be unproblematically assigned to either the social sciences or humanities. Four of the disciplines occupy a more borderline area between social sciences and humanities: communication, empirical studies of the arts, ethnic studies, and women’s or gender studies. Decisions about where to place these disciplines depended on subject matter, methodology, and classification of journals in indices of impact factors. Researchers in the empirical studies of the arts have a humanities subject matter, but their methods are quantitative, and most of them have appointments in departments of psychology. That group was thus assigned to the social sciences. Women’s or gender studies and ethnic studies have primarily social subjects, not subjects in imaginative culture (the arts, religion, history, philosophy). The top journals in ethnic studies, though, are primarily discursive, not quantitative, in orientation, and the top journals in women’s or gender studies include much quantitative work, so ethnic studies was placed in the humanities, and women’s or gender studies in the social sciences. In indices of impact factors, the top journals in communication are sometimes grouped with the social sciences and sometimes with the humanities. Much of the work, though, is quantitative, and the field as a whole seems to have more affinity, in both methodology and subject matter, with sociology than with literary study, history, or philosophy.

Selecting Journals and Respondents in Each Discipline

After setting targets for the number of invitations to be issued in each of the 22 disciplines, potential respondents were selected by identifying contributors to major journals in each discipline. (The evolutionary humanists were an exception. Since only one short-lived journal was dedicated to that field, evolutionary humanists were identified by scanning bibliographies of humanistic journal articles published by evolutionists.) Major journals were identified by collating lists in three main online sources:

Journal Citation Reports (Thomson Reuters ISI Web of Knowledge) (available through a library license)

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Google Scholar Metrics (https://scholar.google.com/citations?view_op=top_venues&hl=en)


These three sources use somewhat different but overlapping measures for journal impact scores. SCImago Journal Rankings and Google Scholar Metrics provide information on both the social sciences and the humanities. Google Scholar Metrics divides up some disciplines (history, for example) into subdisciplines distributed into both the social sciences and humanities. Journal Citation Reports, though putatively limited to the sciences and social sciences, provides ranked journal listings for ethnic studies, history, history and philosophy of science, and women’s studies.

To avoid bias produced by selecting potential respondents too heavily from any one journal, the target number for any given discipline was divided among multiple top-ranked journals, with a limit of 10 journals, if (as in most cases) 10 journals could be identified as top-ranked. To give an example, a target was set for 200 invitations from anthropology journals. Ten top journals were identified by collating lists from the three online databases. Eleven journals appeared in the top lists for all three databases. The 10 highest ranking from those 11 were selected: Current Anthropology, American Journal of Physical Anthropology, Annual Review of Anthropology, American Journal of Human Biology, American Ethnologist, Cultural Anthropology, Journal of the Royal Anthropological Institute, American Anthropologist, Anthropological Quarterly, and Anthropological Theory. Twenty letters of invitation were assigned to each of these 10 journals. Contributors to each of the journals were selected from among the most recent issues. Similar procedures were followed for each of the 20 disciplinary groups other than the evolutionary humanists and evolutionary social scientists.

One thousand evolutionary social scientists were selected from among contributors to eight journals that are explicitly evolutionary in orientation: Cliodynamics, Evolution and Human Behavior, Human Nature, Evolutionary Behavioral Sciences (previously, 2007–2013, the Journal of Social, Evolutionary, and Cultural Psychology), Evolutionary Psychological Science, Evolutionary Anthropology, Evolutionary Psychology, Evolution, Mind, and Behavior (volumes 1–5 published as the Journal of Cultural and Evolutionary Psychology; volumes 6–12 published as the Journal of Evolutionary Psychology). Only one journal oriented to evolutionary studies in the humanities provided potential respondents, the Evolutionary Review (four issues, 2010–13). Other journals that provided potential respondents in the group of evolutionary humanists included Helios, Interdisciplinary Literary Studies, Mosaic, Ometeca, Philosophy and Literature, Politics & Culture, Studies in the Novel, Style, and Utopian Studies. None of the journals for the evolutionary social scientists or the evolutionary humanists was placed on any of the other disciplinary lists.

Each of the 4,071 potential respondents was sent an e-mail invitation giving a link to the questionnaire and identifying the journal from which his or her name had been drawn. In the questionnaire, each respondent was asked to click on that journal from a drop-down list. By isolating journals within each discipline, and identifying the journal to which each respondent had contributed, questionnaire scores could be segregated into specific disciplines.

We anticipated that some journals that are not explicitly designated as evolutionary would contain articles that are evolutionary in orientation. General interest journals in psychology or anthropology, for instance, often publish articles by social scientists who also publish in the eight journals designated as explicitly evolutionary. One main purpose of the study was to assess the degree to which the beliefs of contributors to top journals in any given discipline...
would converge or diverge from the beliefs of contributors to journals that are explicitly committed to an evolutionary analysis of human behavior.

Two journals in anthropology presented a question as to whether they should be included in the evolutionary or nonevolutionary group: American Journal of Physical Anthropology and American Journal of Human Biology. We reflected that virtually no scientist contributing to an anthropology journal would deny, as physical facts, that humans have evolved or that humans are biological organisms. We distinguished those noncontroversial affirmations from the presumably more controversial affirmation that biological adaptations influence human behavior. The eight journals that served as a source for evolutionary social scientists are characterized by an explicit affirmation of that presumably controversial proposition. Since neither physical anthropology nor the study of human biology requires an affirmation of the controversial proposition that characterizes the set of eight evolutionary journals, the American Journal of Physical Anthropology and the American Journal of Human Biology were included in the group of journals that are not explicitly evolutionary in orientation. A post hoc comparison of scores among these two journals, the other anthropology journals, and the evolutionary journals confirmed the validity of the reasoning on which the segregation had been made.

Measures

The questionnaire was made available to participants via Survey Monkey. It consisted of several demographic questions, including disciplinary affiliation and the journal from which the participant was recruited. The rest of the questionnaire involved rating agreement/disagreement with a number of statements on a series of seven-point Likert scales. The statements were clustered by general theme (human universals and cultural diversity; what shapes gender; what shapes human behavior; what shapes values, beliefs, and feelings; what shapes culture; whether science can explain human behavior), and each cluster of three or four statements was followed by an option to comment on the statements (limited to 500 words per comment).

Response Rates

Given that the letters of invitation identified the source of the invitation as a journal titled Evolutionary Studies in Imaginative Culture, the authors anticipated a higher rate of response from evolutionists than from nonevolutionists. Indeed, from 1,000 letters sent to evolutionary social scientists, 208 (21%) resulted in a response, while only 199 (11.1%) of the 1,800 nonevolutionary social scientists contacted responded; 29 (41%) of the 71 evolutionary humanists responded, while 179 (14.9%) of the nonevolutionary humanists responded.

Planned Analyses

Several sets of statistical analyses were planned to examine how academics from different disciplines differed in their beliefs about human nature, culture, and science. First, descriptive statistics were computed to assess the number of valid cases for each survey item and to examine
the frequencies for each response category for the survey items.

The responses to the survey were then subjected to a principal components analysis to see if the data could be reduced to several general factors. Subsequently, items that loaded primarily on one of the general factors were combined to form reliable scales. Mean scores on these scales were compared across the 22 disciplines. Effect sizes between pairs of disciplines were calculated for 12 disciplines that had relatively large numbers of respondents and that, in addition to the 2 evolutionary groups, gave a representative sampling from among the nonevolutionary social sciences and the nonevolutionary humanities.

Next, disciplines were classified according to whether they represented one of the social sciences or one of the humanities and whether they held an evolutionary or nonevolutionary perspective. Means on the survey factors were compared for the four resulting categories (evolutionary social sciences, evolutionary humanities, nonevolutionary social sciences, nonevolutionary humanities) with a 2x2 analysis of variance (ANOVA).

RESULTS

Descriptive Statistics

The number of respondents, means, and standard deviations for each survey item are shown in table 1. Of the 634 respondents, valid responses were received from 614 to 633 (min./max.) of the participants to most of the survey items. The three items on causes of cognitive and behavioral differences among ethnic and racial groups were answered by only 162 to 164 participants because these items were administered only to participants who agreed with a previous item stating that such differences existed.

Means ranged from a low of 2.33, for “Cultures vary so widely that one cannot identify any important underlying commonalities of values, beliefs, and feelings among all cultures,” to a high of 6.28, for “Human behavior is produced by an interaction between genetically transmitted characteristics and environmental conditions, including cultural conventions.” Distributions of responses were skewed for about half of the items, but even items where participants leaned toward the high or low end showed sufficient endorsement frequencies across the seven response categories to subject the responses to principal components analyses.

Results of Principal Component Analysis

An exploratory principal components factor analysis initially identified six factors with eigenvalues greater than 1. However, the sixth factor was defined by only one item, so the analysis was repeated, specifying a five-factor solution. Items assessing a common theme tended to load highly on the same factor except for the four items dealing with cognitive and behavioral differences among ethnic/racial groups. Because of the low response rate for three of these items and unclear loadings from all of them, they were excluded from the final principal components analysis, which produced a clearly interpretable four-factor solution accounting for 60% of the total variance.

The first factor, accounting for 31.5% of the total variance, was defined primarily by six items stating that the environment produces human behavior, values, beliefs, feelings, and gender identities and that culture operates independently of genetics. We labeled this factor Environmental Determinism.

The second factor, accounting for 12.6% of the total variance, was defined by the four items stating that science can explain nature, human behavior, imaginative artifacts, and subjective human experience. We labeled this factor Scientific Explanation.

The third factor, accounting for 9% of the total variance, was defined by six items stating that genes produce human nature, behavior, values, beliefs, feelings, gender identities, culture, and the human life cycle. We labeled this factor Genetic Determinism.
TABLE 1 Responses to Survey Items.

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humans have a nature, a species-typical set of characteristics that are</td>
<td>633</td>
<td>5.57</td>
<td>1.57</td>
</tr>
<tr>
<td>genetically transmitted, that have evolved in an adaptive relationship to</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>the environment, and that form an underlying unity for all diversity in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>culture and individual behavior.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cultures vary so widely that one cannot identify any important</td>
<td>633</td>
<td>2.33</td>
<td>1.55</td>
</tr>
<tr>
<td>underlying commonalities of values, beliefs, and feelings among all</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cultures.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>The human life cycle (birth, growth, reproductive maturity, old age,</td>
<td>631</td>
<td>5.36</td>
<td>1.63</td>
</tr>
<tr>
<td>death) is regulated by a species-wide set of genetically transmitted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>adaptations shaped by natural selection.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender identities in humans are produced predominantly or exclusively</td>
<td>624</td>
<td>3.58</td>
<td>1.83</td>
</tr>
<tr>
<td>by biological characteristics, that is, by genetically encoded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>behavioral dispositions mediated by anatomy, hormones, and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>physiology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender identities in humans are produced predominantly or exclusively by</td>
<td>623</td>
<td>3.21</td>
<td>1.71</td>
</tr>
<tr>
<td>environmental conditions, including cultural conventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender identities in humans are produced by an interaction between</td>
<td>629</td>
<td>5.96</td>
<td>1.36</td>
</tr>
<tr>
<td>genes and environmental conditions, including cultural conventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human behavior is produced predominantly or exclusively by genetically</td>
<td>624</td>
<td>2.58</td>
<td>1.55</td>
</tr>
<tr>
<td>transmitted characteristics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human behavior is produced predominantly or exclusively by environmental</td>
<td>624</td>
<td>3.21</td>
<td>1.74</td>
</tr>
<tr>
<td>conditions, including cultural conventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human behavior is produced by an interaction between genetically</td>
<td>629</td>
<td>6.28</td>
<td>1.09</td>
</tr>
<tr>
<td>transmitted characteristics and environmental conditions, including</td>
<td></td>
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<td></td>
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<tr>
<td>cultural conventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culture is produced by genetically transmitted human behavioral</td>
<td>625</td>
<td>4.25</td>
<td>2.05</td>
</tr>
<tr>
<td>dispositions interacting with environmental conditions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Culture is not constrained by genetically transmitted human</td>
<td>622</td>
<td>2.98</td>
<td>1.95</td>
</tr>
<tr>
<td>behavioral dispositions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>During human evolution, genes and culture have had cumulative</td>
<td>620</td>
<td>5.58</td>
<td>1.52</td>
</tr>
<tr>
<td>causal effects on each other, with genetic changes leading to cultural</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>developments, and with cultural developments leading to genetic</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>changes.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Culture evolves independently of human biological evolution.</td>
<td>619</td>
<td>2.92</td>
<td>1.89</td>
</tr>
<tr>
<td>Human values, beliefs, and feelings are derived exclusively or</td>
<td>620</td>
<td>3.41</td>
<td>1.85</td>
</tr>
<tr>
<td>predominantly from cultural conventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human values, beliefs, and feelings are derived exclusive or</td>
<td>621</td>
<td>2.46</td>
<td>1.37</td>
</tr>
<tr>
<td>predominantly from genetically transmitted characteristics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human values, beliefs, and feelings are produced by an interaction</td>
<td>627</td>
<td>5.89</td>
<td>1.39</td>
</tr>
<tr>
<td>between adaptations shaped by selection and environmental conditions,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>including cultural conventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>There are significant differences among ethnic and/or racial groups —</td>
<td>614</td>
<td>2.95</td>
<td>1.95</td>
</tr>
<tr>
<td>differences that include behavioral dispositions and/or cognitive</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>capacities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant cognitive and/or behavioral differences among ethnic and/</td>
<td>163</td>
<td>3.82</td>
<td>2.00</td>
</tr>
<tr>
<td>or racial groups are attributable exclusively to environmental</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>conditions, including cultural conventions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant cognitive and behavioral differences among ethnic and/or</td>
<td>164</td>
<td>2.57</td>
<td>1.58</td>
</tr>
<tr>
<td>racial groups are attributable exclusively to heritable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>characteristics.</td>
<td></td>
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</tr>
</tbody>
</table>
The fourth factor, accounting for 6.9% of the total variance, was defined by four items dealing with the interactive effects of genes and environments on each other and on human behavior, values, beliefs, feelings, and gender identities. We labeled this factor Gene–Environment Interactionism.

Scales were created by summing the items whose high loadings defined each factor, and Cronbach alpha reliability estimates were calculated. These reliability coefficients were as follows: Environmental Determinism, .79; Genetic Determinism, .79; Gene–Environment Interactionism, .75; and Scientific Explanation, .88.

Although the varimax orthogonal rotation forced the four principal component factors to correlate zero with each other, each of the four scales was constructed from only a subset of the highest-loading items and therefore could correlate with each other. Table 2 presents the intercorrelation matrix for the four scales. This table shows that Genetic Determinism, Gene–Environment Interactionism, and Scientific Explanation all intercorrelated positively, indicating that persons endorsing one of these beliefs tend to endorse the others. In contrast, Environmental Determinism correlated negatively with all three for these scales, indicating that persons who believe in environmental determinism tend to reject the other three beliefs.

**Comparison of Individual Disciplines**

The next set of results covers comparisons between individual disciplines on the four factor-scale scores. First, some representative disciplines illustrate patterns of scores on the four factors. Then, for each of the four factors, a graph (figure 1) shows the ranking of all disciplines, followed by a table comparing scores between disciplines by listing of all Cohen’s \( d \) effect sizes that are .20 or greater. For each of the four factors, there are 12 disciplines in the graph that also appear in the table of effect sizes. These disciplines are represented by black bars in the graph. The other 10 disciplines in the graph are represented by light gray bars.
Disciplines representing environmental emphasis, genetic emphasis, and intermediates. Figure 1 shows factor-scale scores for six disciplines that represent a range of scores on the four factors. Note the similar “stair-step” pattern between Genetic Determinism and Gene–Environment Interactionism, with the six disciplines showing nearly identical rankings. Scientific Explanation shows a less clear but comparable pattern. The clear pattern in Genetic Determinism and Gene–Environment Interactionism is reversed for Environmental Determinism.

Environmental Determinism effect sizes. Figure 2 presents a ranking of disciplines on the Environmental Determinism factor from low to high. (The number of respondents in each discipline is noted parenthetically after the name of the discipline.) Note that the two explicitly evolutionary groups rank lowest on this factor. Disciplines from the social sciences and humanities can be found along all points of the continuum, with drama, sociology, and visual arts showing the highest scores.

Table 3 compares Environmental Determinism scores between disciplines. Note the shading and font code that distinguishes the smallest Cohen’s $d$ effect size considered (at least .20 but less than .45; for example, the difference between evolutionary social science and psychology) up to the largest observed effect sizes (1.5 standard deviations or greater).

Genetic Determinism effect sizes. Figure 3 presents a ranking of disciplines on the Genetic Determinism factor from low to high. This ranking is largely a reversal of the ranking on Environmental Determinism (Spearman’s rho = –.64) with the two evolutionary groups this time at the very top.

Table 4 presents a comparison of disciplines on Genetic Determinism, listing the Cohen’s $d$ effect sizes greater than .20. The highest scorer, evolutionary humanities, distinguished itself from the crowd, showing effect sizes greater than 1.50 with five other disciplines and effect sizes between 1.00 and 1.50 with four disciplines. The evolutionary humanities were even half a standard deviation above the evolutionary social sciences on this factor.

Gene–Environment Interactionism effect sizes. Figure 4 ranks disciplines from high to low on the Gene-Environment Interactionism factor. This ranking was similar to the ranking for Genetic Determinism (Spearman’s rho = .67); as was the case with that factor, evolutionary...
FIGURE 2  Environmental Determinism Factor Scores.

TABLE 3  Environmental Determinism Effect Sizes.

<table>
<thead>
<tr>
<th></th>
<th>Evol Social Science</th>
<th>Evol Humanities</th>
<th>Psychology</th>
<th>Empirical Study of the Arts</th>
<th>Philosophy</th>
<th>Political Science</th>
<th>Education</th>
<th>History &amp; Philosophy of Science</th>
<th>History</th>
<th>Sociology</th>
<th>Anthropology</th>
<th>Literary Study</th>
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</tbody>
</table>

0.2 - 0.449, 0.450 - 0.649, 0.650 - 0.949, 0.950 - 1.49, 1.5 and up

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humanities and evolutionary social sciences lead all disciplines, with ethnic studies at the very bottom. However, in contrast to the first two factors, which showed a great disparity across disciplines, all disciplines were on average in agreement with the proposition that human behavior is a function of gene–environment interaction. The lowest-scoring discipline, ethnic studies, had a score of 4.53, which is in the range of agreement.

Table 5 compares the disciplines that differ on Gene–Environment Interactionism by a
### TABLE 5  Gene–Environment Interactionism Effect Sizes.

<table>
<thead>
<tr>
<th></th>
<th>Evol Social Science</th>
<th>Evol Humanities</th>
<th>Psychology</th>
<th>Empirical Study of the Arts</th>
<th>Philosophy</th>
<th>Political Science</th>
<th>Education</th>
<th>History &amp; Philosophy of Science</th>
<th>History</th>
<th>Sociology</th>
<th>Anthropology</th>
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</tr>
</tbody>
</table>

**FIGURE 4** Gene–Environment Interactionism Factor Scores.
Cohen’s $d$ of at least .20. Effect sizes were not as great for this factor as for the previous two factors, confirming greater agreement across many disciplines that gene–environment interactions are responsible for human behavior. There were no Cohen’s $d$ scores above 1.10. The highest-scoring disciplines, evolutionary humanities and evolutionary social sciences, showed the most divergence from other disciplines, with the latter exhibiting somewhat higher $d$ scores because of the larger sample size for this group.

**Scientific Explanation effect sizes.** Figure 5 presents the ranking of disciplines on Scientific Explanation. Unsurprisingly, the social sciences tended to score higher than the humanities, with economics, political science, and evolutionary...
social science displaying the highest scores, while drama, literary study, and music displayed the lowest scores.

Table 6 presents differences in Scientific Explanation across disciplines, listing all differences represented by a Cohen's $d$ of at least .20. Although a number of significant differences between disciplines can be found, the largest $d$s are found with literary study, which scores at least 1.5 standard deviations lower than six other disciplines, including over 2 standard deviations lower than evolutionary social science. Evolutionary social science, which scored higher than any other discipline, also showed very large differences with education, history and philosophy of science, history, sociology, and anthropology.

**Results of 2x2 Analyses of Variance**

Disciplines were classified as belonging to either the social sciences or humanities and as being either evolutionary or nonevolutionary. The disciplines’ classifications into the resulting four categories were as follows. Evolutionary Social Sciences included one discipline: evolutionary social science ($N = 208$). Nonevolutionary Social Sciences included 10 disciplines: anthropology, communication, criminology, economics, education, empirical study of the arts, political science, psychology, sociology, and women's/gender studies ($N = 199$). Evolutionary Humanities included one discipline, evolutionary humanities ($N = 28$). And Nonevolutionary Humanities included 10 disciplines: drama, ethnic studies, film studies, history, history and philosophy of science, literary study, music, philosophy, religious studies, and visual arts ($N = 178$).

Means and standard deviations for the four groups on Environmental Determinism, Genetic Determinism, Gene–Environment Interactionism, and Scientific Explanation are shown in table 7.

The 2x2 ANOVAs showed the following significant effects.

First, Nonevolutionists scored higher than Evolutionists on Environmental Determinism, $F(1,609) = 79.20, p < .001$.

For Genetic Determinism, there was a significant statistical interaction, $F(1,610) = 6.20, p < .05$, between the Evolutionary/Nonevolutionary factor and the Social Sciences/Humanities factor. There were significant simple effects for the Evolutionary/Nonevolutionary factor, with evolutionary social scientists scoring higher than nonevolutionary social scientists, $F(1,610) = 54.97, p < .001$, and evolutionary humanists scoring higher than nonevolutionary humanists, $F(1,610) = 40.80, p < .001$, but the mean difference between the evolutionists and nonevolutionists was greater for the humanists. Another way to look at the statistical interaction is that there was no significant

<table>
<thead>
<tr>
<th>TABLE 7 Factor Scores for Evolutionists, Nonevolutionists, Social Scientists, and Humanists.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Environmental Determinism</td>
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<tr>
<td>Social Sciences</td>
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<tr>
<td>Gene–Environment Interactionism</td>
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<td>Social Sciences</td>
</tr>
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</table>
difference between the nonevolutionary social scientists and nonevolutionary humanists, \( F(1,610) = .09, \) n.s., while the evolutionary humanists scored even higher than the evolutionary social scientists, \( F(1,610) = 7.00, p < .01. \)

The \( 2 \times 2 \) ANOVA for Gene–Environment Interactionism showed only a significant main effect of the Evolutionary/Nonevolutionary factor, \( F(1,610) = 34.63, p < .001, \) with the evolutionists endorsing gene–environment interactionism more strongly than nonevolutionists.

There were two main effects on Scientific Explanation scores. The evolutionists scored higher on this scale than nonevolutionists, \( F(1,596) = 68.25, p < .001. \) And the social scientists scored higher than the humanists, \( F(1,596) = 19.22, p < .05. \)

### Views on the Existence of Racial/Ethnic Differences

The participants’ responses to the four items assessing their views on racial/ethnic differences unexpectedly did not align coherently with their responses to the other items, so responses to these items were examined separately. More participants (\( N = 614 \)) responded to the item on the existence of racial/ethnic differences than to the other three items (\( Ns = 162–164 \)), so this item was analyzed first. We split the sample at the scale midpoint, 4, forming two groups: those who disagreed that racial/ethnic differences exist and those who agreed that such differences exist. A cross-tabulation of those groups with the two other groupings (evolutionary/nonevolutionary; social sciences/humanities) produced the distribution of participants shown in table 8.

A chi-square (Fisher’s Exact Test) indicated that the overall proportions in table 8 differed from what would be expected by chance, \( p < .05. \) Looking at the cells individually, the number of Evolutionary Social Scientists and Evolutionary Humanists who agreed that racial differences exist was exactly what would be expected by chance. This means that membership in these two categories had no impact on agreeing or disagreeing with the existence of racial differences. However, the Nonevolutionary Social Scientists agreed that racial differences exist at a greater level than expected by chance, while the Nonevolutionary Humanists disagreed that racial differences exist at a greater level than expected by chance. To be clear, all four groups denied racial differences more often than they affirmed them. But the Nonevolutionary Social Scientists affirmed racial differences more often than expected while the Nonevolutionary Humanists denied them more often than expected by chance.

Although there were only 162–164 valid cases for the three items on causes of ethnic/racial differences, tentative analyses were undertaken to see if data from those items might be used. The item attributing ethnic/racial differences to the environment correlated zero with the item attributing these differences to heritable factors and

### TABLE 8 Scores on Racial and/or Ethnic Differences.

<table>
<thead>
<tr>
<th>Racial and/or ethnic differences</th>
<th>do exist</th>
<th>do not exist</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>observed</td>
<td>expected</td>
<td>observed</td>
</tr>
<tr>
<td>Evolutionary Social Sciences</td>
<td>58</td>
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</tr>
<tr>
<td>Evolutionary Humanities</td>
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<td>15</td>
</tr>
<tr>
<td>Nonevolutionary Social Science</td>
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<td>Nonevolutionary Humanities</td>
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<tr>
<td>Totals</td>
<td>152</td>
<td>349</td>
<td>501</td>
</tr>
</tbody>
</table>
r = -.39 with the item attributing these differences to gene–environment interactions. The heritability item and gene–environment interaction item correlated r = .24. Combining the items into a scale with the environmental item reversed produced a scale with a Cronbach alpha of only .45, well below the accepted minimum of .70. A 2x2 ANOVA on the scale showed no significant effects of academic affiliation on perceived cause of racial and/or ethnic differences. Separate 2x2 ANOVAs on the individual items also showed no significant effects. In short, no meaningful conclusions could be drawn about academics' views of the causes of racial and/or ethnic differences.

The Four Factors: Cross-Disciplinary Clustering

Do the nonevolutionary social sciences and the nonevolutionary humanities form separate, internally cohesive blocs that can be defined by shared ideas about human nature and culture, and by shared attitudes toward science? On the three factors that isolate causal beliefs—Environmental Determinism, Genetic Determinism, and Gene–Environment Interactionism—they most definitely do not, but the humanities come much closer to forming a cohesive group than the social sciences do. One main segment of the social sciences—anthropology, sociology, education, and women's or gender studies—clusters with the core humanities disciplines: literary study, history, history and philosophy of science, ethnic studies, and visual arts. Another main segment of the social sciences—psychology, empirical study of the arts, economics, and political science—has scores closer to those of the evolutionists than to those of the group constituted by most of the humanities and by social sciences such as anthropology and sociology. Communication and criminology do not contribute much to polarization between the nonevolutionary social sciences and humanities. They have small Ns and also display mid-range scores. On the third causal factor, Gene–Environment Interactionism, the variation among disciplines is much smaller than on the other two causal factors but the distribution of disciplines is similar.

The two evolutionary groups occupy the lowest-scoring positions on Environmental Determinism and the highest-scoring positions on Genetic Determinism and Gene–Environment Interactionism; they are both in the top half of the distribution on Scientific Explanation. Psychology and empirical study of the arts score in the bottom half of the distribution on Environmental Determinism and in the top half on Genetic Determinism, Gene–Environment Interactionism, and Scientific Explanation. In that respect, they remain in close association with the two evolutionary disciplines and also with philosophy and political science.

Economics and political science form a small subgroup to themselves. They are adjacent in scoring sequence on all four factors: moderately low on Environmental Determinism and quite high on both Genetic Determinism and Scientific Explanation; on Gene–Environment Interactionism, they split the middle (positions 11 and 12 in the sequence of 22).

In contrast to scores on the three causal factors, on Scientific Explanation there is a greater pull toward polarization between the social sciences and humanities, with the social sciences tending toward scientific affirmation and the humanities toward skepticism. But even on this factor, one humanities discipline (philosophy) scores in the top half of the distribution, and two social science disciplines (anthropology and women's or gender studies) score in the bottom half. Anthropology scores lower than the history and philosophy of science, and women's or gender studies scores lower than both anthropology and history. Sociology, though in the top half of the distribution, scores lower than eight other disciplines, including both the evolutionary humanities and philosophy.

If we separate the 22 disciplines into just 4 components—evolutionary, nonevolutionary,
social science, and humanities—the 2x2 ANOVAs reveal that on the three causal factors the only statistically significant difference is that between evolutionists and nonevolutionists. On the fourth factor, Scientific Explanation, the evolutionists score significantly higher than the nonevolutionists, and the social scientists also score higher than the humanists. However, the broad patterns revealed in the 2x2 ANOVAs contain substantial variation both within each of the two nonevolutionary groups and between the two evolutionary groups. The largest variation appears in the nonevolutionary social sciences. On all four factors, the graphs displaying scores for individual disciplines do not form sharply demarcated blocs but rather fairly continuous slopes from high to low on each factor. In all four of those slopes, some social science disciplines rank near the top, and others near the bottom.

The evolutionists score in the terminal positions of the sequence on all three causal factors, but the differences between the evolutionists and the highest-scoring nonevolutionary disciplines are smaller than the differences among the highest-scoring nonevolutionary disciplines and the lowest-scoring nonevolutionary disciplines. For example, the differences between scores for the evolutionary social sciences and for psychology are consistently smaller than the differences between scores for psychology and for anthropology, sociology, education, and women’s or gender studies. On Environmental Determinism, for example, the Cohen’s d (effect size) for the difference in scores between the evolutionary social sciences and psychology is .26, a small difference. In contrast, the Cohen’s d for psychology and sociology is 1.22, for psychology and literary study 1.00, for psychology and anthropology .96, and for psychology and women’s or gender studies .75—all large effect sizes.

The two evolutionary groups are adjacent at far ends of the scales on Environmental Determinism, Genetic Determinism, and Gene–Environment Interactionism. They thus form a distinct pair, but not a pair radically disjunctive from the nonevolutionary disciplines. On Environmental Determinism, the distance (.3) between the mean of the evolutionary humanities (2.1) and the mean of the evolutionary social sciences (2.4) is greater than the distance between the mean of the evolutionary social sciences and that of film studies (2.54), philosophy (2.6), and psychology (2.66). On Genetic Determinism, the distance (.59) between the mean of the evolutionary humanities (5.06) and the evolutionary social sciences (4.47) is greater than the distance between the means of the evolutionary social sciences and economics, political science, film studies, psychology, religious studies, philosophy, empirical studies of the arts, communication, and visual arts. On this factor, the evolutionary humanities could be said to form a group of one, standing apart from the next 10 disciplines in the sequence. Even so, the distance (.59) between the mean of the evolutionary humanities and that of the evolutionary social sciences is dwarfed by the distance (1.43) between the mean of the evolutionary social sciences (4.47) and that of anthropology (3.04).

On Gene–Environment Interactionism, the means for the two evolutionary groups are only .01 apart, but the distance between that mean and the next three disciplines (communication, psychology, and film studies) is less than a tenth of a point. When the evolutionists are set off against all the nonevolutionary disciplines, in an ANOVA, they score significantly higher. If the 5 highest-scoring disciplines were grouped together, however, and set off against the remaining 17, that group of 5 would score significantly higher than the group of 17. The point here is that on the three causal factors, there is in fact no sharp break between the two evolutionary disciplines and other disciplines. A more important difference is the very sharp contrast between the high and low ends of the scales on Environmental and Genetic Determinism; on Gene–Environment Interactionism, the contrasts are much less
sharp but still distinct—distinct enough so that the two evolutionary disciplines alone, despite their close proximity to other disciplines, score significantly higher than all nonevolutionary disciplines clustered together.

On the ANOVA for Scientific Explanation, there was a significant main effect for the Evolutionary-Nonevolutionary factor. This means that the two evolutionary disciplines together score on average significantly higher than the weighted average of all the nonevolutionary disciplines combined. However, there was also a significant main effect for the Social Sciences-Humanities factor. The evolutionary humanities actually score lower on Scientific Explanation than political science, economics, and the empirical studies of the arts. The evolutionists score significantly higher than all non-evolutionary disciplines combined because the evolutionary social sciences score highest and because disciplines at the low end of the scale score very low. The Cohen's $d$ for the evolutionary social sciences and literary study (2.27) is the largest in the study, and it is accompanied by other large effect sizes for the evolutionary social sciences and history (1.47), history and philosophy of science (1.45), anthropology (1.41), education (1.18), and sociology (1.08).

On Scientific Explanation, the distance between the mean of the evolutionary social sciences (5.54) and that of the next highest scorer (political science, 5.27) is not very great. Accordingly, the Cohen's $d$ for political science and literary study (1.93) is the second largest effect size in the survey. Literary study scores so low on this factor that it has large Cohen's $d$ effect sizes with disciplines that it clusters with on the Environmental and Genetic Determinism factors, such as sociology (Cohen's $d$ 1.04) and education (Cohen's $d$.93). But literary study is not isolated and anomalous. It scores higher (mean = 2.92) than drama (mean = 2.58) and only a little lower than music (mean = 2.96) and ethnic studies (mean = 3.09). The distance between the mean of literary study (2.92) and the mean of anthropology (3.76) is .84. That is less than half the distance between the means of anthroplogy and evolutionary social science (distance = 1.78). The effect size for the difference between anthropology and literary study is .59, a little more than half a standard deviation. In contrast, the effect size for the difference between anthropology and the evolutionary social sciences (Cohen's $d$ = 1.41) is nearly one and a half standard deviations.

Do scholars and scientists who affirm that human behavior is heavily influenced by biology also tend to affirm the validity of scientific explanation? Yes, they do. The ANOVA results tell us that much by isolating the two evolutionary disciplines and noting that they score significantly higher than the other 20 disciplines taken as a group. But evolutionary ideas have penetrated into other disciplines also—disciplines such as psychology, philosophy, and political science. Comparing factor scores among all the respondents, Scientific Explanation correlates negatively with Environmental Determinism ($r$ = -.40, $p < .001$), positively with Genetic Determinism ($r$ =.54, $p < .001$), and positively also with Gene-Environment Interactionism ($r$ = .28, $p < .001$).

To sum up, the two evolutionary disciplines pair up fairly closely on all four factors, but on three factors—Environmental Determinism, Genetic Determinism, and Scientific Explanation—the differences in mean score between the two are greater than the differences between one of the two evolutionary disciplines and one or more of the nonevolutionary disciplines. Polarization in beliefs and attitudes is a reality, but it is neither a complete polarization between the evolutionary and nonevolutionary disciplines nor between the social sciences and humanities. It is a polarization, on the causal factors, between Environmental and Genetic Determinism; and on Scientific Explanation, between science affirmers and science skeptics. Humanities and social science disciplines are strung out all along the slopes between the terminal points on these two scales. ANOVA results inform us that in the nonevolutionary humanities, the center
of gravity is located toward the bottom of the scale for Genetic Determinism and also for Scientific Explanation. In the nonevolutionary social sciences, the center of gravity is located somewhat closer to the top of the scale for Scientific Explanation. On the three causal factors, the nonevolutionary social sciences are distributed along the whole scale—with representatives at both ends and in the middle.

Two Polarized Groups: Genetic Emphasis and Environmental Emphasis

To isolate main tendencies in the scoring pattern, the 22 disciplines can be divided into two groups, one group emphasizing environmental causes, and the other genetic causes (see figure 6).

This division was achieved by apportioning scores on the three causal factors into top and bottom halves. Eight disciplines score in the top half of the distribution on Environmental Determinism and in the bottom half on Genetic Determinism. (Six of the eight also score in the top half on Gene–Environment Interactionism). Another eight disciplines score in the bottom half of the distribution on Environmental Determinism and the top half on Genetic Determinism. (Seven of those eight also score in the top half on Gene–Environment Interactionism). The remaining six disciplines (ethnic studies, music, religious studies, visual arts, criminology, and communication) can be distributed between the two groups on the basis of scoring in the environmental or genetic categories on two out of three factors (with scoring in the top half of Gene–Environment Interactionism counting in the genetic category). Disciplines in the environmental-emphasis group include anthropology, drama, education, ethnic studies, history, history and philosophy of science, literary study, music, religious studies, sociology, visual arts, and women's or gender studies (N = 264). Disciplines in the genetic-emphasis group include criminology, communication, economics, empirical study of arts, evolutionary humanities, evolutionary social sciences, film studies, philosophy, political science, and psychology (N = 351).

![Figure 6](image-url)
The polarization of causal scores correlates with the polarization of scores on Scientific Explanation. Ten of the twelve disciplines in the environmental-emphasis group score in the bottom half of the distribution on Scientific Explanation. Nine out of ten of the disciplines in the genetic-emphasis group score in the top half of the distribution on Scientific Explanation.

DISCUSSION

Genes, Environments, and Culture: What People Believe

Three central themes are embedded in the survey: (1) beliefs about the relationship between genes and environments, (2) beliefs about the specific character of culture as a feature of the environment, and (3) beliefs about scientific explanation. We shall first examine beliefs about relationships among genes, environments, and culture, then the correlation between causal beliefs and beliefs about the validity and scope of scientific explanation.

Statements on beliefs about culture are crucially important because scholars and scientists who emphasize “environment” are in most cases thinking much less of the physical environment than of the social and cultural environment. “Environment” is the more encompassing term, but “culture” or “society” is the term that most scholars emphasize when designating causes of behavior, gender identity, values, beliefs, and feelings. That kind of emphasis is evident in many of the comments offered by respondents, for example:

In my view, “environmental conditions” don’t simply include “cultural conventions”; they’re inevitably shaped by and understood through the lens of cultural conventions and have virtually no existence apart from these. (literary study)

I have a hard time responding to these questions because I believe that humans can have a “nature”—in the sense of certain patterns of behavior that are reproduced across cultural contexts—without that necessarily being genetically transmitted or programmed. It’s rather classically sociological, I suppose, to think that the problem of social life creates some universal human characteristics, that are derived more from the institutional structures we are born into than the genetic material we are born with. (sociology)

“Gender identity” is itself a cultural term and concept, whose content has changed in recent years. (history)

Not being what is called an “essentialist,” I’m inclined to say that human beings have a history rather than a “nature,” and that what counts as being human is contingent upon many variable conditions, so that the “man–animal” relationship is open and subject to local social, cultural, and historical qualification. (literary study)

Such comments need to be taken into account when registering what respondents mean in producing scores that are incorporated in the factor Environmental Determinism.

Designating either group in figure 6 as “determinist”—environmental or genetic—would evidently be a mistake. On Environmental Determinism, the group emphasizing environmental causes scores below 4.0—the score stipulating “neither agree nor disagree.” On Genetic Determinism, the group emphasizing genetic causes scores between the neutral 4.0 position and 5.0, which is the lowest level of affirmative agreement. On Gene–Environment Interactionism, the genetic-emphasis group scores higher than the environmental-emphasis group, thus moderating their emphasis on genetic causes. Both groups score well into the affirmative range on Gene–Environment Interactionism.

Do the two groups then basically agree on the range of causal factors, differing only in their emphasis on one or the other of the causal factors? Many of the written comments do suggest...
a difference of emphasis, but sometimes the
difference in degree amounts to a qualitative
difference; strong causal primacy is accorded either
to genes or environments, especially cultural envi-
ronments. Here below is a sampling of statements
on genetic and environmental primacy.

I think that human behavior is determined, not
exclusively, but predominantly by environmental
conditions, including cultural conventions. (his-
tory and philosophy of science)

I believe gender identity reflects a mixture of
genetic and cultural inputs, with the genetic
being somewhat more important. (evolution-
ary social sciences)

Even if there may be cases in which genetics
has influence on gender identity, I think that
this case is the exception. (history and philos -
ophy of science)

All characteristics are produced by interactions
between genes and “environmental” condi-
tions if we define “environmental” broadly to
include other genes (i.e., the environment of
one gene is other genes). But, it’s highly doubt-
ful that cultural conventions influence gender
identity too strongly. If cultural conventions
influenced gender identities, and were gender
identity merely an arbitrary social construc-
tion, humans wouldn’t be here anymore. The
genes hold culture on a leash to some degree.
(evolutionary social sciences)

The extent to which a gender identity is outward-
ly expressed is mediated by one’s environmental
acceptance of fluctuating gender identities, but
the underlying gender self-identity is almost
exclusively biologically based. (Thus, my view
of an interaction.) (evolutionary social sciences)

The interaction is the only possible real answer,
but statistically it is clear that biological
characteristics are the more important factor in
it. (evolutionary social sciences)

Clearly there is some sort of interaction.
Which predominates? I tend to give the nod to
environmental factors. (history)

Interaction—but “genes” are more important.
(political science)

I agree that biological characteristics play a role
in gender-identity formation, but I suppose
I absolutely disagree that they do so “predomi-
nantly.” (literary studies)

While the third statement, human behavior
being produced by an interaction, appears
more compelling to me, the role of genetically
transmitted characteristics are likely to be more
decisive. (political science)

Differences of emphasis allow for alternative
hypotheses to be tested empirically. But confir-
mation or falsification of competing hypotheses
requires that the formulators of the hypotheses
agree on the meaning of terms. What precisely is
“culture”; what is its origin? And how indepen-
dent is it as a causal agent? The comments suggest
conflicting answers to these questions. Comments
from disciplines giving emphasis to genetic causes
identify culture as essentially constrained and
channeled by genes. Comments from disciplines
giving emphasis to environmental causes suggest
that culture operates in largely autonomous ways,
overwhelming biological constraints. In one form,
this belief implies a kind of dualism in which cer-
tain aspects of life are controlled by biology, while
other aspects are purely cultural. A version of this
culturalist dualism posits a sharp break between
biology and culture: biology is a physical fact but
has no influence on identity, values, or beliefs.
Here below is a sampling of statements reflecting
these different ideas about what culture is and how
it operates as a causal force.

Culture originates in biology and is
channeled by it

Biological and social experiences do shape
parts of the life cycle (like speed of growth,
timing of reproductive maturity), but the cycle itself exists through natural selection, and many of the experience-moderators are themselves adaptations. (political science)

Surely the predominance of pentatonic music in various cultures (e.g.) has quite a lot to do with the way that the human brain processes sound, which is a result of various evolutionary forces pre-dating culture. (philosophy)

Clearly things like reproductive maturity, taboos, growth rates, religions, etc. are all a product of our evolved genetic abilities and fairly free to vary as a function of the cultural institutions and norms that develop in path-dependent ways and in response to different ecological settings. Part of human nature is to be a cultural species. (evolutionary social science)

Many genetically transmitted traits are likely shaped by cultural conventions (that is, culture can exert selection pressures on genes), and as recent work in epigenetics is starting to show, the same genes often express themselves differently depending on different environmental triggers. And conversely, cultural conventions don’t come out of thin air; our capacities to be attuned to culture are rooted in genetically evolved cultural learning. (psychology)

CULTURE IS AUTONOMOUS OR PRIMARY

I would prefer to say that “genes and culture have had cumulative causal effects on each other, with genetic changes leading to cultural developments, and with cultural developments leading to genetic changes” in pre-historic times, until the emergence of Homo sapiens; and that “culture has evolved independently of human biological evolution” ever since. (anthropology)

While there is a biological human nature, shaped by evolution, one of its components is high intelligence (with a few, prominent, exceptions), allowing for a high degree of behavioural flexibility. Hence, human cultures are extremely diverse and complex, making it all but impossible to discern how much of our behaviour is “natural.” (history and philosophy of science)

The problem I see in these questions is that they take as an epistemological starting point an ontological divide between nature and culture. Yet I believe that this divide itself is a cultural product. (anthropology)

SOME ASPECTS OF CULTURE ARE CONSTRAINED BY BIOLOGY, AND SOME ARE NOT

Important aspects of human “nature” are genetically transmitted, but given that an essential part of our human nature is to participate in symbolic culture, that is a matter of shared agreements—which are not genetically determined. (anthropology)

Values I take to be cultural. Beliefs? Well, what do you have in mind? My belief that something is colored certainly has a genetic/biological component; I “come equipped” to perceive some colors and sounds, for example. But my beliefs about kinship systems? Don’t see a genetic component creating those beliefs. Not sure what is meant by “feelings.” Perhaps there is a natural aversion to certain things, e.g., spiders. But feeling patriotic? Again, I see a larger cultural component to most of these matters, but my weight would shift depending on topic under discussion. (history)

MEANING IS CULTURAL AND IS INDEPENDENT OF BIOLOGICAL FACT

The human species-typical set of characteristics is a set of biological characteristics, which do not determine cultural characteristics. All the stages of the human life cycle (even birth and death), although with a biological substratum, are endowed with different meanings in different cultures. (history and philosophy of science)

Human capacities to acquire patterns of thought and behavior are inherited, but this
does not mean that there is an “underlying unity” other than this innate plasticity. Even aspects of the life cycle, though regulated by inherited traits, is flexible. More importantly, “life” and “cycle” are themselves subjectively apprehended, and so even if people’s biological life went through a fixed series of stages or processes, its formation as a “life” depends on how that individual’s mind sees itself and has learned to see itself. (anthropology)

Maybe it is true that hormones strongly govern whether someone feels to be a man or woman. But then again, what it means to be a man, i.e., the gender identity, is a purely cultural question. (sociology)

Human (Darwinian) evolution/origin of species remains a theory, embedded in categories then words of human invention. No historian, of any segment of humanity, could ever agree that any such universal is absolutely true. (history)

The tendency to regard culture as an autonomous or semiautonomous force can be contrasted with an extreme biologism that denies the existence of culture altogether. The comments (numbering about 500 total) contained one such statement: “I don’t know what culture is. I see animal behavior as an effect of genes interacting with environments. I see human behavior the same way. I don’t find it necessary to invoke ‘culture’ in either case” (evolutionary social science). The opposite extreme appears in comments already quoted—statements such as “environmental conditions” have “virtually no existence” outside of “cultural conventions,” and that “the problem of social life creates some universal human characteristics, that are derived more from the institutional structures we are born into than the genetic material we are born with.”

Four Statements about Culture

The survey questionnaire contains four statements about culture. These four statements are dispersed in the factor analysis; they are associated with three separate factors. Two statements are included in the Environmental Determinism factor: “Culture is not constrained by genetically transmitted human behavioral dispositions”; and “Culture evolves independently of human biological evolution.” One statement is included in Genetic Determinism: “Culture is produced by genetically transmitted human behavioral dispositions interacting with environmental conditions.” The remaining statement is included in Gene–Environment Interactionism: “During human evolution, genes and culture have had cumulative causal effects on each other, with genetic changes leading to cultural developments, and with cultural developments leading to genetic changes.”

The idea that culture operates independently of biology appears to influence the score on one of the cultural statements in the questionnaire: “Culture is produced by genetically transmitted human behavioral dispositions interacting with environmental conditions” (see figure 7; in the graph, the phrasing in all four cultural questions has been condensed for reasons of space).

The group emphasizing environmental causes scores 3.51 in response to that first cultural statement in figure 7—below the point (4.0) of neither agreeing nor disagreeing. In other words, the group on average disagrees with the statement that culture is produced by the interaction of genes and environmental conditions. From a biological perspective, one might ask: If culture is not produced by an interaction of genes and environmental conditions, from what could it possibly be produced? What feature of any aspect of the biological world is not ultimately a product of the interaction of genes and environments? The answer “nothing” is implied in three comments:

I don’t even know what the final statement [culture evolves independently of biology] could mean. “Culture” is biological; non-living things don’t have culture. (evolutionary social sciences)
Cultural dynamics can be independent for a very long time but will then at some point tie up with biological evolution. (evolutionary social sciences)

Over more recent, and shorter time intervals culture can evolve somewhat independently of biology, but over the span of human evolution, the past 7 million years, clearly culture has not been independent of biological evolution. (evolutionary social sciences)

Both the environmental-emphasis and genetic-emphasis groups score in the affirmative range on the factor Gene–Environment Interactionism, but on the first culture question—the question about the source of culture itself—the environmental-emphasis group is particularly reluctant to acknowledge that this interaction produces culture. The implication is that culture is transcendent and autonomous; it is not a product of biological processes.

For those who look for hopeful signs of potential consensus about the relations between nature and nurture, biology and culture, some reassurance can perhaps be derived by the scores on the other three cultural questions. Both groups score in the affirmative range on the statement that culture and genes have coevolved. On the statement that culture is not constrained by genes, neither group scores in the affirmative range; that is, neither group denies that culture is constrained by genes. On the statement that culture evolves independently of biology, again, neither group scores in the affirmative range.

All three points of agreement have to be qualified. As one of the comments quoted above indicates, researchers can acknowledge that genes and culture coevolved in prehistoric times but nonetheless maintain that for modern Homo sapiens culture has become detached from biology. The idea that genes constrain culture seems hard to reconcile with the idea that culture is not produced by interactions between genes and environmental conditions. Likewise, the idea that culture does not evolve independently of biology seems hard to reconcile with the idea that culture is not produced by interactions between genes and environmental conditions. (Consider the propositions with a change of sign from negative to positive: “Culture is produced by an interaction..."

FIGURE 7 Scores on Culture Questions for Disciplines Emphasizing Genes or Environment.
between genes and environmental conditions, but culture evolves independently of biology.”)

And finally, there are substantial differences of degree in the scores of these two groups on all four statements about culture.

**Scientific Explanation and Beliefs about Biology and Culture**

The two polarized groups—genetic-emphasis and environmental-emphasis—contrast sharply on the Scientific Explanation Factor score. The group emphasizing environmental causes scores 3.54, below the affirmative range. The group emphasizing genetic causes scores 5.28, inside the affirmative range. That contrast corresponds to the negative correlation between Scientific Explanation and Environmental Determinism \((r = -.40, p < .001)\) and to the positive correlation between Scientific Explanation and Genetic Determinism \((r = .54, p < .001)\).

How are we to interpret the correlation between believing in genetic influences and believing in scientific explanation? One possible interpretation is that scientific evidence gives strong grounds for a rational belief in the biological underpinnings of human behavior and human experience. Conversely, an unwillingness to acknowledge the biological underpinnings of human behavior could motivate skepticism about science in general. These complementary hypotheses both posit a causal relation between belief in genetic causes and belief in science. It is, of course, also possible that some trait of intellectual character, or some more general belief system, underlies and causes both a belief or disbelief in genetic influences and a belief or disbelief in scientific evidence.

Traits of intellectual character that might influence both beliefs about science and beliefs about genetic and environmental/cultural influences include personality factors like those explored by psychologists who investigate the relations between temperament and beliefs (Eysenck and Wilson 1978; Paulhus and John 1998; Paulhus and Trapnell 2008; Graham, Haidt, and Nosek 2009; Hirsh et al. 2010; Dodd et al. 2012; Haidt 2012; Oakley 2014; Stählin, Zaal, and Skitka 2016). Much of the research exploring correlations between personality and belief systems focuses on political and ideological beliefs. Those issues seem particularly relevant to diverging beliefs about environmental and genetic causes of human behavior. Accusations of “biological determinism” have typically been accompanied by claims that belief in genetic causes undermines the hope of altering human behavior in ways concordant with liberal or progressive social ideals.

Or more aggressively, that belief in genetic causes provides a biologically grounded sanction for violence and for existing distributions of social power (Sociobiology Study Group 1976; Lewontin 1980; Lewontin, Rose, and Kamin 1984; Degler 1991; Buss and Malamuth 1996; Segerstråle 2000; Pinker 2002; Vandermassen 2005; Tybur, Miller, and Gangestad 2007; Duarte et al. 2015). A model of personality that incorporates a conception of “honesty” (the “H Factor”) might help integrate hypotheses about underlying qualities of intellectual character with hypotheses of direct causal relationships between belief in science and belief in genetic influences (Chirumbolo and Leone 2010; Lee and Ashton 2012; Rindermann, Flores-Mendoza, and Woodley 2012; de Vries et al. 2016).

Among candidates for more general belief systems that could influence the correlation between Scientific Explanation and the causal factors, one belief system emerges most prominently: the ontological and epistemological dualism suggested by many of the comments written into the questionnaire and also by disagreement with the proposition that culture is produced by interactions among genes and environmental conditions. Here below is a sampling of comments suggesting how a dualistic world view manifests itself in attitudes toward science.

Human behavior is not subject to immutable laws, and, therefore, can’t be studied scientifically.
The “social sciences” in my view, relate closer to philosophy than to the hard sciences, although some biological and psychological factors can be studied scientifically. Some subjective human experience could possibly be explained scientifically. (religious studies)

I certainly think that many aspects of nature and some aspects of human behavior, experience, and the creative arts can be explained by science. But I see scientific explanations as typically limited both by a failure to admit their own subjective biases, their own partiality, and by their emphasis on quantitative data to the exclusion of messy, unstable aspects irreducible to numbers. (literary studies)

Scientific knowledge has something to tell us about material artifacts and their production, but “human nature,” “human experience,” and “human behavior” are not empirically stable. (literary studies)

It would be important here to distinguish between “natural sciences” and “human sciences.” My agreement with these statements depends on the understanding that “human nature” (behavior, subjective experience, art, etc.) cannot be explained by hard, natural sciences, but only by interpretive, symbolic, historical sciences. (anthropology)

Perhaps good to mention that I am a Christian: I have my doubts about the truth of macro evolutionism, and strongly oppose all kinds of determinism, perhaps with divine predestination as the only exception. I believe humans are composed of a soul and a body, ergo the impossibility of scientific understanding of humans in all their facets. I notice these convictions, for which I believe to have good arguments, playing a role in answering this survey. (religious studies)

“Culture” isn’t a thing—you can’t trace origins or really ever hope to accurately describe “key characteristics” of a given cultural form (and what is that anyway—do you mean cultural group, organisational culture, what is “culture”??). Human societies are constantly shifting and changing, and figuring out how those changes happen and why they take the direction they do is a pretty fruitless enterprise. Surely biology and cultural norms are interrelated, but I don’t think any of your statements above can adequately capture what that relationship might be, and it’s really problematic to try to attribute some sort of originating force to one or the other. (women’s or gender studies)

From a dualist perspective, it might be possible for the physical world to be known by science, reduced to quantitative terms, but the human world is qualitative, irreducible, knowable only phenomenally, subjectively, in ways that cannot be either falsified or confirmed by scientific criteria of epistemic validity.

Most of the comments affirming a belief in science were similar to one another—making a distinction between what is now known (limited) and what hypothetically can be known (much less limited).

I think none of these things is likely to ever be completely known, but it’s just due to limitations in our imagination and time, and not due to in-principle barriers to any of these things (except possibly for results related to incompleteness theorems, uncertainty principles, and the like). (philosophy)

I had trouble answering these because I didn’t know if you mean can be explained with the current theories or if you meant can be explained in principle (that is, will eventually be explained by scientific theories). (evolutionary social sciences)

In theory I agree with all of these statements. In practice, I’m not sure it could ever happen. (evolutionary social sciences)
Subjective experience—not yet for sure, but maybe in the future. (evolutionary social sciences)

We’re a long way from it, but I believe it’s possible! (evolutionary social sciences)

CONCLUSION

Are the social sciences and humanities moving toward consensus about the biological underpinnings of human behavior and cultural experience? If all the disciplines discussing these questions agreed on the validity of scientific evidence, some eventual consensus would seem more likely. The low regard in which science is held by disciplines that emphasize environmental causes suggests that there are no common criteria of epistemic validity by means of which the two groups—those who emphasize genetic causes and those who emphasize environmental causes, and especially cultural causes—could work toward a reasoned consensus.

The common willingness to affirm that behavior and experience are produced by interactions between genes and environments offers some prospect for reasoned debate. Even so, ambiguities and confusions over what is meant by that interaction—what culture is, where it originates, and how independent it is—are likely to impede rational agreement, and even rational disagreement, on some of the questions that most urgently concern social scientists and humanists: the causes of human behavior, the causes of variations in behavior, the sources of personal identity, and the sources of values, beliefs, and feelings. The degree to which science can illuminate these questions is itself an issue of central concern in both the social sciences and the humanities. The failure to reach agreement on that one question is the chief obstacle impeding rational debate on all the other questions.

Insofar as affirmative scores on Gene–Culture Interactionism provide a basis for rational debate and the testing of alternative hypotheses, the question posed by the divergences of causal belief can be reduced to this: To what extent do genes constrain human behavior, identity, values, beliefs, and feelings? Or conversely, to what extent are environmental influences, and especially culture, free to shape human behavior, identity, values, beliefs, and feelings independently of genetically transmitted dispositions and capacities? Knowledge on these issues can be produced both by research on particular topics, such as child development, mating, parenting, and social behavior (Dunbar and Barrett 2007; Gangestad and Simpson 2007; Buss 2016), and by research on gene–culture coevolution and the cognitive foundations of cultural learning (Lumsden and Wilson 1981; Baumeister 2005; Richerson and Boyd 2005; Cochran and Harpending 2009; Henrich 2016). Arguments that cultural meanings are independent of biological facts can be tested by cross-cultural comparisons that identify underlying commonalities in conceptions of life phases, family and kinship, social relationships, and forms of imaginative culture, such as religions, ideologies, and the arts (Brown 1991; Dissanayake 2000; Norenzayan and Heine 2005; Carroll 2012; Antweiler 2016). Research in cognitive and affective neuroscience can test claims for phenomenal experiential diversity (Panksepp 1998; Cacioppo and Patrick 2008; Chiao 2011; Decety and Cacioppo 2011; Panksepp and Biven 2012). Is it true that all cultures experience hunger, curiosity, sexual ardor, maternal affection, or loneliness in radically different ways? Are there in fact no common biological sources for kinship systems or patriotism? These are empirical questions.

Particular empirical findings, if they are sufficiently robust—supported by converging lines of evidence—have a special status as “facts” against which hypotheses and theories can be tested. A converse but complementary kind of epistemic strength arises from the integration of individual facts within a larger network of explanatory principles. For the evolutionary social sciences and evolutionary humanities, facts can be integrated within at least four main
networks. The most comprehensive network, containing the other three, is the whole system of evolutionary biology, founded on Darwin’s theory of evolution by means of natural selection but extended and supported in the Modern Synthesis: the integration of Darwin’s theory with post-Mendelian genetics. Explanatory networks that are specific to humans, and thus to the social sciences and humanities, include human life history theory, gene–culture coevolution, and biocultural theory.


Gene–culture coevolution delineates the sequence of causal interactions, over evolutionary time scales, between physical evolution—anatomical, physiological, and neurological—and cultural practices. Many evolutionary social scientists now recognize that the human species has uniquely developed capacities for acquiring cultural learning, and that those capacities have, over millions of years, profoundly altered the human genome, shaping the body and brain and generating the potential for complex technology and social interaction (Lumsden and Wilson 1981, 1983; Boyd and Richerson 2007; Cochran and Harpending 2009; Carroll 2011; Henrich 2016).

Biocultural theory assimilates the concepts in evolutionary biology, human life history theory, and gene–culture coevolution, and brings them to bear on the interactions between culture and biologically grounded motives and passions in specific historical cultures (Turchin 2006; Smail 2008; Fukuyama 2011; Clasen 2012; Fukuyama 2014; Carroll et al. 2015; Turchin 2015). Biocultural theory offers the most obvious and direct opportunities for integrating cultural insights from the humanities within the explanatory networks made available in evolutionary social science.

Researchers who declare that human behavior cannot be studied scientifically can perhaps never be reached by appeals based on evidence gathered in research like that pursued by scientists and scholars who affirm a biological basis for human behavior. But then, there is no epistemic method or body of beliefs on which humanity as a whole has ever reached complete consensus. All over the world, large numbers of people believe in various forms of supernaturalism, both religious and merely superstitious. In the United States, creationists occupy considerable space in public discourse. Among the comments in the survey, a few express overtly religious skepticism about the premises of the survey. For instance, “Man is a spiritual being. Material factors depend on our beliefs; they can be changed by our spiritual development. I believe in spiritual factors as playing a great role in the development of individual beings as well as cultures. I don’t believe in the genetic evolution of species. There is an imprint of divinity in each person that ensures our commonalities” (ethnic studies).

Most researchers who regard human behavior as beyond the reach of science, or who deny that science has any special claims on the production of knowledge, have more academic respectability than creationists, but they are similar to creationists in that they step willingly outside the circle of knowledge susceptible to empirical falsification. Are the culturalists and bioculturalists then at an impasse, unable to find shared epistemic ground? The status quo, in intellectual as in political history, is never really stable, certainly not permanent. The statistical snapshot taken in this survey...
is a moment in time, a cross section from a landscape constantly changing, and now tending unmistakably toward an integrated biocultural understanding of human behavior. The further biocultural research goes in producing knowledge about particular cultures—opening deeper levels of inquiry, and revealing deeper networks of causal explanation—the less feasible it will seem for any serious academic discipline to claim exemption from criteria of empirical validity, and the less attraction any such claim will exercise.

WORKS CITED


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