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# The Application of Darwinism to Ideological Change, with a Case Study of Food-Safety Regulation

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Consumers in the United States are frequently exposed to news about food poisoning outbreaks. The year 2009 featured a *Salmonella* outbreak caused by contaminated peanut butter (Blaney 2009). The previous year started with a massive recall of beef processed by a California meat packer who was caught mishandling cows (Blinch and Doering 2008). This event was followed by an outbreak of *Salmonella* poisoning that was initially and incorrectly blamed on contaminated tomatoes (Garber 2008). No sooner did this food scare taper off than we heard news of a substantial ground beef recall by Whole Foods Market (Garber 2008). The news reports of recalls and food-borne disease outbreaks are almost invariably accompanied by editorials advocating larger budgets for food-safety agencies and by politicians' demands for reforms of these agencies—demands that often include the establishment of a new agency to guarantee food safety (see, for example, “The Need for Regulation” 2007; Adelman 2008; “Beef Business” 2008; “Now It’s Tomatoes” 2008; “Hazardous Peanut Butter” 2009; “Who’s Watching What We Eat?” 2009).

Responding to these demands faithfully, the federal food-safety authorities, the Food and Drug Administration (FDA) and the U.S. Department of Agriculture

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(USDA), have steadily increased their budgets in recent decades even though the effects of such efforts regarding food safety are not discernible in the number of food-borne illness outbreaks and cases reported to the Centers for Disease Control and Prevention. Such calls for increased food-safety regulation also regularly come from the local (Shannon 2009) and state (Meyer 2009) levels. Nevertheless, food-safety policy is still often criticized from both an economic (Antle 1995) and a theoretical (Yasuda 2008) point of view.

Iron triangle politics, involving industry lobbies, politicians, and bureaucrats, is often evoked to explain an expansion of government regulatory powers—powers that in fact do not promote the welfare of the entire population. A great deal of evidence shows that the drafting process for particular food-safety regulations is under the influence of various lobbying groups, such as the food industry (Nestle 2002) and the wellness industry (Luik, Basham, and Gori 2006). However, the iron triangle theory does not explain the whole picture. This theory rests on the assumption that individuals will not waste their tangible resources to act collectively when they cannot gain net benefits (Olson 1965). In reality, however, people do act collectively to promote food-safety policies that do not necessarily promote their health. For example, they form advocacy groups to lobby for stronger food-safety agencies (Bennett and DiLorenzo 1999). Also, the media's and politicians' demands for expanded government roles in food safety enjoy consumers' support. An Associated Press poll reported that 62 percent of the adults surveyed in 2007 had a favorable impression of the FDA ("A Poll Conducted" 2007). Food-safety agencies have enjoyed budget increases within this political environment favorable to their expansion. We cannot attribute all the budget and mandate increases for regulatory agencies to iron triangle politics.

We need to ask, then, how this political atmosphere favorable to government agencies has been created and maintained. Why do people form advocacy groups and donate money to such groups to promote policies that are not necessarily beneficial to them? Why do people continue to believe in government agencies even though these agencies have failed many times? We need to tackle the question of how this ideology has come into being and how it is maintained. The role of ideology in directing the course of government expansion has long been recognized (Higgs 1987, 35–74). However, the process of ideological change has defied systematic analysis so far (Higgs 2007, 66).

In this article, I explore the process of ideological change by applying evolutionary science to it. Ever since Richard Dawkins proposed the concept of a unit of cultural transmission ([1976] 1989, 192–93), evolutionary thinking has been applied to cultural change (see, for example, Dawkins 1982, 109–12, 2006, 222–34; Blackmore 1999)<sup>1</sup> Because the word *evolution* has been used to describe ideological

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1. Richard Dawkins proposes the term *meme* for a unit of cultural transmission or a unit of imitation and explains that memes follow the law of evolution because there are variation, copying, and selection among them ([1976] 1989, 192–93). The ideological components I deal with in this article—ideas, collective

change (Higgs 1987, 71; North 2005, 167), an application of evolutionary thinking to such change seems to be a natural development. Although previous studies of cultural evolution mentioned ideology (see, for example, Dawkins 1982, 111; Balkin 1998), they have not examined the unique evolutionary characteristics of ideology, which can be separated from other ideas and beliefs. I apply here the logic of evolution to ideological change and develop a theory of ideological evolution. The theory redefines ideology simply and meaningfully based on how it emerges and evolves. The theory provides a systematic way of looking at familiar facts about ideologies and explains these facts, which so far have been only described. The theory produces empirically verifiable predictions, and I use food-safety regulations and their implementing agencies as a case study to test these predictions. Some elements of ideologies that are regarded as irrational and counterintuitive become understandable with the application of evolutionary science.

## Application of Evolutionary Science to the Evolution of Ideologies

Charles Darwin summarized his theory of evolution by natural selection in one paragraph in the introduction to his seminal book *On the Origin of Species* (1859, 4–5). He stated three premises: (1) there is variation among individual organisms; (2) some of the variations are hereditary; and (3) there is a struggle for survival among individuals. If the validity of these premises cannot be challenged, the logical conclusion is that organisms that have a better chance of survival in a certain environment leave more offspring, and, therefore, organisms that are better adapted to the environment will evolve over a long period of time. It is possible to interpret the rest of Darwin's book as his effort to validate the three premises in the natural world.

The application of Darwin's theory of evolution by natural selection does not need to be limited to biological entities. Any entities that satisfy these three premises—variation, heredity, and selection—follow the law of evolution (Dawkins [1976] 1989, 193). Thus, nonbiological entities can also be studied through the application of Darwinism. Ideologies, or more precisely their components, are such entities.

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behaviors, and political institutions—are memes by this definition, and I am dealing here with the evolution of ideological memes in this sense. Dawkins also proposes the term *co-adapted meme-complex* ([1976] 1989, 199). The coadapted ideological complexes in this article represent one category of Dawkins' coadapted meme-complexes. However, there is a difference between Dawkins's memes and my self-replicating entities (ideas, behaviors, and institutions). Dawkins regards a meme as a pattern of synaptic connections. He also regards music and styles of clothes as the manifestations of memes—that is, synaptic connection patterns in the brain (1982, 189). I regard ideas, behaviors, and institutions as self-replicating entities and consider synaptic connections within the brain, ink on paper, and digitally encoded data on magnetic surfaces as forms of their storage. Human brains form an environment for these self-replicating entities together with natural and social surroundings. These entities function like genes, but they do not necessarily have to have tangible physical and chemical properties like DNA for genes.

An ideology is composed of ideas—beliefs about the workings of society and certain theories of the social sciences. Robert Higgs provides the most succinct definition of an ideology as “a somewhat coherent, rather comprehensive belief system about social relations” (1987, 37). Ideologies have components other than ideas and beliefs. The application of evolutionary thinking in the following sections reveals that ideologies are complex systems by nature. Their emergence and evolution show that they usually consist of mutually supportive and compatible ideas, behavioral patterns, and political and social institutions. Behavioral patterns in this context include organizing and participating in political rallies, and institutions include publishers, academic and educational organizations, advocacy groups, political parties, government agencies, and regulations.

All three components of ideologies satisfy the previously mentioned three conditions for evolutionary entities: variation, heredity, and selection. There are always several ideologies in a society, even in a totalitarian one (Higgs 2007, 74). Varying ideas compose different ideologies. Even an ideology that is commonly treated as a single set of coherent ideas, such as communism, is usually conceived of as a varying set of ideas by its individual advocates. People working for different causes demonstrate different behavioral patterns. Some Communists choose to resort to violence, but others do not. Some ideologies depend on private organizations for their dissemination, whereas others enjoy the support of the state apparatus and tax money.

Ideas, behavioral patterns, and institutions are learned and copied. People absorb others’ ideas and behaviors through listening to what they say, reading what they write, and observing what they do. Educational institutions and certifying organizations make sure that certain types of knowledge are faithfully passed on. Political activists are keen to copy successful fund-raising practices, organizational skills, and lobbying tactics. When people set up new institutions, they rarely do so from scratch. They copy an organizational structure and managerial practices from other institutions. People who have experience in other institutions are often invited to participate in setting up a new institution. Even the physical structures of successful institutions are copied, as indicated by the components of Greek and Roman architecture found in many buildings around the world. The components of ideologies, as these examples illustrate, are copied.

Different ideas, behaviors, and institutions are copied and spread at differential rates. People *constantly* engage in learning and communication, and these activities put selective pressure on the components of ideologies. Some ideas, behaviors, and institutions are copied more than others. These components are mindless entities, but we may say figuratively that they compete with one another (Higgs 2007, 74). Because they exhibit variation, heredity, and selection, they are always under the influence of dynamic evolutionary processes. Evolution logically *must* occur.

As long as biological entities are the products of evolutionary processes, it is necessary to understand these processes to comprehend why the current characteristics of biological entities came to be as they are now, and accordingly a great deal of research

in biology has been devoted to the understanding of the mechanisms that create variation, heredity, and selection. We can also gain insights into the characteristics of currently prevalent ideologies by examining the evolutionary processes of ideologies.

## The Evolution of Coadapted Ideological Complexes

Through the selective process, mutually supportive components of ideologies will *naturally* emerge as coadapted complexes. Various organisms have evolved in the biological world, and every one of them can be regarded as a complex consisting of mutually assisting genes. Free-floating ideological components such as ideas, behaviors, and institutions start to aggregate into complexes in which they assist one another so as to enhance their collective chances for survival. Two free-floating components that happened to stick together will stay together generation after generation if staying together enhances their reproductive success.

For example, a policy proposal for redistribution of wealth can be understood readily by those who already have a strong belief in social equality. This policy proposal can increase its survival rate by tying up with the belief in social equality. Psychological studies have shown that people will work to reduce the dissonance between incompatible ideas and that consistency itself is generally admired and emulated (Festinger 1957; Cialdini 1994; Blackmore 1999, 166). An ideology is defined as comprising ideas that are somewhat coherent (Higgs 1987, 37). Selective pressures tend to aggregate mutually compatible ideas into a complex because compatible ideas in effect help one another to survive by being copied and spread in human brains. Theoretical or belief systems consisting of mutually compatible ideas are psychologically appealing to humans, and therefore they are more often copied and spread than sets of mutually incompatible ideas. This tendency explains why people entrenched in one ideology do not easily convert to a rival ideology. At the same time, ideas in a complex do not need to be logically and precisely consistent (Higgs 2007, 67) because what matters is the complex's psychological appeal for human brains. Thus, ideologies show some inconsistency when scrutinized carefully (see, for example, Yasuda 2008).

In addition, this combination of mutually compatible policies and beliefs in social equality can enhance the complex's reproductive success when it is institutionalized in the form of a bureaucracy that implements the policy and promotes the belief. An ideological complex grows by incorporating political and social institutions, such as political parties and government agencies, when these institutions are beneficial to the complex's being copied and spread. Political and social institutions are described as outside factors, or as only a context for ideologies (Balkin 1998, 86–88). However, the process of attaching political and social institutions to a belief system makes the system an ideology, which by definition has political and social connotations. The incorporation of sociopolitical institutions and political actions, which I discuss later, makes ideology distinct from other belief systems.

The incorporation of behaviors such as political and collective actions into the combination further help it to be visible and copied. It is noted that ideologies motivate people to act politically (Higgs 2007, 67). The application of evolutionary science allows us to make sense of why action-motivating components are incorporated into an ideological complex because that incorporation increases the likelihood that the complex will be copied and imitated more often than competing complexes will be. Complexes that lack the components that motivate collective action will be weeded out in competition with those armed with such components.

Evolutionary processes thus reveal that successful ideological complexes that are readily copied will be formed through coevolution within and between ideas, collective behaviors, and sociopolitical institutions. An ideological complex therefore consists of a wide range of more or less coherent ideas, behaviors, and institutions. In other words, based on its genesis and evolutionary behavior, we can redefine *ideology* as a naturally evolved complex consisting of mutually assisting ideas about social relations, collective behaviors, and socioeconomic institutions. The emergence of ideological complexes consisting of ideas, behaviors, and institutions is an unavoidable evolutionary consequence when the components of ideologies are affected by a Darwinian process.

The nature of the selective environment for ideological components decides what types of components are more copied than others. By characterizing the selective environment, therefore, we can better understand the patterns of evolution of ideologies. Paleontologists have shown the evolutionary pattern of horses quantitatively by demonstrating the reduction of the number of toes appearing in horse fossils over a long period time. Although it is a formidable task to quantify change in ideologies (Higgs 1987, 52), we may be able to quantify some factors in the selective environment for ideologies.

There are two selective environments for ideologies: the psychological and the socioeconomic. I focus on the selective factors operating in the socioeconomic environment to elucidate the directions of currently occurring evolution among ideologies. However, the psychological environment is also an underlying layer of selection among ideologies, so it is necessary to understand its basic nature.

## **The Psychological Environment: The First Layer of Ideological Selection**

The psychological environment, which consists of numerous human brains (Blackmore 1999, 6), forms the fundamental screening layer for the components of ideologies. Human brains select certain components to copy and then discard the others. Many components are produced incessantly, and the collective brain space of the human population has a limit; therefore, the components *constantly* compete to survive. The configuration of human psychology has a large impact on the selection process of these components and thus on the evolution of ideologies.

Human brains identify, store, and disseminate ideas, behaviors, and institutional arrangements that are most appealing to human psychology. As I noted previously, human beings tend to seek consistency among ideas they hold. The human psychological characteristics also include conformity bias and strong risk aversion. In other words, people tend to do what other people do (Dunbar, Barrett, and Lycett 2007, 150), and they try to avoid small risks to an extent that economists characterize as “irrational” (Viscusi 1998, 14–16).

The psychological appeal of an ideological component does not necessarily match the component’s theoretical correctness. “Wrong theories in science may spread simply because they are comprehensible and fit easily into existing theories” (Blackmore 1999, 57). For example, an economic policy idea that exploits the human sense of insecurity about the future is more likely to be copied than ideas that lack this psychological appeal. This tendency does not mean that an idea’s ability to explain social and physical reality has no relationship to its reproductive success. Simply put, the ideas that possess greater psychological appeal than others will be copied further and become numerous. On the question of why economic theories that economists believe promote social welfare (as they define it) are not widely accepted in society, George Stigler rejected the suggestion that economic theories are difficult to comprehend and declared, “[O]ur theories are not *that* difficult, and more difficult theories of physical scientists are accepted with alacrity” (1975, ix, emphasis in original). His observation can be explained by psychological selection. When theoretical correctness competes with psychological appeal, the latter takes precedence over the former. In the psychological environment consisting of numerous human brains, the ideological components that are most copied will obviously become numerous. Entering the competition, these numerous components evolve to become more adapted to the selection pressures in the psychological environment.

The words *adaptation* and *evolution* need some clarification at this point. They do not mean “progress” or “advancement.” Rather, describing a certain ideological component as “more adapted” means that the component has higher survival and reproductive rates than others in a particular selective environment. A more adapted or evolved ideology can be judged as either advanced *or* regressed from different political or theoretical points of view.

Human psychology has taken its shape through genetic evolutionary processes, but the evolution of ideological components takes place independently of the evolution of the human brain. The human psychological configuration is a given condition under which the selection of components occurs within numerous human brains. Once this initial condition is given, the evolution of components assumes its own life. Therefore, ideological components that are harmful to the carriers of the brains—that is, to the individual humans—can be copied and spread in the psychological environment if these components have their own survival values. In this sense, components of ideologies resemble pathogenic viruses. For example, an idea promoting suicide can kill individuals who are infected with it.



When such an idea accompanies co-ideas that glorify these deaths and co-institutions that disseminate the glory, it will be copied and spread at the expense of its carriers' lives and genes.<sup>2</sup>

## **The Socioeconomic Environment: The Second Layer of Ideological Selection**

The psychological environment does not operate in a social vacuum, but rather within the socioeconomic environment, which forms another layer of ideological selection. Human beings interact with one another, and components of ideologies are communicated between them. When exposed to a variety of such components, human brains select only some of them for copying and future dissemination. This initial exposure to various ideological components depends on socioeconomic factors, which form the socioeconomic environment for ideologies. How people are organized into groups and the extent of their mobility between these groups influence the spread of ideas, behaviors, and institutions. Institutions such as publishers, colleges, and trade leagues that connect merchants in faraway cities historically also have influenced the spread of ideological components. Government practices, such as censorship and trade restrictions, that are institutional components of coadapted ideological complexes heavily influence the spread of ideas in society in favor of the survival of their co-ideas in the complexes. Every society, including our own, has its own set of socioeconomic factors for ideological selection.

### **Government Agencies as a Dominant Selective Factor**

In this article, I treat the selective factors in the socioeconomic environment as the main object in the examination of ideologies' evolutionary processes. For three reasons, I focus especially on government agencies and their roles in disseminating information to the public. First, currently dominant ideologies support and demand government intervention in society. Ideologies have ebbed and flowed, but ideologies opposed to government intervention have generally been on the wane since the late nineteenth century and especially since the Great Depression (Higgs 2007, 75). Therefore, government agencies are a natural candidate for a powerful institutional component in the currently dominant ideological complexes. In an examination of the currently proceeding evolution of ideologies, government agencies cannot be ignored.

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2. The genes that make the organisms carrying them susceptible to the infection of suicide-promoting ideologies might weed out their human carriers in the long run. However, we are dealing with the evolution of ideologies taking place now, and the current human psychological disposition may be treated as a constant in this context.



Second, ideas are the essential component of any ideological complex, and they are copied and spread only through human communicative activities such as reading materials on the Internet and in publications, watching television, listening to the radio, attending lectures, and engaging in conversations. Government programs for education, public awareness, and consumer warnings interact with people's communicative activities and therefore influence the selection processes of ideas.

Third, government programs' reliance on tax money for their operation makes them evolve differently from private institutions such as publishers, corporations, think tanks, advocacy groups, and trade associations. This difference creates a particular thrust in the evolution of ideologies in contemporary society. Let us consider what different directions may be expected by applying the logic of evolution to government programs. I make two predictions here and test them empirically in due course.

### *Prediction One: Government Information Supply Grows*

Government agencies and private organizations differ fundamentally. Private institutions can continue to exist only by satisfying consumers on an individual basis. An ideological complex with a strong private institutional component can persist for some time against a shift in consumer demand away from that complex. However, as long as ideological complexes rely on individual choice to copy their components, their survival ultimately depends on ever-changing individual preferences.

In contrast, government agencies do not need to satisfy their consumers on an individual basis. Types of taxes and their rates are decided collectively through political processes. Therefore, no one-on-one relationship connects the payer and the receiver. Government agencies' greater ability to secure resources for their operations means that they do not have to adjust their information commodities accordingly. They can continue to supply ideas and information no longer in demand. These ideas and any accompanying information can persist in the selection environment longer than privately supplied ideas and information can because the demand for the latter fluctuates constantly. Given people's conformity bias and the frequency-dependent nature of their taking up of ideas, human brains more readily accept the persistent, unchanged messages that government agencies provide than they accept ever-changing, privately provided messages.

It is logically to be expected that an ideological complex can and will evolve with tax-secured government agencies as its nucleus. Ideas, behavior, and other institutions that readily attach themselves to this secure nucleus can increase their survival rates in their respective selective environments. Government agencies evolve to select ideas, behaviors, and other institutions that are as beneficial to their survival as to the survival of their co-components. It is logically to be expected, therefore, that government information programs grow as a natural consequence of this ideological complex formation and the selective advantages it creates.

*Prediction Two: A Mutualism Between Bureaucrats  
and Academics Emerges*

The ability to collect tax monies from the population does not make government agencies immune to selective pressures. In a society such as the United States, where people elect the political decision makers and the mass media actively provide information to the people, the selection pressures on government agencies take the form of criticisms of their activities. When sufficient criticism of certain governmental activities has occurred, these activities face budgetary elimination or downsizing through the action of popularly elected decision makers. Government agencies also compete for limited tax money. Agencies, therefore, strive to justify the popular merits of their activities so as to retain or expand their mandates. Agencies find this activity necessary because policy justifications in the United States typically come from purportedly disinterested studies provided by policy experts (Formaini 1990, 4).

When the evolution of an ideology is treated as a series of coevolutionary processes that culminate in a complex consisting of mutually assisting ideas, behaviors, and institutions, it is not a far-fetched expectation that mutually beneficial behaviors between bureaucrats and academics will evolve as a part of the complex. Mutually beneficial relationships have evolved between many species in the biological world. The relationship between ants and aphids, in which aphids provide honeydew to ants and in return ants protect aphids from their predators, is one well-known biological example (Dixon 1998; Yao, Shibao, and Akimoto 2000). Because tax spending for a particular policy and its implementing agency are constantly under media and political scrutiny, providing research funding to academics in return for theoretical protection is a logical outgrowth of the creation of a tax-supported information program. This mutual relationship between bureaucrats and academics has been recognized as a social phenomenon. Murray Rothbard observed in a 1985 letter to Greg Christainsen, “This cozy coalition benefits the State rulers . . . because the public is persuaded to obey the king or State; the intellectuals benefit from a share in the tax revenue” (cited in Higgs 1995, 58–59).

The evolutionary theory of change in ideology warrants a process whereby this cozy relationship emerges as a behavioral component of an ideological complex. Even if bureaucrats did not initially provide funding to academics with the intention of receiving theoretical protection from the academics, the selection pressure causes the practice to become agency protective. Academic work that successfully justifies tax funding for the agency will be rewarded by continuous research funding from bureaucrats who are protective of their budgets, which are constantly under threat. In turn, academic career advancement facilitated by agency funding will further spread the practice of seeking agency funding among academics. This interaction can lead to the establishment of new academic societies, journals, and research centers, and new behavioral patterns can thus become institutionalized as a part of

the ideological complex. It is logical to expect the emergence of a mutually beneficial relationship between bureaucrats and academics.

## Testing the Predictions

I now undertake to test the two predictions I have presented. I test the first prediction by examining the share of government-supplied information in the information pool on food-safety policy. That share is an indicator of government's current role in shaping the selective environment for ideas and of its historical growth in providing a substantial proportion of the supplied information.

I measured different organizations' and individuals' contributions to the information pool on food-safety policy using the Internet news site Google<sup>TM</sup> News, which I chose because it is widely used as a portal for news publications. The news articles easily available through this site are considered a valid representation of a variety of news reports accessed in the United States. An Internet survey conducted on September 5, 2008, using the key words *food safety* and *policy* hit "about 567" news articles. Among these articles, 180 were accessible. Within the 180 articles, 59 turned out to be relevant to the key words. The largest category of the nonrelevant articles was "foreign news" (59 articles).

I quantified an article's news sources and their contributions by the number of sources in the article. For example, when an article was based on the interviews of five people, I regarded each person's contribution to the article as a value of 0.2. I reviewed all 59 articles for their interviews and citations. I considered a news source's total contribution to the whole information pool (59 articles) as the sum of its fractional contributions to all the articles in which the source was interviewed or cited. For example, if an organization's staffers were interviewed in a total of 20 articles in which the organization's staffer was always one of four sources in these articles, the organization's total contribution to the information pool is 8.5 percent ( $[0.25 \times 20]/59 = 0.0847$ ). For opinion pieces (eight articles), which lack citations, I regarded the authors or newspaper companies as news sources.

The results obtained by these procedures show that, in terms of economic-sector categories, federal, state, and local governments contributed 31.9 percent of the 59 articles on the subject as cited sources. The government sector was followed by the food industry (28.6 percent), journalists and authors (15.9 percent), consumer advocacy groups (9.0 percent), and university academics (8.1 percent).

Among individual organizations used as sources, the USDA (12.9 percent), the top spender of federal food-safety funding, was cited most, followed by the FDA (9.5 percent), the second-largest spender of federal food-safety monies ("Who's Watching What We Eat?" 2009). The two federal agencies were trailed by Monsanto (a biotech company, 3.4 percent), the Center for Food Safety (a consumer advocacy group, 2.8 percent), and the Grocery Manufacturers Association (a trade association, 2.6 percent). Six out of the fifty-nine articles (10.2 percent) consisted of a USDA

news release and five media reports that relayed agency announcements. Five out of nine university academics whose names were cited were confirmed to have received USDA funding or to belong to an institute that has received USDA funding.

These results clearly show that government agencies, both as an economic sector and as individual organizations, are the most powerful entities providing information on the subject of food-safety policy. According to this survey, such agencies provided more than 30 percent of the information on the topic readily available through the Internet. The percentage rose to 36 percent when I added the contributions by government-funded academics. Agency dominance in information supply allows these bureaucracies to create a regular sense of crisis among the general populace by repeatedly publicizing outbreaks of common food poisoning. Given the persistence of government-supplied content in the information pool, it is clear that government agencies are the major selective agent in the competitive environment for ideas on food-safety policy. Furthermore, policies and tax allocations are collectively decided by majority votes of elected politicians and by relatively anonymous bureaucrats directly or indirectly appointed by these political figures; these two groups, in the aggregate, are considered to represent public opinion. This institutional arrangement gives the most dominant food-safety ideology a competitive edge in policy formulation and budget allocation and in being continuously propagated in the court of public opinion.

Also, the USDA and FDA's current dominant position in the provision of information on food-safety policy demonstrate that these agencies' role has grown considerably over the past 150 years (the predecessor of both the USDA and the FDA was created in 1862 [USDA 2007]). My snapshot survey of Google<sup>TM</sup> News does not tell us precisely how government's role in food-safety information provision has grown over the intervening years, but it does clearly indicate that since 1862 the USDA and the FDA have grown to be the most powerful information suppliers on food-safety policy.<sup>3</sup>

The government's powerful role in the formation of public opinion has been recognized. James Bennett and Thomas DiLorenzo state, "Since government has such vast resources, wherever it enters a public policy debate on one side of an issue it has the capacity to drown out all other view points" (1999, 15). The survey described here not only quantifies the government's dominant position, but also

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3. In this article, I do not try to answer the question of how pro-regulatory food-safety ideology initially emerged. The analogy with pathogenic viruses is useful in discussing how new ideologies emerge. Non-pathogenic viruses become pathogenic when they acquire virulence or an ability to infect humans through genetic changes. These genetic changes are caused by mutations or transfers of genes from other microorganisms (Antia et al. 2003). Although a few human individuals might be capable of true innovations, most changes in ideology are achieved by introducing components from the outside. The field of biology, for example, has been enriched by knowledge introduced from mathematics, chemistry, and physics. Also, a change in the selective environment will shift the direction of evolution of both pathogens and ideologies. Urbanization reduced the number of farmers and increased the percentage of the population dependent on food produced by others. This change might have created a social atmosphere in which people became more susceptible to a new ideology supportive of food-safety regulation.

proves that initially small tax resources allocated to government agencies grew over time to allow government agencies to dominate the information pool eventually.

The ant-aphid theory of a mutually beneficial relationship in this context can be tested by looking at the flows of agency funding in academic research. I reviewed a National Science Foundation (NSF) publication on academic research expenditures (Britt 2007) for agency-by-agency contributions to research funding in different academic fields. These NSF data sets do not specify amounts of funding for food-safety policy academics, so I used the category “economics” as a proxy because food-safety policy research involves a great deal of cost-benefit analysis.

University economists received \$119 million from federal agencies in 2006. This amount is comparable to the federal funding for mathematics (\$373 million), but it is dwarfed by the federal funding of other major scientific fields, such as biological sciences (\$6,240 million), medical sciences (\$10,434 million), environmental sciences (\$1,763 million), physical sciences (\$2,705 million), and engineering (\$4,236 million). Federal funding accounted for 35.1 percent of university economists’ total funding. This percentage is relatively small compared to the percentages of federal funding in other science fields (biological sciences, 69.0 percent; medical sciences, 66.0 percent; environmental sciences, 67.8 percent; physical sciences, 70.7 percent; and engineering, 59.9 percent). Among the federal agencies, the USDA was the largest fund provider (21.7 percent) to university economists. The largest federal fund providers varied among other science fields (biological sciences: Department of Health and Human Services [HHS], 80.7 percent; medical sciences: HHS, 91.5 percent; environmental sciences: NSF, 32.0 percent; physical sciences: NSF, 29.8 percent; and engineering: Department of Defense, 31.3 percent).

These numbers show that even though the federal agencies’ fund-providing role is smaller for university economists for academics in other major science fields, the former still receive a substantial percentage (35.1 percent) of their research funding from federal agencies. The largest portion of federal funding of university economists came from the USDA, which is also the largest provider of federal food-safety money. Calls for research proposals issued by the USDA are specific about the types of research it funds (USDA 2008). Academics who receive USDA funding engage in agency-directed economics research in fields that include food-safety policy.

In order to see the government agencies’ influence in academic research publications in the field of food-safety policy, I reviewed all the articles in the academic journal *Food Policy* for their authorship and funding sources. I ideally should have examined *all* academic articles in the field, but Google<sup>TM</sup> Scholar surveys demonstrate that more than two thousand items with the key words *food policy* and *safety* have been published every year since 2002. These numbers defy exhaustive examination, so I chose the journal *Food Policy* as a representative academic publication for its focus on food-policy issues.

A search carried out on July 2, 2008, within the articles published in *Food Policy* since its establishment in 1975, using the key words *food safety*, hit forty-six articles in

total. I examined all forty-six articles for their authorship and funding sources. I assessed the contributions of funding sources and author affiliations with the same method used for the news articles accessed through Google<sup>TM</sup> News, previously described. When an article was funded by multiple sources and written by multiple authors, I regarded their contributions as equal.

University academics and authors affiliated with government agencies contributed as authors 69 percent and 26 percent of the forty-six articles, respectively. Thirty-nine percent of articles not authored by government-affiliated authors were funded by government agencies, with the USDA as the top fund provider (11 percent). This result clearly indicates that government agencies play a dominant role in academic publication in the field of food-safety policy. As authors or fund providers, government agencies were involved in 65 percent of the articles on the topic. I also noticed the USDA's prominent position in the formation of the news-reporting pool on food-safety policy in academic publication.

The 35 percent financial support for university economists and the 39 percent funding support for food-safety academics who authored journal articles on the topic indicates that government agencies heavily influence academic research on food-safety policy through funding. This influence not only benefits the careers of some academics, but also shapes the structure of relevant academic fields. This level of influence affects the manner in which academic societies and university-based research centers are organized and determines how the next generation of academics is trained. Even those research activities that are not funded by a federal agency nevertheless shift toward agency mandates and concomitant viewpoints because an academic's past research affects his or her prospect for receiving funding in the future.

The benefits of agency funding for academics are obvious. Agencies assign and fund academic work specifically designed to promote certain elements in their programs. Therefore, agencies receive benefits from the academics they fund. However, whether academic research protects its funding agencies against budget and mandate cuts by politicians is not easily discernible.

Past experience provides partial support for the *actual* budget-protecting benefit of agency-funded research. Martha Derthick and Paul Quirk (1985) describe the scrapping of the Civil Aeronautics Board and the downsizing of both the Interstate Commerce Commission and the Federal Communications Commission in the 1960s and 1970s as rare cases of deregulation. These agencies were small, by comparison with other agencies such as the USDA and the FDA, when Congress decided to eliminate or downsize them. The Civil Aeronautics Board, the Interstate Commerce Commission, and the Federal Communications Commission employed 789 staffers in 1977, 2,178 staffers in 1976, and 1,504 staffers in 1968, respectively (USDC 1968, 1977). The USDA and the FDA currently employ approximately 102,000 and 10,000 staffers, respectively (Grossman 2008; USDC 2008). If agency size reflects research budget size, it is reasonable to assume that the small agencies

that were eliminated or downsized did not fund academics and therefore lacked an ideological defense against budget cuts.

In fact, it is not necessary for such relationships to be *really* beneficial to bureaucrats. It is enough for the relationship to *look* beneficial for it to emerge and grow. It is unreasonable to assume that bureaucrats, who are surely sensitive to their agencies' budget cuts, are not aware of the cases of the downsized or abolished agencies I've mentioned. Derthick and Quirk chronicle how a small, privately funded research initiative challenging the validity of the policies implemented by these agencies eventually grew to enjoy bipartisan support in Congress (1985, 36–39). The perception and belief of the budget protective benefit of academic work among bureaucrats are enough for research-supportive behavior to be copied, maintained, and extended as agency funding grows in parallel. The data I have accumulated indicate the existence of a behavioral relationship between academics and bureaucrats that *looks like* the ant-aphid mutualism. Agency research funding drives the adaptation of the theoretical components of the ideology-based complex of food-safety regulations. As a component of a coadapted complex, theory evolves in the direction of further justifying government's often increasing regulatory mandate for securing food safety.

By testing the two predictions, I have demonstrated two characteristics in the current evolution of pro-regulatory ideology. First, government agencies, which are the core institutional component of the pro-regulatory ideological complex, dominate the information supply. This dominance helps to promulgate ideas that are compatible with the ideological complex. Second, with the availability of governments' secure resources, in particular almost-guaranteed funding levels, a mutually beneficial relationship evolves between bureaucrats and academics as an increasingly entrenched behavioral component of the pro-regulatory ideological complex. This mutualism drives the adaptation of the complex's theoretical components so that they seem to be almost immune to criticism.

## **The Coadapted Ideological Complex as a Spontaneously Organized Social Phenomenon**

Biological entities, in particular genes, have been the subject of investigation in evolutionary science for a long time. As a result, there is a huge amount of research on these entities, and useful analogies can be drawn from biological research to reach a better understanding of the evolution of ideologies. However, a gene and an ideology differ, specifically in the manner in which each is created and copied.<sup>4</sup>

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4. Components of an ideology can be group selected. For example, the research in a certain academic field can be terminated when a government agency that is the sole supporter of the field is abolished. This academic field can become extinct altogether, along with the agency, even though the field can be resurrected in the future from documents. This scenario illustrates group selection of ideas and theories. However, such an agency's staff and its academic fellow travelers who have received funding from that



Genes are not modified by their carriers' will—that is, not until the recent development of genetic engineering. Plant and animal breeders have been dependent on the appearance of purely accidental varieties from which they can select. In the case of the development of ideological components, however, human will has long played a purposeful part. Academics can choose certain theoretical elements that will fit well into existing theories. This aspect of ideological components makes their evolution faster than evolution based on genes. In general, an organism's genes can be passed on only to its descendents, which is quite time-consuming, whereas ideological components such as ideas, behaviors, and institutions can be copied by anybody very quickly, even across national borders. This difference allows the spread of ideological components to range widely, compared to that of genes.

Even if there is room for human will in the processes of variation in creating and copying ideological components, however, the coadapted ideological complex is not as a whole a product of human intention and design. Individual academics introduce certain theoretical elements into an ideological complex, but these individuals do not necessarily have an overall design for the complex's final shape. A bureaucrat in a particular agency that provides funding for a certain research project does not necessarily intend to build a mutually assisting relationship between his agency and a whole group of academics. Individual engagement in an ideological complex is limited to certain components of it, and no single individual is in charge of the entire complex. Even powerful government officials can design only a part of a complex. In this respect, the evolution of ideologies is much like the evolution of biological entities.

The theory of the evolution of ideologies by psychological and social selection presented here does not require human design as its driving force. A coadapted ideological complex is similar to what F. A. Hayek called a spontaneously organized social phenomenon, which is the result of human action but not the result of human design (1948, 7). However, some components of ideologies, such as governmental institutions, influence the formation of the environment in which spontaneity occurs. The case examined here shows that collectively funded government agencies set the boundaries for individual voluntary action.

### **Academics' Altruistic Attitude as a Behavioral Component**

The evolutionary theory of change in ideologies does not require the existence of cynical intent in those involved in the evolution of ideological complexes and their components. Nutritionist, university academic, and author Marion Nestle explains, "Nutritionists are simply trying to educate the public that some foods are better for health than others" (2002, 359). Food-policy analysts Spencer Henson and Julie Caswell (1999) discuss the factors that influence the *evolution* of food-safety regula-

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bureaucracy will move on to other positions and funding sources. Therefore, the elimination of one academic discipline has nothing to do with genetic selection.

tion. It is perfectly possible that food-policy analysts are truly and objectively interested in the evolution of food-safety regulation, even as they themselves receive agency funding and prepare agency reports on such regulation. We need not doubt nutritionists' good intentions and food-policy analysts' research interest in order to predict an emergence of the ant-aphid relationship between bureaucrats and academics. In other words, this relationship, which drives the evolution of theories that benefit bureaucrats and academics' interests, can emerge against the good will of participating academics who genuinely wish to help the general public.

The practice of academics viewing themselves as unselfish experts goes back to ancient times. Plato's ideal and perfect state is to be ruled by unselfish philosophers (Mises [1944] 1996, 109). More recently, Karl Mannheim envisaged a classless "socially unattached intelligentsia" capable of thinking independently of any class interests (1936, 137). The long life of this academic self-image can be explained by the theory of the evolution of self-deception proposed by Robert Trivers (1976).

According to this theory, a capacity for self-deception would evolve against strong selection for spotting free riding. Genes that enable their carriers to hide their motives, even from themselves, are better adapted in a world where detected free riders are condemned. Ideas are selected for further replication within the psychological environment of academics who play a major role in teaching and propagating these ideas. The idea of unselfish academics trying to improve the public's welfare possesses an appeal that facilitates survival in such a psychological environment. In addition, human beings are susceptible to the so-called altruistic trick: they tend to copy the ideas and behaviors of those who *appear* to be altruistic (Blackmore 1999, 166). Ideas and behaviors embodied by seemingly altruistic academics will be copied and spread with far greater frequency.

## The Three Directions of Current Ideological Evolution

I have shown that the evolution of ideologies presently moves in three directions. First, ideologies have evolved to be coadapted complexes consisting of ideas, collective behaviors, and political institutions, and currently dominant ideologies have government agencies as their nuclear components. Second, ideas and theories evolve to be increasingly appealing to human psychology. Third, ideas supportive of government agencies have and will continue to become numerous. Government agencies play a dominant role in shaping the selective environment for ideas, and in such an environment, ideas that promote the survival of the currently dominant ideological complexes possess survival advantages over ideas that run against these dominant complexes.

Under constant scrutiny by the media, rival agencies, and privately funded research activities, ideas and theories in the dominant ideological complexes become better adapted to taking advantage of human psychology, which has a number of cognitive blind spots. For example, as already mentioned, humans have difficulty

spotting free-riding behaviors among altruistic-looking individuals. In addition, agency dominance in the food-safety-related information supply allows bureaucracies to turn common outbreaks of food poisoning into crises so that people's strong risk aversion can be more easily exploited than it is in ordinary situations. Ideas and theories prevalent in the dominant government-supportive ideological complexes end up having characteristics that justify further government intervention by taking advantage of the aforementioned cognitive blind spots.

Of regulatory policymaking for risk management, W. Kip Viscusi observes, "While government policy could ameliorate these [individual] shortcomings, in many instances, the effect of government policy is to mirror the types of irrationality that are reflected in individual decisions" (1998, 3). His observation is correct, but he fails to appreciate why government policy often institutionalizes "inadequate" (1998, iii) decision-making patterns characteristic of the majority of individuals: taking advantage of human psychology—in particular, its cognitive blind spots—is an effective adaptation by which pro-regulatory ideological complexes can survive and grow in their "arms race" against rival complexes.

### **Limitations of the Theory of Ideological Evolution**

Beyond the two specific predictions detailed here, the evolutionary theory of ideology identifies three general directions under the current dominance of governmental information supply. Stephen Jay Gould states that what interests us most in history are the details, which lie in the realm of contingency (1989, 289–90). The theory presented here does not challenge this statement. For example, the theory does not predict who will propose what kind of new economic theory to justify what type of new regulation and when. In addition, the theory cannot predict what kind of external events will change the current socioeconomic selective environment at what point in the future. As long as humans have free will, we cannot eliminate the possibility that some people's efforts will change the current course of change in ideologies. The general theory presented here was never expected to deal with such a contingency.

One of the implications of my analysis is that individual human beings are motivated to take certain actions by the ideological complexes they hold dear, even at the expense of their own material and biological welfare. Consciousness emerges at the individual level, and therefore we cherish feelings and satisfaction at the individual level. A sense that we individuals are somehow influenced by mindless human-created entities, such as ideological complexes, causes psychological uneasiness among us. For this reason, many people may reject the theory advanced in this article.

Anticipating that such psychological uneasiness might arise from the publication of his classic work *The Selfish Gene*, Dawkins concluded that book by stating, "We [human beings], alone on earth, can rebel against the tyranny of the selfish replica-

tors” ([1976] 1989, 201). If we wish to rebel against ideological complexes, it will be useful to understand what we are rebelling against and how these complexes work. Controlling the spread of infectious pathogens, be they biological or psychological, requires understanding their evolution. I hope that the ideas advanced here will contribute to such an understanding.

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