Evolving political science

Biological adaptation, rational action, and symbolism

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ABSTRACT. **Political science, as a discipline, has been reluctant to adopt theories and methodologies developed in fields studying human behavior from an evolutionary standpoint. I ask whether evolutionary concepts are reconcilable with standard political-science theories and whether those concepts help solve puzzles to which these theories classically are applied. I find that evolutionary concepts readily and simultaneously accommodate theories of rational choice, symbolism, interpretation, and acculturation. Moreover, phenomena perennially hard to explain in standard political science become clearer when human interactions are understood in light of natural selection and evolutionary psychology. These phenomena include the political and economic effects of emotion, status, personal attractiveness, and variations in information-processing and decision-making under uncertainty; exemplary is the use of "focal points" in multiple-equilibrium games. I conclude with an overview of recent research by, and ongoing debates among, scholars analyzing politics in evolutionarily sophisticated terms.**

That human beings have evolved by natural selection is broadly accepted. That lessons of evolution should inform theories of human behavior is far *less* broadly accepted, notably so in political science and economics.[1] Resistance to evolutionary thought in these fields has several partial explanations, including methodological ones, but is largely the legacy of one error, the naturalistic fallacy, whereby an "is" of nature becomes an "ought" of morality, as it did notoriously in Social Darwinism and the Eugenics Movement.

Would theories employed by political scientists and economists — and political-economists, for that matter — perform better if lessons of evolutionary psychology were made endogenous?

The premise of this question is in some respects new, even in biopolitics. I am not asking whether genetic or gene-expression factors are behaviorally consequential or whether some rarely considered variable, such as low-level neurotoxicant exposure, is more often influential than commonly imagined.[2] Nor do I mean to suggest that evolutionary theory has been ignored uniformly; it has not.[3] Rather than trying to add or replace a theory, I propose to dissect and enhance one: rational-choice theory, upon which economics and, increasingly, political science rely. On its surface, rational-choice theory might seem incompatible with evolutionary theory.[4, 5] Yet rationality itself has evolved, as has emotionality.

I proceed by first covering some significant theoretical issues involving *types* of explanation. Specifically, I review the general type of explanation natural selection embodies — functionalism — and compare it to the type of explanation the rational-choice school offers: intentionalism. We can alleviate some of the difficulties encountered in intentionalist explanations by drawing on the evolutionist's functional explanation. I also suggest that rational-choice understanding of the symbolic and political dimensions of social processes help evolutionary theory conceptualize the

role of social environment in shaping behavior. I then cover several empirical phenomena that should be of special interest to political scientists and economists. Finally, I outline the limitations of my approach and offer suggestions for future empirical and theoretical work. While I am principally concerned with the study of politics, my interest in rational-choice theory requires considering economic literatures. Indeed, economists have done much of the pioneering work on developing rational-choice theory in an evolutionary context and the unique contributions of this paper build on those efforts.

Types of explanation

Explanations of particular phenomena, whether they be decisions to vote or why the peacock has evolved a highly decorative tail, differ not only in *what* is being explained but also in *how* it is being explained. A poorly chosen explanatory type might hypothesize causal relations that do not exist, exclude pivotal variables, or apply ineffective tests.

Jon Elster[6] characterizes a functional explanation in the following manner: an institution or behavioral pattern, X, is explained by its function, Y, for a group, Z, if and only if:

1) Y is an effect of X.
2) Y is beneficial for Z.
3) Y is unintended by the actors producing X.
4) Y — or at least the causal relation between X and Y — is unrecognized by the actors in Z.
5) Y maintains X by a causal feedback loop passing through Z.

Daniel Little[7] describes functional explanations as those putting the explandum (that which is to be explained) in terms of its consequences (*i.e.*, we explain the cause of something by the presence of the effect). The biological theory of natural selection is a commonly accepted use of functional explanation. Psychological or physiological features of an organism are explained by their contribution to successful reproduction that in turn produces more organisms with the beneficial features in the future. If the function (Y) of the behavioral pattern (X) is effective (not effective) given the *current* environment, the feedback loop (natural selection) works to increase (decrease) the prevalence of the behavioral pattern (X).

The natural selection explanation used in biology is *not goal-directed*. Evolution works by a process of local maximization, where adaptations are evaluated only in terms of the current environment. Future effects of an adaptation are unknown, and no waiting process permits "better" adaptations to be selected in a later time period that would, otherwise, be unavailable if a current adaptation is selected. Evolution is a myopic process and cannot be considered teleological.[8, 9]

Elster and Little maintain that successful functional explanations in the social sciences are uncommon because they rarely demonstrate the causal feedback loop connecting an effect to its cause. That is, scholars rarely specify a *mechanism* (like natural selection) that increases or decreases the prevalence of some social behavior or institutional arrangement. Instead, an assumption is made that if certain benefits accrue to some social behavior, then these benefits satisfy the needs of those within the system of norms or institutions. This is not a well-specified explanation. Just because they may be discernible, benefits do not explain their own cause. Little notes, "(t)he fact that the system of norms is best for the group as a whole is not sufficient to explain the existence and reproduction of the normative system that would produce those benefits. To assume otherwise is to implicitly assume what we might call the principle of Panglossian functionalism — the expectation that those social arrangements will emerge with a given social setting that best satisfy the needs of the group affected."[10] *A priori*, we have no reason to assume our social institutions are optimal.

Furthermore, functionalist explanation lends to a static conception of social institutions because it is hard pressed to show how conflicting interests are incorporated into the explanation.[11, 12] Without demonstrating mechanisms (feedback loops) that sustain some practice, alternative benefits to some institution or social behavior — potentially to a subset of actors — and thus alternative explanations, cannot be ruled out. Such a strategy is inconclusive.[13, 14] The natural-selection mechanism that regulates the prevalence of a feature in a species is well understood. In the social sciences, mechanisms are less clear.

Intentionalist explanations address this problem by specifying three factors: actions (strategies), desires (preferences), and beliefs. "An intentional agent chooses an action that he believes will be a means to his goal."[15] While intentional explanations can take several

different forms, the most prominent has been rational-choice theory, with its models of strategic (not parametric) decision-making: actors choose actions altered by what they think others will do. Collective social outcomes may thus be explained and predicted in terms of individual rational decisions.[16, 17]

Asking "Who wants specific benefits?" and "How do agents generate and maintain benefits?" treats individual actors as if they intentionally select beneficial norms.[18] This violates Elster's third agent principle (that agents do not intend the function of the norm) and the fourth agent principle (that specific function is unrecognized). In this sense, we might think of intentionalist and well specified functionalist explanations on a continuum of causal explanations, differing by the extent to which Elster's third and fourth principles of functional explanation are relaxed. Indeed, Elster's strict separation of functional and intentional explanations has been questioned.[19]

So, can we deploy functional explanations of human psychological or physiological traits *alongside* explanations that include purposeful, or goal-oriented, action? Elster repeatedly questions whether "sociobiology" (a term typically avoided in modern evolutionary writing) is useful for explaining human behavior.[20, 21, 22, 23] However, he appears to consider evolutionary explanations in isolation from other types of explanation. An explanatory consilience, with evolutionary analysis complementing rational-choice theory, may help stabilize our explanatory framework. Such a consilience has long been stymied because evolutionists have not been studying goal-directed processes, whereas social scientists have been.

While stating assumptions, postulating reasonable mechanisms, and working with formal logic are desirable properties of a scientific enterprise, rational-choice explanations are still belayed by considerable difficulties and limitations.[24, 25] One line of criticism is that a "thin" theory of rational decision making, which abstractly identifies beliefs, desires, and actions through a formal (mathematical) representation, is at most marginally helpful because it does not incorporate the cultures, norms, values, *et cetera*, characterizing the empirical world the social sciences study. Answering this criticism, some rational-choice theorists have drawn on interpretive methodologies, such as ethnography, while trying to avoid the "hermeneutic circle" that lent many in the interpretive tradition (*e.g.*, the anthropologist Clifford Geertz) to reject the generalizability sought by many in the rational-choice movement. The connection between these "thicker" rational-choice approaches and interpretive methods is relatively straightforward, though certainly not prominent in either epistemic community. "To understand individual meanings and actions it is necessary to interpret them, and to understand social practices it is necessary to understand the meanings and values that their participants attribute to them. Interpretation of individual action may take a variety of forms, either as goal-directed action or as symbolic participatory action."[26] These interpretations allow preferences, beliefs, and strategies to be specified in relation to real decision-makers and cultural contexts,[27, 28, 29, 30] though even these approaches have drawn more conventional critiques.[31, 32] This "thicker" form of rational-choice explanation, and the more abstract "thin" account, can be improved by incorporating insights from evolutionary psychology and cognitive sciences.

Beyond asking *what* actor preferences, strategies, and beliefs are, we must ask *how* specific actors came to obtain them. Strict rational-choice theorists omit this second question, dismissing all its possible answers as exogenous. Evolutionary theory accepts these answers as endogenous, even in analyses otherwise observing rational-choice conventions.

"Thicker" rational-choice theories ultimately rest upon 1) relevant local conditions, including cultural resources such as symbols, identities, and values; 2) processes dynamically governing the formation and change of these conditions; and 3) the processing and manipulating of whatever information may be contained therein. Holding preferences, strategies, and beliefs exogenous can generate problematic explanations of behavior.[33, 34] Insights from the human cognitive sciences, including behavioral psychology, inform each of these areas, especially the third. For example, how do neurological characteristics affect how, *and to what extent*, agents consciously navigate the social world around them?[35, 36, 37] How does emotion influence decision-making, and how does our understanding of affective process suggest we ought to analyze political and economic phenomena?[38, 39] These are important issues for political scientists, but conventional theories are hard-pressed to clarify them. Absent empirical and theoretical work on human cognitive and emotional characteristics, theories of human social behavior can

easily become — and remain — idealized, some veering to the optimistic, some to the pessimistic.[40]

In the next section, I dissect the standard rational-choice approach and discuss how each part of the intentionalist explanation (desires, beliefs, and actions) unnecessarily relies on a faulty model of human behavior dubbed by evolutionary psychologists the "Standard Social Science Model" (SSSM). I show that intentionalist explanations can fruitfully draw on an evolutionary understanding of human political and economic behavior. Reciprocally, I argue that a rational-choice account of culture — an account stressing the explicitly *political* nature of culture — helps remedy explanatory problems faced by evolutionary psychologists.

An evolutionist's critique of rational-choice theory

Albert Somit and Steven Peterson argue that the prominence of rational-choice work in political science, compared to their "biopolitics," can partially be attributed to how rational-choice theory uses the familiar assumption that social forces are dominant in explaining what people want and how they pursue their desires — all according to the SSSM.[41, 42] Despite the controversies it has created within other social-science research traditions, rational-choice theory still ascribes to the view that almost all human behavior is learned through (or explained by) an individual's social environment. I argue that rational-choice approaches do not need to rely exclusively on the SSSM. To show this I consider each component of the rational-choice explanation: preferences, beliefs, and strategies. I deal with equilibrium concepts (how one solves a game-theoretic problem) in the second half of this paper.

Preferences

"Thick" rational-choice theory has traditionally explained how actors get their preferences through some form of socialization process. Socioeconomic conditions, religious beliefs, ethnic identities, or whatever "socially constructed" force one wishes to invoke, are used to explain the preferences specific actors have (or, more specifically, the tradeoffs an actor has) within specific contexts. These cultural factors are conceptualized as preferences entirely exogenous to a rational-choice model, with efforts to endogenize them kept neatly within the SSSM.[43, 44, 45]

As a result, rational-choice theory assumes that every human mind enters the world as a *tabula rasa*, with socialization processes then defining preferences roughly in line with, or in reference to, an individual's culture. Considerable uncertainty, and not just amongst rational-choice theorists, exists over how to move away from the SSSM. "Perhaps the most important departure for modern conceptions of culture is the nature/nurture distinction. Unfortunately, few scholars agree on how we should parse this complex dichotomy. Be that as it may, 'culture' — according to its current usage — refers only to beliefs or behaviors that are produced socially, and thus, are non-natural."[46] Evolutionary psychologists John Tooby and Leda Cosmides[47] argue at length that the SSSM, with its roots in the work of theorists such as Geertz, Durkheim, and Weber, has regrettably oriented the social sciences away from thinking about how our evolutionary heritage affects behavior (though the extent to which Durkheim can be read as not endorsing an evolutionary perspective is debated[48]).

Cosmides and Tooby suggest "evolutionary psychology should be able to supply a list of human universal preferences, and of the procedures by which additional preferences are acquired or reordered."[49] These "human universal preferences" would have been selected for over time by the functional process of natural selection. Thus, the common perspective of seeing preferences as socially derived is incomplete.[50] Following my discussion of beliefs and strategies, I attempt to incorporate an evolutionary theory of preferences and a theory of "culture."

Beliefs

The beliefs that actors hold about other actors, and their beliefs about causal processes resulting from their actions, are concretely specified in rational-choice models. Beliefs allow a rational-choice model to deal with uncertainty. *What* the beliefs are may be discussed, such as when a Bayesian game-theoretic model of player "types" (*e.g.*, cooperative or exploitative) includes a known distribution, but rarely is heard any discussion of *how* those beliefs have been generated. In part, this paradox is due to the technical apparatus being used. The "move by nature" employed to turn games of incomplete information into games of imperfect information fundamentally treats all the players, actions, and preferences as being fixed in a mathematical "closed universe."[51, 52] This "closed universe" assumption remains necessary because no way has been found

to relax it without destroying the *deductive* power available to rational-choice models. Without explaining *how* these beliefs are generated and changed, beyond invoking an inductive process of some sort, a rational-choice explanation does not show how different features of the strategic environment gain or lose salience, or, further still, appear or disappear.

I would like to highlight two problems here.

First, presumptions about the processing of information have been based on generic mathematical machinery, not on direct observation.[53] How are prior beliefs changed and at what pace? Do humans package information into tidy uniform bundles that feed into a Bayesian learning process? Do different types of information influence beliefs differently? Hard to say using an equation-based theory.

Second, even *if* information is analyzed by type, socialization processes will surely have affected the typology used. Take the way Robert Bates and co-authors treat ethnicity.[54] An actor believes another actor has a specific set of preferences; *i.e.*, he or she conforms to a particular player "type" due to classification in "X" cultural grouping, identifiable through some set of socially defined symbols, characteristics, or strategic choices. The relevance of information generated by strategic choices during a game, such as an extensive-form game with imperfect information, is contingent on the ways members of a culture interpret the social significance of the choices. A social process generates these shared meanings and norms. Beliefs about other players, the way information is processed, and the nature of the strategic environment are all given, *if at all*, by an explanation dependent on the SSSM.

But, why is "ethnicity" frequently so powerful in constituting identity and generating beliefs about others? Why are symbols, as opposed to simply abstract ideas, the vehicles for beliefs about other actors? How do humans revise beliefs, and exactly how does this process differ from, or how is it obfuscated by, standard Bayesian updating? Humans routinely use information and form beliefs in ways that either deviate *from* or defy explanation by anything *within* rational-choice theory and the SSSM upon which it relies. Evolutionary, not just social, explanations give us some of the needed leverage.

Strategies

Rational-choice theory assumes that actors consciously choose from a set of action plans (strategies) to optimize outcomes given the strategies selected by other actors. Beyond the above-mentioned "closed universe" problem, which prevents the introduction of genuinely new strategies, this optimization assumption is famously problematic. Humans do not always optimize, nor do they even *act* as if they do.

First, people often act in ways independent of any conscious reflective decision-making process. Eating, sleeping, mating, status-seeking, and the displaying of emotion are not plausibly understood as rational choices though we *do* make rational choices about them. These behaviors do play out in real-world political and economic interaction, and their exclusion cripples contemporary rational-choice models, which emphasize the consciousness — though, ironically, not the *conscientiousness* — of decision making.[55, 56, 57, 58, 59]

Second, their information-processing abilities being only what they are, actors cannot always distinguish the best decision rules from other decision rules. The ability of utility-maximization models to predict observations is well known to be disappointing,[60, 61] and considerable work has gone into developing models that can recognize these predictive failures.[62] The bedrock of intentionalist explanations should be a theory that says *how* actions are chosen; however, nothing *within* rational-choice theory tells the social scientist how someone chooses one action over another. The assumption that people are self-interested optimizers is simply a veil covering a tautology.[63] Behavioral game theory is seeking empirical insight into the decisions rules — the utility functions — used,[64] and policy makers are beginning to consult a literature that more broadly considers strategy selection.[65, 66] These developments suggest a widening appreciation of evolutionary explanations and the importance of not basing public-policy decisions on narrow uses of rational-choice theory or on other components of the SSSM.

Towards theoretical consilience

Humans are born with randomly individualized versions of neurological processes and preference sets conserved during natural selection — which is to say, adapted to the "environment of evolutionary adaptation," the EEA.[67, 68, 69, 70] The modern evolutionist argument, as used in current social-scientific work, can be boiled down to the idea that a broad range of human behaviors, including emotions, expressions, language,

aggression, xenophobia, and drives for status, have an evolutionary origin. Specifying the past adaptive function of these behaviors helps us understand them better. The capacity for language, reciprocity, fight-flight responses, all of which are relevant to the study of politics, all are shaped in symbolically different, but substantively similar, ways by different cultures. Humans speak a broad array of languages, but all healthy humans have the capacity for language. A broad range of physical gestures indicate various messages in different cultures, but all humans react similarly to different types of facial gestures.[71, 72] Many different customs resolve issues like commons access or free-rider problems, but all humans have information-processing abilities and emotional-state controls that address exploitation, more or less successfully.[73, 74]

Contrary to social Darwinism and the eugenics movement, whose twin legacies long poisoned the well from which pioneer researchers hoped to draw consilience between the biological and social sciences, the evolutionary model does *not* imply that socialization or culture contribute nothing to an explanation of observed behavior. The modern evolutionary literature shows great interest in these forces.

However, to suggest that rational-choice and evolutionary theories are *both* valid in social-science explanation requires that their reconciliation be demonstrable — or, better, that their consilience be achieved — for culture, evolution, and intention. Accordingly, I must account for evolutionary theory's concept of culture. I argue that the inability of evolutionary theory to explain specific cultural phenomena, such as why a *particular* language is spoken or, more generally, local semantics,[75] can be resolved by recognizing the way intentional political actors use cultural resources to obtain distributional advantages. *I supplement the evolutionary focus on ultimate causes with a theory of proximate — and highly political — causes of cultural development and change.*

A number of authors have explored the intersection of culture and evolution.[76, 77, 78] Unfortunately, these authors do not explain how the *specific* manifestations of cultures — such as types of language (*e.g.*, English vs. French), customs of exchange and property, and symbols of hierarchical social organization — are generated from the neuropsychological framework that makes culture possible. This is problematic because it leaves proximate explanations of particular social features unspecified.[79] I argue that evolutionary psychology, and evolutionary theory more generally, leaves out the *political* part of culture and thus does not offer a robust account of culture on its own. Building on previous work,[80] I provide an initial solution.

Two key observations are necessary. The first is the difference between what Ernst Mayr termed "open" and "closed" behavioral programs.[81, 82] Open behavioral programs interact with the social environment to produce some phenotypic trait. For example, while all humans have the capacity for language, specific languages are spoken only by those who are exposed to them. Closed behavioral programs are much more rigid in their expression. All humans respond similarly to the taste of sweetness;[83] the meaning of many facial expressions is universal;[84, 85] and we tend to favor symmetrical anatomical traits.[86, 87, 88, 89, 90] Manifestations of closed behavioral programs should be seen more or less identically across cultures,[91] and open behavioral programs should vary in substance but not in underlying purpose. Open behavioral programs lend themselves to criticism as "just so" theories since the "function" they may may have served in evolutionary history cannot readily be assessed today given cultural variation in their expression.

The second observation is that cultures have symbolically identified norms, values, and ways of doing things, which, in turn, have *distributional consequences*. This is a major contribution of the "thicker" rational-choice theory discussed above. Different ways of organizing a culture provide particular actors with certain sets of advantages and disadvantages. Because of their distributional consequences, these factors are actively and competitively manipulated.[92, 93, 94, 95, 96, 97, 98] James Johnson observes, "(y)et because symbols constrain indeterminacy in partial, contested ways, because, that is, they render some ranges of options and identities available at the expense of others, political actors have a powerful incentive to contest them for strategic advantage."[99] Culture, on Johnson's account, arises out of the creative energies political actors use to define and redefine the world around them. Political actors do this by working to impart meaning to symbols, identities, and rituals that create cultural "reality." The emphasis on culture as being outside the head and in the form of meaningful symbols and rituals directly draws on anthropologist Clifford Geertz.[100]

Geertz considered that we should study humans

through the symbols, identities, and practices of the cultures they live in. For this position he and his intellectual progeny have been targeted as exemplars of the faulty SSSM, though Geertz did have a sophisticated rationalization for his position. On his account, the human brain began to change considerably *after* the post-Pleistocene period when "culture" began to develop. "A cultureless human being would probably turn out to be not an intrinsically talented though unfullfilled ape, but a wholly mindless and consequently unworkable monstrosity. Like the cabbage it so much resembles, the *Homo sapiens* brain, having arisen within the framework of human culture, would not be viable outside of it."[101] Evolutionary psychology, on the other hand, argues that not only did significant developments of the mental infrastructure of *Homo sapiens* arise in the Pleistocene period, but that those adaptations both provide the mechanisms by which cultural forces can operate and have behavioral effects not simply governed by local cultural cues.[102] Geertz was correct to emphasize "an ordered system of meanings and symbols" in the study of culture.[103] The adaptive use of these cultural resources, and the mental tools needed to use them, have been with us for much longer than Geertz's, and by extension Johnson's, post-Pleistocene story permits.

Taken together, the distinction between open and closed behavioral programs, the strategic and highly political nature of culture, and the symbolic representation of "shared meaning" provide a helpful formulation of culture. Intentional decision-making can change the specific manifestations of open behavior programs, such as the language spoken or the specific symbols and identities that selectively constitute status and power. For example, natural selection may have given rise to the cognitive capacity for xenophobic behavior, but its expression is entirely contingent on how the conflict of interest between ethnic groups is politically harnessed[104] and manipulated through *symbolic* means. Intentional action is *less* capable of preventing the use of open behavioral programs and even less able to prevent the expression of closed behavioral programs.

Conceptually this is similar to the "orders of intentionality" suggested by several authors.[105, 106, 107] The zero-order state includes psychological reflexes and involuntary responses; the first-order state has rational agents with individual beliefs and desires about themselves; and the second-order state has beliefs about the beliefs and desires of other actors. On my account, evolutionary theory will be more helpful in understanding lower-order states, and proximate theories will prove better equipped for dealing with higher levels. Evolutionary psychology is helpful in considering higher-order states because it helps specify the psychological structure that permits humans to have a "theory of mind." This approach spans the neurological mechanics of behavior and the variety of customs and behaviors used in different polities.

Evaluating the alternative theory

The theory I suggest, while briefly laid out, conveys a solution to several problems. First, evolutionists have no systematic theory of how cultures change. The account I offer takes up recent work on the evolved adaptations for symbolic meta-representation that make culture possible[108] but place it in a politicized, strategic, environment. We ostensibly agree that "culture matters," but little is said about the actual mechanisms by which culture does matter *or* how cultures change. Two notable exceptions are "gene-culture coevolution" and "memetics,"[109] though neither field incorporates a concept of purposeful individuals driven by distributional concerns that shape and re-shape their cultural environments. Steven Pinker[110] seems to rely on the work of historian Thomas Sowell[111] but is quite vague, offering no theory about how cultures change.

Indeed, the SSSM claims an advantage over the standard evolutionary model in that considerable variation exists in the way people "do" things. Thus, to respond, the evolutionary model must offer some conception of how we get this significant amount of variation *and* temporal change while also recognizing salient behavioral themes reflecting our evolutionary past. Borrowing from political scientist James Johnson and others, I have provided a rough sketch of how culture plays a salient role in shaping, and being shaped by, human behavior. While many authors in the evolutionist camp have made considerable contributions to this critique of the SSSM, they have not carved out a role for symbolically grounded, individual-level, intentional explanations. All are silent on how intentional agents try to define and redefine the social world around them through the cultural resources of identities, symbols, and rituals. [112, 113, 114] Indeed, and oddly enough, Pinker discusses rational-choice theory

only briefly, even though his book *The Blank Slate* is sweepingly aimed at the social sciences. While some evolutionarily minded social scientists have been interested in concepts related to strategic interaction, such as altruism and conditional cooperation, few have gone past showing that "such and such a strategy is evolutionarily stable" in a mathematical sense[115] to demonstrating the neurological mechanisms employed[116] or the cognitive requirements needed to play a game[117, 118, 119] and how these strategies manifest themselves in the symbolically constituted "real" world. These efforts help alleviate the conceptual difficulties that have belayed both modern evolutionary and rational-choice theory, and show how functional and intentional explanations can be jointly deployed.

Part 2: Empirical Applications

In this section, I provide several examples that illustrate the usefulness of evolutionary theories in explaining political behavior. I have no doubt that better examples are available, but I find the following highly suggestive that a new way of thinking about rational decision-making might be found. As a set, the examples address intentionalist explanations broadly. I consider the role of emotions in economic and political decision-making; the political and economic consequences of status-seeking; and the role of physical characteristics in selecting game-theoretic strategies, political candidates, and partners in economic exchange. Each of these topics pertains to preferences, and each has well accepted evolutionary explanations.

Next I turn to beliefs by focusing on a literature about actual, as opposed to assumed, properties of human information-processing. Finally, I turn to strategies, reviewing recent work on equilibrium-solution concepts realistically in accord what we know about human cognitive abilities. All this leads to a discussion of focal-point solutions to the multiple equilibria problem in game theory. I argue that this approach can fruitfully draw on evolutionary theory to avoid *ex post* rationalizations of given outcomes. Each of these examples is pertinent to scholars working around or within political science. The relevance and connection to economics is simple: politics has distributional consequences for economic commodities. These examples should also interest evolutionists and interpretive social scientists as novel applications of their work.

Emotions in politics and economics

Psychologists — and all of us, really — have always known that emotions shape human behavior. This truism greatly interested leading nineteenth-century economists but then fell off the factor list later in the neoclassical era; it has more recently begun to reappear.[120, 121, 122, 123] Economist Robert Frank argues that emotion unrestrained by rational material interest permits actors to cooperate, as in prisoner-dilemma games, while, if guided by such interest, they would not. This ability credibly to commit to a cooperative strategy allows "cooperators" to coexist with "defectors."

Frank does not give a "just so" account of how emotions would have developed from an evolutionary standpoint. He details the evolutionary process that would have selected actors with observable emotions, catalogues the behavioral correlates of these emotions, and considers their role in signaling information to other actors. For example, he spends a considerable amount of time discussing how changes in physical characteristics, like eye movements, voice, facial expressions, and body language, help convey valuable information about whether an agent will cooperate or defect. Frank helps explain a broad range of economic situations by considering the role of emotions, with special focus on the commitment problems that are often at the center of economic exchanges. Because it is very difficult to control consciously the behavioral correlates of emotions, they provide a clear example of how unintentional behavior can play out in exchange environments traditionally characterized as populated by rational, conscious decision-makers.

Political scientists George Marcus and colleagues have crafted a sizable research tradition that considers how "affect," and anxiety more specifically, influences a broad range of political behavior, from deliberation to voting patterns. On their account, the degree of anxiety modulates the amount of conscious, rational thought a decision-maker is willing to invest: in situations of low anxiety, extensive access to higher-order mental processes is not needed. Instead, the brain relies more on automatic processes usually associated with the limbic system.[124, 125] Other political scientists explicitly consider the emotions in political decision-making.[126, 127, 128] Furthermore, political symbols collectively hold and communicate emotions, and, not surprisingly, symbols are at the center of emotionally

charged debates ubiquitous in political societies.[129] Evolutionary theory suggests why emotions conferred an adaptive advantage, why emotions matter in politics, and why political explanations — to make any sense — must turn securely, even if silently, on a biological substructure.

The role of status in politics and economics

The quest for social status has been explained by several authors as serving a crucial role in human evolution.[130, 131, 132, 133] Achieving high social regard — achievable in a number of ways — leads to better chances of reproducing (more). At least in Western cultures, this drive has translated into what Frank terms "*Luxury Fever*," where people seek to improve, and are generally worried about, their relative material standing within society.[134, 135] Frank demonstrates how this "fever" affects on wage structures and incentive (taxation) systems so as to prevent inefficient and zero-sum "arms races" in status goods. Richard Wilkinson and his public-health colleagues argue that those who occupy low-status positions in societies with high income variance are, *ceteris paribus*, less healthy. Their hypothesis is intriguing, though not likely to be confirmed any time soon. They propose that exacerbated concern over relative social status produces prolonged catecholamine secretion, to detrimental effect.[136, 137]

For reasons beyond potential policy implications, political scientists might want to pay more attention to the behavioral foundations of status-seeking. How is diplomacy affected by what ThorsteinVeblen called "conspicuous consumption"? How are voters' decisions influenced by attributes of political candidates conveying social status *and* policy preferences? Does the blood-pressure elevation some people exhibit when examined by unfamiliar medical doctors, the so-called "white coat syndrome,"[138] have an analogue in deliberative or electoral politics? Is a politician's desire to retain office, a desire universally assumed in rational-choice models of politics, more instinctual than rational?[139] What political coalitions might most fervently try to tax "*Luxury Fever*" into remission? In the social-capital literature, do horizontal relationships and vertical relationships differ in their propensities to initiate and sustain drives for status?[140]

Here we see two relatively clear ways that a rational-choice model strictly informed by the SSSM would be inadequate. First, while individuals pursue status in various forms across cultures, this pursuit is a culturally mediated biological adaptation. The expression of status will vary symbolically, with styles, brands, enviable social positions, and so on, fading in and out as status symbols. However, while people may be conscious or strategic about *how* they seek status, *that* they seek status is not the result of rational calculation. Second, preferences for political candidates extend beyond the narrow confines of a politician's perceived socioeconomic position.

Physical attractiveness

A considerable literature in economics suggests that physical attractiveness can have significant advantages in the marketplace. Recommendations to hire, starting salaries,[141, 142] performance ratings,[143, 144] earnings, and labor force participation[145, 146, 147] are all significantly influenced by the physical attractiveness of an individual. A number of news sources have reported on these findings, including a piece recently run in *The Economist*.[148] A decrease in prices for plastic surgery has brought about a staggering increase in operations, which would be expected if deformations or undesirable qualities, especially in the face, generated psychological and social difficulties.[149, 150] Less expectedly, game-theoretic experiments have shown that attractiveness can affect the way people play prisoner's-dilemma[151] and ultimatum games.[152, 153] Recent work in political science has also shown a role for physical attractiveness, and a very strong role for "facial dominance," in voter decisions.[154] Normative implications are considerable.[155]

Contrary to popular belief,[156] perceptions of physical attractiveness are not strongly culture-specific.[157, 159, 159, 160, 161, 162] In fact, researchers have shown that the attractiveness of the human face is highly correlated with the degree of symmetry.[163, 164, 165, 166, 167, 168] The bilateral symmetry of facial features is believed to serve as a correlate of physical health and genetic fitness.[169] The journal *Evolution and Human Behavior* contains extensive discussions of and debates about this research. Findings suggest that evolved preferences strongly influence political and economic decisions; visual cues, for example, measurably complement beliefs about a candidate's viability. The culturally relative description of attractiveness suggested by the SSSM model is empirically incorrect or, at least,

seriously overstated. Rational-choice models, and the empirical work they inform, are thus fundamentally incomplete if they consider preferences only along socially described dimensions.

Peter Stone[170] suggests a different interpretation of the tendency to vote for persons of high attractiveness or status: voter expectations converge on these characteristics because they produce a "focal point" through which differentiation of candidates can occur without communication between voters. This hypothesis — which presupposes that status and attractiveness have long-since somehow become attention-getters in the social environment — suggests a sophisticated rational process and, thus, differs from my hypothesis, which posits an extra-rational mechanism. Still, these two hypotheses emphasize different aspects of what may prove to be a coherent, if complex, phenomenon.

Information processing

Daniel Kahneman shared the 2002 Nobel Prize in Economics for work, largely done with the late Amos Tversky, illuminating how the framing of information influences economic decision-making. Kahneman and Tversky's "heuristics and biases" program continues to challenge the rational-choice convention that people readily use the laws of probability in making inferences. Their explication of numerous anomalies has helped establish a new field, behavioral economics.[171, 172, 173] Jonathan Bendor, in a lengthy discussion not unsympathetic to the evolutionary approach taken here,[174] shows how the work of Herbert Simon, who won the 1978 Nobel Prize in Economics, Kahneman, Tversky, and others bears on rational-choice approaches to political science.

These researchers suggest that the hyper-intelligent general-purpose mathematician modeled by the SSSM — even in the "as if" sense — should give way to an agent that uses psychological mechanisms to process information in a "fast and frugal way."[175] This perspective easily lends itself to an evolutionary interpretation,[176] and other pioneers in the field certainly endorse such a perspective. For example, Herbert Simon, presenting bounded rationality, argued that "the minds of living systems should be understood relative to the environment in which they evolved."[177, 178] The domain-specific reasoning abilities suggested by the modular theory of mind being developed in evolutionary psychology differ markedly from the Bayesian skills assumed in rational-choice models.[179]

While the work of Kahneman and his colleagues appeared to bring much-needed skepticism to the rational-choice project in the social sciences, these contributions were early steps. Recent research suggests that understanding how information is processed, and the decision rules that are used, must be complemented by an understanding of the information format available to agents. The information format encountered throughout evolution was natural frequency, which would have been much more readily understood than information formats conveying probabilities about single events. When the information format is natural frequency, subjects appear to be very good at inductively reasoning their way through uncertain environments in a Bayesian fashion.[180, 181, 182]

Several implications follow. First, experiments meant to test rational-choice models should provide participants with natural frequencies instead of probabilities or percentages. Similarly, the way aspiring social scientists are introduced to Bayesian reasoning should be with natural frequencies. Second, important policy issues that involve some sort of mathematical characterization of uncertainty, such as explaining environmental risks or the relevance of false positives and negatives, should be presented in a natural-frequency format to enhance comprehension among "citizen consumers." Third, these authors all point to the transmission and updating of information as important — and as laden with cultural messages. Instead of engaging in some austere Bayesian process, we must be able to account for actual experiences and communications that portray the frequencies of actors being assigned type roles within formal rational-choice models.[183] Only by seeing the generation of beliefs as a process mediated both by the symbolic construction of culture and by adapted psychological mechanisms do we get a comprehensive picture of human belief formation.

Equilibrium solution concepts

John Nash, who shared the 1994 Nobel Prize in Economics, proved that given a game consisting of a finite number of players, actions, outcome preferences, and beliefs, there exists a solution where players adhere to some strategy and no one has a positive incentive to change strategy, given that everyone else's strategy is held constant. This is the Nash equilibrium. In the prisoner's-dilemma game, this concept produces the prediction that both players will defect (will say the other

person committed the crime) if the game is repeated a (known) finite number of times. Over the years many equilibrium refinements have been developed, usually to deal with the existence of multiple solutions. However, underlying the Nash equilibrium is a range of very demanding cognitive assumptions about actors. Recently, solution concepts — not simply refinements — have been developed that incorporate the cognitive limitations of real decision-makers.

The quantal response equilibrium (QRE) allows actors to make small mistakes in selecting their strategy, and also allows them to respond optimally to other actors known to make mistakes.[184] Error allows the QRE to generate a statistical model helpful in analyzing experimental data. The cognitive hierarchy equilibrium (CHE) relaxes the assumption that strategies are selected based on "you think that I think that you think ... that I am going to choose x." The CHE has also proven helpful for analyzing experimental data.[185] Finally, the self-confirming equilibrium (SCE) relaxes the "common prior assumption."[186] This assumption holds that all features of a game are commonly known at the beginning of the game, and that any difference in beliefs as the game is played are based only on access to different information. The SCE allows different actors to have different beliefs about events that do not occur (counterfactual beliefs), a feature that accords with a range of recent work in psychology and cognitive science.[187] The QRE, CHE, and SCE model human decision-making that is error-prone, subject to cognitive limitations, and heterogeneous in prior beliefs. All of these approaches engage the insights of evolutionary psychology and the modern understanding of human cognition, although the evolutionary-psychology literature unfortunately seems unaware of them.

Multiple equilibria and focal points

After specifying the preferences, beliefs, and strategies of a game-theoretic model, multiple equilibria frequently are found. A simple equilibrium in the game-theoretic sense is where no player has a positive incentive to change strategy, given that no other player changes strategy. A number of ways have been proposed to refine away equilibria using characteristics of the formal model itself (*e.g.*, sub-game perfection, perfect Bayesian, trembling hand). Finding a single equilibrium is desirable in the sense that it can serve as a prediction or prescription of what a rational actor would or should do. A model with multiple equilibria can only say what could happen in the rational play of the game. Thomas Schelling,[188] however, proposed that qualitative features of the game environment could serve as a focal point that players would observe and use to help coordinate their strategies to a single equilibrium. That is, information that is *common knowledge* to players and not part of the strategic model itself can serve to coordinate strategy selection to achieve a single equilibrium.

This encourages, if not requires, political scientists using formal rational-choice models to be aware of the substantive features of the environments they model.[189] Just how a strategic environment *gets* its focal-like qualities, though, is not known. As a result, focal points can easily be smuggled in as *ex post* rationalizations.[190, 191] For this reason, political scientist Lisa Wedeen is skeptical about the use of focal points, and about rational-choice theory more generally, for the common knowledge needed to select one equilibrium "rely on the assumption of common knowledge in order to prove it."[192] Interested in the study of culture and its role in our theories of politics, she suggests that "(b)y tracking how common knowledge gets produced, is subject to change, or is implicated in political relationships of leverage and domination, we can produce robust explanations of why people coordinate their actions when they do, while avoiding erroneous causal inferences"[193] due to spuriously identified sources. Wedeen's focus is exclusively on how one can explain observed behavior through analysis of semiotic practices: "what language and symbols *do* — how they are inscribed in concrete actions and how they operate to produce observable political effects" and "view political phenomena by focusing attention on how and why actors invest them with meaning."[194] Thus, Wedeen is still thoroughly within the confines of the SSSM, despite considerable attempts to distance her research program from the Geertzian conception of culture. And, as such, her program suffers from many of the problems identified above.

I see another way to understand focal points. Our shared evolutionary heritage might, in some instances, provide the requisite common knowledge. This possibility follows from evolutionary argument: if humans have a common evolutionary history and adaptations from that history have an effect on behavior, then the common knowledge necessary for a focal-point argument is implied by virtue of common evolutionary background. This idea is consistent with the understanding that focal points are based on some "pre-

theoretical knowledge similar to knowledge of a language's grammar."[195] Elements of a game environment that are not described by payoffs and the strategy set could still be apparent to all players if attributable to an evolved feature of the mind itself. For example, certain colors, spatial relationships, and other physical features mimic promising (or dangerous) environments; these could have focal qualities.[196, 197, 198] Observable emotional cues, especially those in the face, signal information about the likelihood that one or another strategy will be chosen in mixed-motive coordination games.[199] The "rules" governing the interpretation of these signals are roughly universal in humans. We might call these "evolutionary salience rules."

I do not mean that we are automatically programmed to play strategies that are "more apparent" because of their success in coordinating with others in previous periods of human evolution. I only suggest what salient outcomes could be. My arguement is similar to John Schiemann's: selecting a strategy that is part of a focal point equilibrium is a rational, intentional act, because the salience (or apparentness) of a set of strategies is not a *sufficient* condition for being selected. In his theory, the realization of focal-point equilibrium still depends on instrumental action.[200] Likewise, we *could* use our cognitive powers consciously to ignore focal points created by evolutionary salience rules. This approach neither predetermines human behavior nor sets up the naturalistic fallacy. Johnson's approach,[201, 202] where actors instrumentally choose from a set of focal points that are symbolically constructed by creative and goal-seeking political actors, is also accommodated: *some* of the symbols and the way they are perceived are powerful by virtue of the very basic instincts they invoke.

This discussion on focal points does not explain how evolution could have affected our preferences. Focal points, by definition, are not in terms of payoffs but instead are in terms of the labeling of strategies and players. This labeling may be influenced by psychological mechanisms and neural organization developed in humans over time. Consistent with the argument of this paper, evolutionary theorizing about focal points clearly suggests how intentional explanations of behavior can benefit from understanding foundational functional processes.

Review of part 2

I have described several empirical research programs that gain better explanations by explicitly incorporating evolutionary, interpretive, *and* rational-choice explanations. I cover how emotion and status-seeking play important roles in solving credibility problems, participating in politics, and establishing power relations between individuals. Following work in behavioral economics, I cover how the evolved neural framework and psychological characteristics of humans influences information-processing and strategy-selection. I argue that physical characteristics of exchange partners and politicians influence their probability of economic or political success in a way that only an evolutionary approach can explain. Finally, I suggest a novel, though relatively unexplored, solution to the multiple equilibrium problem that hampers many game-theoretic models. Further consideration of these and other examples should help social scientists utilize the rich resources provided by modern evolutionary theory.

Conclusion and further research

This paper has considered how rational choice and evolutionary explanations rely on different types of explanation, respectively intentional and functional. This difference has added to the difficulty evolutionists face in developing research traditions in political science. I suggest that both evolutionary and rational-choice theories encounter difficulties that are partially alleviated by incorporating elements of each approach into a synthetic theory. The result is a theory that 1) better specifies proximate and ultimate explanations and the mechanisms they work through, and 2) begins to establish consistency with conceptual developments in other social- and life-science fields. This result makes conceptual progress that will help generate hypotheses for suitable empirical testing.

While rational-choice theory has a prominent place in political science and economics, it is certainly subject to criticism. The theory outlined here is consistent with both cultural *and* evolutionary approaches. Further, the empirical examples suggest that scholars adopting the rational-choice perspective should be interested in an evolutionary literature less cited and presumably less read. Like other theories, the theory laid out here should be judged on its internal consistency, ability to explain interesting empirical phenomena, and consistency with developments in other fields. I look forward to suggestions and criticisms from those working inside and outside the rational-choice tradition at all these levels.

Much mentioned here deserves further scrutiny. How, and why, do anxiety and other emotions influence different individuals in different ways? How does the pre-frontal cortex process symbolic information? When are focal points the result of common psychological adaptation, and when are they the result of contemporary social agency? How will evidentiary difficulties, such as a lack of data on human development in earlier evolutionary stages, limit both theorizing and the testing of hypotheses?[203] How do ongoing differences in interpreting "human nature" play out in political positions?[204] And where does evolutionary theory clarify or muddle these differences? Does evolutionary theory help us understand the structure of modern formal political institutions? Or, at least, does it help explain behavior *within* that structure? How are normative theories of justice and disputes about genetic engineering and genome discrimination influenced by our understanding of evolution?[205] These and similar questions should encourage political scientists to sketch out ultimate and proximate explanations for the phenomena they study.[206]

Some political scientists — probably many or even most — would object that *what* they are explaining has no particular history in nature and nothing more than the odd marginal cause in biology. The theory set out here, as well as other research,[207, 208] cautions us against sharing this perspective. But an evolutionary approach to, and within, political science has several infamously false paths and many dead ends. We must chart them. And then proceed.

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