

Disciplinary Unification of the Natural Sciences, the Humanities, and the Social Sciences: Adapted Minds and Strategic Approaches to Consilience in the Academy

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ABSTRACT

The purpose of this paper is to consolidate and extend the arguments we made at the EvoS symposium on Oct. 26, 2012. Most fundamentally, we argue that we are entering an exciting and potentially productive era in the history of the human knowledge enterprise. We are at the inception of a “unification revolution” in which all the areas of our understanding (the natural sciences, the social sciences and the humanities) have the potential to be joined in a single coherent endeavor through shared insights and practices. Earlier, more local cases of such disciplinary unification produced spectacular advances (the unification of quantum mechanics and classical chemistry to produce modern chemistry and the subsequent unification of these with biology to produce the molecular revolution, for example). Thus, we can expect even more dramatic advances from the unification of all disciplines, including insights that can serve global human welfare in very specific and powerful ways. We argue that evolutionary psychology has an important contribution to make to this unfolding knowledge revolution. From this vantage, we outline what we believe the crucial challenges are and the institutional and social responses we can make to facilitate this vital unification.

KEYWORDS

Human Evolution, Evolutionary Psychology, Disciplinary Unification, Knowledge Revolution, Unification Revolution, Human Welfare, History, Archeology, Power, Hierarchy, Global Democratization, Competitive Parsimony

“An unexamined life is not worth living.”
“Education is the kindling of a flame, not the filling of a vessel.”
Attributed to Socrates

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INTRODUCTION

Professional evolutionary psychologists have long recognized that human minds are primarily designed to see and understand the world, not as it “really” is, but in ways that serve individual self-interests. In developing what has come to be called social coercion theory, the authors have argued that all the human properties considered unique to us emerge as adaptations to a single adaptive novelty, our unprecedented vast expansion of kinship-independent social cooperation. Moreover, this novel social adaptation, in turn, has a single, simple cause: The ancient evolution in our lineage (for the first time on Earth) of the capacity to cost-effectively manage individual conflicts of interest through access to inexpensive coercion (Bingham & Souza, 2009; Bingham & Souza, 2012; Bingham, Souza & Blitz, 2013; and references therein). It follows that the human knowledge enterprise lives at the interface between our conflicting individual interests and the management of those conflicts allowing our social groups to form and function.

As a result of the decisive power of cooperating coalitions (arising from their mutually coercive membership), our central, uniquely human evolved social strategy is *not* to pursue isolated individual self-interest (contra classical economic theory; Smith, 1776), but rather to collude with individuals with whom we share some confluent interests (minimizing the costs of policing residual conflicting interests). Thus, our capacity to understand the “real” world (rather than proselytizing for some artificial, self-serving picture) is utterly dependent on the capacity of the coalition of the whole to monitor and police the functioning of its constituent self-interested, colluding sub-coalitions.

The striking association of the Scientific Revolution, the Industrial Revolution, and the Modern Economic Miracle (North & Thomas, 1973; Bernstein, 2004; Clark, 2007; Appleby, 2010) with coercive democratization of the modern state demonstrates how adaptively powerful this broad, democratized policing can be (Bingham & Souza, 2009). The essential prediction of this picture is that the modern democratized state reflects the ancient, original human social adaptation, dramatically increased in scale, thereby permitting enormous gains in knowledge, adaptive sophistication and productive power (op.cit.). We argue here that this insight, in turn, emphasizes the enormous stakes implicit in unification of the academy, and the potential for yet another revolution of even greater scale. Moreover, the molecular revolution in biology (resulting from the unification of physics, chemistry and classical biology over the last ca. 60 years) provides freshly recent, compelling additional empirical verification of the intellectual power of disciplinary unification.

In other words, we can anticipate an intellectual revolution of immense proportions with the unification of the entire knowledge enterprise, with its attendant sharing of information between the natural sciences, humanities, and social sciences. The implication of this intellectual revolution for the expanding human global population (and the enormous opportunities and huge threats it faces) cannot be overstated. We will argue that viewing the special problems presented by the adaptively novel contemporary scale of human kinship-independent social cooperation from the perspective of social coercion theory allows us to begin to

specify the specific steps we should take as members of the academy if we are to bring this potential revolution to its promising fruition.

THE LIMITS AND POTENTIAL OF HUMAN KNOWLEDGE

Emergence of edifices of insight like the scientific advances associated with Newtonian mechanics, atomic theory, Darwinism, or molecular biology (with empirical verifications like footprints on the Moon, thermonuclear detonations, and predictable genome sequences) demonstrates that the management of collusive, short-term interests can be sufficiently successful to achieve authentic knowledge of the universe. However, as the cutting edge of the scientific enterprise has reached the very details of the human condition itself, our problem in managing narrow interests in support of an authentic knowledge enterprise has grown explosively. Specifically, our proximate minds evolved to adaptively navigate the expanded human social scale, not to understand its ultimate causal origins. Moreover, most of us enjoy various de facto individual “privileges” within our local social coalitions that are potentially threatened by full description of the logic of our social cooperation.

We have argued elsewhere that pursuit of full global democratization (majority global policing of individual interests) is the ultimate solution to this problem in the public economic/political sphere (Bingham & Souza, 2009; Bingham & Souza, 2012). Our focus here is how failure to solve this problem within the academy continues to obstruct the human knowledge enterprise.

As evolutionary psychologists, all of us occupy a unique position in the quest for unification of the knowledge enterprise. On the one hand, we are individually self-interested, collusive actors (as all psychologically normal humans always are). On the other hand, we also possess tools and insights that allow us to understand how to approach this problem of conflicting interests as it determines how the academy functions, for better and for worse, day in, day out.

In other words, we can intuitively grasp the central problem we face with a depth that no other discipline currently possesses. Our challenge is to translate this scientific insight into practical action. The path forward will require not merely mapping out specific tactical steps. It will also require translating our knowledge from specialized, unconsciously exclusionary jargon into a shared common language.

In this article, we begin with several translations that we consider essential. We then finish with several suggestions for practical action to help drive the crucial unification of the human knowledge enterprise.

TRANSLATING WHAT WE BELIEVE WE KNOW INTO THE COMMON PUBLIC DIALECT

Power, ethical correctness, and hierarchy

Social coercion theory predicts that our uniquely human social cooperation (independently of close genetic kinship) is the central feature of the human adaptation (Bingham & Souza, 2009). Kinship-independent social cooperation (KISC) is something non-human animals do only in rare cases and on very limited scales, whereas KISC on a large scale is the central feature of the “public” domain

of all known human societies, ancient and contemporary. Moreover, this theoretical assertion leads directly to strong, testable theories of the human fossil record, of the evolution of language and human cognitive virtuosity, and of the details of human history – all emerging as adaptations to or implications of uniquely human KISC (op.cit.).

The central claim of social coercion theory is that uniquely human KISC is a direct consequence of a single ultimate cause, the evolution of access to inexpensive conjoint coercive threat. This development allows cost-effective ostracism of potential cheaters on cooperative endeavors. This use of credible threat then makes non-kin cooperation an adaptive opportunity. As far as we can determine, the only pathway to this novel access to individually cost-effective coercive threat is through the evolution of the capacity to project threat from a substantial distance (many body diameters away). Consistent with this theoretical prediction, the origin of uniquely human KISC in the fossil record follows rapidly after the evolution of elite human throwing, the first biological capacity for projection of threat from a distance (remotely) in any animal in Earth's history, as far as we can determine (Okada & Bingham, 2009; Bingham & Souza, 2009; Roche, Venkadesan, Rainbow & Lieberman, 2013).

Further empirical support for this theoretical assertion emerges from the observation that the scale of human social cooperation over our entire 2 million year history into the present correlates with the properties (especially range) of the coercive technologies we possess for projection of coercive threat. Finally, the everyday function of our societies, through the present moment, appears to be absolutely dependent on the projection of coercive threat remotely (Bingham & Souza, 2009). Think of the handguns of contemporary law enforcement, for example.

On the basis of social coercion theory we can make the following predictions, specifically useful in this context.

First, coercive threat would have been relatively democratically distributed among individuals from the inception of the human lineage until very recently in our history (below). This expectation is based on the inherent properties of the original coercive technologies (throwing stones, atlatls, bows) and ethnographic observation of pre-state societies (reviewed in Bingham & Souza, 2009 and Bingham, et al., 2013). Thus, self-interested projection of threat would have enforced relatively mutually beneficial cooperative practices. Indeed, the “right” (ethically “correct”) would have been defined as pursuing self-interest in those specific ways that were confluent with the self-interests of surrounding (highly mutually powerfully coercive) non-kin others. Self-interested behaviors that did *not* have this property would have provoked pre-emptive ostracism (and have been perceived subjectively as “selfish”) (Okada & Bingham, 2008; Bingham & Souza, 2009).

Second, an important second-order implication emerges from the preceding paragraph's considerations. We are highly adapted to perceive the views (on any subject) supported by coercive power as the “right” (ethically correct). Moreover, our optimal self-interested strategy is to behave as if (and to subjectively believe that) social “might makes right.”

Third, these considerations lead to the origins of the fundamental problem we face. When coercive power becomes systematically monopolized by small

subgroups (as first became possible with technologically advanced weaponry, especially beginning with the rise of the first states; Bingham & Souza, 2009) we expect ancestral human social cooperation to become distorted. In particular, we expect economies policed by those powerful subgroups to serve their interests disproportionately and for the majority of “commoners” to be treated essentially as domesticated animals. This prediction is remarkably well fulfilled by the records of archaic and modern authoritarian states (Bingham & Souza, 2009, 2012).

Fourth, our concern here is the implication of this well-supported picture for the internal workings of the contemporary human knowledge enterprise including our scientific and educational institutions. The central prediction is straightforward. Powerful small subgroups are expected to police the knowledge enterprise in support of their economic and military needs (various branches of engineering and finance, for example), as they apparently do. However, these very same subgroups will act to suppress knowledge generation that would potentially support the interests of coercively weak commoners, especially as this knowledge lays bare the internal logic of human social coalitions. Ostensibly religious suppression of knowledge generation provides excellent empirical support for this prediction. For example, recall the well-known persecution of Galileo by the Roman Church (intimately affiliated with “royal” state power). Also most illuminating is the constant threat posed by religious authorities to early developers of increasingly materialist world views like Spinoza (see Stewart, 2006, for a rich discussion).

Thus, our evolved behavior/psychology makes us extremely vulnerable to distorting our knowledge-pursuing activities in response to perceived concentrations of coercive power. This propensity is crucial to understanding our behavior in the contemporary academy, as we will argue below.

Social scale and adaptive novelty

To fully understand the impact of our evolved behavioral strategies/psychologies it is also crucial to consider the scale of contemporary human institutions, including those of the academy.

For roughly the first 1.7 million years of human evolution, we apparently lived in relatively small, democratized kinship-independent social coalitions. We would each have had a clear view of the locus of coercive power (democratized consensus). As our coalitions have recently grown enormously in size (to hundreds of millions in the case of contemporary states), we have lost the capacity to perceive and monitor directly the locus of coercive power and to conveniently, fully assess the interests being enforced by that coercive power.

This feature puts us in the position of having to make the central adaptive assessments of human cooperation under conditions of severely incomplete information. Moreover, mis-assessment of who holds coercive power and what their interests are creates enormous danger for each individual. This condition of great, but obscure danger engenders an environment in which some level of secrecy and dissembling are crucial strategic tools – pretending to hold power and/or to be aligned with power through various signaling strategies, for example.

While we predict that the actual distribution of access to coercive threat should ultimately determine the structure of human societies (op.cit), we also expect

the massive, adaptively novel societies and institutions of contemporary human cooperation to chronically function at partial (even extensive) disequilibrium. Self-interested acts covered by some level of implicit secrecy allow the chronic creation of the (mis)impressions of holding power and of serving the common good (see Moldoveanu & Baum, 2011; James, 2012, for two recent empirical discussions of this well-known phenomenon).

While it will be of great value to develop this perspective further as a theory of all (contemporary) human institutions, our goal here is more narrow: to understand how these properties of human behavior/psychology play out within the academy.

A brief summary of the nature of the knowledge enterprise

To understand the challenges we face we must always keep in mind the nature of knowledge. While engineering is an enormously creative human activity, it is a fundamentally deductive enterprise, based on the skillful use of knowledge we already possess.

The knowledge enterprise, *sensu stricto*, does not include engineering, but rather consists of the pursuit of new knowledge we do not yet possess. It follows that the knowledge enterprise is a fundamentally inductive process, as has long been recognized (Popper, 1972; 1978). It is the social and institutional context for this inductive process that concerns us here.

The illusion of social power within the academy

Because of the tendency to collude and the capacity for substantial secrecy (often unconsciously pursued), the disciplinary groupings and institutions that make up the knowledge enterprise are continuously at risk of the “social capture” of financial, attentional and institutional resources for the benefit of a collusive community rather than the benefit of the coalition of the whole they claim to serve. Such social capture encompasses not only the assets of the academy, *sensu stricto*; but tributary institutions, like the scientific press and funding agencies, are also extremely vulnerable. Moreover, the secrecy and exclusivity implicit in this social capture creates opportunities for construction of artificial, self-serving hierarchies *within* disciplines.

The challenge presented by social capture is particularly severe as the evolved human mind is highly adapted to unconsciously self-serving ethical self-justification. In other words, each of us runs the constant risk of participating in debilitating social capture, while nurturing the strong subjective illusion that we are purely ethical, pro-social actors.

A specific example will add substance and clarity to these general statements. We choose the human genome project and its connection to human evolution for several inter-related reasons. This example is clear and well-documented. Moreover, it is accessible to evolutionary psychologists and has been impactful on our discipline.

First, the genome projects were launched with great enthusiasm on the parts of the large, well-endowed institutions ideally positioned to benefit from the resulting

multi-billion dollar investment. As this undertaking was fundamentally an engineering project (its scientific foundation had been fully established previously), progress and data return were highly predictable. Massive structures within the academy and its tributary institutions grew up as a result and the desired engineering outcome was efficiently delivered.

Second, however, as an engineering (rather than scientific) endeavor, the genome projects have, thus far, delivered relatively little new knowledge – though, of course, we all expect this massive store of data to ultimately be put to strong scientific uses.

Third, against this background, we can now perceive the distorting effects of this massive social capture of resources on our own discipline. The old joke goes, “When you have a hammer, everything looks like a nail.” In possession of the massive data trove from the genome projects, *scientific* hypotheses that selectively privilege the importance of these data received highly disproportionate attention. For example, the proposal that evolution is driven by genetic change, rather than new selection (“genetic driver” hypothesis), becomes eminently attractive as something that makes the genome sequence engineering project important even though this hypothesis is inherently dubious.

A specific example is illuminating – and also transitional to our final section below. The genetic driver hypothesis predicts that the evolutionary success of behaviorally modern humans over Neandertals should have an ultimately genetic cause. Thus, exploring the genetic differences between moderns and Neandertals is predicted to reveal the basis of modern ascendancy. With this hypothesis in mind, Paabo and colleagues (Enard, et al., 2002) used sequence analysis of living species (humans and other apes) and sequence divergence data within the human population to infer the recent evolutionary history of speech-related amino acid substitution mutations in the FOXP2 gene. These investigators reached the conclusion they expected to reach – FOXP2 was redesigned for speech very recently, after the modern-Neandertal divergence.

For eight long years this interpretation held ascendancy in many communities as they thought about recent human evolution, in spite of its poor empirical foundation. The truly destructive nature of this event sequence is illustrated by the subsequent discovery that this conclusion is simply wrong (including work from the Paabo group; Green, et al., 2010). The crucial point here is that the hypothesis most beneficial to a large interest group was framed in a way that allowed the hypothesis to survive (and even to be apparently actively supported).

The most fundamental failure here is that the genetic driver hypothesis was formulated in ways that allowed uncertain evidence to support it, *not* in ways that made it powerfully falsifiable (below) as scientific hypotheses should always be constructed. The reviewers chosen by the journals publishing the original 2002 work shared the biases of the authors, leaving the larger academic community without critical input. [Disturbingly, new confusion may still be being created in this domain (Maricic, et al., 2013).]

We chose this particular case for one additional reason. It was ultimately resolved, so that our capacity to interpret its implications is unambiguous. However, it is extremely likely that many other cases of weak hypotheses, supported by strong

collusive sub-groups, survive not merely for eight years, but for 80 or 800. Theories of how our (very powerful) economic institutions work is one arena where we expect this problem to be particularly severe, for example (see de Soto, 2000, for one especially illuminating discussion of this particular case).

Our challenge is to immediately translate any particular hypothesis into a form where the coalition of the whole can reliably evaluate its merits and standing. Discipline-internal implicit secrecy supported by and inherent in hierarchical subgroups impedes this essential effort.

Our goal in the following section is to begin to define some institutional practices that allow us, as the scholarly coalition of the whole, to overcome these severe impediments to our common progress and, ultimately, to the essential unification of all our diverse disciplines.

FALSIFIABILITY, PARSIMONY AND FECUNDITY: CRITERIA FOR THE COALATION OF THE WHOLE

We will argue in this section that there are three fundamental tools that the coalition of the whole can bring to bear to minimize the problem of unconscious social capture by individual disciplines and sub-disciplines.

Just-so stories and the problem of falsification

The first of these tools is illustrated by the genome project case above. We must insist that the members of any academic discipline (i.e., interest group) formulate their hypotheses in forms that allow these hypotheses to be potentially falsified by data from other disciplines.

This requirement has three crucial effects.

First, it allows the coalition of the whole to monitor and impose pro-social discipline on each individual interest group within the academy.

Second, this imposed discipline vastly improves the effectiveness of work within each area of specialization. Members of each discipline are required not just to address fellow members with whom they share short-term collusive interests in social capture of resources; they must also address the concerns of the larger academic community.

Finally, this requirement to address the academic coalition of the whole results in the translation of insights and hypotheses into the common vernacular. This translation dramatically improves the capacity for disciplinary unification; we all understand one another. Equally importantly, this translation allows the entire human community (not just the academy) to monitor and discipline the academic enterprise. The relatively low esteem in which the academy is currently held in some quarters reflects our failures in this area to date.

To fully grasp the importance of theory falsifiability, it is fruitful to consider another example of failure (among many), in this case from the social sciences.

The hypothesis that changes in the details of belief systems drive social change (the “belief driver” hypothesis) is extremely pervasive in several academic disciplines, history and anthropology in particular. However, specific versions of this hypothesis are almost always formulated in ways that allow members of a local discipline to find

evidence supporting them rather than in ways that would allow them to be decisively falsified.

A specific example is illustrative. The hypothesis that religious belief is causal of substantial social change (rather than being a knock-on effect of some other ultimate cause) has long standing (Gibbon, 1777). Moreover, it remains popular into the contemporary era (see, for example, Chavin & Watkins, 2000; Pauketat, 2004). Most of the arguments supporting this claim are extreme versions of “just-so story” telling. Correlation and assumptions of causation are hopelessly intertwined.

Indeed, the empirical evidence for *correlation* between religious belief innovation and large scale human social change is powerful (see Trigger, 2003, for one particularly sober, critical assessment of this evidence in the case of the primary archaic states). Translating this religion variant of the belief driver hypothesis into a form that would allow it to be falsified by evolutionary psychologists (or other disciplines) would be an enormous contribution, for example.

Competitive parsimony and fecundity

When dealing with phenomena of large scale or long duration, it can be difficult to achieve the same level of crisp falsifiability that is possible in, say, a chemistry or cell biology laboratory. While we must continue to insist on maximal falsifiability, it is essential to recognize other criteria that are also useful in shaping hypothesis formation in individual scholarly disciplines.

Two interrelated criteria, winning in competitive parsimony and displaying fecundity, provide these essential additional practices. Moreover, these approaches are abundantly validated in the last four centuries of the history of the natural sciences.

Applying competitive parsimony is central to monitoring and disciplining social capture and facilitating the unification revolution. It is useful to reflect on a very familiar case from the natural sciences. Newtonian mechanics can be thought of as a theoretical description of a particular domain of the universe. However, the development of general relativity demonstrates decisively that Newtonian mechanics is merely an “as if” description of a reality well beyond Newton’s ken. In other words, some pieces of the world behave as if the algorithmic mathematics of Newtonian mechanics were an accurate description of reality, but the superior performance of general relativity demonstrates that, to the contrary, Newtonian mechanics is an artificial approximation, a kind of “work-around.” [By the way, the incompatibility of general relativity and quantum mechanics indicates that one or both of these “great theories” is probably just as “as-ify” as Newtonian mechanics, implying a reality still well beyond our contemporary grasp.] Though such as-if theories can have great usefulness (witness Newton’s contribution to putting footprints on the Moon), their narrow artificiality ultimately limits us (witness the irrelevance of Newton to much of the Manhattan Project).

From the perspective of our individual disciplinary silos, we sometimes develop theories that survive as much falsification as we know how to apply. [The NASA engineers tasked with reaching the Moon would never have discovered that Newton’s Laws were merely as-if work-arounds, for example.] However, if we

impose the additional requirement that our local disciplinary theories generalize to predict the observations of other disciplines, we create the environment in which competitive parsimony can drive disciplinary unification. [Note that Newton's work, though ultimately transcended, had revolutionary importance. Likewise, the local theories our individual disciplines have developed can also have profound importance as portals to more general theory.]

The third criterion for scientific hypothesis/theory that is vital for policing local social capture and facilitating disciplinary unification is the requirement of fecundity. Isolated disciplinary interest groups quickly become jaded, satisfied with the endless round of generating empirical evidence that can be explained on the basis of favored theory, without asking that self-serving theory to make new, even unexpected predictions.

In contrast, strong, unifying theory inevitably spins off previously unexpected predictions promiscuously. For example, the development of quantum mechanics in physics spun off an account of the periodic table in chemistry (see, for example, Pauling, 1939). Likewise, the molecular revolution in biology spun off a vast array of predictions about molecular events associated with biochemical function or evolutionary change (among many other things).

Thus, as members of the academic coalition of the whole, we must insist from one another that our local theories show evidence of continuing to spin off unexpected insight and new falsifiable hypotheses. Indeed, any theoretical claim that has long standing but has never produced a significant new insight beyond appearing to account for the initial evidence on which it was based should be considered, *prima facie*, unlikely to be correct (or even useful). The belief driver hypothesis in history and anthropology that we discussed above is, we argue, an excellent example of a hypothesis that should be regarded as extremely unlikely on the grounds of its lack of fecundity over its centuries of use.

Applying these practices to our own discipline, our theories of human evolved psychology should generalize, perhaps accounting for aspects of history or of contemporary economic or political behaviors, for example, well beyond the specific empirical domains in which they were originally developed.

Applying these criteria to disciplinary unification, a practical example

A crucial practical issue is how we can continue to develop our skills at applying these crucial criteria (falsifiability, competitive parsimony, fecundity) to monitoring for and managing social capture while driving the unification revolution. Our longstanding interest in social coercion theory led us to recently participate in a Symposium and follow-on dedicated journal issue bringing us as evolutionary biologists/psychologists together with archaeologists with an interest in Neolithic revolutions (see Bingham, et al., 2013, and the other papers in this dedicated issue of *Evolutionary Anthropology*).

While a detailed discussion of this project is beyond our scope here, we recommend to young investigators that they explore this work as one source of models for the future. In overview, we combined work in the areas of social complexity theory with work in diverse areas of North American archaeology, asking whether these theories could predict the entire North American record, not just one

local case or another. This required theories to make locally falsifiable predictions. This requirement, in turn, forces theories to demonstrate fecundity and to compete in the parsimony of their explanations and predictions. Incidentally, this approach also contributes to the scientific “dance” between good theory and good empirical evidence – where each feeds and drives the other to deeper knowledge acquisition. We hope this project will prove to have been a small practical step on this long, but crucial and exciting journey toward the disciplinary unification revolution.

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