SYMPOSIUM

Emerging Models of Collaboration in Political Science: Changes, Benefits, and Challenges

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In increasing numbers, political scientists are engaging in collaborative research. It is useful to consider the advantages of such efforts and to suggest strategies for finding optimal collaborators. In addition, there are issues and challenges that arise in the face of increased collaboration, particularly interdisciplinary collaboration across the life and social sciences. Inevitably, as the discipline has moved from a dominant solo-author model to a wider array of authorship possibilities, whether those teams encompass two-person partnerships, large research teams, or something in between, new administrative and cultural questions have already begun to surface as the discipline works to assimilate these changes. Consonant with previous efforts by the American Political Science Association (Biggs 2008; Chandra et al. 2006), we seek here to continue a broader disciplinary conversation surrounding the opportunities and challenges posed by more diverse patterns of teamwork. In so doing, we hope to help continue to encourage transparent, predictable, and openly collaborative intellectual partnerships wherein individuals receive the institutional credit and merit they deserve.

In his 1963 book *Little Science, Big Science*, Derek J. de Solla Price describes the transition of small programs of science into the large organized research organizations characteristic of the modem era. In what was assumed to be a humorous tone, he predicts: "at the present rate, by 1980 the single-author paper will be extinct." Price was largely correct that single-authored works would decrease over time. Indeed, Abt (2007) forecasts that multiple authors will constitute the majority of work in the foreseeable future, although single-author papers will never become completely extinct. However, the reduction of single-authored works has occurred more rapidly in some disciplines than others. Across disciplines, such as biology, economics, genetics, information sciences, physics, political science, and sociology, scholarly collaboration, most commonly measured by number of authors per publication or total number of coauthored publications, has increased in both volume and significance over the last century (see Al-Ghamdi et al. 1998; Choi 1988; Grossman 2002; Harsanyi 1993; Koehler et al. 2000; Luukkonen, Persson, and Sivertsen 1992; Newman 2004; Tarnow 2002). In two of the most prestigious interdisciplinary journals, *Science* and *Nature*, it is extremely rare to find a single-author peer-reviewed research article. Indeed, of the hundreds of research articles published in these journals in the first six months of 2009, only six were single authored,[1] while author lists of over 10 were quite common. For example, the recent revelation in *Science* of a four-million-year-old fossil dubbed Ardi, which turns notions of the intertwined evolutionary history of humans and chimpanzees on its head, had no fewer than 47 authors who worked together over the course of 15 years.[2]

A number of converging factors have enhanced the drive toward greater levels of collaboration that include the rapid increase in the amount of information available, the wide variety of new research techniques, the myriad sources of interdisciplinary funding, the high levels of diverse statistical skills and computation resources required, the huge amount of specific in-depth knowledge of subject areas and proprietary programs necessary to compete in large scientific enterprises, and of course the emergence of large interdisciplinary institutes and teams. All these forces make it extremely unlikely, if not impossible, for any one scholar, even working within the confines of a single discipline, to produce as sophisticated, developed, thorough, well funded, and complete a contribution as a well-integrated interdisciplinary team can generate.

In political science, a significant, but less pronounced, pattern of increased collaboration has emerged. Over the last three years (2006–2008), the *American Political Science Review* (*APSR*) averaged 1.7 authors per article, while the *Journal of Politics* (*JOP*) and the *American Journal of Political Science* (*AJPS*) averaged roughly 1.9 authors per article. This is a modest 29% increase compared to a three-year period 25 years ago (1981–1983).

Fisher et al.'s (1998) review of political science scholarship attributes increase in collaboration to three multilevel factors:

1. greater exposure, including an increasing number of suitable collaborators who are more accessible because of growth in specialized groups that give authors more opportunities to interact with like-minded scholars and a greater number of specialized journals that give researchers more outlets for their work;
2. the availability of large data sets from archival depositories, along with increasingly sophisticated technical and statistical data analyses, which encourage more scholars to profitably divide labor; these forces coupled with increased research funding have helped to create "invisible colleges" (see Crane 1972; De Maio and Kushner 1981; Price and Beaver 1966); and

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3. technological developments that have made collaboration easier and more feasible through the use of e-mail, teleconferencing, and so on.

While this list is not exhaustive, and there are countless additional incentives, Adams et al.'s (2005) 20-year review of almost 2.5 million articles across disciplines provides strong evidence in support of Fisher et al.'s arguments (see also Katz and Martin 1997).

Obviously, there are numerous reasons, some not easily quantifiable, to motivate or encourage collaboration. However, the most important reason justifying increased collaboration may also be the most difficult to measure, and therefore, ironically, has often been ignored. That is, successful collaborative efforts have greater potential to produce superior scholarship. This is not to say that all collaborative work is uniformly better than all single-authored work. It is certainly not, but, in general, for those of equal skill, "authors who work with others are more likely to write higher quality papers, regardless of discipline" (Presser 1980, 97). This finding has been echoed and categorized in numerous ways (see Chung, Cox, and Kim 2009; Hart 2007; Hollis 2001; for an exception, see Medoff 2003).

Large interdisciplinary teams often create working groups around research programs of great scope, depth, and breadth, and have access to more extensive opportunities for funding.[3] As the recipient of one of these grants, Arie Kruglanski argues, "Big interdisciplinary social science will attract big money, particularly if . . . we have real-world concrete deliverables that deal with large-scale social problems. Terrorism is only one such issue" (Dingfelder 2005). We have both been part of such teams, including psychologists and epidemiologists who developed the interview techniques and questionnaire design, psychiatrists who performed clinical evaluations, pathologists who collected blood and saliva, microbiologists who extracted the DNA and performed the physical genotyping, statistical geneticists who prepared the data (e.g., removed genetic anomalies, etc.), statisticians who developed simulations, behavior geneticists who built the statistical applications, and of course political scientists who analyzed the data, wrote the articles, and placed the findings into context (e.g., Hatemi et al. 2008; Meyer et al. 2000; McDermott et al. 2009). Had one person on the team attempted to conduct the project alone, it would have taken many more years, if not the better part of a decade, and the product would not have been as sophisticated or timely. Alone, each of us would have had to master biology, genetics, political science, physiology, and psychology at the very least. In addition, a much greater chance for error would have certainly emerged. These examples, while anecdotal, are not anomalous; rather, they constitute the norm for most interdisciplinary scientific endeavors and are becoming increasingly common in political science as well (e.g., see Hatemi et al. 2009; Orbell et al. 2004; Oxley et al. 2008; Spezio et al. 2008).

COLLABORATION

Systematic research on the nature and structure of collaborative enterprises has been conducted for quite some time across disciplines. Sociologists and economists have done the most extensive work on the characteristics of cooperation, mostly involving business and financial collaborations, but also investigating the features of academic coauthorship, focusing, not surprisingly, on their own disciplinary norms (Ruef forthcoming). In an effort that mimics that of the APSA Working Group on Collaboration, Hunter and Leahey (2008) undertook an analysis of the major journals in sociology between 1935 and 2005. They find that people doing quantitative work are much more likely to collaborate than those involved in non-quantitative work and suggest that this is because such work is more likely to require data-collection efforts and numerous analytical tools.

Scholarship exploring the nature of collaborative networks in biology, physics, and mathematics demonstrates that while the rate of publication has increased over the last 50 years in each of these fields, the rate of collaboration has spiked more considerably (Newman 2004). Not surprisingly, given the multidimensional nature of the discipline, biologists collaborate much more frequently than mathematicians; about 66% of mathematics papers have one author, while only 21% of biological ones are written by individuals working alone. Moreover, the average number of collaborators a biologist has is more than four times greater than the average number a mathematician includes.

With regard to prevalence of collaboration, political science does not exist at either extreme. At one end of the spectrum, *The American Historical Review* did not publish one coauthored piece in all of 2007 (Jaschik 2007), while the vast majority of articles in most science and interdisciplinary journals were coauthored. Indeed, as noted above, the leading interdisciplinary journals, such as *Nature*, *Science*, and *Proceedings of the National Academy of Sciences*, with impact factors some 10 times or more higher than their social science counterparts, almost never publish single-author pieces. This may be partly due to the higher article-citation rates associated with multiple-author projects (Lawani 1986), attributed to a combination of factors, including access to larger social networks, increased visibility, greater scope, and enhanced quality of research (Baldi 1998; Goldfinch, Dale, and DeRouen 2003; Katz and Hicks 1997; Martin 1996; Phelan 1999).

For the 2006 "Report of APSA Working Group on Collaboration," Chandra et al. surveyed 10 major journals across subfields from 1956–2005. They find that in the earliest period, from 1956–1965, less than 10% of articles were coauthored. By 1996–2005, about 40% of articles in the discipline involved some degree of collaborative work. The vast majority of these pieces combined two or three authors, mostly all within the same discipline, if not the same subfield. Collaboration increased most significantly in the subfield of American politics, and least in political theory. The working group also notes an increase over time in collaborations involving more than two people. In examining papers presented at the APSA annual meeting, Chandra et al. find that collaborative papers most often involved participants of asymmetric rank (e.g., a faculty member working with a student). Interestingly, collaboration patterns also appear to differ by sex; less than 10% of collaborations involved women and the majority were composed of all male groups, with mixed gender groups falling in between.

Table 1

Authorship in the *American Political Science Review*

YEAR	SOLO MEN	SOLO WOMEN	MALE PAIRS	GREATER THAN 2, ALL MALES	FEMALE PAIRS	GREATER THAN 2, ALL FEMALES	MIXED DYAD	MIXED-SEX GROUPS
1970	33	2	15	4	0	0	0	0
1980	36	2	6	0	0	0	2	1
1990	28	2	19	5	0	0	6	0
2000	19	3	11	6	0	0	1	2
2008	15	2	8	7	0	0	2	1

We conducted a brief examination of articles in the *American Political Science Review* (*APSR*), to compare rates and styles of collaboration, using the years 1970, 1980, 1990, 2000, and 2008 as benchmarks. We picked this journal because historically it represented the outlet most likely to increase visibility and improve professional standing for its authors within the context of research-oriented departments. Striking patterns emerge by both number and sex. Every research article for each of these years was tabulated (see table 1).

Two patterns emerge. Collaboration increased, and the biggest change is that men working in groups of two increased over time. Women, however, have only increased their presence through enhanced mixed-sex collaborative efforts, not through solitary work or same-sex groups. Indeed, the number of women in the discipline has increased over time, but their single-authored publications in the *APSR* have not substantially increased over the course of the last 40 years (Young 1995).

More central to our theme is the emergence of large research teams. Interdisciplinary work has only recently begun to emerge in political science, and it is too early to make any historically based empirical assessment, or properly gauge its long-term potential influence on the discipline. However, this latest development may be akin to what was witnessed in the life sciences decades ago and only time will tell if the trickle becomes a trend. Yet, long-term developments regarding large-scale collaboration in the life sciences may be able to offer both instructive and cautionary guidance for our field. Their experience with developing established consensual norms around large interdisciplinary collaborations may provide a useful guide for political scientists in establishing predictable partnerships and clear roles and rules for developing graduate training, evaluating hiring, promotion, journal policy, and determining other professional accolades.

Increasing interdisciplinary work may require more complex forms of collaboration across fields as research projects become larger, more sophisticated, and more demanding in nature. Indeed, certain political science departments[4] have started to develop integrated laboratory models more traditionally associated with the life science research laboratories in order to obviate this obstacle, while life science institutes that have historically only included scholars more traditionally associated with the so-called hard sciences, such as geneticists or biologists, have begun to hire social scientists; indeed there has been a substantial growth of interdisciplinary institutes to tackle complex social and biological problems in the last several decades in order to address this need.[5]

WHY ENGAGE IN INTERDISCIPLINARY COLLABORATION?

In his theory regarding the structure of science, sociologist Robert Merton (1973) proclaims that the goal of science should be to expand genuine knowledge, emphasizing originality as the factor that advances scientific knowledge most clearly. Not only does collaborative work contribute to originality, but successful teamwork also enhances the development of long-term vision, skills, breadth, and depth among and between researchers of different expertise (Amabile et al. 2001; Hagedoorn, Link, and Vonortas 2000; Hamel, Doz, and Prahalad 1989; Katz and Martin 1997). Those who collaborate have more opportunities to grow intellectually as opposed to those who do not, because collaborators benefit from the inevitable cross-fertilization of research programs, direct and indirect training from affiliates, and the transfer of skills and abilities from others who are experts in areas outside their own, whether through specific training, social networks, graduate student exchange, or direct exposure to new ideas (see Crane 1972; Price and Beaver 1966).

There is strong support for the notion that collaboration is critically important for creating better work products. Academics is an enterprise that is built on the accumulation of knowledge and, under this guise, sole-author work can only accomplish as much as a research team to the extent that individuals are able to accumulate as much knowledge over time as those who work in groups. To be clear, sole authors can produce the highest-quality work, but it may be harder for them to do as much as quickly as teams. Combining depth and breadth of skills across a number of scholars can facilitate a better, faster work product than any single author attempting to learn every aspect of each idea examined, or every method required at every stage of development and analysis for complex topics. This view is not new and such intellectual interdependence remains commonplace in certain areas within political science, although seldom is it explicitly acknowledged or understood as such. For example, whether using the ANES, congressional records, voting returns for data analysis, large number quantitative data sets such as COW or MID, or translated ancient archival texts, most

authors using such data sets did not develop the questionnaires or collect the original data themselves, much less interview or assess the respondents, code the data, train the interviewers, translate books, build the statistical packages, and so forth. Rather, people who downloaded the data, picked up a translation, or used data made available by a large research grant written by someone else already benefited from their colleagues' prior efforts. However, current disciplinary norms do not cast previously collected or manipulated data, or time spent obtaining funding, as constituting collaboration, or justifying coauthorship.

This does not mean that the value of individual effort loses merit. Rather, it should go without saying that the probability of creating and producing great work depends not only on one's intellectual forerunners, but also in part on one's current peers. It is noteworthy that a small number of authors have a very large number of collaborators, which means that a great deal of work passes through the hands of a small number of the best-connected scientists, or those with high so-called betweenness scores (Newman 2004). While this phenomenon means that a few powerbrokers often inadvertently control the flow of information across a large number of individuals within any given field, such highly influential actors do not appear to preferentially work with each other. These individuals wield a disproportionate influence on their areas, due to some combination of their greater productivity and the critical nature of their particular social and intellectual abilities in bringing diverse experts together in pursuit of a common research goal. Often, such individuals function as crucial "translators," helping to make the implicit norms, assumptions, and expectations of each field transparent to team members from other disciplines. This ability to build bridges often requires deep and sustained exposure to more than one discipline at some point in the person's career, which is why cross-disciplinary postdoctoral fellowships often provide such unique and critical training opportunities. These networking skills do not seem to be easily transferred or replaced across random individuals. For instance, Newman (2004, 5204) finds that "collaboration networks are highly susceptible to the removal of the individuals with the highest betweenness score. One need only remove a few such individuals from the network, it turns out, to break the connection between the others and fracture the network into disconnected parts." Thus, collaboration in no way negates the critical role of the individual scholar.

Yet, long-term developments regarding large-scale collaboration in the life sciences may be able to offer both instructive and cautionary guidance for our field. Their experience with developing established consensual norms around large interdisciplinary collaborations may provide a useful guide for political scientists in establishing predictable partnerships and clear roles and rules for developing graduate training, evaluating hiring, promotion, journal policy, and determining other professional accolades.

Benefits to Individuals

Direct compensation accrues to individuals as a result of collaboration. Diamond (1985) finds that the financial remuneration for authors of collaborative work exceeds that remitted to single-author work. Durden and Perri (1995) find that in economics, collaboration increases both individual and total productivity. Further, in economics, McDowell and Smith (1992) note that coauthored work has as much importance in decisions concerning promotion as sole-authored work.

Hunter and Leahey (2008) note that the institutional prestige of those who collaborate tends to be higher than for those who work on their own. The reasons for this remain unclear, and may involve selection or causation. For example, the higher status for collaborators may reflect that individuals who tend to work on their own are not as highly networked and thus have fewer opportunities for collaboration. Or, those already established at higher-status institutions do not feel as much pressure to produce sole-author work in order to increase their chances of moving into better jobs. High-status individuals may also be pursued more often as coauthors, notably by those seeking to improve their own status by association.

Costs and Drawbacks

While the intellectual recompense for collaboration is transparent, the professional costs are not as obvious and yet may be daunting. Indeed, the magnitude of any conjectured efficiency gains from collaboration by researchers with complementary skills may be overstated since reputational and intellectual benefits must be balanced against potential personal and professional costs. Drawbacks can result from collaboration because of heightened transaction costs, shirking by a coauthor, monitoring differing levels of individual commitment and effort, duplication of effort, difficulty in coordinating tasks, and not receiving credit for individual performance. Collaboration might also require intellectual compromises, result in less-creative projects, potentially reduce individual productivity, and cause a decline in professional reputation (Hudson 1996). Contrary to Diamond's (1985) finding, Liebowitz and Palmer (1984) find that economics faculty who collaborate receive 30% less merit-pay increases compared to their sole-author colleagues. The costs and benefits differ by field and time period.

Another potential collaboration cost occurs when readers attribute opinions to individual authors as a result of

coauthored work that a particular author might not fully espouse. Individual authors may make compromises in order to participate in projects they could not pursue alone, and thus accommodate definitions or interpretations with which they might not fully agree. In such cases, it is up to the individual authors to decide the degree to which they are willing to accede to views in print that differ from their private beliefs in order to facilitate a larger professional or intellectual agenda.

In addition, in many interdisciplinary research groups, various members wish to publish in different disciplinary journals. Yet each discipline has its own norms and styles within specific journals. As a result, some individuals working in interdisciplinary teams may incur the additional burden of having to communicate similar concepts across different disciplinary argots, and absorb startup costs associated with having to learn the norms involved in publishing across disciplinary boundaries. In addition, their own disciplines may not recognize or reward publications outside their own fields as much as might be warranted by the journal's overall impact factor and readership.

THEORIES AND MODELS OF COLLABORATION

Various theories and models regarding collaboration exist. In work specifically examining the nature of collaboration, Leahey and Reikowsky (2008) find three distinct styles. The most common they call the reinforcing specialist model, whereby individuals work with others who come from within their own area of specialization (Barnett, Ault, and Kaserman 1988). The rationale for this arrangement rests on the desire for equally skilled researchers to reduce their research efforts without reducing individually measured research output. The second involves complementary skills, whereby people with nonoverlapping skills join together for mutual benefit. The third is spurred by those who migrate into new intellectual territory and begin working with those who have skills in other areas. One can imagine this last style being particularly beneficial when scholars wish to work in interdisciplinary groups focused around topics of common substantive interest, but cannot invest all the time necessary to learn a particularly challenging new methodology or technology in order to work on a particular problem. A good example might be scholars who wish to do studies involving brain-imaging technology to answer their substantive question, but do not have the time or desire to pick up another graduate degree or certification in neuroscience. Learning the technology or performing the analyses is a major multi-year investment. Rather, such scholars benefit by collaborating with those already trained in the technology and methodology.

Broad theories are useful for categorization, but the functional specifics of how people actually work together are often overlooked. The number of approaches to the practical aspects of collaboration is immeasurable; there are probably as many styles as there are groups of collaborators. In a series of open-forum discussions with political scientists we conducted over the last year, two work arrangements emerge as the most common. The first approach rests on a more contractual division of labor and specialization design, whereby individuals know what they bring to the collaborative enterprise. When a project needs one specific skill, it often seems useful and effective to add a collaborator for this purpose. The growth of new methodologies, computations skills, and research areas has made efficiency gains from a more pronounced division of labor (McDowell and Melvin 1983). Certainly, the increasingly complex biological, economic, political, and social world has made it almost a technical necessity to specialize (Barnett, Ault, and Kaserman 1988). In this style of collaboration, the initial interaction revolves almost exclusively around task-related efforts, but the collaborations also often involve a team of individuals coming together to work on a distinct project of mutual interest.

A second work style relies on a more partnership-oriented model, whereby each person is expected to give 100% to the team effort. This style appears more common in groups within the context of a mutually enduring, long-term, shared research agenda. Partnerships with mutual expectations of a long shadow of the future are more likely to overcome problems related to division of labor or order of authorship because many opportunities for balance exist and increasingly emerge over time and across diverse domains of action, from publishing to giving presentations, and so on. In addition, such partners often derive value from sharing a variety of tasks and tackling difficult problems together over time. This finding is consistent with the literature. In approaching multiparty alliances as a social dilemma, Zeng and Chen (2003) argue that collaboration can fail if individuals perceive that social defection generates higher individual payoffs. They note that by recognizing the important mutual benefits of cooperation, such challenges can be overcome. Over many repeated successful interchanges, trust can develop within the context of such collaborations if team members are lucky. And, as Adler (2001, 215) importantly notes, "economic and organizational theory have shown that, relative to trust, price and authority are relatively ineffective means of dealing with knowledge-based assets," adding that "the effect of growing knowledge intensity may indeed be a trend toward a greater reliance on trust."

THE NATURE OF COLLABORATION AND CHOOSING COAUTHORS

The legitimate reasons an individual might want to collaborate can differ, but we believe that collaboration should not be sought primarily as a vehicle for social or professional networking. Similarly, it may not be a good idea to collaborate with someone just because you are friends. While it is common for friendships to develop over the course of collaborations, it is equally possible for friends to become frustrated at one another as a result of disagreements over work. Rather, we take the view that collaboration is best pursued for the primary goal of achieving a superior work product, whether for the long or short term, than might be accomplished by working alone. In addition, we argue that collaboration should not be pursued as a mechanism to get more credit for less work. While it is true that collaboration may reduce the absolute amount of time it takes to complete a particular project, it does not reduce one individual's time on that project. Nor does it necessarily increase one individual's overall production. Most often, one will spend the same amount of time per article

(McDowell and Smith 1992), but be able to produce an article of greater scope and quality through collaborative efforts.

While assessments of quality in academics often remain notoriously difficult and subjective in nature, the additional ephemeral advantage offered by the collaborative enterprise revolves around establishing and maintaining collegial relationships. These relationships often make the work better, potentially more engaging and more enjoyable, as long as the collaborations themselves are properly managed and negotiated. At the most basic level, it can help to talk a challenging intellectual problem through with someone who is similarly knowledgeable and invested. In collaborative groups with complementary skills, each person can contribute their areas of expertise toward a common product of mutual interest. The problem, of course, is that not all collaborations are born equal, and finding the best fit is not always easy or simple. Here a twist on the analogy presented in the tale of the three bears may be most apt: some require too much, others offer too little, and very few feel just right. But the effort invested in the "just right" productive collaboration can prove well worth the effort.

Picking Coauthors

As Sun Tzu said about war: "If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle" (Sun Tzu 1910). Too often academics, like policymakers, focus too much time and effort on finding the opposition's weakness and not enough on trying to ascertain and understand their own strengths and limitations. Yet this knowledge remains absolutely critical for finding and working successfully over the long term with a variety of collaborators. First of all, it can seem overwhelming to try to discover initially who else might share a genuine intellectual interest and a compatible view of a particular problem, which is why professional associations and conferences offer such great opportunities for low-cost ways of finding out what people are like, what they are working on, and how they respond to challenges and opportunities to cooperate.

In approaching a potential collaborator about a given project, it is very important to know where you are coming from, and where the other person is coming from, and the expectations you have for one another. These processes should be compatible in terms of your intellectual approach to the issue at hand, as well as your conceptions of the nature of the intellectual enterprise and the actual timing and allocation of the conduct of the work. Incomplete information regarding one another's capabilities or intentions can derail the most brilliant theoretical enterprises (Tomasello et al. 2005). Even simple practical differences, such as whether or not they can accept others editing their material, can raise insurmountable roadblocks to successful collaboration if the overall relationship does not rest on a shared foundation of reciprocal intellectual respect, trust, and interest. Mutually beneficial collaborative relationships emerge when both partners want to engage in the project out of joint authentic interest. These unions can be further facilitated when each person in a partnership trusts each other's intentions, and envisions each contribution as constituting an intrinsic aspect of the collaborative team, committing the same level of energy, interest, and investment to the project.

As noted above, it is not appropriate to approach any potential collaborator in hopes of becoming a free rider on someone else's effort. Collaboration may mean that a given participant does not need to learn a new technique, such as how to run a functional MRI machine, but that participant should fully invest in contributing within his or her appropriate area of relative expertise, whether that area lies in research design, analysis, fundraising, writing, or some other aspect of the product. Just as the non-technical partner would want and expect the skilled MRI analyst to excel in a collaborative venture, all partners should expect to offer the best work possible to the collective enterprise in their areas of expertise. When collaborators lose interest, cannot contribute fully, or are not capable of completing their portion of a project, they should withdraw from a project rather than let others expect that the effort is forthcoming. Failure to do so simply engenders resentment. Learning to say no to projects or collaborations that do not fit one's primary research agenda, require skills outside one's capacity, or require more time than is realistically available constitutes an important part of learning how to be a successful coauthor. Saying yes to too many opportunities only risks exhaustion, alienation from coauthors, and potentially sloppy work.

Regardless of the obvious benefits that can accrue to successful collaborators, it can prove challenging to negotiate a comfortable relationship before starting to work with a new coauthor. One strategy for instigating new collaborative ventures involves explicitly agreeing upon tasks and authorship order from the beginning. However, allocation of tasks or roles may not always be possible or even desirable. For some scholars, rules concerning collaboration violate the norm or expectation of trust implicit in such enterprises. Moreover, sometimes projects can transform in unanticipated ways that lead to an unexpected shift in the burden of labor between coauthors. For example, it may be difficult at the beginning of a project to know exactly who needs to do what, especially if responsibilities change over time as goals shift and evolve, personality styles are taken into account, and opportunities develop. It can take a while to learn others' work styles and find patterns of interaction that work for everyone. It is also not uncommon for intellectual views to change, or for one collaborator to move in a different research direction over time.

Indeed, the most difficult, challenging, and potentially gratifying aspects of collaboration relate to the social negotiation of the relationship. This interaction can prove especially difficult in the context of relationships between partners of unequal rank or value, where one person is more senior, or possesses a less central role in the overall project. If there is a way to put aside such imbalances, or egos, and clarify roles and tasks, at least within the internal context of a particular group, it will benefit the product since good ideas won't be self-censored or squelched by anyone involved. Relationships between equally committed intellectual partners, even if they

may not possess objectively equal status or rank, generate the best prospects for a successful, enduring collaborative effort.

Just as with any other kind of interaction, a wide range of experiences in collaboration, both positive and negative, can occur. The more scholars collaborate over time, the more likely they will run into some negative experiences. Outside of personality differences, among the most common of these experiences are unresponsive coauthors and negative interactions between junior and senior scholars, including those between faculty and graduate students. Clearly, as everyone who has had a bad collaborative experience can attest, problems related to personality or ego typically pose the greatest frustrations. To the extent that collaborators can put their egos aside for the sake of the work, both the work and the other participants can benefit. The problem, of course, is that those most in need of this advice often prove least likely to heed it.

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Styles of Work

One of the important things to know about yourself when seeking a potential collaborator is an honest appraisal of your own style of work and your work habits. Some people like to turn work around fast. Others like to take their time before passing work along to their collaborators. No one style represents the best practice, but it is absolutely critical that partners share the same preferences if all are to end up satisfied. If one person expects and produces a 24-hour turnaround, and the second prefers a month between iterations, each person will end up frustrated with the other unless they accept these work-style differences. This temporal element is certainly something that can be discussed prior to working together, or it can be discovered, for good or ill, over the course of collaboration. Some people are more flexible than others are and can work in different styles with different people more easily, but for enduring collaborations, the best and easiest work occurs when all participants function in the style that makes them most comfortable, yet remains compatible with that of their collaborators.

A second important aspect of work style has to do with more subtle aspects of interpersonal engagement. Some people like collaborators who relentlessly challenge them to excel, eliciting and inspiring their best work, even if only rarely offering any reinforcement or encouragement. Other people prefer the kinder, gentler partnerships that provide lots of social rewards, reinforcements, and incentives. Still others fall between these extremes in their preferences for social engagement. Again, no one style represents correct practice; rather, it remains important to know your own needs and style and what feels most comfortable to you, and to seek to work with those who synchronize with it. Many successful patterns of interpersonal community, created within a particular collaborative network, exist. The specific style remains less important than making sure partners operate off the same playbook in terms of identifying which relational problems merit attention and which can be dismissed without consequence. Obviously, for many issues related to division of labor or work style, similarity becomes more important to the extent that the partnership encompasses more work over longer periods of time.

THE POTENTIAL EFFECTS OF INCREASED MULTIDISCIPLINARY COLLABORATION FOR THE DISCIPLINE

If increased collaboration continues at current rates, particularly in the area of large interdisciplinary teams as has happened in the life sciences, and there is some early evidence of this beginning to occur in political science, such changes will eventually exert a significant impact on departmental decisions related to hiring, tenure and promotion, and the journal review process. Questions each department and the discipline may need to consider revolve around what matters most in these evaluations. Is the overall quality of scholarship or journal reputation more important than the relative ease of assigning credit for work? How does the field consider the high-impact interdisciplinary journals? These are not easy questions. Quality can be very difficult to assess, especially in new or highly specialized areas of research where few people are familiar enough to evaluate others. Certainly no one would argue that lower-quality work at the cost of ease of credit is best, but the practical considerations associated with attributing credit properly remain necessary for promotion, salary

increases, and so on. Determining author contributions can prove difficult to the extent that norms of author order are not well instantiated in the discipline, and interdisciplinary journals have historically not been part of the normal disciplinary discourse.

Political science currently resides only slightly on the side of the spectrum favoring solo work, as it also values collaborative work. In many ways, the discipline already considers the quality of coauthored work as seriously as single-authored work in making decisions about professional advancement. Yet such a move obviously encompasses more than just a cultural shift, but also normative change, and such future moves are not without professional and administrative consequences beyond the level of individual departments. It seems likely that a potential shift in reorientation of credit from single- and two-authored works to multiple-authored works may pose a central challenge to the established norms of the discipline.

In addition, if political science follows the patterns we have enumerated in other fields, more coauthored work might also lead to greater overall journal submissions. Such an increase would put greater pressure on an already overtaxed review process. This raises broad and systematic challenges for journal editors and the discipline at large. Editors are already having difficulty securing adequate numbers of qualified referees in a reasonable time period, and the challenge of obtaining a sufficient number of qualified and responsible reviewers constitutes a serious concern for many in the discipline. Without making procedural or staffing changes, increased collaboration and productivity will most likely increase reviewer demands and generate longer wait times for initial responses at prominent journals.

Other fields have attempted to address these concerns in various ways. Interdisciplinary science journals such as *Science* and *Nature* publish weekly, and these articles are dramatically shorter than the average article in political science. Some journals have large professional editorials staffs. Reviewers are often given a maximum of 10 days to review an article. Rejection without review is commonplace. Indeed, a large percentage of articles submitted to high-impact journals are rejected prior to review, making reviewer tasks much less burdensome. Editorial staffs give an almost immediate decision, and are not required to give a reason. Thus, the common interpretation around rejection regards fit and not quality. Such rejection policies save overburdened reviewers from having to undertake frivolous reviews, making this process crucial for the high-submission, higher-impact interdisciplinary journals. However, in many ways, such a process runs counter to historical norms in political science that strive to review every manuscript and value the feedback and teaching that comes from such readings. One way in which both traditional norms and more efficient processes might meet is a voluntary editorial reject-without-review process, whereby authors indicate if they are willing to have their manuscripts sent for review or summarily dismissed if the editor is not interested in the article. Such a process has clear advantages for both sides. Authors know their fate relatively quickly, thus allowing them to submit their work to another journal much sooner, yet they can choose to opt out in order to receive feedback on work that may ultimately be rejected for publication. Another tool common in the life sciences is the pre-submission inquiry. In this process, authors send a short abstract to the journal editor to inquire whether the project itself is of interest to the journal before submitting the entire manuscript. The editorial staff replies with a simple encouragement or denial of interest in submission.

However, these benefits do not come without a price. Editorial staffs have to take on additional duties, and often publication costs are pushed onto the authors. In *Proceedings of the National Academy of Sciences* for example, authors have to pay a significant amount of money for articles running longer than six pages ($750 per page), although Web appendices of virtually unlimited lengths are allowed for free. In addition, many economics and sociology journals charge a submission fee (around $25) to offset administrative costs.

Not all processes developed to address increased numbers of journal submissions require intervention at the journal level. Working models differ greatly by research group and field, but it is not uncommon that approval from a research institute or lab director or some other departmental appointee, such as an advisor, be required prior to journal submission. Such a norm reduces the number of frivolous journal submissions and increases manuscript quality. Senior personnel widely support such policies because they remain invested in increasing the quality of submissions from their departments or research teams, and understand that any manuscript submitted from their labs or departments affects the professional reputation and image of their programs. This image has a direct influence on the placement of graduate students, future recruitment, and even prospects for funding future work. Indeed, such status constitutes a significant form of currency in their own fields and disciplines.

As times change and scholarship becomes more integrated and complex, the discipline has already begun to establish a consensus around more complex criteria for professional evaluation. Indeed, it is already true that sheer number of publications, or citations alone, does not constitute a sufficient assessment of the quality of an individual's contribution to collective work. A thorough review of any given scholar's overall record tells a more coherent story regarding the depth and breadth of the total contribution to the field. The administrative process associated with moving to an even broader assessment of quality for purposes of hiring, promotion, and merit increases will no doubt prove harder to navigate institutionally, and certain changes may take some time. However, the issues posed by increased collaboration of diverse types are already being openly discussed among editorial boards and executive committees.

Relevant to these discussions is the emergence of a recent trend, whereby some of the most profound, innovative, and groundbreaking work involving political topics, conducted by political scientists utilizing interdisciplinary tools, has increasingly been presented in journals *outside* of the discipline (e.g., see Oxley et al. 2008; Fowler and Schreiber 2008; McDermott et al. 2009; Spezio et al. 2008). If this trend continues, such work will advance without the participation of its most relevant contributors. The dual forces pressuring the journal review

process and the challenges associated with allocating appropriate institutional and departmental credit for interdisciplinary work provide powerful conflicting reinforcement. Whether an impetus for organizational and normative shifts occurs, there is no doubt that cutting-edge debates involving political topics are now commonplace outside our own field. Whether in neuroscience, genetics, psychology, endocrinology, physiology, anthropology, primatology, or other fields, inherently political topics including affiliation, cooperation, punishment, ideology, conflict, coalition formation, framing, status, and so on have become the focus of primary research interests across a wide variety of disciplines outside political science (e.g., see Adolphs 2003; Eaves and Hatemi 2008; Inbar, Pizarro, and Bloom 2009; Rozin, Haidt, and Fincher 2009; Sanfey et al. 2003; Shergill et al. 2003; Westen et al. 2006; Wrangham 1999). This movement can represent a boon to the field of political science because it demonstrates the import of and widespread interest in the topics we study. But if political research begins to progress in large part outside the field without the expertise of its primary membership, both the larger academic community and the political science community will suffer.

CONCLUSION

We have addressed two distinct but overlapping themes in discussing the norms involved in various types of collaboration, both in terms of what it does for discipline as well as the individual. In presenting some options for new and emerging styles of collaboration, we offer two sets of considerations: those designed primarily for debate by the discipline and those intended for application by the individual. Such inclinations hold extremely important implications for individual scholars and the academic community.

In disciplinary terms, the last 60 years have seen a substantial increase in coauthorship. This shift has improved productivity and enhanced research quality, but simultaneously posed new challenges to established institutional and administration norms in the field. Past disciplinary norms developed to provide optimal support and superstructure for scholars to produce their best research. Such strategies and norms appear to be shifting in response to emerging changes in the nature and structure of collaboration. Outside disciplines may be able to provide helpful examples and lessons learned, but every discipline is unique, and while others' lessons may prove useful, ultimately their insights may not always translate well into our own field, and it may be beneficial to continue to develop new approaches tailored to political science.

For individual researchers, the process of finding a successful, enduring, collaborative partnership may require some trial and error. A person can certainly get a publication out of a onetime effort wherein one or both people know that no foundation for future interaction exists. A person can also generate a limited number of publications around a specific topic of mutual interest by working with someone for a short time, or only on specific topics or techniques. But for a truly productive partnership to last over time, it appears that participants with similar work styles and values, possessing overlapping and complementary skills and interests, must invest equally in a collaborative enterprise around a research agenda of shared interest. Such collaborative enterprise offers the best prospects for moving the discipline forward in productive and innovative ways. ■

NOTES

1. Research articles, brevia, and reports are considered peer-reviewed research in *Science*, whereas letters and articles are considered peer-reviewed original research in *Nature*. The remainder of sections fall into other categories, akin to editorials, letters to the editor, summaries, news, etc.
2. The articles unveiling the discovery of *Ardipithecus* appear in the October 2, 2009, issue of *Science* in a sequence of 11 articles written by 47 authors.
3. According to a March 2003 report of the National Academy of Sciences, the average number of departments has quintupled in the last 100 years, not through increased specialization but through the growth in interdisciplinary departments. NSF devoted $36 million toward the creation of 21 interdisciplinary centers to study such topics as obesity. And the Department of Homeland Security has allocated $18 million over the course of three years toward the creation of interdisciplinary teams to study such topics as terrorism (Dingfelder 2005).
4. For example see the Political Physiology Laboratory at the University of Nebraska.
5. See the National Consortium for the Study of Terrorism and Responses to Terrorism (START) at the University of Maryland, the Center for Cognitive and Educational Neuroscience (CCEN) at Dartmouth College, the Chicago Consortium for Stigma Research at the University of Chicago, the Institute of Cognitive and Decision Sciences (ICDS) at the University of Oregon, the Virginia Institute for Psychiatric and Behavioral Genetics (VIPBG) at Virginia Commonwealth University, and the Institute of Behavioral Genetics (IBG) at the University of Colorado to name a few.

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