

The Critique of Disciplinary Silos

Proponents of interdisciplinarity have offered diverse objections to existing scholarly disciplines. The large literature on interdisciplinarity, however, can be distilled into five main criticisms. Disciplines, it is charged, inhibit communication, stifle innovation, thwart the search for integrated solutions to social problems, inhibit the economic contributions of universities, and provide a fragmented education for undergraduates. Amidst these varied lines of criticism, the central complaint is that disciplines have become isolated “silos.” This fundamental weakness is a premise that undergirds the other main charges levied against disciplines.

While the current reform movement is significantly more vigorous than earlier ones, the case for interdisciplinarity is not new. A detailed review of an edited volume from the 1960s raises many of the themes that continue to echo today. This will be our point of entry. The balance of the chapter examines the five themes just outlined.¹

Donald Campbell: Voids versus Overlaps

Donald Campbell, a prominent social psychologist, defined the problem of disciplines as one of sets of important social topics that receive little or no attention because of the inward orientation of disciplines. This essay appears in a collection edited in 1969 by Muzafer and Carolyn Sherif, along with a number of other interesting contributions. The issue with the American organization of academia, as Campbell saw it, was “the ethnocentrism of disciplines,”

Portions of this chapter draw on and further develop themes addressed by the author and Scott Frickel in their 2009 essay in the *Annual Review of Sociology* (Jacobs and Frickel 2009).

i.e. the symptoms of tribalism or nationalism or ingroup partisanship in the internal and external relations of university departments, national scientific organizations, and academic disciplines” (1969, 328).

Disciplines not only act like tribes or ethnic groups in advancing their group interests, but the principal tendency is to direct intellectual focus toward the center of the field. Each discipline defines a hierarchy of topics, and enterprising scholars seeking to have a successful career understand they need to address the issues defined as significant in their area. Disciplinary pressure thus acts as a centripetal force that pulls scholars toward issues defined as central and away from topics that are considered marginal to the field. So powerful are these inward-directed forces that topics at the margins or peripheries of fields lie fallow and are neglected.

Campbell effectively captures his view of the state of academia with a diagram (see figure 2.1). Each discipline is seen as a tightly knit configuration of people and ideas, with overlapping strands of research taking the shape of a ball. Between these tightly knit units are voids, domains neglected by science. In Campbell’s view, academic fields are scattered like galaxies across large stretches of empty space. A more effective organization of science would devise a way to cover the entire span of social experience and remove the gaps between fields, which he labels “the fish-scale” model of “omniscience.”

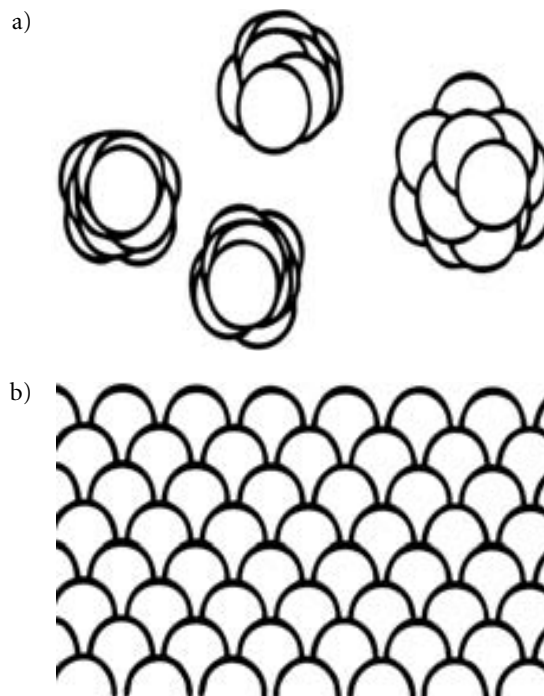


FIGURE 2.1. Donald Campbell’s fish-scale model of omniscience. a. Present situation: Disciplines as clusters of specialties, leaving interdisciplinary gaps. b. Ideal situation: Fish-scale model of omniscience. Source: Adapted from Campbell 1969.

Campbell's wonderful diagram captures the idea of academic silos quite effectively, although he does not use this term. As soon as he presents the diagram, however, Campbell hedges: maybe these empty voids are not ignored but relatively neglected; perhaps there is attention to these interstitial issues but this attention is not as useful as it could be because the practitioners in different fields ignore one another's contributions. In other words, perhaps the problem is that disciplines are operating on different planes rather than truly intersecting. In the end, Campbell never tries to label the void. In other words, he does not offer a list of the important topics that he thought were neglected by scholars at that time.

The notion of fields being isolated is a common argument for interdisciplinarity, but it is by no means the only one. Campbell's diagnosis of the problem was quite different from that offered by Stanley Milgram, who argued that all interesting problems touch on a variety of disciplines. In his essay discussing the "small world" experiment that attempted to ascertain the number of links needed to connect two disparate individuals, Milgram wrote, "The small world problem is a relatively new topic of investigation, and thus has not yet been 'claimed' as the exclusive property of any one discipline. Communications specialists, city planners, social psychologists, mathematical sociologists, political scientists, and historians have felt free to talk about the problem. Let us hope that it does not become the 'private property' claimed by any single discipline, which then posts 'no trespassing' notices on it, and thereby denies it the benefit of new insights from a variety of sources" (1969, 119). In Milgram's view, then, the typical pattern is not huge chasms separating disciplines but rather intellectual overlap and potential turf wars.

In their own essay, Muzafer and Carolyn Sherif also emphasize the *overlap* between fields, rather than the gaps between them, as the central problem: "man does not arrange his problems or divide them up neatly along lines laid down by academic disciplines. On the contrary, there is a great deal of overlap in the subject matter of topics considered by the social science disciplines" (1969, 7). The objective of interdisciplinary research, for the Sherifs, is not the solution to particular practical problems, such as how best to allocate police to reduce crime. Rather, the fundamental goal of interdisciplinarity should be to check the validity of findings across fields.

We propose that each discipline needs the findings from others as a check on the validity of its own generalizations. For example, formulations about intergroup relations, or leader-follower relations, or power relations cannot be one thing when taught in a department of psychology and another thing when taught in a sociology department, and still another in a political science

department, if any of the disciplines in question claims validity for its formulations. (1969, 5)

Campbell does not consider the possibility that disciplines might compete with each other for resources by claiming the latest, sexiest, and best-funded topics as their own. One might expect disciplines to venture forth into unchartered territories that abound in Campbell's map of the intellectual universe. Enterprising scholars would seek to build their own reputations by claiming some of this void for themselves and in turn for their discipline. After all, tribes and nations pursue expansionist strategies: why not disciplines?²

In addition to territorial conquest, another, more prosaic, motivation for academic entrepreneurship is offered by Raymond W. Mack, another contributor to the Sherif and Sherif collection. He notes the role of money in shaping the intellectual terrain. Mack is clearly uncomfortable with the subject of financial support for research, which he seems to think pulls scholars away from their most fundamental and most important ideas: "research emphases in social science tend to go where the money is. Because this a somewhat embarrassing point, let us be brief about it" (1969, 55). He proceeds to cite examples from medical sociology and the study of poverty: when funding became available, sociologists were drawn to these fields. What neither Mack nor Campbell considers explicitly is that the lure of research funds might serve as a countervailing force to what Campbell sees as the "ethnocentrism" of disciplines. If topics such as educational disparities, global warming, or international terrorism are interdisciplinary by nature and become well funded because they become seen as urgent social problems, researchers from different fields may well feel inclined to explore them.

Campbell does not consider the possibility that disciplines might be dynamic entities because of competition between scholars, or even competition between specialty areas within a field. Nor does he offer any evidence regarding the ostensible failures of disciplines. But there is an even more basic flaw in Campbell's argument. His suggestion that powerful, inward-directed forces make disciplinary scholars narrow and limited assumes a rather neat, structured internal hierarchy of problems. But disciplines, according to Campbell himself, are more like a "hodgepodge" of disparate areas of inquiry and groups that are only affiliated in the loosest of ways. The "hodgepodge" terminology would seem to undermine the argument that disciplines narrow the vision of researchers. If one can affiliate with any number of subareas within one's field, and if the configuration of the hodgepodge evolves over time (not a possibility Campbell specifically explores), then it would be hard to see how disciplines force scholars into rigid boxes.

In trying to distinguish between overlaps and voids, I believe the facts point more in the direction of the Milgram/Sherif side of this debate. The educational challenges facing our society may serve as an example. Many believe that national and individual success in a global economy requires academic achievement, and much public discussion has been centered on how to improve our educational system. Academics have not shied away from this problem. Psychologists have delved into educational issues, as have sociologists, anthropologists, political scientists, economists—all have had much to say about educational issues, as have faculty members in schools of education. The case of education, which is examined in detail in chapter 5, suggests that the overlap model is more applicable than the void model. Researchers and scholars from various fields do not avoid but instead actively seek out social issues when they believe that insights from their discipline may be informative. Many academics want their discipline to be relevant, and by conquering widely recognized problems, their personal prestige, along with that of their discipline, is enhanced. Moreover, research funding not infrequently accompanies attention to social issues.

This review of Campbell's essay and its companions suggests that the case against disciplines is not a single argument but a set of related and sometimes contradictory positions. The literature on interdisciplinarity has expanded considerably since the late 1960s, yet many of the lines of reasoning developed then continue to inform the current debates.

The writings of today's reformers echo the concerns raised in the Sherif volume. In his introduction to the *Oxford Handbook on Interdisciplinarity*, Robert Frodeman (2010) includes among the criticisms of disciplines "excessive specialization, the lack of societal relevance and the loss of the sense of the larger purpose of things are tokens of these concerns" (xxxii). He warns against the dangers of "disciplinary capture, where new questions become just one more regional study or specialist's nook" (xxxiii) in terms that closely resemble Stanley Milgram's in the late 1960s.³

Disciplines as Silos

One of the central claims of advocates of interdisciplinarity is that disciplines become inwardly focused, and actively block attention to developments occurring in other fields. As we have seen, criticism of disciplines is not new, but the use and popularity of the term "silo" is a departure. Neither Campbell (1969) nor Klein (1990) used the term, although both anticipated this idea.

The association between academic disciplines and this terminology has

become commonplace, especially since 2000. A Google search of the terms “disciplinary silos” and “academic silos” yielded 6,000 and 4,000 hits, respectively (conducted January 1, 2011). A search in Google Scholar found these terms were rarely used before 2000 (20 instances), 55 times between 2000 and 2005, and 450 since 2006.

There is reason to believe that the term spilled over from the business world to academia. An Ngrams (a Google search of terms in English-language books) analysis reveals that the term “organizational silo” increased in use between 1995 and 2000, to a greater extent and well before the term “disciplinary silo” came into use. The critique of disciplines thus may have landed in a cultural setting receptive to this line of criticism.

The term as applied to academia sometimes emphasizes ignorance of developments in other fields, and sometimes points to the importance of informing the public of a scholar’s findings. The suggestion that silos stifle innovation is often wrapped together with the idea that real-world problems are bigger than any one discipline can handle. Sometimes the term refers to the distance between university life and “the real world.”

For example, writing in the *Chronicle of Higher Education* in 2008, Juan Gilbert emphasizes the way silos make it more difficult to follow developments in related fields.

It is clear that diversity research and programs take place within specific academic disciplines, or “silos.” We don’t reach beyond our own silos enough to know that colleagues in other silos are wrestling with similar issues and ideas. (Gilbert 2008)

The need for academics to try to reach a broader audience is another way in which the term silo is employed. For example, an NSF graduate fellowship recipient (Neal 2011) offered this advice online to other NSF candidates:

“Tie it [your research] to a real-world problem. No one wants an academic that just hides in his/her cubicle, only working in an academic silo, with no desire to make an impact in the real world. How can *you* or *your own work* be disseminated to society? (Neal 2011)

Silos, it is often suggested, inhibit innovation. Thus, Alan Saltiel, the director of the University of Michigan Institute for Life Sciences, explains:

We have so far brought to the Institute 20 talented researchers and their groups, spanning disciplines and bridging interests to flex a more powerful scientific muscle than might be found in a single academic silo. We hope that collaboration among these hundreds of capable and diverse researchers will help us solve problems faster and with more ingenuity. (Saltiel 2011)

Mark Taylor conveys two facets of this notion of remoteness when he bemoans the separation of academia from society: “Colleges and universities are more isolated from the world and inwardly fragmented today than ever before” (2010, 47).

The associations of the term “silo” are not in keeping with the self-image most universities have as open and lively centers of research and learning. The term is probably most often associated with grain storage but may sometimes conjure up missile shelters as well. In both cases, silos are remote, lonely, and quiet places with high walls; they are designed for insulation; they protect their contents from the external environment.

Jamming Communication

At its core, the silo thesis emphasizes the inadequacy of communication across fields. This ostensible problem might have a variety of contributing causes. For example, it might be difficult to keep abreast of technical advances in diverse fields because of insufficient training. The unending tide of new information could compound this problem. As we will see, there are some twenty-eight thousand peer-reviewed scholarly journals currently being published, and the number continues to grow. A further obstacle to communication might be genuine disagreements over intellectual frameworks. Thus, cultural anthropologists have an elaborate approach to culture that does not comport easily with economists’ assumptions regarding the utility maximization of self-interested individuals.

However, each of these explanations would raise questions for interdisciplinarity. Thus, if communication requires intensive training and specialized knowledge, then any serious interdisciplinary alternative would have to figure out a way to effectively train scholars in a variety of specialties. If the problem is too much information, no simple solution presents itself. If intellectual differences, what Karin Knorr-Cetina (1999) calls diverse “epistemic cultures,” are at the heart of the matter, then again this would pose serious challenges for any attempt at transdisciplinary synthesis.

Thus, several prominent explanations for gaps in communication are problematic from the perspective of interdisciplinarity, and consequently these explanations tend to be de-emphasized or ignored. The root cause of silo-ism leveled by critics is willful ignorance—the collective, coordinated, and deliberate effort to make one’s own knowledge esoteric and thus inaccessible to outsiders and the related strategy of keeping the ideas of other specialists at bay. This claim can be belittled as mere “turf wars,” or it can be elevated to a contest for intellectual authority, autonomy, and legitimacy.

Either way, what is at stake is the ability of specialists in a field to “own” their intellectual domains, to be seen as legitimate and ideally exclusive authorities. The sins of disciplines are thus essentially viewed as political and perhaps cultural rather than intellectual. If scholars could just be persuaded to set aside the self-interested and self-directed concerns of their disciplines, then the hard work of making true synthetic scholarly advances could begin. Reformers have generated a lengthy list of critical epithets along these lines. Klein’s compilation includes “feudal fiefdoms” and “warring fortresses” policed by “no trespassing notices” (1990, 77).

From time to time, advocates of interdisciplinarity acknowledge that communication between fields does occur. For example, Allen Repko suggests that “disciplines are fluid and their boundaries porous” (2008, xiii). Klein’s own empirical work (1996) is even more explicit regarding the openness in the humanities.⁴ Focusing on the humanities in the UK, Joe Moran (2010) reaches a similar conclusion. Lisa Lattuca (2001, 243–45) suggests that disciplinary boundaries have softened in recent years. Repko suggests that “disciplines are fluid and their boundaries porous” (2008, xiii). Yet the emphasis on silos still dominates, and it does so for a good reason: the openness and fluidity of current academic fields undermines the main critique of the disciplinary system.

Stifling Innovation

The failure of disciplines to communicate with each other slows down the advancement of knowledge because researchers in one field are not poised to take advantage of insights and breakthroughs developed in other disciplines. Thus, the premise that disciplines are isolated silos is fundamental to the claim that they fail to innovate. If disciplines were open or porous, then they would not stifle innovation.

But the charge goes deeper. Disciplines become self-referential, small communities of performers enchanted with the sound of their own voices, concerned more with their position in the field’s status hierarchy than with advancing knowledge. While this uncharitable description certainly applies to some professors who unfortunately have more ego than insight, the question is whether this is a general pattern, and whether it inheres in the organization of disciplines.

At its extreme, the suggestion is that graduate students simply reproduce their adviser’s work. For example, Mark Taylor, writing in the *New York Times*, warned that “the emphasis on narrow scholarship also encourages an educational system that has become a process of cloning. Faculty members cultivate

those students whose futures they envision as identical to their own pasts” (2009, A-23). This charge is leveled more frequently at the humanities than it is at the obviously more dynamic fields such as the biomedical sciences. The review of the field of American studies presented in chapter 8 shows that this claim is not fair even for the humanities, which have undergone noteworthy theoretical and empirical transformations in each decade since the 1950s. But rather than focusing on the specific issues pertaining to the humanities, the tendency is to elevate this problem as being characteristic of disciplines in general.

Diversity of ideas is held up as the source of innovation, and any set of social constraints is seen as impeding the exchange of ideas. For example, Myra Strober draws on noted historical figures, academic administrators, and cognitive psychologists in making the case that “diversity fosters creativity” (2011, 22).

While there is much to be said for the possibility of intellectual synergy bringing diverse sources together, there are also strengths deriving from the deep training in a subject matter that disciplines can provide. In fact some ideas are too distant from others to serve as useful points of connection. Some points of cross-disciplinary dialogue are ripe for development while others are not. In short, while complementary skills and insights can be valuable, not all interdisciplinary conversations are successful. Also lost in the clamor for interdisciplinarity is the simple fact that many advances require digging deeper within a field rather than borrowing from other places. The virtues of disciplines as centers of intellectual creativity are developed in chapter 3.

Thwarting Solutions to the World’s Problems

The litany of the world’s challenges—poverty, hunger, disease, water shortages, and climate change among them—is prominently featured in discussions of interdisciplinarity. As we have seen, this line of reasoning dates to Donald Campbell and no doubt even earlier.

The logic here seems inescapable: the social problems confronting society are numerous and serious; all require insights from disparate fields; many of these challenges are new and thus the disciplines that are rooted in divisions that emerged in the nineteenth century may seem increasingly out of sync with the society’s needs.

Taylor cites the case of diabetes:

The causes of this epidemic are not only medical but social, political, economic, environmental and psychological as well. The only way we can begin

to meet the challenges this epidemic poses is by bringing together experts and professionals from all fields to share their knowledge and develop productive strategies. (2010, 151–52)

One could substitute AIDS or any number of other social issues and most of Taylor's words would remain applicable.

Yet a closer examination reveals the issue is far more complex. One way to reframe the debate is to recognize that many social issues are multifaceted. This way of putting the matter suggests that there may be specialized knowledge from disparate fields that needs to be brought to bear on the issue at hand. The question is how closely these different facets need to be in contact for research to advance.

For example, the challenges of the AIDS epidemic require medical investigators who have the skills and training needed to develop drug cocktails that suppress the virus. The fight against AIDS is also aided by epidemiologists who can map out the likely trajectory of the epidemic based on an understanding of social networks. The question is whether the laboratory scientists need extensive training in epidemiology and vice versa. Awareness of each other's work is certainly important, but this might be promoted by conferences, review articles, and research centers. It is not at all clear that a department or school of AIDS studies is the best solution to this problem. This topic is considered more systematically in chapter 7.

There are many historical examples of research centers and even schools developed to focus on a topical area and in order to address the social issues that arise in that terrain. One prominent case is schools of education. If education is an important social challenge, and if bringing all fields relevant to education together under one roof is the answer, then schools of education would seem to fit the prescription. In other words, the organization of schools of education resembles the interdisciplinary future envisioned by some reformers. Yet educational shortfalls and disparities remain stubbornly with us after a century of vigorous educational research based in schools of education (Labaree 2004). (Educational research is discussed in more detail in chapter 6.) A note of caution is thus in order: cutting a ribbon for a school of global health or a school of global warming will not automatically generate solutions to these vexing social problems.

Throttling Economic Growth

The image of colleges and universities as ivory towers governed by their own rules at a considerable distance from the “real world” coexists with the reality

that higher education is a major industry. The considerable public investment in universities naturally leads to questions about whether taxpayers' dollars are being well spent. More broadly, the economic role of universities, both locally and nationally, is being emphasized to a greater extent than ever. Universities seek to replicate the part that Stanford University played as an incubator for Silicon Valley start-ups and that of the Massachusetts Institute of Technology in nurturing computer and biotechnology firms in the Boston area.

As Roger Geiger and Creso Sa (2009) put it, universities are increasingly encouraged, indeed expected, to "tap the riches of science." The rationale for this approach is simple and compelling. The economic success of advanced countries depends on working smarter rather than working harder. In other words, jobs that involve few skills, such as unskilled manufacturing, will gradually migrate to low-wage countries. To maintain and improve their standard of living, affluent countries will have to lead in the knowledge sectors of the economy.

There are many ways that universities can contribute to economic development, including the development of a skilled technical labor force, and the advancement of basic research that over time would diffuse into various products and processes. Historically, these indirect contributions have been seen as among the university's primary missions. Increasingly, however, universities have been encouraged to play a direct role in the process of innovation. If economic success in a knowledge economy depends on maintaining a competitive edge, and if this competitive edge requires a steady stream of innovation, and if universities are to play a central role in this system, then it stands to reason that universities should be encouraged to play a direct role in the innovation process. In some fields, new patents have begun to take their place alongside grants and publications as a metric for measuring faculty productivity (Berman 2012).

This theme becomes a strand of the interdisciplinarity narrative because innovation increasingly becomes linked to product development, and research teams in the corporate setting are often multifunctional and multidisciplinary in nature (Rosenberg 1994, 152; Vissers and Dankbaar 2002; Olson et al. 2001).⁵ In other words, if the task at hand is to bring a new skin cream to market, even one that is based on the latest in dermatological research, then a diverse team is needed, including basic scientists, clinicians, specialists with a background in managing clinical trials, financial analysts, and marketing specialists, among others. The set of skills thus goes well beyond those likely to be found in the faculty of a biochemistry department in a school of arts and sciences or a dermatology department based in a medical school. Even

without the sales component, translating basic research into a product with market potential involves several broad skill sets.

Many of the most prominent new interdisciplinary centers on university campuses cited by Geiger and Sa are in the life sciences—Bio-X at Stanford, computational biology at Berkeley, genomics at Duke, life sciences technology at Cornell (Geiger and Sa 2009, chapter 5). Each of these offers the promise of a stream of new patents and potentially lucrative biomedical products.

These centers typically involve huge investments of resources in one main area, such as genomics at Arizona State, translational sciences at the University of Pennsylvania, and nanotechnology at the University at Albany–SUNY. Only a few universities, including Duke, Stanford, and the University of Pennsylvania, can make investments on this scale in more than one area. The risks are (a) the big bets may not pay off; (b) these examples will be taken as a model and applied to contexts where they do not apply; (c) there may be a lack of fit between these ventures and the educational missions of the university, and (d) the costly failure of commercial ventures will hurt universities over the long run.

Fragmenting Undergraduate Education

Despite its many successes, higher education in the United States has been criticized for a variety of reasons, with the complaints about disciplines just one among many. Colleges and universities are routinely castigated for their high cost, for limited student access, and for low completion rates (Martin 2011; Tierney and Hagedorn 2011; College Board 2011). The interdisciplinary critique often takes the form of an aggravating offense: not only is college too expensive, but it does not provide the fully rounded education it promises.

Here again there many interrelated lines of reasoning. A central argument is that the liberal arts disciplines are disconnected from one another, making an integrated undergraduate educational experience difficult to achieve. The problem is attributed to the incentive structure, which elevates departmental needs over the general good. A recent report on general education at the University of California paints a more nuanced picture:

Over time, universities have delegated responsibility for courses and curriculum to academic departments, producing a situation of extreme decentralization. As a result, curricular development is seldom in the portfolio of deans' responsibilities. Departments may be motivated to offer general "service" courses to non-majors out of a desire to swell their enrollments, but departments are rarely motivated to develop general, interdisciplinary offerings.⁶

In chapter 9, evidence is presented on the prevalence of team teaching, cross-disciplinary courses, and cross-listed classes that points to a more complex reality.

A related concern is that distribution requirements that mandate a certain number of courses from different areas of the curriculum do not produce true intellectual integration (for example, see Czerniak et al. 1999). In interdisciplinary parlance, distribution requirements may generate a certain disciplinary range, and perhaps even a degree of multidisciplinary, but not a truly integrated intellectual experience and certainly not a peak of trans-disciplinary synthesis. This perspective emphasizes the need for more connection among diverse academic subjects.

Some argue that there is too much emphasis on research in universities and not enough on teaching. In this vein, the reliance on graduate teaching assistants is often seen as deleterious to undergraduates, and inextricably linked to the organizational structure of the research university. For example, Taylor (2010) suggests that research universities depend on instruction by inexpensive teaching assistants. In this way, the emphasis on research and the neglect of teaching responsibilities by faculty go hand in hand.

Another line of argument focuses on the need for more integration between academic and real-world experiences.⁷ This complaint begins with how material is taught rather than what is taught, but often ends with a revised agenda for a college education. There is evidence that students find it difficult to retain most of the content contained in lectures (Fink 2003), and that hands-on instruction has a more enduring impact. Some stress the need for more practical experiences to enable to students to connect their studies to their postcollege lives. Others stress the need for more volunteer experiences, more emphasis on education as a preparation for citizenship, and even for building more bridges between intellectual goals and spiritual understanding (Parker and Zajonc 2010). A related point is the need to inculcate in students the ability and desire to become lifelong learners (for example, Candy 1991; Vaill 1996).

A major point of divergence within the integrative education perspective is the issue of commonality versus differentiation. Many writers today focus on the individual student who is thought to require education that is individualized and directly engages his or her unique interests and abilities. This differs from the emphasis of an earlier generation of writers on a common intellectual core that provides each generation with a shared basis in contemporary culture (Bell 1966).⁸ While of course it is possible to pursue both objectives to some degree, there is only so much time to devote to these concerns while students also find time to learn specialized subject matters and skills.

Moving past the criticisms of the current arrangements yields an even more diverse range of interdisciplinary prescriptions. These diverse philosophical perspectives can be embodied in a range of practical reforms. For some, integrated education takes the form of a truly synthetic capstone course combined with an interdisciplinary research project. Some seek to reorganize departments so that they focus on “problem-oriented programs” (Taylor 2010, 157), while others simply seek an expansion of service learning programs and other experienced-based initiatives (Eyler, Giles, and Astin 1999; National Service-Learning Clearinghouse 2012).

Applied and preprofessional education is usually not the main concern, as is the case with most discussions of interdisciplinarity. A theme developed in chapter 9 is that applied programs tend to be more integrated but at the cost of being narrower in scope than the liberal arts. This paradoxical pattern points to the ambiguities and complexities in the meaning of the term “integrative education.”

Conclusion

Calls for more interdisciplinary connections on campus have a long history. A brief review of one set of such arguments from the late 1960s reveals many continuities with contemporary concerns.

While the current disciplinary arrangement of colleges and universities has been criticized from many vantage points, a central complaint is the inward focus of disciplines. Their resemblance to silos is at the core of a series of ostensible flaws. The chauvinistic, tribal, or inward orientation of disciplines is at the root of diverse complaints ranging from stifling innovation to fragmenting undergraduate education.

The American system of higher education encompasses thousands of schools, hundreds of thousands of faculty members, and millions of students. In any system this large, examples of shortcomings will not be hard to come by. The question is whether these problems are inherent in the nature of disciplines themselves. If disciplines are fundamentally flawed, then it is imperative that we search for an alternative. However, before we rush to tear down disciplinary silos, a closer examination of the reasons behind the current arrangements is in order. Perhaps the critics have not provided a complete and balanced appraisal. As we will see, many of the charges leveled against disciplines are not supported by the evidence. But first we will turn to a consideration of some theoretical arguments on behalf of a division of academic labor rooted in disciplinary arrangements.

Dynamic Disciplines

Thus far the discussion of interdisciplinarity has been proceeded in the absence of a formal definition of academic disciplines. In this chapter, a new definition of academic disciplines is developed. A discipline is defined as a broadly accepted field of study that is institutionalized as a degree-granting department in a large number of colleges and universities. This institutional theory of disciplines builds on the work of Stephen Turner but differs in some important respects. Whereas Turner emphasizes the way disciplines are closed and operate as employment cartels, the approach developed here highlights a number of features of disciplines that contribute to their dynamism and vitality.

In this institutional approach, the question of how many schools offer a degree in a particular field becomes a matter of central importance. Consequently, the empirical portion of this chapter focuses on counting the availability of degree offerings in various academic fields on college and university campuses.

The number of liberal arts disciplines is actually quite small. Broad fields such as psychology and history have attained the status of academic disciplines in the US system of higher education, whereas narrower fields of research, such as gerontology and demography, have not yet attained disciplinary status as defined here. The issue of stand-alone departments, versus sharing a department with another field of study, is also considered. The data suggest that joint or hybrid departments are remarkably common even for well-established fields such as physics. The presence of multiple fields co-existing under one departmental roof is especially common for foreign language instruction.

Evidence on the size of departments indicates that academic disciplines in

their current form are remarkably recent developments in the United States,¹ dating back no earlier than the Second World War. Before that time, academic departments were so thinly staffed that they were more like lonely outposts rather than the buzzing centers of intellectual life that they have become. As disciplines grow they become increasingly differentiated internally; they also contribute to the emergence of related new fields. This pattern is illustrated with examples from the field of sociology.

The upshot of this discussion is to reverse the notion of disciplinary silos as applied to liberal arts fields at the most basic definitional level. Disciplines are broad, not narrow. Their breadth generates internal differentiation and competition, which contributes to their vitality. They frequently blur into each other, given the lack of clear jurisdictional boundaries; this is one among many factors that promote the borrowing of ideas and techniques across disciplinary lines.

Institutionalized Disciplines

The search for a satisfactory definition of academic disciplines typically begins with a search for their common intellectual properties (Krishnan 2009). This path is strewn with obstacles, since disciplines vary tremendously in the attributes of their theories, logics, and techniques, and the nature of their domains (Knorr-Cetina 1999). The fuzziness of disciplinary boundaries is often taken as a sign of the arbitrariness of the entire enterprise (for example, see Calhoun and Rhoten 2010, 103). Yet disciplines are recognizable entities, and they can be properly defined once their social and organizational features are given their due.²

A discipline is a form of social organization that generates new ideas and research findings, certifies this knowledge, and in turn teaches this subject matter to interested students. An institutional discipline is a recognized area of study that typically is identified with an academic department and an undergraduate major. An individual with a doctoral degree in a discipline is responsible for mastery of a certain body of knowledge, has contributed to that knowledge base in some way, and may be selected to teach the next generation of students in this field. There are no doubt brilliant insights obtained by individual observers of the natural or social world who have no formal training. For example, amateur bird-watchers surely know a great deal about the behavior of the species they observe, and their insights may match or even surpass those who have PhDs in biology or ecology. But institutionalized disciplines are different: they are organized groups that certify knowledge in the university context.

Defining a discipline is not unlike defining a profession.³ It is a status that many fields seek and is one that is not always accepted by our institutions or the public at large. A long-standing debate in sociology has centered on which attributes of professions are essential in distinguishing them from other occupations (Greenwood 1957; Wilensky 1964). A similar approach might point to the common features of academic disciplines: they typically are organized into scholarly associations; their members meet at national and international conferences on a regular basis; and their research is typically published in peer-reviewed journals (Krishnan 2009, 9).

In the definition of institutional disciplines, it is the organizational arrangement of the field on university and college campuses that is most crucial. Disciplines produce PhDs who in turn are hired to teach undergraduates and graduates in the same field. Disciplines are based in departments and confer degrees. This attribute distinguishes broad disciplines from many important but smaller fields of scholarship that have not been able to attain control of their own academic departments. When departmental openings in a field are filled exclusively by PhDs with degrees of the same name, the field in question can be considered to have attained a great degree of autonomy and authority.

For Turner, to be a discipline, a field must have an “internal labor market,” that is, a set of arrangements that make it typical to hire specialists in the field.⁴ Without this, nonspecialists can obtain employment, and there is consequently less control over the specialized knowledge of the field. “Disciplines, this suggests, are cartels that organize markets for the production and employment of students by excluding those job-seekers who are not products of the cartel” (Turner 2000, 51). Turner’s emphasis on disciplines as employment cartels, which emphasizes the exclusionary nature of disciplines, may lead a reader to assume that Turner has a negative view of disciplines. And indeed Turner does express concern over the risks of “fossilization” of disciplines.⁵

But Turner notes positive features of disciplines as well. For example, “The fact that a lot of people are trained in fundamentally the same way makes it possible for them to effectively make judgments about the quality of the work done by other people and for regimes of training to themselves be evaluated for their rigor” (Turner 2000, 52). The absence of an internal labor market, Turner suggests, makes interdisciplinary programs vulnerable to many external factors, which, he suggests, is “the answer to the question of why interdisciplinary efforts so often fail” (Turner 2000, 56).⁶

Turner’s approach represents a good starting point because it emphasizes the social organization of disciplines. Yet this perspective can be improved

upon by extending the analysis to more fully consider the conditions that contribute to the founding and persistence of disciplines. The two key elements Turner's approach misses are (1) the prerequisites for establishing an internal labor market in the first place, and (2) the continuing legitimacy needed to maintain it. To establish an internal labor market for a field, its advocates need to convince colleges and universities throughout the system to establish their program. Given the pressures of institutional isomorphism (institutions mimic and copy features from their peers, as explained by DiMaggio and Powell [1983]), fields are greatly advantaged if they are large enough for most, if not all schools, to adopt them. Thus, the pressures that derive from the need to be accepted on campuses throughout the country lead to the broad reach of disciplines; that is, they need to claim a large substantive or theoretical domain in order to warrant general adoption.

Institutionalized disciplines are thus distinguished from smaller fields by their larger size and scope. A small and specialized field is not likely to be established uniformly by colleges and universities across the country, and consequently it is not likely to have the scale needed to generate an internal labor market. According to this definition, physics is a well-institutionalized discipline while astronomy is less well ensconced. There were over 850 colleges and universities that offered degrees in physics in the United States in 2009, and tenured appointments are typically reserved for those with PhD degrees in physics.⁷ In contrast, only eighty-seven colleges and universities in the United States offer degrees in astronomy, along with thirty-two additional schools offering degrees in the composite field of astrophysics. It is possible for a college or a university to forgo having an astronomy department, but it is more difficult to skip having a physics department. (See table 3.1.)⁸

Raising questions about the status of astronomy as a discipline may be jarring to some readers, given the signal place of the heavens as an eternal object of human fascination and the key role that astronomy played in the emergence of modern science. This example is chosen precisely to highlight the fact that the intellectual or epistemic status of a field of inquiry is not sufficient to make it an institutionalized discipline, which requires its widespread incorporation as a department on most college and university campuses.

No discipline is found in its own department in all colleges and universities. This distinguishes disciplines from the professions, since all states have doctors and lawyers, architects and engineers. A number of fields approximate universal adoption but most do not completely achieve this standard.

Turning to a more recent entrant, translational science is emerging as a field focused on the transfer of basic biomedical research into medications

TABLE 3.1. Number of schools featuring degree programs in liberal arts fields, 2009

	# schools offering	
	Bachelors degrees	PhD degrees
<i>Humanities</i>		
English	1,378	134
History	1,267	150
Philosophy*	879	100
Classics	288	41
Art history	413	54
Linguistics	121	53
Classics	288	41
<i>Natural sciences</i>		
Astronomy	119	62
Biology	1,345	226
Chemistry	1,146	162
Computer science	601	26
Mathematics	1,233	83
Physics	812	191
Psychology	1,389	252
<i>Social sciences</i>		
Anthropology	462	92
Economics	827	153
Political science/government	1,073	124
Sociology	1,039	112

* Includes thirty-two philosophy and religion programs.

Source: *College Blue Book*, 36th edition.

and other cures for diseases and ailments. Translational medicine can boast of newly established journals (for example, *American Journal of Translational Research*), scholarly societies (for example, International Society of Translational Medicine), and research centers and institutes springing up on universities around the United States. For example, the University of Pennsylvania is opening the Institute for Translational Medicine and Therapeutics with over eight hundred investigators based in a new, state-of-the-art \$370 million medical research complex.⁹ However, despite the reference to “the discipline of clinical and translational science” by the Society for Clinical and Translational Science (2011), translational science is not currently an institutionalized academic discipline as I use the term here in that there are currently no PhD programs, no academic departments, and no undergraduates are as yet gaining degrees in this field.

By the same standard, sociology is an institutionalized discipline: most colleges and universities have a sociology department; sociologists with soci-

ology PhDs are hired to teach sociology to graduate students (in universities) and to undergraduates (in both universities and colleges). In contrast to sociology, demography is a specialized area of research that is not an institutional discipline. Demography is a respected field of scholarship: it has scholarly associations (for example, the Population Association of America), peer-reviewed journals (*Demography*, *Population and Development Review*), and national and international meetings. But there are no undergraduate degrees offered in demography, no stand-alone demography departments, and only a handful of doctoral programs offering a degree in demography. Thus, graduate students specializing in demography must find an academic position in a related department, typically in sociology but sometimes in anthropology, economics, public health, or area studies. Demographic specialists may also seek employment in governmental agencies such as the US Bureau of the Census or nongovernmental organizations concerned with issues of population and health, such as the World Health Organization.

Undergraduate majors are thus a key component of this disciplinary system, since hiring decisions are based in part on enrollments. Without sufficient undergraduate majors, even the most venerable fields of study, such as astronomy, will have difficulty maintaining faculty positions and even a separate academic department. Similarly, while physics is among the most recognized and respected of academic disciplines, its small number of majors has resulted in the loss of independent departmental status at many colleges and even some universities. Fewer schools offer degrees in physics than they did thirty years ago, and physicists increasingly share a department with astronomers, as we will see in more detail below. Many students taking physics courses do so in order to fulfill general science requirements. In this way, physics takes on a service-department role with respect to undergraduate education even though the field is highly regarded in intellectual terms.¹⁰

The second amendment to Turner's approach is to note the importance of obtaining and preserving disciplinary legitimacy. Even though they represent somewhat closed employment enclaves, disciplines must continually maintain the support of a number of important constituencies: prospective students, deans and administrators, and colleagues in other fields.¹¹ Without sufficient undergraduate majors, the number of faculty openings will come under pressure. Without a steady stream of graduate students, the field will be unable to reproduce itself. Without a degree of respect accorded by colleagues, candidates for promotion and tenure in a field will face an increasingly skeptical audience. Without various indicators of external legitimacy—grants, awards, and conferences—deans will grow wary of making additional investments. Thus, while Turner emphasizes the ways that disciplines resemble cartels, the

fact is that they remain dependent on the recognition accorded by various publics. These external demands can offset the tendencies toward intellectual insularity and purity that can turn fields inward.

This definition of institutionalized disciplines distinguishes a limited set of liberal arts disciplines from much a larger set of smaller fields that are not part of the standard repertoire of academic degrees and departments. Compared with many smaller fields, liberal arts disciplines typically have a broad domain that is not precisely defined. For example, sociology is broader and more encompassing than a number of related areas of inquiry: demography, gerontology, public opinion research, or social network analysis.

The breadth of disciplines has two immediate organizational consequences, one internal, one external. Internally, the broad scope of disciplines results in the emergence of internal differentiation. For example, sociologists are currently organized into fifty different subgroups, and these in turn are each amalgams of many research nodes and specialties. Externally, disciplines' breadth and imprecise definition means that they frequently blur into each other.

The broad terrain covered by disciplines raises questions about their internal coherence. For example, in the field of sociology, there is little that connects experimental social psychology and comparative historical studies. Lattuca (2001, 244–45) suggests that members of a discipline sometimes disagree on its boundaries.

Thus, critics maintain, disciplines are loose assemblages of disparate specialties united only in their distinction from other fields. If disciplines are arbitrary arrangements that arose for accidental historical reasons, then breaking them down and reassembling them into interdisciplinary themes should be a relatively easy step.¹²

The fact is that the breadth of a field is one of the key prerequisites for its widespread incorporation by colleges and universities. It is only by making a convincing claim over a broad intellectual terrain that a field can make it onto the relatively short list of disciplines featured by most schools. While the intellectual distance between subfields often presents a challenge to faculty, it also represents a discipline's strength. The clash of disparate specialties and perspectives within a field generates intellectual sparks and efforts to bring intellectual order to the disparate units. Moreover, the competition of these subgroups for students and other resources helps to keep them moving forward. A field needs to demonstrate advances, or at least describe a narrative of advances, in order to draw in students.

In their discussion of the field of information systems, Avison and Elliot (2006) suggest that there is dynamic tension between clear intellectual

lines of demarcation and intellectual vitality. Too rigid a definition of a field could stifle innovation, since certain questions or topics would be ruled out of bounds, yet if the scope of the field is too broad, it risks the loss of intellectual coherence. The sweet spot between these two extremes, they suggest, leaves room for creativity while allowing for sufficiently unified training to take place.

Andrew Abbott (2001) develops a theory of internal divisions within fields that emphasizes the elaboration of logical distinctions. Each field in the social sciences, he suggests, divides along a series of dimensions, each of which then divides again along the same lines. Thus, polarities such as pure versus applied, quantitative versus qualitative, and culture versus structure, serve as points of division, yet each divides again along the same lines, setting off a chain of distinctions that ultimately produces a fractal pattern.

The theory developed here is not inconsistent with Abbott's approach, although it does not depend on his fractal pattern, which some may misread as simply a merry-go-round of academics endlessly arguing with each other. The emphasis here is on what Metzger (1987) calls "domain expansion," that is, the development of new techniques, new methods, and especially new topics for exploration. The continual search for novelty is driven in part by competition between specialties and between fields for resources and legitimacy. This competition occurs across a variety of domains, including access to students, cultural influence, research grants, fellowships, and faculty positions.¹³

The institutional theory also emphasizes the size and scope of disciplines, which in essence serve as preconditions for Abbott's fractal processes. In particular, access to students is emphasized as a key resource that is often neglected in such discussions. In other words, academics must not only argue with one another over endless points of scholarly distinction but they must convince new generations of graduate and undergraduates students to join the party. Without their participation, and the broad legitimacy required to facilitate the regular recruitment of new generations of students, disciplines would not have the faculty positions and other resources needed to sustain themselves and the fractal process would come to an end.

Disciplines are self-organizing and do not have any formal legal status. In contrast, professions have legal standing. For example, laws in many states prohibit the practice of medicine without a license. There are no such sanctions for the practice of sociology or physics without a license. As Abbott (1988) has shown, even strict rules regarding professional boundaries are insufficient to prevent turf disputes. Where medicine ends and nursing and social work begin is often difficult to define, and in practice it becomes a mat-

ter of negotiation. The system of academic disciplines magnifies this pattern, since there is no system for policing the fuzzy boundaries between fields.

Thomas Gieryn (1983, 1999) drew attention to the issue of social boundaries in science. In Gieryn's usage, "boundary work" is principally about making claims about the authority of scientific knowledge, in other words, the distinction between science-and nonscience. This notion has been extended (Lamont and Molnar 2002) to efforts to maintain symbolic boundaries between a wide range of groups, including disciplines. The imprecise boundaries of academic disciplines facilitates competition among fields, and they allow for innovation without requiring the relabeling of disciplines. Thus, when economists began to explore the economics of the family (for example, Becker 1991), scholars from other disciplines, including sociology and anthropology, could not turn to any court for a cease and desist order. No injunctive relief was available for this type of academic trespassing. Rather, scholars of the family from other fields could incorporate insights from economists while arguing for the value of their own perspectives to various audiences, including prospective students, deans, and funding agencies.

The system of disciplines is thus characterized by extensive differentiation within fields and the lack of sharp boundaries between fields. There is no central authority that polices the boundary between sociology and political science, for example, the way border guards police national boundaries. Both fields examine social movements, public opinion data, civil wars and revolutions, the influence of corporate elites on political decision making, and a host of related issues. To take another example, the precise point where chemistry ends and biology begins has shifted over time as research questions have evolved and new techniques for studying biochemical processes have been developed. Thus, disciplines are not silos but rather can be thought of as sharing a dormitory space where they raid each other's closets and borrow each other's clothes. This system is dynamic; competition occurs on many levels within fields as well as across fields. The very structure of the disciplinary system tends to push in the direction of competition and over time will generally arrest any tendency toward intellectual fossilization.

Liberal arts disciplines are distinguished from applied and preprofessional fields by their greater emphasis on exploring the nature of its intellectual domain for its own sake. While disciplines are useful and devote tremendous efforts to solving social problems, they also attempt to systematize knowledge without having to focus on immediate vocational or practical concerns. Thus, disciplines are useful but are not exclusively oriented to immediate utility.

Disciplines differ from applied fields of study in the relative emphasis on the intrinsic value of knowledge. Academic disciplines emphasize their

understanding of an intellectual domain and deemphasize the set of skills that will make degree holders immediately employable, whereas the emphasis in applied and preprofessional programs is the reverse. Yet this distinction should not be overstated. Academic disciplines, such as economics, for example, impart practical skills to undergraduates: it would thus be inaccurate and misleading to characterize liberal arts disciplines as devoid of utility outside of academia. Other fields impart a range of skills, including writing, research, and critical reasoning skills. Nonetheless, there is a difference in emphasis between an economics degree obtained from a school of arts and sciences and a degree in finance obtained in a business school. The emphasis in finance is on training the next generation of financial analysts, whereas the emphasis in economics is on teaching its subject matter. Disciplines pursue knowledge for its own sake to a greater degree than do other fields. This difference is a matter of degree and is not absolute on either side of a bright line.

A final element of the disciplinary system that warrants mention is that cooperation prevails as a norm on campuses. Disciplines surely compete with one another, but they do so as units within the same college or university. Thus, rival software companies compete more vigorously than do sociologists and psychologists. In the former case, defeat may mean going out of business. In the academic case, victories and defeats involve issues of status, resources, positions, and the like, but only in exceptional cases does the losing field go out of existence, and even then, it is usually hard to pinpoint a rival field that is responsible for its demise.

Committees with members from diverse disciplines meet routinely to decide matters large and small: to approve new courses, to award graduate fellowships, to advise the university administration on budgetary issues, and to make recommendations regarding promotion and tenure cases. Colleagues from different fields get to know and respect one another and gain an appreciation for the richness and diversity of campus intellectual life. Of course, disagreements often arise and conflicts ensue. Michèle Lamont (2009), for example, stresses the challenges that occur in the context of interdisciplinary grant review committees, but even she concludes that by and large decisions are made in ways that are broadly accepted by committee members. In short, the fact that cross-field committees function every day on campuses nationwide is often overlooked.

To return to the tribal metaphor so popular with critics of the disciplines, disciplines as tribes are remarkably peaceful and cooperative. Academic battles rarely go beyond wars of words. In the international arena, cooperation between formal adversaries is a noteworthy event. For example, the international space station was hailed as a remarkable feat of international coop-

eration between former cold-war rivals. By comparison, academic disciplines collaborate on a host of less visible projects on a routine basis. Thus, the notion of disciplines as rivals akin to tribes or nation states, while colorful, surely overstates the distance and degree of conflict between fields.

Departments and Research Centers

Academic departments are responsible for instruction across the terrain of each discipline. Given the breadth of most disciplines, this goal is difficult to meet in practice even for research departments based in the largest state universities, and it is completely out of reach of departments in small liberal arts institutions.

The need for broad coverage implies that departments are not first and foremost designed to maximize research productivity, since they must balance research objectives with the need for a sufficient range of skills to cover the field's teaching needs. In general, departments seek to strike some balance between a concentration of research skills and the breadth required to cover an adequate range of courses. The tension between these divergent objectives is one source of intradepartmental conflict for which universities are well known. Despite this and other sources of conflict, this hybrid system works because undergraduates help to provide funding stability and graduate students provide a source of research assistants. The combination of attending to teaching needs in conjunction with a substantial commitment to research enables university-based departments to take the long-term view needed for addressing the most fundamental and challenging lines of research and scholarship.

While academic departments are not necessarily designed to maximize research output, there are other units on campus that put this mission front and center. Research centers provide an important context for cooperation between fields, since most claim to be interdisciplinary. These centers can be developed to address a particular constellation of research issues or to address certain issues of the day, and they also represent a convenient arrangement for organizing external research funds. As we will see in chapter 5, research centers are ubiquitous in large research universities, and are often more common than discipline-based departments. In addition, research centers and other campus-based programs represent opportunities for cooperation between disciplines. Research centers are cross-cutting arrangements that are unique to academia. The system of professions has no analogue. Thus, there is no institution that connects the engineering and medical professions the way that academic bioengineering programs connect biology and engineer-

ing scholarship. Disciplines thus may be territorial and focused on political strategies that enhance their own standing, but via research centers and other programs across campus, they connect and cooperate with other domains of scholarship.

One might argue that the department has become an organizational convenience and is no longer an intellectual necessity because of the growing strength of international professional communities and the cosmopolitan nature of academics in most colleges and universities. But without a department, there is no hiring, no stable employment, and relatively little faculty input into decision making.

Scientific and Intellectual Movements

To become a defined field of inquiry, intellectual advances require more than a solitary scholar with a brilliant insight. Disciplines emerge because of the successful organizing efforts of a group of champions. Scott Frickel and Neil Gross (2005) introduced the term “scientific/ intellectual movement (SIM)” to describe the intellectual and social processes involved in the development of new intellectual fields and subfields. Frickel and Gross suggest that the development of a new field, such as the establishment of the discipline of psychology, or a subfield, such as the “status attainment model” in sociology, is analogous to the development of a new social or political movement, such as the civil rights or women’s movements. In both cases, success depends on compelling ideas, sufficient financial and social resources, and effective organizational structures. Opportunities in the intellectual and social landscape are also indispensable.

Frickel and Gross suggest that new ideas are more likely to find a receptive audience when they resonate with established ideas. For example, when the founders of American studies sought to develop a more unified conception of American culture, they latched onto anthropological conceptions of culture that were already available. SIMs also benefit from social as well as economic resources. For example, Frickel and Gross note that new fields are more likely to emerge when high status actors “harbor complaints against what they understand to be the central intellectual tendencies of the day” (2005, 209). Advocates for a new field solicit the financial support needed to host conferences, edit newsletters and journals, and establish regional and national organizations. Key resources in the academic realm are research grants, fellowships, and especially tenured faculty positions.

An insurgent intellectual movement can help to bring about the creation of a new academic field. We will see this in action in chapter 8 with the emer-

gence of American studies as an interdisciplinary area of research. SIMs can also help to overthrow an old approach and replace it with a new one. This too can be seen in the field of American studies, when a new generation entering the field in the late 1960s and 1970s overthrew the “myth and symbol” approach and brought in one that embraced women’s studies, African American studies, regional analysis, and a critical stance toward American’s position in the international arena. Finally, SIMs can also contribute to the differentiation of specialties within a field. This point will be illustrated later in this chapter with examples from sociology.

The discussion thus far has defined some of the essential features of university-based academic disciplines and the social forces that help bring them about. Now we can turn to the implications of this theory for our understanding of the disciplinary landscape in academia.

Institutionalized Disciplines: Organizational Measures

Liberal arts disciplines are thus distinguished from smaller fields or subfields by their breadth and ubiquity, and they are distinguished from applied and preprofessional fields by their greater emphasis on knowledge for its own sake. This approach makes disciplines as much a matter of their prevalence as their intellectual character. In other words, a field is more established as a discipline if it is represented in a wide array of colleges and universities.

Only a small number of fields have achieved the status of fully institutionalized disciplines in the college and university context in the United States. There are eight fields that are close to ubiquitous: the great majority of institutions that grant bachelors degrees offer these fields of study represented. These disciplines are biology, chemistry, English, history, mathematics, political science, psychology, and sociology—each one of these fields is ensconced in over one thousand institutions (see table 3.1).¹⁴

Three additional fields are nearly as common: economics, physics, and philosophy. While courses in these fields are widely available, degrees in these fields are occasionally not available. Economics sometimes falls under the purview of business schools, and thus some institutions offer degrees in business rather than economics. Physics and philosophy both suffer from low enrollments, and thus offerings in these fields are sometimes offered as supplemental to other science degrees (in the case of physics) or humanities degrees (in the case of philosophy) rather than as stand-alone degree programs. In any event, while not quite universal, these three fields are well established as liberal arts disciplines that largely define what it means to be a liberal arts school.

Another tier of fields follows rather substantially behind: computer science, anthropology, art history, and classics. Each of these is represented in hundreds of institutions, but not all institutions feel the need to offer a degree in each of these fields. These are all disciplines in Turner's sense of having a well-established internal labor market, but their presence is not currently viewed as an indispensable part of the liberal arts constellation.

A number of other fields are frequently found in research universities but are often absent in liberal arts colleges. Fields such as astronomy and linguistics are respected fields of inquiry that typically are present mostly in research universities. Consequently, without a market of positions available in liberal arts colleges, the number of PhDs produced in these fields is much smaller, and they do not constitute a defining element of the set of liberal arts fields.

The placement of biochemistry is an interesting one, since at first glance it would seem to be a hybrid field and thus by definition interdisciplinary. If counting degree-granting institutions were our sole criterion, then biochemistry would rank as a well-established discipline. In 2010, 463 colleges and universities granted a bachelor's degree in biochemistry, while 244 programs, including a number based in medical schools, offered doctoral degrees in this field. However, biochemistry often does not have its own department and thus is in a weaker position to control hiring decisions than are fields that typically control their own departments. (Data on the scarcity of stand-alone biochemistry departments are presented below.) In this schema, it is less a matter of biochemistry's intellectual vitality than its organizational position that raises questions about its disciplinary status. In some ways, biochemistry is its own fully established discipline, while in other ways it remains a specialty within the fields of chemistry and biology.

Ecology is another field with a great deal of scientific stature but limited representation as an undergraduate degree program. Only 114 schools currently offer degrees in ecology, and most are under the aegis of a biology department. A total of 534 bachelor's degrees were awarded in the field of ecology in 2008, compared with 54,384 in general biology. It may be that growing interest in the environment and climate change will increase interest in this field, but it seems most likely that ecology will follow biochemistry as an important area of inquiry with only partial autonomous disciplinary status.

The reason that having separate majors and departmental status is important is that these are the lynchpins of the disciplinary employment system. Autonomous disciplines have their own departments, their own majors, and their own doctoral degree programs. While journals, conferences, awards,

and honors are all attractive accoutrements, an independent discipline cannot exist without an enclosed employment loop rooted in majors and departments.¹⁵

The last set of cases to be considered are languages, which help to illustrate several points. Let us agree that every language is equally worthy of study, although as a practical matter languages that are spoken by large numbers of people, and especially by economically powerful countries, are likely to garner more interest and resources. The fact that some languages are well ensconced in American universities says more about the university system and its priorities than it does about the languages themselves. While universities aspire to cover all knowledge, they often fall short of this goal in practice. Perhaps nowhere is this gap more evident than in languages. An estimated six to seven thousand languages are currently spoken, many of which are expected to become extinct over the next fifty years (Harrison 2007). Despite their large scale and considerable resources, even the largest American university can aspire to cover only a small fraction of them.

Ironically, for all the lofty rhetoric about addressing the challenges of globalization, only a few languages regularly have degree offerings in American universities. While considerable numbers of students take a course or two, since many schools maintain a foreign language requirement, the number of students majoring and receiving degrees in foreign languages is quite small. Brint and his colleagues (2012) report that Romance language programs bore a disproportionate share of programmatic cutbacks, even before the 2008 economic crisis.

Table 3.2 presents a variety of different indicators of foreign language instruction. Spanish is the most commonly available language in which students may obtain a bachelor's degree, with some 888 programs granting 9,278 degrees in 2009. Spanish may be considered a discipline in the sense that 65 doctoral programs granted 193 PhDs in Spanish language and literature. This field is large enough to support scholarly journals and to fill tenure-track vacancies for professors of Spanish. The only caveat is that Spanish is often located not in a Spanish department but in a department of Romance language and literature.

At present, degrees in Spanish and French can be obtained at most colleges and universities, with German trailing as a distant third. As a practical matter, Spanish and French are close to being defining members of the set of liberal arts fields, and thus the closure of a French department represents a serious challenge to this status. While we can speak of the discipline of Spanish language and literature, it is difficult to do so for many other languages

TABLE 3.2. Number of schools featuring degree programs in languages and literature, 2009

<i>Language</i>	<i>Number of BA degree programs</i>	<i>Number of PhD degrees awarded (2011)</i>	<i>Number of BA degrees awarded (2011)</i>
<i>Romance languages</i>			
Spanish	888	179	8,918
French	696	81	2,492
Italian	141	28	313
Romance languages, general	152	34	132
Latin	114	1	75
<i>Asian languages</i>			
Japanese	98	3	774
Chinese	72	8	449
Korean	5	3	28
Vietnamese	0	—	not listed
Hindi	1	—	not listed
Thai	0	—	not listed
<i>Other languages</i>			
German	440	43	1,019
Russian*	88	3	340
Arabic	13	1	141
Swahili	0	—	not listed

* Some may obtain relevant training in Russian via one of the twenty-four existing Slavic studies doctoral programs.

Source for degree programs: *College Blue Book*, 36th edition.

Source for degrees obtained: Digest of Education Statistics.

Source for course enrollment: Modern Language Association database.

in the United States. This is not a matter of disparaging these languages and the rich cultural traditions they embody, but simply because programs and students are so rare that there is not a sufficient numerical base for producing new scholars or for restricting new faculty positions to those with doctoral degrees in the field. For example, while seventy-two schools offer a bachelor's degree in Chinese, at present there are no doctoral programs conferring degrees in Chinese language and literature, and only eleven offering doctoral degrees in Chinese studies. Fewer than one hundred institutions offer degrees in Russian, Japanese, or Arabic. The situation is even worse for other important languages such as Arabic and Hindi. African languages such as Swahili and Yoruba are almost completely absent as degree options.

Thus, Chinese and Arabic have not yet reached the status of disciplines in the American university system because instruction is not normally restricted to PhDs in these fields. PhDs are being produced in small numbers, and the small number of schools with departments and degrees in these fields means that the market for PhDs remains small.

Disciplines, Degrees, and Departments

We have seen that only a relatively small set of fields has been sufficiently established that most colleges and universities offer degrees in them. It might be reasonable to assume that all schools that offer a degree in a field also have a college department. It is now time to examine this assumption. As we will see, the organizational configuration of many schools leaves important fields such as biochemistry as subunits of other departments, while the small scale of programs in other fields results in two or more disciplines sharing a department. The equation of discipline, degree, and department thus breaks down for some fields, especially in smaller and less elite colleges.

The presence of a stand-alone department is important because it gives members of the faculty a greater role in defining their academic needs. There is no need to persuade colleagues in a related field about one's priorities, or that a junior candidate is worthy of appointment. There is no risk of having the department chair being from another field, a chair who may not be able to fully appreciate or articulate the needs of one's field. Moreover, a department chair who hails from a neighboring discipline is likely to lack the personal disciplinary ties that facilitate many activities, from obtaining up-to-date information to soliciting tenure letters to assessing the quality and accuracy of letters of recommendation for job candidates. Disciplinary autonomy is clearly greater in a stand-alone department than it is when sharing a roof with another field of study. Securing a department of one's own is a basic indicator of the political strength of a discipline.¹⁶

I examined the 383 schools sampled by Brint and his research team by visiting each school's website to ascertain whether a degree was offered and whether there was a department that matched the degree program. Five fields were examined: anthropology, biochemistry, French, physics, and sociology. Of the 383 schools in this sample, 268, or 70 percent, offer a bachelor's degree in physics. But in a substantial number of them, physics is not a stand-alone department. It most commonly shares a departmental home with astronomy, but in other cases it cohabits a department with engineering or is part of a physical sciences unit. Only 45 percent of institutions in the sample had a stand-alone physics department. Schools without physics departments tend to be smaller and less elite.¹⁷ Just under half of the sample of schools offered anthropology degrees (47.3 percent), while only one-third (35.0 percent) had stand-alone anthropology departments. Anthropology is most often paired with sociology. Sociology was housed in its own department in half of this sample of schools. It was housed jointly with another field in another 30 percent of schools, and was absent in the remaining 20 percent.

Biochemistry is an interesting case, as it has long been considered by some to represent a hybrid form, an “interdiscipline” (Hubenthal 1994). But while the intellectual contributions of biochemistry are indisputable, the field’s organizational success is more limited, since stand-alone biochemistry departments are quite rare. Of the 147 schools in this sample offering degrees in biochemistry, only a small minority (21 percent) featured a stand-alone biochemistry department. The more common arrangements are (a) joint chemistry/biochemistry departments (28.5 percent); (b) biochemistry degrees offered by chemistry departments (21.2 percent); and (c) joint degrees offered by biology and chemistry departments (11.7 percent). The remaining degrees are issued under a variety of other auspices: departments involving molecular biology, departments with three or more fields, and programs under the heading of “general sciences.”

French language instruction is in a similar position with respect to garnering independent department status. In this sample of 383 schools, 189 schools offered French degrees, but only 30 had stand-alone French departments. In the balance of cases, French was housed with Italian, Romance languages, modern languages, or foreign languages.¹⁸

These data have several important implications for disciplines. First, the equation of disciplines, departments, and degrees is not nearly as tight as many assume. It is not uncommon for degrees to be offered by subdepartmental units. Second, several prominent fields, including physics, are not as universally established as many discussions of disciplinary status assume. In other words, while physics is one of the most respected fields, its small enrollment hobbles it in the undergraduate context, and small colleges are often unable or unwilling to commit the resources needed to maintain a stand-alone physics department. Departments such as physics and anthropology are not infrequently asked to share space with neighboring fields, most often astronomy in the case of physics and sociology in the case of anthropology. Third, a minimum level of undergraduate enrollment is indispensable for disciplines as we have defined them. Analysts have long pointed to physics’ intellectual breakthroughs and its long-standing federal support, but its weakness in terms of undergraduate enrollment puts it behind fields such as biology and psychology in terms of its presence on university and, especially, college campuses.

The importance of enrollments results in the need to slightly amend Frickel and Gross’s approach to scientific and intellectual movements. While they focus on the elements of mobilizing faculty, grants, conferences, and the like, there is also a need for attracting a sizable number of undergraduates. This means that defining an area of study and making it attractive to consid-

erable numbers of prospective students is an indispensable step in a field's successful transition to disciplinary status.

Contemporary Academic Disciplines as Recent Arrivals

Disciplines are often seen as ancient institutions. In discussions about interdisciplinarity, this sometimes appears as a rhetorical strategy to make disciplines seem antiquated and out of date (Klein 1990; Taylor 2010).¹⁹ Yet disciplines as they appear in contemporary research universities are remarkably recent inventions.²⁰ Before the Second World War, the *idea* of discipline-based departments was well ensconced. As a practical matter, however, at most colleges and universities, departments were usually remarkably small in size. The most common arrangement was a single professor charged with providing expertise and guidance in all aspects of his field.

Taking my own field of sociology as an example, in 1936, over half (55 percent) of colleges featured sociology as a field of study.²¹ Sociology was more common in universities than in colleges (two-thirds of universities offered sociology as a field of study, compared with just over half of colleges). In a number of schools, sociology was housed in a department with another discipline, most often economics.

In those schools with stand-alone sociology departments, the modal faculty size in 1936 was one. Just under half (49 percent) of schools employed a single sociologist; over 70 percent employed just one or two. In other words, the most common arrangement was to have a single sociologist representing sociology as a discipline. Even if we restrict our attention to universities, the typical sociology program was tiny. The presence of one or two professors was common there as well; the median faculty size was 2.0 (mean 2.7). The largest sociology department in 1936 had ten professors; only nine universities employed more than five professors of sociology.

Sociology was somewhat less established as a field in 1936 than were other fields of study, but departments in most other disciplines were just as small. Data were culled on biology, mathematics, and economics as comparison fields. In 1936, in mathematics and economics, the most frequent arrangement was one professor per department, while in biology two professors per department was slightly more common. Even if we set aside small colleges and focus strictly on research universities, the small scale of most academic departments is apparent. The median size of university-based biology departments in 1936 was just under two, while economics and mathematics departments averaged three professors each.

These small departments were very different social entities than the aca-

ademic departments with which we are currently familiar. One or two professors would have had to cover a wide range of topics in their classes. The opportunity for discussion and debate with disciplinary colleagues was more limited. Fewer opportunities to specialize in particular lines of scholarship would have been available.

Research and scholarship predates the current arrangement of academic life. For example, Collins (1999) finds remarkable continuities in philosophical debates spanning a wide variety of epochs and continents. Yet contemporary academia stands out in terms of its size and scope and the creation of a disciplinary system that fosters innovation. Thus the present arrangement has been successful in part because of the scale of academic departments and not just their formal structure.

Disciplinary Growth and Internal Differentiation: The Case of Sociology

The growth of the academic enterprise in the United States since the Second World War is well documented. This is the terrain covered by Derek de Solla Price's transition from little science to big science. Cole (2009) summarizes many of these trends: the explosive growth in the number of students, research articles, peer-reviewed journals, and federal research support. American universities have been successful on a wide range of quality measures, including international rankings, the share of Nobel Prizes awarded to faculty at US research universities, and the number of foreign students seeking training in US graduate programs.

The emphasis here is more on specialization than growth, although the two are of course related. A faculty member in a large department can specialize to a much greater than her lonely predecessor would have been able to during the 1930s. Specialization is no doubt related to growth, but the relationship is far from one to one.²²

Research specialties are far smaller than disciplines. While it is easy to count disciplines, it is far from clear how to count research specialties. The term "invisible colleges" has been used to refer to networks of researchers who work on the same issues and who follow each other's research but who are typically not located at the same research university (Price 1963; Crane 1972; Gmur 2003). We know that there are many such specialties in all liberal arts disciplines as well as in applied fields. It may be easier to paint a picture of internal differentiation within a single field, so I will turn again to sociology to illustrate some trends that apply more broadly.

In 1945, the *American Journal of Sociology* (AJS) celebrated its fiftieth anniversary with a set of eight essays that covered some of the main specialties

of sociology. The specializations singled out for attention were social psychology, social pathology, population studies, race, theory, methods, and human ecology. In a review of the articles published in *AJS* during its first fifty years, Ethel Shanas used these same categories plus “social institutions and organization” and “social reform.” These fields remain prominent to one degree or another in the discipline today, although “social pathology” now goes under the heading of “deviance and social control” and “social institutions” has evolved into the fields of organizational studies and economic sociology. Sociologists in many areas address issues of “social reform” although they are more likely to use terms such as “policy implications” or “public sociology” to describe this aspect of their research.²³

The one lonely sociologist leading his own department in the late 1930s would thus have a bevy of topics for which he was responsible. By today’s standards, we would view this scholar as a remarkable generalist. Yet even at the time, complaints were levied against excessive disciplinary specialization (for example, see McDowell 1948).

By 1950, sociology had grown considerably. Membership in the American Sociological Association had shot up from 1,000 in 1936 to 3,500 (American Sociological Association (Rosich 2005, appendix 12). While the modal department size remained just one, there were now forty-two colleges or universities with more than five sociologists, and fifteen with ten or more sociology faculty members.²⁴

In the six decades since 1950, the sole sociology professor has been joined by substantial numbers of colleagues. In turn, specialization within sociology has continued to crystallize new areas of research. Members of the American Sociological Association (ASA) can become members of specialized groups of researchers called “sections” and one can create a new section with the support of two hundred ASA members. (In a number of academic organizations, these units are called “special interest groups” or SIGs.) There are currently fifty-three such sections. For example, under “M” we have Marxist sociology, mathematical sociology, medical sociology, the sociology of mental health, and sociological methodology. The most recent additions include disability and society; evolution, biology and society; and sociology of the body (American Sociological Association 2011). The ASA could boast of over fourteen thousand members in 2007. ASA membership tripled between 1940 and 1950, doubled again by 1960, and has doubled again since then (Rosich 2005, appendix 12).²⁵ An association with some fourteen thousand members is likely to have considerable internal differentiation.²⁶

Sociology may be an especially diffuse field of inquiry, but it is by no means alone in the proliferation of specialties. The American Political Science

Association currently has forty-three sections, while the American Chemical Society is divided into thirty-three technical divisions. The American Mathematics Society currently lists seventy-one specializations within mathematics, while the *Journal of Economic Literature*, published by the American Economic Association, distinguishes twenty specialty areas within economics, many of which in turn have their own subdivisions.²⁷ This pattern is not restricted to liberal arts disciplines but is equally evident in interdisciplinary fields such as American studies (discussed in chapter 8) as well. American studies may well be even more differentiated per capita than sociology.

While some sociologists maintain their identity as generalists, most tend to specialize in a small set of these fields. Specialty areas in turn compete for positions in the top research departments, for space in the leading journals, and for grant support from the National Science Foundation and other funding sources. The internal differentiation of the discipline and the attendant competition that this generates contributes to its forward momentum.

The emergence of these specialties can be viewed as instances of the intellectual movements theorized by Frickel and Gross. In creating sections, activists have sought to assert the importance of these as areas of inquiry and made claims on the resources of the American Sociological Association, specifically, the opportunity to obtain a designated number of sessions at the annual meeting. In most cases, however, the goal has been to achieve recognition and a place at the table rather than to displace or overthrow established specialties.

Ulrich's Periodicals lists 605 active, peer-reviewed scholarly journals in sociology as March 2011, half of which were founded since 1990. While academic sociologists might question the inclusion of many of the journals on Ulrich's list, there are nonetheless more than before. My own list includes 120 sociology journals (Jacobs 2011). While a number of the leading journals are still generalist journals and review journals, the specialization of the field is increasingly evident in the journals, which focus on areas such as the sociology of education, health and social behavior, social psychology, gender, race, work and occupations, and so on. The theme of specialization is developed further in the next chapter.

Specialization in sociology remains a matter of research specialization rather than degree specialization. In other words, sociology is not divided into specialized undergraduate degree offerings, but becomes differentiated only for graduate students and researchers. In this way, it differs from applied fields of inquiry, which often exhibit extensive differentiation of specialty offerings for undergraduates.²⁸

Internal specialization increases competition between specialties for re-

sources and recognition. This helps to foster innovation. Furthermore, for those who maintain that diversity promotes creativity, the high degree of internal differentiation suggests that there is considerable room for diverse exchanges within a discipline.

Academic Specialization: The Contribution of Liberal Arts Disciplines to the Rise of Applied Fields of Study

The growth of disciplines results in internal specialization, but it also contributes to the emergence of new fields of study, many of which are applied in nature. Metzger's fine history of academic fields in the United States (1987) distinguishes between two types of growth. There is a tendency for fields to subdivide—first as they break away from natural and moral philosophy into their own specialties, and later as they divide into finer and finer subdivisions.²⁹ At the same time, there is a parallel process that brings applied fields into the academy, either through “affiliation” or “dignification.” In other words, established professional fields such as law and medicine come to be affiliated with the university, while over time less well recognized subjects also become accepted as part of the university curriculum.

What Metzger's analysis misses is the ways in which arts and science disciplines have helped to lay the intellectual foundation for the creation of applied fields as well as the multiplication of internal subdivisions within each field. Metzger's two processes are thus more intertwined than he allows. Indeed, it is the very success of the traditional academic disciplines that has helped to develop the intellectual basis of the applied undergraduate fields with which they now compete for enrollments. Here again I present examples from the field of sociology, which has been prolific, but not unique, in spinning off specialties. Specifically, sociology has contributed to the development of communications, marketing, management, and criminal justice, all burgeoning applied fields, each with undergraduate enrollments that surpass those of sociology.

Social scientists over the course of the twentieth century developed the techniques to conduct surveys of public opinion based on statistically representative samples. This led to the founding in 1947 of the American Association of Public Opinion Research and its international counterpart, the World Association for Public Opinion Research, and to the creation of the journal *Public Opinion Quarterly*. Public opinion research, however, did not become its own discipline in the sense that there are no undergraduates who major in public opinion, no separate academic departments of public opinion, and no doctoral degrees in this field. Instead, public opinion research contrib-

uted to the formation of two applied fields, communications and marketing, even while continuing to play a role in sociology, political science, and psychology.

Sociologists with long memories celebrate the role that leading figures such as Paul Lazarsfeld and Herbert Hyman played in the development of public opinion research.³⁰ Sociology played an important role, but by no means was it the only influence on the formation of communications research, which today draws on many fields, including literary analysis, social psychology, and visual studies (Pfau 2008)

By the end of the 1960s, communication emerged not only as a field of study but also as a degree field for undergraduates. The communications major incorporated journalism but also addressed communication issues in other settings as well, including business and nonprofit organizations. The number of bachelor's degree recipients in the field of communications rose from just over ten thousand in 1971 to nearly seventy-seven thousand in 2008, which represents a rise from 1 percent to nearly 5 percent of undergraduate enrollments.³¹

Over time, however, communications has developed into its own field with its own concerns. (See Pooley and Katz [2008] for a brief history of the divergence of American sociology and communications research.) More important, communications began to produce its own PhDs. New fields often seek to create PhD programs since these are a sign that scholarship in the field is recognized as worthy of granting a degree. The production of newly minted doctorates in communications has moved this field into a position to be able to hire its own as faculty. In the early years of communications programs, faculty inevitably held degrees from various fields since there were few people with PhDs in communications.³²

In short, communications began as an interdisciplinary field both intellectually and in terms of the training of its faculty, yet over time, faculty members were increasingly drawn from communications departments. In this way, applied fields such as communications gradually come to resemble disciplines. Communications as a field remains quite intellectually diverse, but this is principally because of the range of styles and approaches produced by communications PhD programs.

In order to consider the question of employment closure, that is, selecting faculty exclusively from those with a degree in the field, data on faculty hiring patterns by discipline from the National Survey of Post-Secondary Faculty (National Center for Education Statistics 2011) were consulted. By 2004, the year in which this survey was conducted, nearly 70 percent of faculty in communications programs had obtained their PhD in the field of commu-

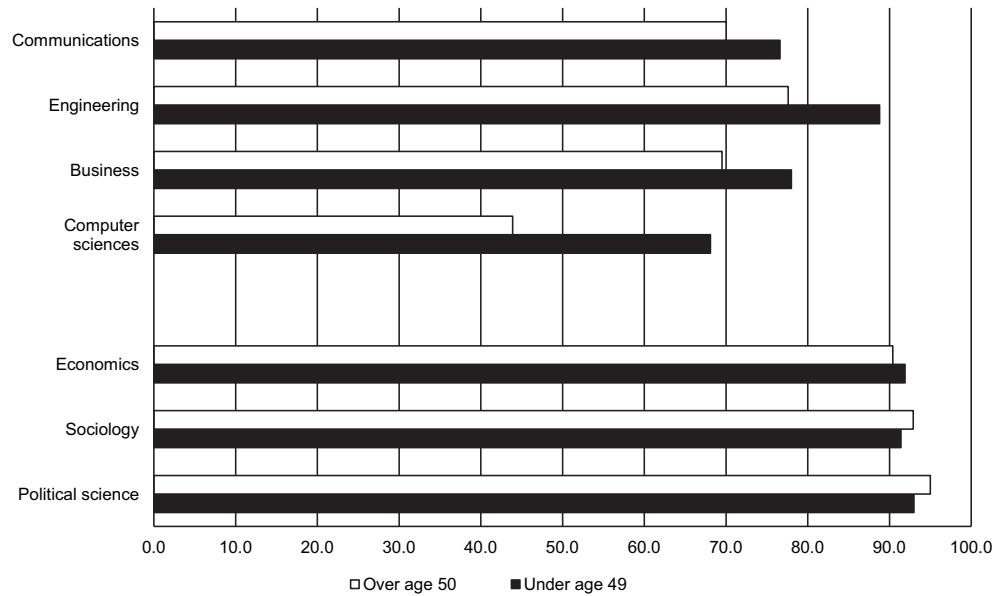


FIGURE 3.1. Faculty hiring closure by age: Percent with degree in same subject as teaching field. Source: 2004 National Postsecondary Faculty Survey Data (NSOPF).

nications. Thus, while sociology and other fields may continue to generate powerful ideas and interesting insights regarding communications processes, over time these will be incorporated into the field of communications only to the extent that faculty trained in communications accept these ideas and pass them along to their students.

Figure 3.1 presents data on the field of communications along with several other fields discussed here. The data suggest that applied fields—business, communications, engineering, and so on—increasingly tend to largely hire faculty from within their own fields. This level of self-recruitment (or doctoral-degree endogamy) in hiring is not as high as that found in the liberal arts disciplines, but nonetheless it has come to represent the majority of faculty appointments in each field. The closure, or self-recruitment, is more evident among the younger faculty. Thus, over time, interdisciplinary fields that endure and succeed in opening their own departments tend to become closed employment fields.³³

Debates continue within the field of communications about its diverse intellectual roots. Herbst (2008) makes the case for communications as a post-disciplinary field of inquiry. Rogers (1999) bemoans the continuing division of the field between interpersonal communications and mass communications. Leydesdorff and Probst (2009) conducted a time series analysis of citation patterns and suggest that communications research is moving toward the establishment of a specialty of its own.³⁴

Another consideration in mapping the field of communications is the many specialties in which undergraduates obtain degrees. As we will see in more detail in chapter 9, applied fields tend to splinter into a large number of degree programs oriented to particular employment opportunities. In the case of communications, degrees are currently offered in no less than thirty-two different fields, including journalism, media studies, radio and television, public relations, digital media, and animation technology. Thus, while communications research is somewhat interdisciplinary, this tendency coexists with internal differentiation in the form of the proliferation of degree offerings.

Sociology also contributed to the intellectual history of marketing research, management theory, criminology, and criminal justice (see Jacobs [2013a] for a discussion of these fields). These fields, once established, compete with sociology for student enrollments. Roughly thirty thousand undergraduates receive degrees each year in sociology. Marketing and criminal justice are each roughly as popular as sociology, while communications and management attract several times as many majors. These applied fields, to which sociology has contributed, now greatly surpass it in enrollments. Since the 1970s, the number of students obtaining degrees in business has nearly tripled, rising from 115,396 in 1971 to 335,254 in 2008. In 2008, over 135,000 students obtained degrees in business administration and management, a total that slightly surpassed all of the enrollments in the social science fields located in the liberal arts (anthropology, economics, political science, and sociology).

Sociology has contributed to the intellectual underpinnings of a number of other fields as well, including women's studies, African American studies, ethnic studies more generally, global studies, and so on. Similarly, one could trace the role that the discipline of economics has played in the development of business school programs, especially finance, as well as the increasingly dominant role that economics has played in public policy programs. The point here is not to attempt to map the full extent of sociology's impact or to recount sociology's greatest hits but rather to put the traditional counterpoint between liberal arts and applied fields in a new light. Arts and science fields such as sociology have helped to create specializations that end up as distinct undergraduate majors and, ironically, end up competing with their parent fields sociology for enrollments. In this sense, the liberal arts disciplines are often victims of their own accomplishments, as they succeed in providing the intellectual basis for applied fields that become competitors for students and other resources.

Conclusion

This chapter has covered a great deal of ground; consequently, a brief summary is in order. Institutional disciplines are defined as fields that are extensively represented in colleges and universities in the United States. This definition helps to identify disciplines as broad fields with extensive internal differentiation and fuzzy borders between them. Disciplines are dynamic, since colleagues compete for recognition and rewards within their chosen field even as disciplines compete with each other for status and resources. Disciplines in the modern sense date only to the Second World War. Before that, the disciplinary architecture was in place, but academic departments were too small to fully realize their modern functions.

As disciplines grow, they tend to subdivide into many specialties areas that often spill past the previously understood borders of the field. The difficulty in developing clear demarcations between fields, which is often taken as evidence of the arbitrariness of disciplines, is better understood as evidence of the vitality of a system that is continually forced to innovate. The dynamism of the system also has contributed to the growth in the number of preprofessional fields of study. While this trend is sometimes taken as evidence of the stodginess of the liberal arts disciplines, in fact they typically have provided the intellectual foundations of these applied fields. Once the liberal arts disciplines are understood to be dynamic entities covering broad fields with poorly defined boundaries, these patterns begin to make more sense. This theory also helps to explain the emergence of calls for interdisciplinarity. Disciplines in this sense are victims of their own success. They are continually uncovering new terrains to be explored and proliferating new specialized areas of inquiry only to be criticized for generating intellectual fragmentation.

Now that we have a clearer sense of the nature of disciplines and how they operate, the need for an academic division of labor can be explored in greater depth. The growth of the research enterprise and especially the proliferation of research journals is the focus point of chapter 4. The accumulated specialization built into contemporary academia raises questions regarding whether an emphasis on interdisciplinarity can in fact integrate knowledge. Ironically, efforts to create a more interdisciplinary academic journal system may make scholarly communication even more difficult.