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The complexity of institutional niches: Credentials and organizational differentiation in a field of U.S. higher education

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Abstract

This paper examines the emergence and differentiation of institutional categories – distinctions of kind that are salient to specific arenas of social life – as an organizationally and historically embedded process. We employ the concept of the institutional niche to describe how multiple orderings of key institutional categories come together to form relationally meaningful regimes within organizational fields. Using social network methods for inducing relational macro-structures, we ground this approach in an analysis of institutional differentiation within a single organizational field, exploring one theoretically salient case. Drawing upon archival data sources we model and interpret the differentiation of institutional categories of credentials within U.S. higher education in agriculture – a field with a putatively egalitarian mission – up to World War II. Findings from this analysis suggest that historical exigencies and organizational dynamics constitute a driving force behind the differentiation of institutional categories, and that this process is tied to the maintenance of symbolic boundaries at multiple levels.

1. Introduction

An enduring goal of cultural analysis in general and the sociology of culture in particular is to account for the emergence and differentiation of specific patterns of institutional categories—distinctions of kind that provide important symbolic boundaries within and across social arenas (see Bourdieu, 1984; Lamont and Fournier, 1992; Tilly,

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1998). How do particular constellations of institutional categories arise and differentiate over time? Our main purpose in this paper is to advance an interpretive research agenda when addressing this question, yet one that also builds on recent attempts to formalize the relational analysis of ''meaning structures'' (see Breiger, 2000; Carley, 1993, 1994; Mohr, 1994; Martin, 2000; for review see Mohr, 1998). In short, we proffer a research strategy for modeling the differentiation of social fields as the complex bundling of multiple orders of categories within specific institutional and organizational regimes. In so doing we hope to build on the theoretical insights of field theory and in particular Bourdieu's assertion that fields should be seen ''as a system of differences, differential deviations, allow[ing] the most fundamental social differences to be expressed'' (1984: 226). Like Bourdieu, we draw upon topological imagery when analyzing institutional differentiation.

In particular, we draw upon the spatial metaphor of the *niche* for describing the formation of patterns of differentiation. First employed sociologically in ecological perspectives on organizations, the niche concept has often been used to explain how social entities compete in a manner akin to species—namely, by carving spaces out of particular resource domains (Carroll, 1985; Carroll and Hannan, 2000; Hannan and Freeman, 1989; McPherson, 1983). Such models rest on the postulate that institutionalized categories of persons (i.e. men, women, middle-aged) serve as the hard resource base for social entities such as organizational and cultural forms (Mark, 1998, 2003; Rotolo and McPherson, 2001). This objectivist approach, however, has been critiqued for its ahistorical view of the basic ontology of institutional regimes (Mohr, forthcoming; Ruef, 1999). Alternately, the niche concept has been used to describe how two orders of institutional classification – one concerning social identities and the other social practices – intersect to form distinct positions within fields (Mohr and Lee, 2000; Mohr and Guerra-Pearson, forthcoming). From such a ''duality'' perspective, categories of persons are the *product* of institutional regimes (e.g. census-taking practices, poverty relief practices) while at once giving meaning to these orders and their manifestations in organizational settings (Bourdieu, 1988a: chapter 2; Foucault, 1994[1973]; Mohr, 1994; Sutton, 1991). The putative objectivity of specific categories of persons is thereby contingent upon a relational nexus of practices that are historically rooted in larger symbolic structures wherein the social divisions between people become naturalized (Alonso and Starr, 1987; Barth, 1969; Bourdieu, 1980; Brubaker et al., 2004; Douglas, 1991).

We extend this constructivist logic by considering institutional differentiation as a complex process wherein multiple layers of categorization come together to form niches within institutional regimes. Specifically, we analyze the emergence and organizational differentiation of a single field of credentials in U.S. higher education, and the extent to which this process is embedded in symbolic boundary maintenance at multiple levels. In engaging credentials in this manner, we are clearly inspired by Bourdieu's many writings on the symbolic power of academic titles to act as institutional rites that reinforce social hierarchies (see especially Bourdieu, 1988a, 1988b, 2001), as well as institutional approaches to organizational dynamics (DiMaggio and Powell, 1991; Meyer, 1977; Meyer and Rowan, 1977). We hope to add further empirical weight to these theoretical statements, all of which suggest academic credentials are relationally meaningful institutional categories that reinforce important symbolic boundaries and status distinctions.

Unlike the rather broad patterns of ''credential inflation'' that have been discussed in conflict approaches to credentials (see Brown, 2001; Collins, 1979) we offer concrete findings that give further insight to the position that important aspects of institutional differentiation arise within the material and symbolic exigencies of organizational fields—in our case, as organizational actors struggle to capture or distance themselves from student constituencies and to legitimate new categories of credentials (see also DiMaggio, 1986a; Fligstein, 1996; Lounsbury and Rao, 2004; Porac et al., 1995; White, 1981). It should be emphasized that this goes beyond a simple recapitulation of studies of student segregation (i.e. who studies what in college; see Jacobs, 1995; Charles and Bradley, 2002) by demonstrating that in higher education differences in kinds of persons and kinds of credentials are crystallized within the macro-structure of the organizational field itself. Ultimately, this suggests that important dynamics of identity attribution and social inequality are orchestrated at an inter-organizational level as part of the differentiation of a field into a marked status hierarchy.

2. The process of categorical differentiation

Specific constellations of institutional differentiation can be witnessed in a variety of industries and social fields. In music consumption, for example, the average music store now contains dozens of categorized sections, ranging from staple offerings such as ''R & B'' and ''Jazz,'' to once esoteric genres like ''Trance'' and ''Alt Country.'' In fine arts, specialty museums have cropped up with collections ranging from the art of particular periods (e.g. contemporary) and individuals (e.g. Warhol), to the art of specific groups (e.g. the insane). Likewise, sports and other leisure activities have expanded into a dizzying array of forms (simply consider ''BASE jumping''). Moving away from the fields of art and leisure activities to areas less often taken as cultural, we witness similar patterns. In the field of mental health, for example, categories of cognitive disorders and neuroses have blossomed in recent decades, creating a telephone book-sized diagnostic manual (Horwitz, 2001). Moreover, as we soon explore in detail, certain fields of higher education – which once granted only a few types of credentials – have evolved into highly elaborate constellations of credentialing subfields.

Sociologists have proffered numerous explanations for institutional innovation and differentiation processes, variously stressing the roles of producers, consumers, and symbolic entrepreneurs (critics, non-profit organizations). Debates have centered on whether such processes are ''bottom up,'' where innovative producers and cutting-edge consumers drive differentiation (Becker, 1982; Gilmore, 1988), or if they are ''top down,'' where industry structures, markets, and organizations lead both market demand and the creative process (Peterson and Berger, 1975; White and White, 1993[1965]). While some researchers have suggested a middle-way (DiMaggio, 1977; Bourdieu, 1984) in what has been called a ''dual ecology'' (Mark, 2003), this has not been formalized in practice, and we believe such an approach can only evolve from a systematic body of case-specific research of the kind presented here. In short, most empirical work has been guided by nomothetic research designs, which fundamentally neglect the role of institutions and organizations in such processes; instead, such studies make the case for the overarching

influence of a single social mechanism that can account for the emergence and differentiation of institutional categories across fields. In what follows, we discuss two recent and influential approaches that have addressed categorical differentiation processes.

2.1. Making the case for taste

Mark (2003) has recently posed the question, ''Why do different kinds of people like different kinds of culture''? His formulation addresses a primary level of categorical embeddedness, concerning why different categories of culture and categories of persons intersect at all. Implicit in his discussion, however, is a theory of why new kinds of cultural categories emerge and how such institutional spaces differentiate. Like other ecological approaches, Mark outlines a model where cultural forms are seen as entities competing with one another for the time and attention of socio-demographic constituencies in ''dynamic Blau space''—a changing multi-dimensional resource space defined by fundamental socio-demographic characteristics such as years of education and age (McPherson, 1983; Rotolo and McPherson, 2001; McPherson and Ranger-Moore, 1991). Categories of cultural forms carve out niches within this resource space based upon the social mechanics of homophily. In short, people have affinity for those with whom they are more alike, and they tend to partake in the same cultural forms as those similar others, thereby building *niche bases* through channels of homophilous ties. Implicit in this discussion, and made more explicit elsewhere (Mark, 1998), is the notion that new or different categories of cultural forms emerge from the ongoing creative interaction of individuals who, through channels of similar others, carve out a chunk of socio-demographic space. Yet this approach does not directly address why specific constellations of categories would emerge in a particular manner, only that such differentiation reflects other more ''fundamental'' social cleavages. Other recent cultural research, however, has attempted to account for how categories of cultural forms emerge and differentiate into predictable patterns.

In attempting to account for why culture changes over time, Lieberson's (2000) work on naming children systematically defines an autonomous region where the inherent logic of cultural forms predominates. The child-naming decision is a highly personal one; yet, in the aggregate Lieberson discerns patterns of change. These patterns, he maintains, arise from certain linguistic properties of names and the cultural logic of distinction itself, and not from the overarching influence of social structures, the media, or status competition. For example, in analyzing shifts in categories of names – androgynous names (Lieberson et al., 2000), and distinctive African-American names (Lieberson and Mikelson, 1995) – Lieberson demonstrates that innovation arises within the constraints of shared notions of taste. Names help to differentiate categories of persons – boys from girls, or racial and ethnic groups – from one another, but they do so within certain cultural constraints that help guide the process. Names, like other elements in systems of fashion, contain their own internal logics that are drawn upon by actors when attempting to negotiate categorical symbolic boundaries. Actors have an intuitive feel for these discursive elements and their aggregated preferences and naming decisions give rise to categorical distinctions (e.g. ''boys'' names versus ''girls'' names). If Mark's project has been to demonstrate that taste flows through homophilous channels and gives rise to broad differences in cultural

categories, Lieberson's has been to show that the symbolic maintenance of categorical boundaries is guided by shared cultural logics. Both endeavors, however, paint a very atomistic picture of how categorical distinctions emerge and change over time, and engage in conscious attempts to simplify such processes as the result of a single social mechanism.

2.2. *Bringing complexity back in*

These "taste approaches" intentionally bracket the influence of organizations and institutions. Their accounts are parsimonious and elegant in explaining how cultural forms arise from the collective activity of different kinds of persons. Yet, like other recent moves in the sociology of culture that fail to escape the false dualism of social structure and culture (see Friedland and Mohr, 2004), these approaches ground differentiation in a causally prior and more fundamental reality of social groups and preference structures. The influence of organizations and institutions only serve to muddy the picture. We believe, quite to the contrary, that organizations are a fundamental locus for dissolving the structure/culture split, and constitute a site where symbolic boundaries are solidified and sometimes contested. Rather than seeing organizational dynamics as noise and bracketing out this significant realm, we put organizations at the center of sustained inquiry into how institutional categories emerge and differentiate.

Musical preferences, or children's first names may tend in the aggregate to reinforce certain group boundaries (i.e. stereotypes), but they are comparatively trivial in terms of shaping one's life chances when compared to academic credentials of all sorts. Credentials work as powerful tools for creating distinctions between persons and are, consequently, heavily mediated by organizations. Credentials are the creations of organizational actors who must strategically position themselves within dynamic fields. The decision to offer a specific credential is the culmination of an organizational decision-making process, wherein leaders must decide how best to position their products (i.e. credentialed students) vis-à-vis the products of similar organizations. A school's profile of credentials is, therefore, embedded within organizational dynamics and field-level pressures—what have been termed "blending and segregating" processes in organizations (Hannan and Freeman, 1989), and "jurisdictional battles" in professions (Abbott, 1988).[1] Because students cannot choose particular credentials if they are not offered by the school they attend, and since paths into certain subfields may be heavily conditioned by the kinds of choices available to students, the strategic choices of organizational decision-makers influence the kinds of choices students are able to make. When examined at a meso-level of aggregation, at the level of an inter-organizational field, these dynamics may result in the partitioning of kinds of persons and types of credentials into specific niches that constitute competing positions within a relational structure. In what follows, we pursue this line of thought by exploring one theoretically salient case in U.S. higher education. We begin with a historical discussion of the origins of the field before moving on to conduct a formal analysis of the structure of the field.

[1] Degree profiles are certainly also determined by other processes, such as professionalization, which are not addressed here, but have been the subject of considerable study (Abbott, 1988; Collins, 1979; Larson, 1977).

3. The field of agricultural credentials—origins and trajectory

In searching for an optimal case for elaborating our approach, we settled on the somewhat inglorious field of agricultural credentials for two reasons. First, U.S. agriculture schools, as we know them today, were created at the stroke of a pen through the Morrill Act of 1863, which mandated the land-grant system of colleges and universities. In effect, this governmental act invoked the creation of a new organizational field—an interconnected set of organizations dedicated to producing a similar product (DiMaggio and Powell, 1991: 64). This provides a somewhat unique type of natural experiment for testing ideas of organizational differentiation. Second, central to the mission of this field was to bring into the institution of U.S. higher education areas of learning and kinds of persons who had not been given a formal place in this elite arena. At first the area of learning was agriculture, and the kind of person was the rural white male of what was then called ''the industrial classes'' (Ross, 1942: 68; Eddy, 1956: chapter 2). Soon thereafter, however, this mission would broaden to include women, persons of color, and a number of credentialing areas more or less related to agriculture. Yet, from the beginning there was conflict and schism over how this field should take shape, as different kinds of organizational actors sought to pull it in different directions. This makes for a more richly diverse site in terms of credentials, kinds of persons, and organizational actors than any single higher educational field leading up to WWII, after which point U.S. higher education changed dramatically. Would such organizational dynamics create hierarchies and important categorical distinctions even within a putatively egalitarian field?

3.1. The beginning—the head and the hand

Agricultural education, with its orientation towards cultivating the land, was marred with the stigma of being a practical and manual field within an institution that was dedicated to producing statuses above the laboring masses. In pedagogical rhetoric, while lower levels of education may focus on training the body to perform certain kinds of tasks, the university is thought to be dedicated to refining abstract qualities in the person by cultivating their character.[2] It is this process of cultivating the individual's *mind* that sets the college graduate apart from others. Consequently, the land-grant system, and the field of agriculture that was central to its mission, was from its inception at the odds with higher education's ''institutional logic''—the central principle that organizes the field both practically and symbolically (Friedland and Alford, 1991).

This tension manifested in an early schism, concerning how best to teach agriculture in the colleges (see True, 1929). On one hand, schools following the ''Michigan model,'' which was associated with Michigan State College (now University), followed in the footsteps of earlier academies, industrial and manual schools, and institutions such as the People's College in New York, which directly *challenged* the institutional logic of higher education. Rather than rejecting physical labor as potentially polluting to the educational

[2] For a discussion of the use of these rhetorical framings in a different context, see Shapin and Barnes (1976).

process, the manual approach openly embraced hard work as a means of learning, and a great deal of the curriculum in these schools consisted in working model farms.[3] A second, more academic approach to agricultural education, which came to be known as the ''New York model,'' because of its association with Cornell University, was rooted in the emerging scientific school model of the day, and consisted mainly of coursework and laboratory study. This approach, which eventually supplanted the manual model, did not challenge the institutional logic of higher education; instead it attempted to elevate topics such as ''animal husbandry'' to the status of sciences on par with other emerging disciplines of the time.

In part, this schism arises from the decentralized manner in which land-grant funds were allocated. The Morrill Acts of 1863 and 1890 (the latter brought African-American institutions into the land-grant system) did not specify financial distributions within states, and instead only mandated that each state should create at least one institution to teach agricultural and mechanical arts to the industrial classes along with mandatory military service preparation. Many states used the funding to create a separate institution – a so-called ''ag-school'' (Michigan, Iowa) – while others simply expanded an already existing state institution to meet the mandate (Wisconsin, Missouri). A few states created public partnerships with existing private institutions (New York, Massachusetts), and most southern states created separate (and unequal) funds for Black colleges (Eddy, 1956; Ross, 1942). Consequently, the field of agricultural higher education diffused into an already fragmented and rapidly changing organizational context, in which different kinds of organizations served different constituencies of students, faculties, and societal sectors. As will be shown, these cleavages would later serve as the basis for the differentiation of the field into distinct institutional niches of credentials and persons.[4]

3.2. *Expansion and symbolic struggle*

For many years agriculture schools had difficulty attracting and retaining students. Those students who were ambitious or privileged enough to leave the farm to attend college evidently had larger goals in mind than returning to the family plot of land, chiefly to escape ''the poverty, boredom, and drudgery of wresting a living from the soil'' (Lucas, 1994: 150). For many students an ''agricultural credential'' must have seemed as oxymoronic as it did for many educators, especially in the more elite institutional settings. Although putatively part of the same institution, agriculture remained a peripheral and disorganized region of higher education even after most schools had abandoned the manual approach to education. It was only after the expansion of higher education that occurred at the turn of the century that agriculture became a popular destination. After a slump during WWI, and aided by new opportunities from expanding agricultural technologies,

[3] Note that this may be taken as an example of what Bourdieu (1984) has called ''making a virtue of necessity'' and not necessarily a calculated form of resistance.

[4] The connections between these shifts in agricultural education and the rise of the modern research university are beyond the scope of this paper, but should not be overlooked. For more general histories, see Geiger (2004), and Veysey (1965).

enrollments in these institutions again began to climb, and studying agriculture became a worthy pursuit for many rural Americans.

During this expansionary period, a new debate erupted concerning how best to shape the future of higher education in agriculture—a controversy that echoed the early schism between schools promoting manual versus scientific approaches. Once again, members of more established institutions led the charge. In numerous reports, commissioned by the federal government, state agencies, and individual institutions, the curriculum of the agriculture school came under fire (Jarvis, 1918). The particularly influential Woodward Report (1920) attacked the many ''specialized'' and ''technical'' courses that were added by schools as the field rapidly expanded. The approaches of six institutions (all but one of which were members of the prestigious Association of American Universities [AAU]) were lauded in the report as models for the rest. The many reports of the period invariably concluded that agricultural education needed to be more tightly organized and standardized, and that courses of study should be guarded against becoming overly technical (i.e. focused on practical or manual application)—again echoing the early concerns of educators in established universities who rallied against manual approaches.

We find it highly significant that these symbolic battles coincide with a period of rapid expansion and diversification of the field. Not only were more rural white men entering the field during this period, but many more rural women were enrolling in land-grant institutions through the creation of home economics departments—most of which were placed in agriculture schools. Likewise, African-American schools like the Tuskegee Institute (founded by Booker T. Washington) were given land-grant status in the 1890s and expanded rapidly after the turn of the century.[5] We see such expansionary periods in fields of higher education as what Swidler (1986) might designate ''unsettled times''—wherein symbolic mechanisms become more explicitly articulated as social actors seek to make sense out of dramatic shifts. Such commissioned reports can therefore be seen as the symbolic tools – or institutional schemata – for helping make sense of rapidly changing fields and for re-establishing extant hierarchies. Such authoritative and putatively objective voices as those in these reports do not simply reflect changes in fields; they actively work to construct new symbolic boundaries, frameworks, and social hierarchies during periods of societal flux, reasserting central institutional logics (DiMaggio, 1991, 1992).

4. The organizational differentiation of agricultural credentials

In the two decades following the publication of these reports the field of higher education in agriculture became a highly differentiated arena, consisting of a more diverse

[5] Symbolic battles were waged at various levels. Within home economics departments, for example, Nellie Kedzie promoted an industrial model at Bradley Polytechnic Institute, while Marion Talbot championed an academic approach at the University of Chicago (Collins, 2002). Across African-American campuses there was a homologous battle epitomized by the antipathy between W.E.B. DuBois' academic and Booker T. Washington's manual approaches (Du Bois, 1999[1903]; Washington, 1904).

student constituency (in terms of race, class, and gender), and granting more types of degrees – from Ph.D.s in biochemistry to certificates in poultry husbandry – than any other single field we could identify during this period. To what extent do the credentials, characteristics of organizational actors and kinds of persons comprising the field – multiple orders of categorizations – come together in relationally meaningful ways? To address this central question we outline a formal modeling strategy that employs social network and exploratory data analysis techniques to reveal an underlying structure in the field. This approach has the advantage of reducing a rather complicated field into an interpretable series of images while simultaneously demonstrating the complex ways that multiple categorical orders intersect.

4.1. Data and modeling strategy

Data for this project come from numerous archival sources. Statistical tables and commissioned reports on land-grant institutions from various government and non-government agencies were consulted as they appear in the bulletins of the U.S. Department of the Interior from the 1890s through the 1940s. The main empirical data for our formal analysis, however, come from a unique publication commissioned at the end of WWII, designed to help veterans enter the field of higher education. This survey data compiled by the American Council on Education (ACE), and subsequently published as *A Guide to Colleges, Universities, and Professional Schools in the United States* (1945), is unlike any guide produced previously or thereafter in that it contains extremely fine-grained tables on all of the precise credentials each institution offered.[6] Institutional characteristics such as student enrollments and university endowments were collected from this and other published sources (ACE, 1940; Woodward, 1920).

By coding the ACE survey, we were able to assemble a dataset of 65 organizations, each offering a distinct repertoire of credentials—from certificates to Ph.D.s.[7] This resulted in each organization displaying a unique profile of 117 credential offerings (see Table 1), which we coded as either present or absent (1/0). Additionally, we gathered data on each organization, including their endowment, income, presence of women, AAU membership, and if they were 1 of 17 African-American institutions (see Table 2).

In short, we pose two interrelated questions to these data: to what extent are the credentials that comprise the agricultural field organizationally differentiated into distinct and interrelated positions? And to what extent is this process of organizational differentiation embedded within other important aspects of symbolic boundary maintenance (i.e. between different types of organizations and their student constituencies)? The analysis of these data therefore proceeds in two phases. In the first, we induce the field of credentials as an organizationally differentiated structure. From this we are able to discern both credential positions and the roles that these positions play in differentiating the organizational field. In the second phase, we explore the extent to which these role

[6] In collecting this data the ACE researchers specifically asked for information to be backdated to before the war. Therefore, these data do not reflect the anomalies of the war period.

[7] We manually dropped credentials that appeared in less than three of these organizations, and would therefore have had little overall weight in field-level differentiation processes.

Table 1
Categories of agricultural credentials, 1940

Credential category	Variable names
Agricultural Bacteriology	AGBACT(1,2,3,4)
Agricultural Chemistry	AGCHEM(1,2,3,4)
Agricultural Economics	AGECON(1,2,3,4)
Agricultural Education	AGEDUC(1,2,3,4)
Agricultural Engineering	AGENGIN(1,2,3,4)
Agricultural Extension	AGEXTEN(1,2,3,4)
Agricultural Journalism	AGJOUR(1,2,3,4)
Agronomy	AGRON(1,2,3,4)
Animal Husbandry	HUS_AN(1,2,3,4)
Animal Nutrition	ANNUT(1,2,3,4)
Applied Entomology	ENT_APP(1,2,3,4)
Biochemistry	BIOCHEM(1,2,3,4)
Botany	BOTANY(1,2,3,4)
Dairy Husbandry	HUS_DAI(1,2,3,4)
Dairy Technology	TEC_DAI(1,2,3,4)
Farm Operation	FARMOP(1,2,3,4)
Forestry	FOREST(1,2,3,4)
General Agriculture	GENAG(1,2,3,4)
Genetics	GENETIC(1,2,3,4)
Home Economics	HOMEC(1,2,3,4)
Horticulture	HORTIC(1,2,3,4)
Industrial Agriculture	INDU_AG3
Landscape Architecture	LANDARC(1,2,3)
Plant Science Pathology	PS_PATH(1,2,3,4)
Poultry Husbandry	POULTRY(1,2,3,4)
Range Science	RANGE2
Rural Sociology	RUR_SOC(1,2,3,4)
Soil Conservation	SOILCON(1,2,3,4)
Soils	SOILS(1,2,3,4)
Veterinary Science	VETSCI(1,2,3,4)
Wildlife Conservation	WLDCON(1,2,3,4)

Note: Numbers after variable name indicate credential level (1 = certificate; 2 = B.A.; 3 = M.A.; 4 =Ph.D.).

positions are embedded within multiple symbolic boundaries between organizational actors and their socio-demographic constituencies. Combining insights from these inductive and exploratory analyses with a close reading of historical texts, we are able to identify key organizational dynamics involved in the differentiation of the field leading up to WWII.

4.2. Niches as structurally equivalent positions

We begin by employing the social network notion of ‘‘structural equivalence’’ to operationalize the organizational dimension of the niche concept (proposed by DiMaggio, 1986b), which allows for niches to essentially reveal themselves from relational data. The concept of structural equivalence asserts that two social entities may be considered linked

Table 2
Frequencies for credential and organizational characteristics

Variable type	Name	Description	Frequency	Range
Credential characteristics	CERT	Two-year certificate	29	N/A
	B.A.	Four-year degree	30	N/A
	M.A.	Master's degree	30	N/A
	Ph.D.	Doctorate	28	N/A
	SCIENCE	Science oriented subfields (Woodward, 1920)	28	N/A
	TECHNICAL	Technical oriented subfields (Woodward, 1920)	65	N/A
	NON_TECH	Non-technical oriented subfields (Woodward, 1920)	24	N/A
Organizational characteristics	WMN_NULL	Schools not reporting if females enrolled	5	N/A
	ALLMALE	Self-identified exclusively male schools	7	N/A
	WMN_ZERO	Schools reporting no females	7	N/A
	COED	Schools with mixed proportions of students	46	N/A
	ALLBLACK	Self-identified all Black schools	8	N/A
	NOBLACK	Non all Black schools	57	N/A
	AAU	Membership in AAU	8	N/A
	AAU_NON	Non AAU members	57	N/A
	CAP_NUL	Schools that did not report financial information	8	N/A
	CAP_LO	Schools with low annual income	9	$X \leq 1$ MIL
	CAP_LOMD	Schools with low-medium annual income	18	1 MIL $< X \leq$ 2.7 MIL
	CAP_MD	Schools with medium annual income	14	2.7 MIL $< X \leq$ 5.2 MIL
	CAP_HI	Schools with high annual incomes	13	5.2 MIL $< X \leq$ 12 MIL
	CAP_ELT	Schools with elite annual income	3	$X >$ 12 MIL

to one another, not simply because they share a direct tie to one another, but because they are both connected to other social entities in more or less similar ways (see Burt, 1976; Lorrain and White, 1971; White et al., 1976; Wasserman and Faust, 1994). Consider that all doctors in a hospital are similar to one another based upon their shared relationships with nurses, patients, and staff (all the other positions in the hospital), even though not all doctors may know one another personally. The meaning of the structural position "doctor" is therefore relationally determined vis-à-vis all the other positions in the field.

In our present analysis, the social entities are not individual persons, but the specific credentials offered by agriculture schools in 1940. We pose the question: do groups of credentials constitute more or less structurally equivalent positions in differentiating the field of organizations? To answer this question we induce more or less equivalent groups of credentials based upon their shared co-occurrences in organizations. In short, credentials are considered tied to one another to the extent that they share organizations in common. In effect, this is an extension of techniques used to induce structure from an "affiliation

network'' where individuals are often thought to be more or less connected to one another based upon the groups in which they share membership (see Breiger, 1974). If two credentials have precisely the same patterns of co-occurrence within organizations (when one appears so does the other), then they can be considered as maximally structurally equivalent to one another. Conversely, if two credentials display the opposite patterns of occurrences – they never occur within the same organizations – then they are maximally non-equivalent. Following this logic with the 117 credentials we induce a macro-structure of a limited number of positions, or ''blocks,'' in the field by aiming for maximally structurally equivalent groups, while in practice somewhat relaxing this threshold (see Burt, 1976; Breiger et al., 1975).

We use a formal means for partitioning the data, employing both Multi-Dimensional Scaling (MDS) and Hierarchical Cluster Analysis (HCA) techniques.[8] To identify distances between credentials based upon their shared co-occurrences we first construct a distance measure, using the Jaccard matching coefficient, which calculates the relative proximity of each credential from its co-occurrences with all other credentials in the field—that is, by the number of times each pair of credentials are granted together in the same organization. This produces a 117×117 matrix of numeric distances between each pair of credentials, which we then submit to an MDS program. The MDS arrays the credentials into a low-dimensional space such that pairs of credentials whose organizational distances are small are positioned near one another, and credentials whose distances are large are positioned far apart. This both identifies cohesive subgroups of structurally equivalent credentials (those proximately coordinated) and provides sets of coordinates locating each credential in the multi-dimensional space. By submitting these coordinates to a clustering algorithm we systematically agglomerate credentials that have a similar presence in the organizational field space. The justification for this serial processing is straightforward and is based upon the goal of producing relationally meaningful credential positions: the distance measure is a pairwise comparison of credentials, the MDS procedure simultaneously finds the best fit of *all* of the pairwise comparisons in a low-dimensional space, and the HCA provides a systematic way to relax the threshold for determining structurally equivalent groups of credentials.[9]

Fig. 1 displays the results of a two-dimensional MDS solution which arrays the 117 credentials in relative proximity to one another based upon their shared profiles of overlap in organizational space. While clearly suggesting the presence of a differentiated structure in the clustering of credentials, especially between a group of core subfields and a group Ph.D.s, the goodness-of-fit statistic is still rather high ($\alpha = .23$), indicating that a two-dimensional solution does not adequately capture the complexity of the distance matrix. Ultimately, we employed a six-dimensional solution with an acceptable level of fit ($\alpha = .12$) when submitting the coordinates to the HCA to determine structurally equivalent blocks of credentials.

[8] The authors employed the SAS System 8.0 and UCINET 6.0 (Borgatti et al., 2002) to estimate all models.

[9] In practice one may cluster the raw distance matrix, yet this would not take into account the entire *field* of credentials, and is therefore not as relationally sound a basis for determining structural equivalence. In analyses not reported here, however, we found that both approaches produced very similar results.

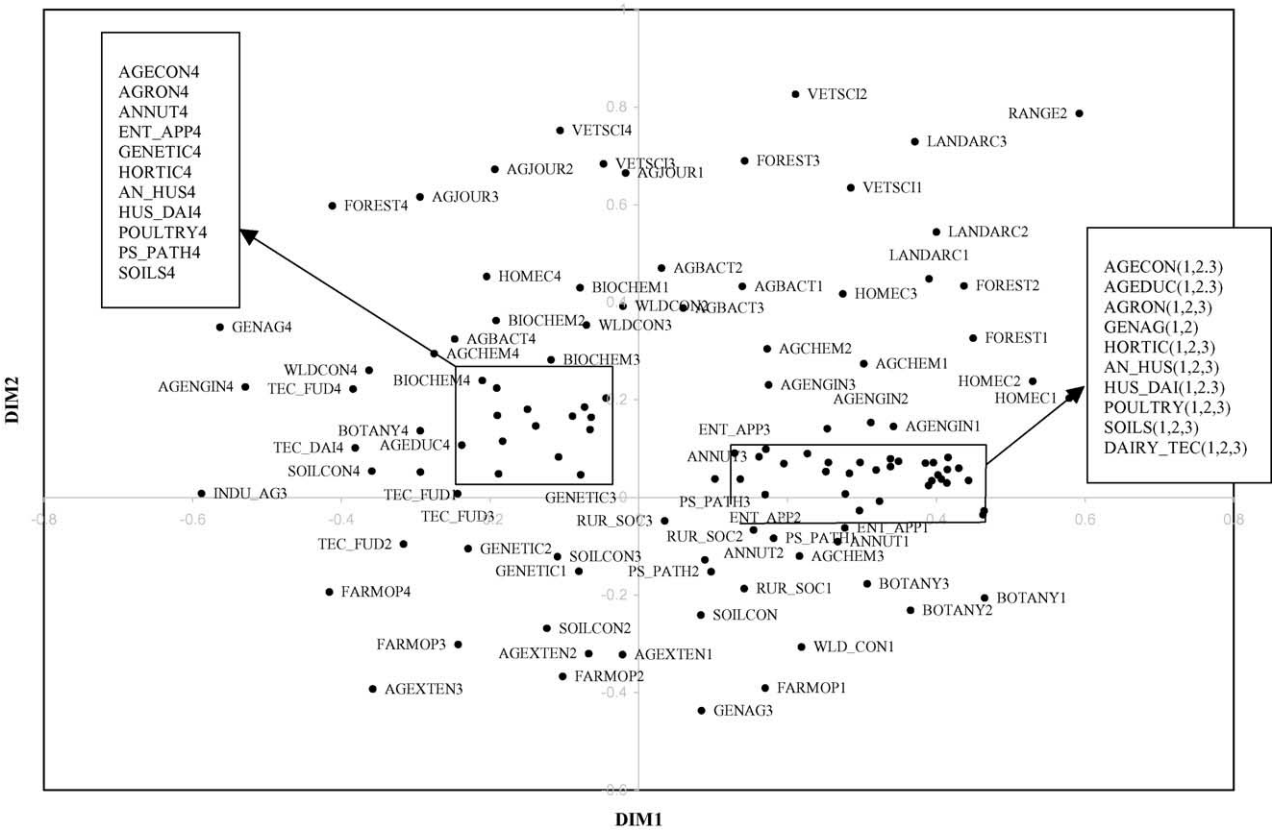

Fig. 1. Multi-Dimensional Scaling (MDS) plot of credentials in organizational space. Note: stress = 0.23.

Table 3
Fourteen cluster solution to Hierarchical Cluster Analysis (HCA)

Cluster	Descriptive mnemonic	Credentials
Cluster 1	VETSCI	RANGE SCIENCE (2), VETERINARY SCIENCE (1,2,3,4)
Cluster 2	HOMEC_FOREST	AGRICULTURAL ENGINEERING (1,2), HOME ECONOMICS (1,2,3), FORESTRY (1,2)
Cluster 3	APPLIED SCI	AGRICULTURAL CHEMISTRY (1,2,3), APPLIED ENTOMOLOGY (1,2,3,4), PLANT SCIENCE PATHOLOGY (1,2,3), BOTANY (1,2,3)
Cluster 4	RURAL SOC	RURAL SOCIOLGY (1,2,3)
Cluster 5	CORE	AGRICULTURAL ECONOMICS (1,2,3), GENERAL AGRICULTURE (1,2), AGRICULTURAL EDUCATION (1,2,3), HORTICULTURE (1,2,3), AGRONOMY (1,2,3), POULTRY HUSBANDRY (1,2,3), ANIMAL NUTRITION (1,2,3), SOILS (1,2,3), ANIMAL HUSBANDRY (1,2,3), DAIRY HUSBANDRY (1,2,3), DAIRY TECHNOLOGY (1,2,3)
Cluster 6	JOURNAL	AGRICULTURAL JOURNALISM (1,2,3)
Cluster 7	TRANSIT	GENERAL AGRICULTURE (3), WILDLIFE CONSERVATION (1)
Custer 8	LANDSCAPE	LANDSCAPE ARCHITECTURE (1,2,3), FORESTRY (3)
Cluster 9	THE_FARM	AGRICULTURAL EXTENSION (1,2,3), SOIL CONSERVATION (1,2), FARM OPERATION (1,2,3,4)
Cluster 10	ODD Ph.D.s	FORESTRY (4), GENERAL AGRICULTURE (4), INDUSTRIAL AGRICULTURE (3)
Cluster 11	BIOCHEM	BIOCHEMISTRY (1,2,3,4), GENETICS (4), AGRICULTURAL BACTERIOLOGY (4), HOME ECONOMICS (4)
Cluster 12	GENETICS_BACT	AGRICULTURAL BACTERIOLOGY (1,2,3), GENETICS (1,2,3), WILDLIFE CONSERVATION (2,3)
Cluser 13	Ph.D.s	AGRICULTURAL CHEMISTRY (4) AGRICULTURAL ECONOMICS (4), AGRICULTURAL EDUCATION (4), AGRICULTURAL ENGINEERING (4), AGRONOMY (4), ANIMAL HUSBANDRY (4), APPLIED ENTOMOLOGY (4), BOTANY (4), DAIRY HUSBANDRY (4), DAIRY TECHNOLOGY (4), HORTICULTURE (4), PLANT SCIENCE PATHOLOGY (4), POULTRY HUSBANDRY (4), RURAL SOCIOLOGY (4), SOILS (4)
Cluster 14	FOOD TECH	FOOD TECHNOLOGY (1,2,3,4), SOIL CONSERVATION (4), WILDLIFE CONSERVATION (4)

Note: Numbers after subfield indicate credential level (1 = certificate; 2 = B.A.; 3 = M.A.; 4 = Ph.D.).

Table 3 displays the 14 credential clusters that were identified by the HCA procedure when using the conservative ''complete-link'' solution.[10] Given that there were four levels to each credential, the first point of interest is that credentials tend to cluster together across levels, such that in cluster 1, for instance, we see all levels of veterinary science credentials. This strongly suggests that, at least through the M.A. level, organizations were

[10] Because there is no completely objective way to determine optimal cutoff points we follow the convention outlined in Aldenderfer (1984) of using the cutoff point wherein the clustering retains the greatest amount of differentiation before grouping together relatively disparate clusters.

differentiating themselves in the credentialing space through offering different *kinds* of credentials, indicating that horizontal distinctions rather than simple hierarchical differences played a key role in structuring the field. Some kinds of credentials appear to be more powerfully insulated than others in this space, and therefore create more coherent clusters. Veterinary science, landscape agriculture, food technology, rural sociology, and agricultural journalism, each form distinct and well-insulated clusters. This indicates that these credentials were most strongly tied to the partitioning of organizational boundaries within this space—organizations offered such credentials in idiosyncratic ways. Other credentials cluster together in interesting combinations. Home economics joins with two more pragmatic male subfields (forestry and agricultural engineering) to form a structurally equivalent position. This suggests that these credential areas tend to appear as a cohesive block within organizations and implies that the presence of women in agriculture schools did not constitute a unique position within the organizational field at the time.

There are indications of organizational hierarchies in these results. The presence of a Ph.D. position (cluster 13) in this space also suggests a certain research orientation that sets apart certain organizational actors in the field, while the largest cluster (number 5) is a collection of many of the more practical and manual fields (e.g. animal husbandry) that characterizes the core origins of the field. Clusters 3, 11, and 12 seem to represent more scientific specializations that were championed in the post-war reports. Two of the clusters (numbers 7 and 10) are not so readily interpretable, and may be considered more transitional positions—a kind of residual result of having been placed together because of an overall structural similarity to the other groupings. In general, however, we feel the clustering procedure yielded significant and interpretable results that, while in line with historical narratives, add a number of interesting findings and give considerable empirical specificity beyond such generalist accounts.

In addition to inducing structurally equivalent positions of credentials we are also interested in how various positions relate to one another and the role that each position plays in the overall field. Do some positions play more central or peripheral roles? Do several positions strongly overlap to form coherent subunits? To address these questions we turn to a blockmodeling procedure that models the extent to which each credential position overlaps with the others in organizational space (see White et al., 1976; Wasserman and Faust, 1994: chapter 10). To do this we return to the distance matrix of credentials described above. We transform the numerical distances into a binary matrix where a ''1'' is constituted by relative proximity using the mean distance as the cutoff point. In short, credentials that are closer than average to one another in organizational space are considered to be linked to one another. Permuting this binary matrix into ''blocks'' using the cluster assignments to order the credentials allows us to take density measures of the overall ties both within and across the clusters, giving a proportion of the total ties possible (see Table 4). In effect, this gives a larger picture of the ways in which each of the structurally equivalent positions within the credentialing field relates to the others in terms of overlapping within organizational space.

Fig. 2 gives graphical form to Table 4. In short, we can interpret this graph as demonstrating that two clusters are tied to one another if more than half their credentials overlap more than the mean amount of overlap in organizational space. The large core

Table 4
Density overlap of clusters

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
VETSCI	0.60	0.08	0.08	0.00	0.03	0.00	0.00	0.00	0.00	0.13	0.11	0.05	0.04	0.00
HOMEC_FOREST	0.08	1.00	0.72	0.46	0.93	0.00	0.25	0.38	0.05	0.00	0.32	0.50	0.33	0.08
APPLIED SCI	0.08	0.72	0.97	0.87	0.96	0.00	0.35	0.00	0.42	0.00	0.65	0.83	0.61	0.14
RURAL SOC	0.00	0.46	0.87	1.00	1.00	0.22	0.67	0.00	0.80	0.00	0.33	0.58	0.78	0.50
CORE	0.03	0.93	0.96	1.00	1.00	0.03	0.53	0.26	0.39	0.00	0.14	0.47	0.46	0.11
JOURNAL	0.00	0.00	0.00	0.22	0.03	1.00	0.17	0.08	0.00	0.00	0.00	0.42	0.13	0.11
TRANSIT	0.00	0.25	0.35	0.67	0.53	0.17	1.00	0.75	0.25	0.00	0.14	0.69	0.20	0.50
LANDSCAPE	0.00	0.38	0.00	0.00	0.26	0.08	0.75	1.00	0.00	0.08	0.00	0.16	0.02	0.29
THE_FARM	0.00	0.05	0.42	0.80	0.39	0.00	0.25	0.00	0.89	0.07	0.14	0.40	0.15	0.38
ODD Ph.D.s	0.13	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.07	0.67	0.05	0.00	0.09	0.33
BIOCHEM	0.11	0.32	0.65	0.33	0.14	0.00	0.14	0.00	0.14	0.05	1.00	0.96	0.90	0.90
GENETICS_BACT	0.05	0.50	0.83	0.58	0.47	0.42	0.69	0.16	0.40	0.00	0.96	1.00	0.60	0.71
Ph.D.s	0.04	0.33	0.61	0.78	0.46	0.13	0.20	0.02	0.15	0.09	0.90	0.60	0.98	0.87
FOOD TECH	0.00	0.08	0.14	0.50	0.11	0.11	0.50	0.29	0.38	0.33	0.90	0.71	0.87	1.00

Note: Cell values represent total number of ties within and between credential positions as a proportion of the total number of possible ties.

cluster is strongly tied to the home economics/forestry, rural sociology, and applied science positions in the field, while more loosely coupled to the remaining credential positions. The clusters of Ph.D.s and more research-oriented science credentials form a more densely interconnected region that is distantly tied to the core mainly through the applied science cluster, but also, through the less science-oriented rural sociology cluster. The veterinary science and agricultural journalism clusters (along with the somewhat idiosyncratic cluster mainly of Ph.D.s) constitute their own unconnected positions—again emphasizing their cohesiveness and isolation within organizational space.

This resulting ''role structure'' suggests a gradual organizational extension beyond the core cluster of credentials—notably towards research and scientific fields, but also towards other specialized institutional areas. It is worth stressing that a very different role structure could just as easily have emerged from such an analysis. Consider that the core cluster might have been more central; instead, it is separated from the more research-oriented positions of the field. The scientific positions might have been fragmented or organizational isolates; instead, they form a highly interconnected group. Likewise, the structural isolates in the role structure need not have been positions that were highly specialized in terms of their credentials. This particular structure clearly suggests that over time organizations moved in different directions away from the core credentialing areas to more specialized niches, some of which are more cohesive, while others are more organizationally isolated. We may finally pose the question, to what extent is this process of organizational differentiation embedded within other layers of symbolic boundary maintenance?

4.3. Mapping multiple institutional orders

In order to answer this question, we array the role positions in the same space with their associated credential and organizational characteristics by drawing upon Multiple

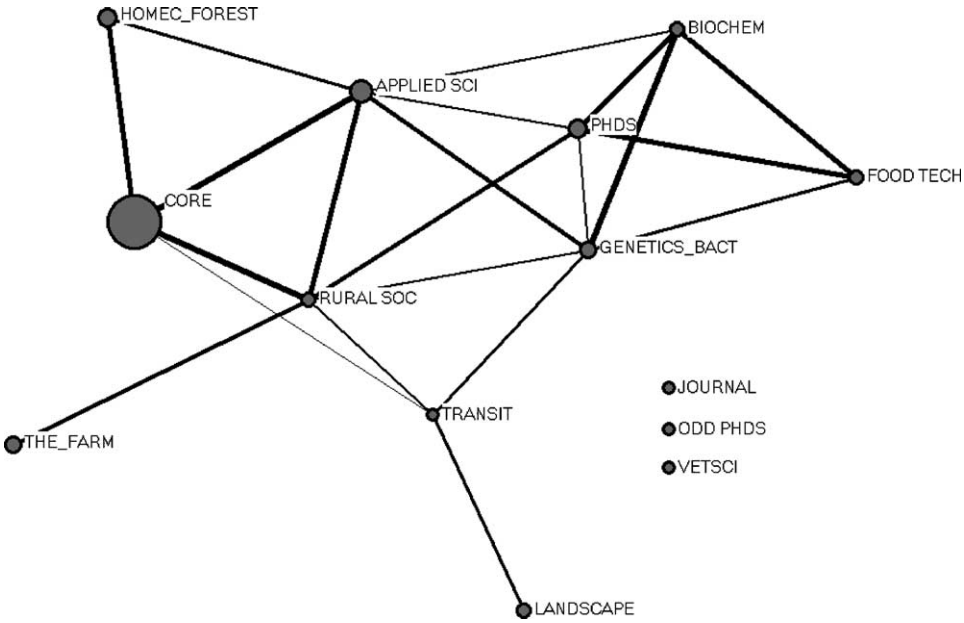

Fig. 2. The organizational differentiation of agricultural credentials, 1940. Note: Layout based upon geodesic distances between nodes—the length of the shortest path. Nodes are sized according to the total number of organizations granting credentials in those positions. Ties between nodes and tie strength based upon blockmodel density > 0.5 (see Table 4).

Correspondence Analysis (MCA) (Greenacre and Blasius, 1994). Also known as ''optimal scaling,'' correspondence analysis is a weighted singular value decomposition of a contingency table. In practice, this method summarizes the association between a set of categorical variables by locating both the rows and columns of a contingency table as points in a two-dimensional Euclidean space. A chi-square distance between each row is calculated by comparing each row with the average row profile (which is the profile of the column marginals).[11] Each row or column profile can be thought of as a vector, providing coordinates for a point in multi-dimensional space. Two row vectors will be located near one another in the Euclidean space to the degree that they differ in the same way from the average row profile. Conversely, the distance between row vectors reflects the degree to which they differ in different ways from the average row profile. Distances between column vectors are calculated in the same way. The task of correspondence analysis is to locate both the row and column points in a best fitting two-dimensional plane while preserving as much as possible the chi-square distances. MCA is the application of

[11] More precisely, the cell frequencies in the contingency table are converted to percentages of the relative row or column totals. The Euclidean distance between two rows in a contingency table is the sum of the squared differences in the row profile values, which is converted to a chi-square distance ''by dividing each of the squared differences in the distance calculation by the corresponding element of the average profile'' (Greenacre, 1994: 11).

Table 5
Crosstabulated frequencies for institutional characteristics and credential clusters

	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	Cluster 8	Cluster 9	Cluster 10	Cluster 11	Cluster 12	Cluster 13	Cluster 14	Column sum
CERT	14	56	106	25	570	9	21	20	57	0	13	37	0	14	942
B.A.	11	47	92	23	524	7	0	15	39	0	0	55	0	11	824
M.A.	8	46	109	23	358	7	15	17	13	3	15	51	0	28	693
Ph.D.	5	0	0	0	0	0	0	0	5	8	45	0	227	25	315
SCIENCE	0	0	307	0	0	0	0	0	0	0	63	113	56	0	539
TECHNICAL	38	71	0	0	1179	0	36	52	79	11	0	30	128	78	1702
NON_TECH	0	78	0	71	273	23	0	0	35	0	10	0	43	0	533
WMN_NULL	8	14	23	1	62	0	1	5	2	1	11	12	23	5	168
ALLMALE	5	10	31	6	141	0	3	6	8	2	4	14	15	3	248
WMN_ZERO	2	5	16	5	127	2	2	3	5	0	2	5	0	1	175
COED	23	120	237	59	1122	21	30	38	99	8	56	112	189	69	2183
ALLBLACK	3	7	2	5	86	0	0	2	10	0	0	2	0	2	119
NOBLACK	35	142	305	66	1366	23	36	50	104	11	73	141	227	76	2655
AAU	9	28	61	15	216	6	7	8	30	5	28	45	73	31	562
AAU_NON	29	121	246	56	1236	17	29	44	84	6	45	98	154	47	2212
CAP_NUL	6	13	22	1	81	0	1	3	3	0	8	8	16	0	162
CAP_LO	1	10	12	5	115	0	3	4	6	0	0	4	5	2	167
CAP_LOMD	6	37	79	13	385	2	8	9	24	0	9	25	13	10	620
CAP_MD	8	40	87	20	392	4	14	13	38	4	12	44	39	22	737
CAP_HI	10	36	75	26	393	14	7	15	32	2	27	35	115	25	812
CAP_ELT	7	13	32	6	86	3	3	8	11	5	17	27	39	19	276
Row sum	228	894	1842	426	8712	138	216	312	684	66	438	858	1362	468	

Note: A total of 2774 credentials were granted within all 65 organizations, giving a mean of 43 credentials granted by each school. Cell counts represent the total number of these 2774 organization-credentials that are granted within the credential and organizational characteristics (rows [see Table 2]) by each of the 14 credential clusters (columns).

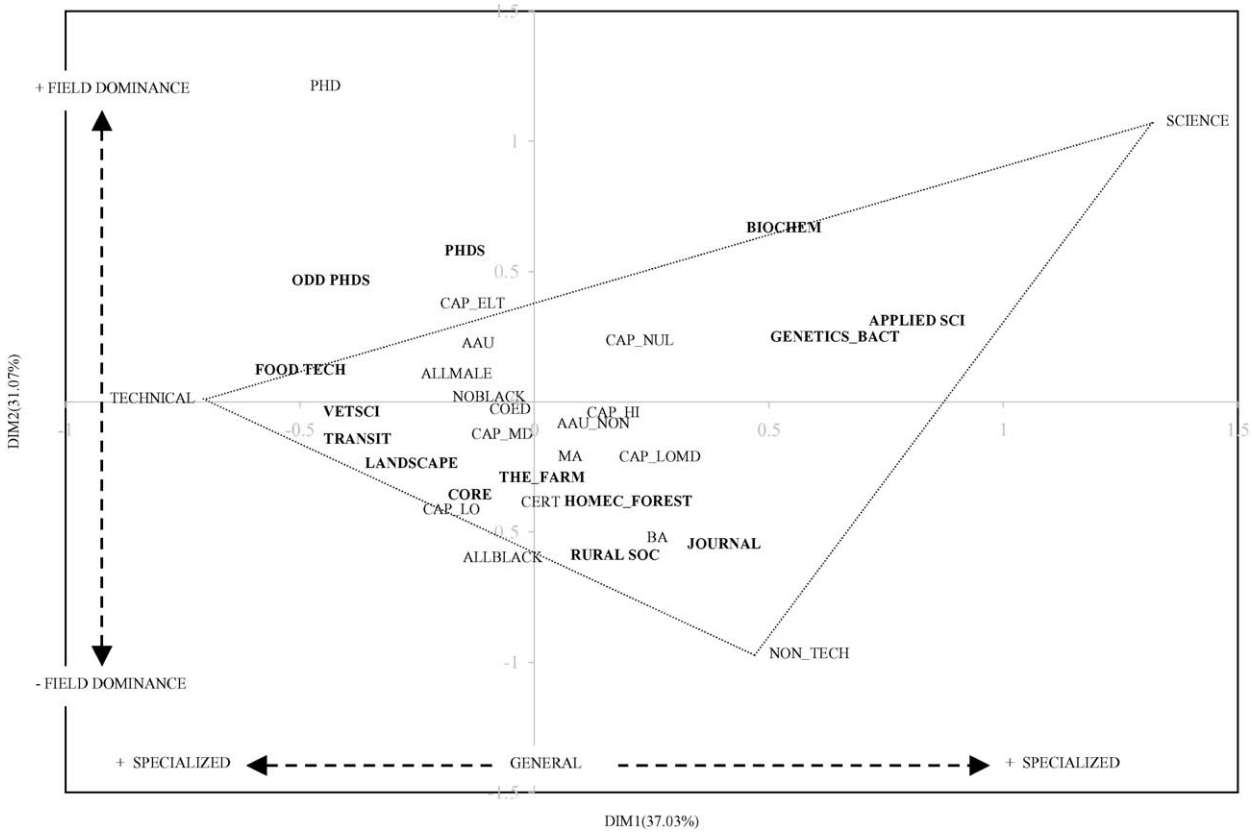

Fig. 3. Multiple Correspondence Analysis (MCA) of credential clusters and institutional characteristics. Note: inertia = 0.417. Quality = 68.1%. See Table 2 for variable descriptions.

this technique to more than two variables. We use the credential and organizational variables listed in Table 2 to differentiate the 14 credential clusters. Table 5 displays the cross-tabulated observed frequencies between clusters and variables from Table 2. Submitting these raw frequencies to an MCA program produced the results summarized in Fig. 3.

The correspondence analysis demonstrates how the multiple layers of symbolic boundaries within the field come together to form complexly embedded niches. To begin, the overall niche structure can be seen as arrayed between three ideal-typical poles, defined by the classifications of credential types from the 1920 Woodward Report: (1) a technical region with increasing focus on credentials demanding mastery of specialized technology, (2) a non-technical region with a growing focus on the rural community itself, and (3) a scientific region with a general research arm branching off into focused scientific areas. This suggests that the symbolic battles following the rapid expansion of the field after the turn of the century accurately reflected some key organizational divisions occurring in the field during the post-war period. Moreover, it is likely these influential reports would have helped further structure the field into this differentiated triangular space by reinforcing these symbolic boundaries and urging organizations to further evolve along the scientific and non-technical arms.

Within this same space we can also see the best fitting correspondences of credential and organizational characteristics to each cluster. In general, the non-technical community-focused region corresponds to low levels of funding, low degree levels (certificates and B.A.s), and African-American constituencies. The clusters moving towards the technical region tend to be associated with higher levels of funding, M.A. degrees, and all-male schools. The areas of greater scientific and research specialization correspond to a move towards the highest levels of funding, Ph.D.s, and high status institutions. There are no clusters near the points of origin, and instead we see a number of characteristics (NOBLACK, COED, and AAU_NON), which point to the more or less undifferentiated membership at the center of the field.

The vertical dimension (dimension 2) is clearly related to institutional dominance as all of the more powerful organizational characteristics are found higher along this dimension. While the technical pole lies at the median along this power dimension, the move outwards towards science and non-technical regions constitutes a gradual fanning out along this dimension. The horizontal dimension corresponds to a move from more generalist positions in the center towards growing specialization, approaching each of the three ideal-typical poles. Notice that the non-technical position has the shortest span along this dimension while the science position has the longest, suggesting the overlapping of science, specialization, and institutional dominance. Moreover, most general positions (those closest to the center along dimension 1) are in the less dominant hemisphere, except for the larger Ph.D. position. The move from the general positions towards the technical pole is therefore a move upwards in terms of institutional dominance, while the opposite is true for the move towards more non-technically focused credential positions. The most highly specialized science positions are at once the highest in terms of institutional dominance.

These spread of characteristics throughout this space and their relative proximities strongly suggests that the organizational differentiation of credentials into structurally

equivalent positions is embedded in multiple layers of symbolic boundary maintenance—between different kinds of organizational identities, institutionalized areas of credentialing, and basic socio-demographic characteristics of organizational constituencies. Indeed, this would seem to give further empirical validity to Bourdieu's central assertion that fields generate symbolic boundaries at multiple levels that express fundamental social divisions. Combining results from these analyses adds further insight into the organizational underpinnings of this differentiation process.

4.4. The organizational dynamics of differentiation

The key insight that arises from bringing these findings together is credential positions located within more institutionally dominant regions of the field are clearly more organizationally embedded than those located in less dominant regions. Leaving aside the rather small and anomalous position of ''odd Ph.D.s,'' positions in the dominant hemisphere of the field demonstrate more ties and greater amounts of overlap with one another than positions in the dominated half. Credential positions in less dominant areas overlap with one another less overall, and become even more structurally isolated as one moves further towards the edges of the technical and non-technical poles. The highly specialized veterinary science and agricultural journalism positions, which are near the relationally furthest extremes along these dimensions, are also the most organizationally isolated positions. This finding points to a dynamics process of categorical innovation and differentiation in organizational fields.

Dominant organizational actors are able use their superior symbolic and material resources to carve out and legitimate new institutional niches and thereby continually reassert their centrality to the field. When tapping into an emergent institutional niche, dominant organizations do so in coordinated ways, and deploy extant institutional logics to legitimate these moves. The ascendant role positions of research and science subfields in the agricultural field attests to the success of the post-War reports that were critical of the growing technical orientation of credentialing, and the effort of a powerful organizational coalition to establish more ''disinterested'' areas as dominant positions in the field. More prestigious organizations – those not created under the Morrill acts but who absorbed the land-grant mission into their existing frameworks – created new positions in the field that further marginalized the more general core region. Organizational actors lacking the material and symbolic resources to participate in the growing research-orientation were forced to bring other resources to bear in capturing more specialized regions of institutional space.

On one hand, less dominant organizational actors were able to continue to draw upon technological innovation, and student flows into these areas, when tapping into institutional niches. Yet, such technical areas often require investments in infrastructure that clearly not all organizations can afford. On the other hand, even the least dominant organizations could tap into the credentialing possibilities opened up by the great movement towards the community sphere that became institutionally valued over the Progressive Era (paradigmatically in Addams, 1961[1910]). Here we see the creation of credentialing subfields such as home economics, rural sociology and agricultural journalism, which sought to study and empower the rural community as a whole by making it the object of

analysis and giving it local voice and agency. Given the failed history of Reconstruction after the Civil War, many African-American institutions oriented themselves towards working as progressive forces in the uplift of rural southern Blacks, first through teaching trades and later by creating community-oriented programs.

In short, organizational actors employed whatever material and symbolic resources were at their disposal to distance themselves from the core areas of agriculture in order to capture areas with higher prestige, more labor market utility, or that embodied new institutionally valued pursuits—an ironic outcome considering the original egalitarian mission of the land-grant charter. While these efforts by dominant organizational actors seem to have created a rather cohesive research orientation, newer organizations seem to have targeted a few specialty areas when searching out niches. These shifts arise because of the exigencies of the field itself. Changing student constituencies, rapidly evolving technical environments, and shifting cultural ideologies allowed for new credentialing terrains to open up, and organizations moved to legitimately fill these niches and to distinguish themselves from other types of organizations in the field in the process.

Such processes must have had very real consequences for the persons who attended these institutions. On the one hand, the kinds of opportunities available to persons at lower prestige and African-American schools were highly circumscribed. One cannot choose a credential to study if it is not offered. Moreover, the patterns of symbolic boundaries created in niche formation invoke pre-existing social hierarchies and institutional logics. Such processes may help naturalize differences between persons by marking them with enduring social labels that appear to be part of a larger symbolic and organizational order. We may conceive of organizational niches comprising the field as institutionally chartered regions that impart social statuses in hierarchical ways, and students internalize these positions through a lagged form of socialization (see Meyer, 1977). Ultimately, the ability of some schools to create new niches does not only reflect the emergence of newly valued statuses, it actively helps construct them by giving credentials and persons a relationally meaningful organizational base (see DiMaggio, 1991).

5. Discussion

While isolating one key social process in the differentiation of certain types of niches, current quantitative approaches to institutional differentiation tend to ignore the historical, organizational, and institutional conditions under which important categorical distinctions emerge in the first place. More specifically, to the extent that such approaches take organizations into account, they tend to see them as competing for resources, but not as active agents in the creation of socially valued categories. In this paper, we have proffered an alternative research agenda to analyzing niches that explores how institutional categories, including basic socio-demographic characteristics, are themselves embedded within multiple orders that are crystallized in organizational practices of boundary formation and maintenance. Our goal has been to promote an alternate institutional analysis of niches, which embraces the inherent complexity of these realms, while advancing methods that help to map and explicate key aspects of these spaces.

While ecological approaches array organizations in a pre-defined resource space – a *fait accompli* that obviates any relational analysis (see Martin, 2003) – our approach is rooted in relational thinking (see Emirbayer, 1997). We attempt to induce from the data itself multiple orderings of institutional categories, which describe the manner in which various levels of categorization co-constitute one another. In our view, institutional niches consist of different orders that often overlap and work jointly to construct each other in ways that are contingent upon the state of the field itself. Credentials carry meaning as an organizationally mediated system of differences (e.g. technical versus science classifications), and these meanings are fundamentally embedded in the social cleavages between different kinds of people and extant organizational hierarchies. Niche boundaries, and dimensions of the social space in which they appear are, to use Bourdieu's term, ''arbitrary''—they arise from the historically contingent state of the field. We couple this relational orientation with insights on organizational dynamics.

Many significant institutional categories such as credentials are produced and disseminated in organizational settings, wherein individual choice is circumscribed by various mechanisms. These institutional categories are often highly coupled with organizational identity and status, and therefore are shaped by historical exigencies and organizational dynamics as fields emerge and differentiate (DiMaggio, 1986b; Lounsbury and Rao, 2004; Porac et al., 1995). By bringing organizational dynamics into the study of the differentiation of institutional categories we also move cultural analysis closer to organizational studies of inequality, discrimination, and segregation. Supply-side studies of discrimination, for example, have demonstrated the complex ways that institutional categories such as job titles and promotion ladders often work to reproduce existing status distinctions (Baron and Bielby, 1986; Bielby and Baron, 1986). In short, these studies have shown that as women and minority groups enter labor markets they tend to be segregated in newly created low-end job categories with few opportunities for promotion. Our approach suggests that similar processes occur at the field level as organizational actors struggle to maintain their positions in the face of rapid environmental changes. Organizational actors have unequal access to material and symbolic resources, which allow incumbent actors to wield a kind of first-mover advantage in order to maintain their valued position in the field as it expands, while newer and lower status actors must take advantage of whatever new opportunities they can seize upon in an uncoordinated fashion (see Fligstein, 1996). Ultimately, credentials may be a prime example of a market which is divided into a status hierarchy based upon organizational actors seeking to insulate themselves from direct competition (see Podolny, 1993; White, 1981). The case of agricultural credentials suggests that such meso-level organizational dynamics may result in structures of categorical inequality becoming institutionalized in the field itself.

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