The Social Network of U.S. Academic Anthropology and Its Inequalities

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Abstract

Anthropologists often call attention to the problems posed by social inequality, but academic anthropology also reproduces many of the very inequalities that its practitioners work to critique. Past research on U.S. academic hiring networks has shown evidence of systematic inequality and hierarchy, attributed in significant part to the influence of academic prestige, which is not necessarily a reflection of merit or academic productivity. Using anthropology departments' websites, we gathered information on all tenured and tenure-track faculty in PhD-granting anthropology programs in the U.S., totaling 1,918 individuals in all. For each faculty member, we noted their current institution and PhD-granting institution, which we treated as a "tie" between those academic programs. With those data, we applied both statistical and social network analysis (SNA) methods to explain variation in faculty placement as well as the

network's overall structure. In this article, we report on our findings and discuss how they can be used to help rethink academic reproduction in American anthropology.

Keywords: academia, anthropology, social inequality, hiring networks, social network analysis

Introduction

Why do the graduates of some programs fare better than others in the academic job market? What role does publication play? What about a program's prestige or the size of its social network? And to what extent do widely-influential advisors have bearing on the future employment of their advisees? Academic anthropologists have spent a lot of time debating these questions in online forums, faculty lunches, and graduate student lounges, but there is little in the way of empirical investigation in our discipline to help answer the question: "Who hires whom and why?"

A common concern is that while many anthropologists proclaim a commitment to fighting social inequalities, academic anthropology often reproduces its very own inequalities, most notably in the academic job market. Past research on U.S. academic hiring networks in other disciplines has shown evidence of systematic inequality and hierarchy, attributed at least in part to the influence of academic prestige, which does not necessarily correlate with academic productivity or merit (Burris 2004; Clauset et al. 2015; Mai et al. 2015). In this article, we employ statistical methods and social network analysis (SNA) to examine U.S. academic anthropology's hiring network, and we identify multiple factors that help to explain variation in faculty placement as well the network's overall structure.

Using anthropology departments' websites, we gathered information on all tenured and tenure-track faculty in PhD-granting anthropology programs in the U.S., totaling 1,918

individuals in all. For each faculty member, we noted their current institution and PhD-granting institution, which we treated as a "tie" between those academic programs. With those data, we investigated the following research questions:

1. Which programs are most successful at placing their graduates as faculty in other PhD-granting programs?
2. To what extent does the network reflect patterns of inequality and reciprocity?
3. Can a "core" group of programs be identified at the center of the network?
4. Does success in faculty placement relate to measures of departmental productivity (e.g. faculty publications), prestige (e.g. faculty awards), or institutional resources (e.g. university endowment)?

Our analysis provides information that should be useful to a wide array of anthropologists. For aspiring graduate students, this study offers data that show programs' success in placing their PhD students on the faculty of other PhD-granting programs. This enables students to identify influential programs in U.S. academic anthropology in general, and within the subfield of their interest specifically.[1] These data can also help faculty in advising undergraduate and graduate students. With the growing acknowledgement of widespread academic precarity (see Platzer and Allison 2018), faculty need to open conversations about developing graduate training that looks beyond careers as tenure-track faculty members in research universities. This may also encourage students to reflect more deeply on long-term career options and where they want to develop their own niche in the field. Given the current atmosphere of higher education, graduate students need more information about the options available to them.

Lastly, as Pierre Bourdieu demonstrated in his book *Homo academicus* (1988), it is important for us as social scientists to turn our analytic gaze toward the conditions of production in which we work, and the positions that we occupy within socially-produced systems (see also Wacquant 1989; Gusterson 2017). If the current social network is dissatisfactory for the majority of academic anthropologists in the U.S., then we must consider how it can be reconfigured in ways that better align with our collective values and vision for the discipline.

Background

Early anthropologists largely focused their investigations on human groups other than their own—a reflection of anthropology's colonial legacy. However, by the mid to late 20th century U.S. anthropology began to develop a more reflexive approach, examining the problematic assumptions embedded in early accounts while also considering how an anthropologist's positionality in relation to research subjects shapes her or his analysis (Clifford and Marcus 1986; cf. Behar and Gordon 1995). Since then, many U.S. anthropologists have studied human groups of which they have been part, from Wall Street financiers (Ho 2009) to contemporary Osage citizens (Dennison 2012). Still, American anthropologists have been somewhat hesitant to systematically examine academic anthropology as a socio-cultural group itself, at least in terms of the patterns of exchange that define its social network.[2]

An important exception is Beverly Hurlbert's article "Status and Exchange in the Profession of Anthropology" which appeared in the pages of *American Anthropologist* in 1976. Hurlbert's analysis considered 1,358 graduates from 80 PhD-granting programs in U.S. anthropology and developed a quantitative method of ranking programs based upon exchange theory principles. Essentially, Hurlbert ranked programs based on the exchange of graduates

among them, in which "giving" in higher proportion to "receiving" was an indication of higher status. She then used her ranking system to identify distinct classes within academic anthropology and offered observations about their dynamics, including noticeable patterns of reciprocation among elite programs as well as a hierarchy among non-elite programs based on the degree to which they shared elite characteristics. This paper seeks to build upon Hurlbert's work more than four decades later.

Recently, many other academic disciplines in the social sciences – including communications, political science, psychology, and sociology – have undertaken analyses of their own social networks and the factors that shape hiring practices within them (Barnett et al. 2010; Burris 2004; Mai et al. 2015; Oprisko 2012; Weakliem et al. 2012). This body of research has brought to light some of the biases that can perpetuate inequalities within the academy. Beyond legally-recognized discriminatory hiring practices – including those based on gender, race, ethnicity, faith, age, sexual orientation, and dis/ability – additional forms of partiality are shown to exist. In the field of communications, Mai and colleagues (2015) demonstrate that faculty are more likely to hire individuals with academic backgrounds similar to their own in part because they can gather more information about candidates through their personal networks, thus eliminating some of the risk and uncertainty in the hiring process. As a result, highly qualified prospective faculty members from institutions outside their network may be passed over. Mai and colleagues refer to this as the "alma mater" bias or the "old boy network" effect (p.577).

Similarly, in the field of sociology, Burris (2004) has identified what he describes as an "academic caste system." He argues that across many academic fields, a high correlation can be found between prestige of departments in which individuals received their degrees and the prestige of the department where they serve as faculty (see also Barnett et al. 2010). Since

scholars who are employed by more prestigious departments often gain access to resources and benefits that improve their chances for other career achievements, this feeds a cycle that, in his words, "results in a stratified system of departments and universities, ranked in terms of prestige, that is highly resistant to change" (p. 239).

Research by Weakliem and colleagues (2012) reinforce Burris's observations, demonstrating that of the 115 PhD-granting sociology departments in the U.S. in 2007, the top 20 programs were responsible for producing 70 percent of the faculty members for the discipline. At the bottom end of the scale, nine departments placed no PhD graduates into sociology faculty positions and 18 programs placed no more than two graduates each (p. 317). Another study by Clauset and colleagues (2015), which examined nearly 19,000 faculty placements in computer science, business, and history departments in the United States, showed that only 25% of institutions were responsible for producing 71 to 86% of all tenure-track faculty in those fields. A similar pattern has been observed in political science as well (Oprisko 2012).

Many of these researchers point out that an academic program with limited prestige is restricted by which departments will consider its graduates for employment, with a low likelihood of altering the situation. The reason behind this, they argue, is that less-prestigious programs seek to hire faculty trained at higher status programs in the hope that it will reflect positively on the department. However, the most prestigious programs rarely hire graduates of lower or middle-ranked programs as that would "undermine the principle of social exclusiveness" that guarantees their status (Burris 2004: 244-245; see also Hadani et al. 2011).

This study makes use of statistical and social network analyses to identify the most influential PhD programs in U.S. academic anthropology. In doing so, it examines the extent to which the network of U.S. academic anthropology demonstrates patterns of inequality and

reciprocity while also seeking to classify a "core" of influential programs. Lastly, it investigates the relationship between faculty placement and measures of productivity, prestige, and institutional resources across PhD-granting programs.

Methods

We consulted the American Anthropological Association's database to identify all Ph.D.-granting programs in the United States.[3] We then visited the websites of each department to collect faculty data. For cases in which the institutional page did not provide all the necessary information, we consulted the *eAnthroGuide Members-Only Individual Search* on the American Anthropological Association's website. In a few instances, faculty information was obtained from individuals' CVs posted on their *Academia.edu* profiles. We recorded the following information for each faculty member: last name, first name, subfield, Ph.D. institution, year of doctorate, and country where doctorate was received (if outside the U.S.). We did not collect data on race, ethnicity, or gender because self-reported racial, ethnic, and gender identities are rarely shared on departmental websites, and we wanted to avoid wrongly imposing those identities on faculty members. We initially collected data on adjunct and contract faculty, but because some departmental websites share this information and others do not, we decided to exclude these positions from the data set. Emeritus professors were also excluded. All tenured and tenure-track faculty members holding rank of Assistant Professor, Associate Professor, and Professor were included. We collected faculty data between April and October 2015.

The four subfields of anthropology – archaeological, biological, cultural, and linguistic – were identified based on faculty's self-reported interests. In some cases, subfields were made explicit in faculty profiles. In other cases, we made a judgment based on faculty research

interests. With the development of interdisciplinary research areas – including bioarchaeology, biocultural anthropology, medical anthropology, and environmental anthropology – the lines dividing the four subfields have become increasingly blurry. Despite this, we attempted to fit all faculty into one of the four traditional subfields for purposes of consistency.

Once we collected data for all of the existing faculty positions in anthropology PhD-granting programs, we created an edgelist. In this case, the edgelist is a record of all the 1,918 individual ties between PhD-granting programs. For example, if Professor A is a faculty member at UCLA and she received her PhD from Chicago, then the entry for the edgelist is one observed tie between UCLA and Chicago (with the former recognized as the receiving institution and the latter as the sender). We input the edgelist with observations of program ties for all faculty into the social network analysis program UCINET (Borgatti et al. 2002). With this statistical package, we conducted analyses that yielded information regarding the structure of the network, including measures of network density, reciprocity, centrality, and "coreness" (Scott 2000). All measures are described further below as they relate to specific features of the results. We also calculated the Gini coefficient – a common measure for assessing social inequality – for overall faculty placements among the 103 PhD-granting programs. Network graphs were produced using Gephi version 0.9.2 (Bastian el al. 2009).

For our statistical analysis, we collected attribute data for individual PhD-granting programs including number of active graduate students and National Research Council (NRC) Program Rankings.[4] From the NRC's 2010 study of anthropology graduate programs, we were able to gather additional data on individual programs including average publications per faculty member, average citations per faculty member, awards per faculty member, average GRE scores of graduate students, and average number of PhDs graduated per year (2002-2006).[5] We also

included two variables at the university level that we deemed relevant to our analysis: university endowment (in billions USD) and U.S. News & World Report ranking for 2016. To better reflect recent faculty hiring dynamics in anthropology, we restricted faculty placement data for this analysis to the period of 2000-2015 (of which there were a total of 77 programs with complete data for the response variables of interest, which accounted for 713 faculty placements).

Since the objective of our statistical analysis was to identify the influence of productivity, prestige, and institutional resources on the number of faculty produced by PhD-granting programs, we focused on variables that we deemed to be useful proxies. Using a generalized linear model, we initially assessed the strength of association between faculty placements in PhD-granting programs and the following seven independent variables: average number of PhDs graduated per year, average publications per faculty, average citations per faculty, awards per faculty member, average GRE score of admitted graduate students, university endowment, and U.S. News & World Report university ranking. After our preliminary analysis, we removed the U.S. News & World Report ranking due to its dependency on some of the variables of interest. In our final model, *average publications per faculty* stands in for departmental productivity while the variables *average citations per faculty*, *awards per faculty member*, and *average GRE score of admitted graduate students* represent varying measures of departmental prestige. *University endowment* is a proxy for institutional resources, and the *average number of PhDs graduated per year* serves as a control variable to account for differences in the number of PhDs produced by program. All variables were calculated at the program level, except for university endowment.

Faculty placement counts were modeled as a negative binomial random variable to account for observed overdispersion (i.e. the variance of the counts was larger than its mean after accounting for the effect of the predictors of interest) when counts were modeled as a Poisson-

distributed random variable. All predictor variables entered the model additively, without interactions, and were further centered and scaled to facilitate model interpretation. The model was fit using 30-fold cross validation repeated 30 times, where the minimum root mean square error was used to select the optimal link and final model parameter estimates. Outliers were identified by calculating Cook's Distance for each modeled observation, while variance inflation factors were calculated for each parameter to assess the risk of multicollinearity. To assess relative variable importance, we utilized the z-values, or the test-statistic for the Wald-test in which the parameters are zero, since all model variables were standardized. To assess error around parameter estimates, 95% Wald confidence intervals were calculated as $Estimate \pm 1.96 \times SE$, where 1.96 denotes the standard normal percentile having right- and left-tail probabilities equal to 0.025 and 0.975, and SE denotes the standard error of the parameter estimate. The final model was fit using the *caret* package (Kuhn 2008), which used the glm.nb algorithm to fit models with dependent variables distributed as negative binomial from the pscl package (Zeileis 2008). Plots were made with the ggplot2 package (Wickham 2010), and all data wrangling was used with functionalities in the tidyverse package (Wickham 2017). Variance inflation factors and Cook's D measures were calculated using the stats and car (Fox 2012) packages in R. Gini coefficients and Lorenz curve calculations were calculated using the ineq package (Zeileis 2013).

Results

Faculty Composition

We identified 1,918 individuals holding tenured or tenure-track positions at PhD-granting anthropology programs in the United States in 2015. Of these, 391 were Assistant Professors, 633 were Associate Professors, and 894 held the rank of Professor. Cultural anthropologists

represented the majority of the faculty positions with 50.5% of individuals identified in the subfield (969 people in all). Archaeology was the second most prominent with 26.4% of positions (506 individuals) while biological anthropologists represented 18.0% of positions (346 individuals). Linguistic anthropologists were a small minority with only 5.0% of positions (97 individuals).

Just over 6.5% of faculty identified in this study received their PhD from a university outside of the United States. Of those 127 individuals, 57 received their PhD from an institution in the United Kingdom, 27 from Canada, and 8 from Australia. 19 countries were represented in all.

Placement of PhDs in Faculty Positions

The program most successful at placing its PhDs in faculty positions at other PhD-granting programs was the University of Chicago with 154 placements, representing 8.0% of positions overall. Chicago was followed by Harvard (126 placements), Michigan (122), UC-Berkeley (104), and Arizona (70). It is noteworthy that the top program in the nation had more than twice as many placements as the fifth most successful program, and graduates from the top five programs cumulatively represented 30.0% of tenured and tenure-track faculty in the network. Furthermore, the top 15 programs accounted for a majority of positions with 1012 placements, or 52.8% of tenured and tenure-track positions overall (Table 1). By contrast, the bottom 15 programs contributed a total of 3 placements.

<TABLE 1 HERE>

Inequality among Programs

The Gini coefficient is a common measure used to assess social inequality that is expressed as a ratio, with 0 representing perfect equality and 1 representing maximal inequality in a frequency distribution. For the distribution of faculty placements among PhD-granting anthropology programs in the U.S. (excluding placements by foreign and non-anthropology programs), we calculated a Gini coefficient of .64 (Figure 1). This closely aligns with the findings of Clauset et al. (2015) for faculty produced in the disciplines of business, computer science, and history, which exhibited Gini coefficients ranging from .62 to .76. For reference, Clauset and colleagues noted that income distribution in the U.S. has a Gini coefficient of .45, and countries with the highest income inequality globally have coefficients of around .6 (see OECD 2018).

Within U.S. academic anthropology, we also find pronounced inequality among top programs. The top ten programs produced 2.5 times more faculty than the second ten programs, and programs ranked 11-20 produced 1.5 times more than those ranked 21-30. It is equally significant that only 28 programs were identified as "net producers," or those that have placed more tenured or tenure-track faculty than they currently have in their program.

<FIGURE 1 HERE>

The Network of U.S. Academic Anthropology

Using social network analysis, we also examined structural features of the network (Figure 2). Of the 1918 total ties, 140 originated from programs outside of the network, primarily through individuals who earned their PhDs in universities outside of the United States as well as a few who received PhDs in U.S. programs other than anthropology.[6] Excluding those ties was

necessary to assess reciprocity and collect other measures that consider directed relations in the network.

We found the density of the network to be .155, or in other words, 15.5% of possible dyadic relationships are present in the network. This relatively low figure is not surprising considering that there are over 100 PhD programs and only a small number of faculty in any given department (average of 18.5 faculty per program). Furthermore, as noted earlier, ties between programs are unevenly distributed because a few programs placed a disproportionate number of their graduates into other programs as faculty.

<FIGURE 2 HERE>

Reciprocity

The network – excluding outside universities and programs – revealed a hybrid reciprocity of .099. Hybrid reciprocity simply measures whether each observed relationship is reciprocated and expresses the result as the proportion of reciprocated relations in the network. In this network, we found 108 symmetrical ties (i.e. programs that hired each other's graduates as faculty) and 985 asymmetrical ties (i.e. relationships in which one program hired a PhD graduate from the other). Simply put, *about 1 in 10 dyadic relationships are reciprocal within the network*.

A revealing measure of reciprocity is the proportion of outgoing ties that are non-symmetric for an individual program. This captures the exclusionary tendency of elite programs because higher proportions mean that a program places its graduates as faculty in many other programs but only accepts faculty from a very limited number of them. The top five programs for this measure are: Chicago (.985), Harvard (.982), UC-Berkeley (.982), Michigan (.894), and

Stanford (.875). It is noteworthy that the top 10 further includes Princeton (.857), Columbia (.854), Penn (.853), NYU (.795), and Yale (.795)—all programs at elite private universities. The number of faculty placements and the proportion of non-symmetric outgoing ties are also very highly correlated (Spearman Correlation= .952, $p<.001$).

A related measure is the proportion of non-symmetric ties that are incoming. This calculates the proportion of a program's faculty that come from programs where it has not placed its own graduates as faculty. The tight-knit relations among elite programs is also revealed by this measure, which consists of the same top five, although in a slightly altered order: Harvard (.145), Chicago (.152) UC-Berkeley (.179), Stanford (.225), and Michigan (.227). Overall faculty placements and the proportion of non-symmetric incoming ties are highly inversely correlated as well (Spearman Correlation= -.941, $p<.001$).

An examination of the interactions among the top programs offers further illustration. Chicago, the program with the most faculty placements overall, placed nine of its graduates at Harvard and nine at Michigan, the second and third most successful programs, respectively. No other programs placed as many of their graduates in other individual departments. In contrast, Michigan and Harvard each placed only two of their graduates at Chicago, demonstrating some asymmetry among the top three. Chicago also placed four of its graduates at UC-Berkeley, the fourth most successful program overall. Meanwhile UC-Berkeley has five of its graduates as faculty at Chicago, making it only one of two programs in the U.S. that has placed more faculty in Chicago's program than it has received from it.[7]

In addition to Chicago's interactions with the top five programs, it has placed seven PhDs at Indiana University, six at UT-Austin, five at University of Virginia, and four each at Stanford, Duke, and Brandeis. At numerous programs, it has placed three of its graduates, including

Arizona State, Boston University, Columbia, Emory, NYU, Tulane, UCLA, UC-San Diego, University of Illinois, University of Minnesota, University of North Carolina-Chapel Hill, University of Washington, and Washington University-St. Louis. Its dominance within the network is unparalleled.

Network Centrality

Different measures of network centrality can help to identify how other programs also exert important influence. One of the most common centrality measures is degree centrality, which simply represents the number of nodes to which an individual node is directly connected. The measure correlates highly with overall faculty placements in the network (Spearman correlation .803; $p<.001$), since programs that place many graduates as faculty at other programs are typically connected to more programs overall. Michigan exhibited the highest degree centrality because it not only placed faculty at many different programs, but it also received faculty from more diverse programs than Chicago and Harvard (see Table 2, column Degree).

Betweenness centrality, which measures bridging in the network, points to other programs that are critically positioned. Betweenness is calculated based on the number of times a node is on the shortest path between any other two nodes in the network. Arizona, Michigan, and UCLA are the top three programs for betweenness centrality—all large public university programs that appear to serve as bridges between elite private programs and other public university programs, both large and small. Betweenness centrality is also significantly correlated with faculty placements by program (Spearman =.743; $p>.001$).

A third measure known as eigenvector centrality captures the extent to which a node is connected to others that are influential in the network. Like degree and betweenness centrality,

eigenvector centrality correlates highly with overall faculty placements (Spearman correlation=.796; p>.001). By this measure, Chicago, Michigan, and Harvard once again stand out as the top three.

<TABLE 2 HERE>

Core-Periphery Structure

Due to the dominance of relatively few PhD programs, we tested the degree to which the network adhered to a core-periphery structure. Such structures consist of a densely-connected group of nodes – typically at the center of the network – which are then tied to a more sparsely connected periphery (see Borgatti and Everett 1999). In continuous core-periphery models, "coreness" scores are calculated for individual nodes based on a measure of their proximity to the network center. In discrete core-periphery models, a definitive group of core participants are distinguished from the outlying periphery. The software program UCINET uses a combinatorial optimization technique to find the partitions that maximize the correlations between observed and idealized structures, yielding a result that is statistically significant by design (and thus does not offer any measure of statistical significance; see Lepori et al. 2013).

In our analysis, the continuous core-periphery function yielded only a moderate correlation between the actual network data and the idealized model (.443). This is not surprising considering that the idealized model expects peripheral nodes to be tied only to the core and not among themselves. The continuous core-periphery analysis identified four programs that stood out with highest coreness scores – Chicago (.559), Harvard (.396), UC-Berkeley (.331), and Michigan (.309) – and recommended a core of those four programs alone (based on a concentration score of .841 on a scale of 0 to 1; see Table 2 for coreness scores).

The categorical core periphery function also yielded a moderate correlation (.428) between the network data and the idealized model. However, it identified 21 programs at the core (listed alphabetically): Arizona, Arizona State, Chicago, Columbia, Cornell, Harvard, Illinois, Indiana, Michigan, NYU, New Mexico, Pennsylvania, Stanford, UC-Berkeley, UC-Davis, UC-Santa Cruz, UCLA, UNC-Chapel Hill, UT-Austin, Washington, and Yale. Notably absent in this analysis were: UC-Santa Barbara (15th by total faculty placements), CUNY (16th), Northwestern (17th), and University of Florida (20th).

While Chicago, Harvard, Michigan, and UC-Berkeley stand out above the rest in terms of overall faculty placements as well as multiple network centrality measures, it is worth considering a larger core of programs beyond those four. Since 15 programs are responsible for a majority of placements, and only 26 programs are "net producers," it is reasonable to suggest that 15 to 25 programs represent the broader core of the network's structure, although the boundaries between the core and periphery are by no means clear-cut (Figure 3).

<FIGURE 3 HERE>

Statistical Model of Faculty Placements

With the six independent variables we selected for the statistical analysis – average number of PhDs graduated per year (PhDGrad), university endowment (Endowment [in billions USD]), average citations per faculty (AvCit), awards per faculty (AwaFac), average publications per faculty (AvPubs), and average GRE scores of grad students (GRE), – the model produced an r-square value of .86, thus explaining 86% of the variation in placements across programs above an intercept-only model (see Table 3). In addition, root mean squared error and mean average error were 3.38 and 2.94 faculty, respectively.[8] Variance inflation factors were all below 1.94,

suggesting little concern for collinearity (i.e. predictors that correlate with other predictors) between model independent variables. However, calculation of the Cook's D statistic indicated that Harvard (d =0.96) was a potential influential observation, given its disproportionately large endowment. Removal of Harvard from the set reduced measures of goodness-of-fit of the model by <1%, and all model parameters by <3%, but maintained relative variable importance. With the exclusion of Harvard, the effect of endowment went from 0.12 to 0.089 faculty per additional standard deviation. Henceforth, parameter estimates presented are those for the model fit without Harvard in the sample. Table 3 contains a summary of results of the final model, with parameter estimates and standard errors expressed in the original scale.

<TABLE 3 HERE>

Controlling for other model variables, anthropology programs in the study placed an average of 7.2 faculty members into positions in other universities. Additionally, all model parameters had positive effects on faculty placements (Table 3, Estimate column), and are interpreted as the change in placements after an increase in one standard deviation of the variable above the mean (Table 3, mean and sd columns). Hence, increasing the control variable *average number of PhDs graduated* (PhDGrad) by one standard deviation (3.63 students) would increase the number of faculty placed by a given university by 0.549 [0.53-0.56].

After controlling for PhDGrad, the most important variable in the model (Table 3, Variable Importance column), all variables related to program prestige suggest significant, albeit more variable, impacts on faculty placement. For instance, a unit standard deviation increase in the number of awards per faculty (AwaFac) raised the number of placed faculty by 0.139 [0.11-0.16], while those for GRE scores were the least important at 0.024 [0.01-0.03] faculty per increase in one standard deviation of GRE score. Endowment size proved to be the second most

important non-control variable, while the average number of publications per faculty produced at the departmental level appears to have no impact on a department's faculty placements.

Discussion

In U.S. academic anthropology, a small cluster of programs is responsible for producing the majority of tenured and tenure-track faculty in PhD-granting programs, with a very select few dominating the network. From this analysis, the most successful programs are generally housed within universities with large endowments and have faculty who hold prestigious awards and are widely cited by other scholars. Such programs also typically produce a high number of PhDs annually and demand high GRE scores for entry. Lastly, they tend to draw from a very limited pool of departments when they recruit faculty.

As has been previously noted, large graduate programs tend to be older and more intellectually dominant in the discipline (Hurlbert 1976). Thorkelson (2010) reinforces this observation, writing: "…however one wants to think about the symbolic and intellectual dimensions of departmental hierarchy, one should take into account the blunt institutional reality that *sheer size matters a great deal*…" (p. 18; italics from the original). This is not just because top programs are able to recruit many students and flood the market with PhD graduates over time, but rather they are able to do so because of their financial and social capital. Analysts across various disciplines have argued that this has led to an entrenched class system that is fairly resistant to change. In the introduction to her analysis over 40 years ago, Hurlbert (1976) remarked: "Virtually all the faculty of Yale, Columbia, Harvard, Chicago, Berkeley, and a few others obtained their degrees from Yale, Columbia, Harvard, Chicago, Berkeley, and a few others" (p. 272). The statement still largely rings true today.

Hurlbert's analysis of the top anthropology programs by their ratio of "giving to receiving" in the mid-1970s revealed very similar results to the present study, with the top 10 programs in her analysis being: Harvard, Chicago, UC-Berkeley, Yale, Columbia, Cornell, Michigan, Pennsylvania, UCLA, and Indiana. Examining the top programs in the present study by proportion of outgoing non-symmetric ties (a similar measure to that used by Hurlbert, see Table 2), only three of these – Cornell, UCLA, and Indiana – have dropped out of the top 10 in the last 40 years (as they have been pushed aside by Stanford, Princeton, and NYU).

Analyses by Burris (2004) and Weakliem et al. (2012) argue that prestige of the university has considerable influence on an individual disciplinary program's prestige—what Burris refers to as the "halo effect" (p. 242). In their conclusion, Weakliem et al. (2012) state: "The major finding of this study is that there is a long-term component of department prestige that is associated with the university…Just as individuals gain a lasting advantage from being located in departments with many strong researchers, departments seem to gain a lasting advantage from being located in universities with many strong departments" (pp. 325-326). While there are some exceptions found in the present study, including the University of Arizona and the University of New Mexico – both large state universities that do not rank particularly high in the U.S. News & World Report annual rankings – most of the top 15 programs in overall placements are located in elite private universities (e.g. Chicago, Harvard, Stanford) or highly-ranked public institutions (e.g. Michigan, UC-Berkeley, UCLA).

With regard to the attributes of departmental faculty, the number of awards per faculty and average citations per faculty appear to be important indicators of a program's strength for placing their graduates in faculty positions. It would seem sensible that students in programs with prestigiously-awarded and widely-cited faculty would accrue some benefits from that

association. On the one hand, graduates of those programs gain rare insights into the intellectual lives of some of the most well-recognized scholars in the field. On the other hand, the simple association with those scholars will have its own "halo effect." In other words, graduates of those programs can receive an advantage simply for having recognizable scholars as advisors. This influence can be exercised in subtle ways, such as when departments looking to hire a new colleague may hope to gain access to elite members of the network by hiring one of their advisees.

The average number of citations per faculty, while significant, also requires critical examination. The very condition of being a faculty member at an elite program like Chicago is likely to have influence on this variable. Not only is an article published by a Chicago professor more likely to garner attention than one published by a professor at less prestigious program, but it is also likely that the Chicago professor is going to have graduate students that will cite and assign that article when they become professors. Not to mention, this Chicago professor's colleagues can recommend the work to their influential friends. These cascading effects are important for considering the perpetuation of the "academic caste system" as Burris (2004) describes it. Still, it is important to underscore that along with the other prestige variables analyzed in our model, average citations were assessed at *the departmental level only*, and not on an individual basis.

One unexpected finding in our analysis was that the average number of publications per faculty appeared insignificant—but why might that be the case? Once again, to be clear, this only indicates that *at a program level* the average number of publications of faculty members is not a significant factor for placing graduates in faculty positions. This does not mean that the number of publications under an individual's belt is insignificant in the hunt for a tenure-track job. Still,

based on the analysis, it would seem that publication quality, not quantity, is a better indicator of a program's ability to place its graduates into tenure-track positions. Despite the "publish or perish" mentality that pervades academia, the recognition of publications through citations and awards appears to send a stronger signal at a program the level than sheer volume of publications alone.

In terms of graduate training, these observations raise many further questions. Does mentorship under prestigiously-awarded and widely-cited faculty mean that graduate students of those programs develop greater understanding of the anthropological discipline and receive superior training overall when compared to their peers? Or do students at top programs simply wield symbolic power conferred upon them by their prestigious mentors and institutions? And how might we distinguish the two? These questions cannot be answered with the data presented here but they do deserve consideration by future hiring committees.

Study Limitations and Implications

The network of U.S. academic anthropology can be understood either as a map of *where doctoral graduates go* or of *where professors come from.* Considering either perspective, there are notable areas that do not appear in the analysis presented here. Looking first from the faculty side, this analysis relies on a snapshot of the professoriate at the time of data collection and does not capture the mobility that is a common feature of academic life. As Barnett et al. (2010) note in their analysis of hiring networks in communication, one of the limitations of such a study is that examining current faculty positions as ties to individuals' graduate programs can bias results, since it will overlook positions that individuals held in between their graduation and their current position. In a similar study focused in the subfield of archaeology, Speakman and

colleagues (2018) add that such a synchronic view of the hiring networks overlooks "how long a person has been employed at that particular department, how long they were on the job market, or how many previous academic positions they may (or may not) have had" (p.4). The same gaps are applicable to our analysis.

Furthermore, this study only includes full-time tenured and tenure-track faculty at doctoral degree-granting institutions. This, by design, overlooks the majority of academics who are not eligible for tenure. Full-time tenured and tenure-track faculty account for only 29.6% of the total academic labor force, while non-tenure-track and part-time faculty represent a majority of the workforce at 56.7%, and the remaining 13.7% are graduate students (Shulman et al. 2017). We also excluded anthropologists teaching at liberal arts colleges, regional universities, and community colleges, but a survey of members of the American Anthropological Association (AAA) indicates that only 46.6% of academic anthropologists teach in research-intensive universities (Ginsberg 2016a: 5), and there is reason to believe that community college professors are underrepresented in that sample.

As we acknowledge in the discussion of our methods, this study does not capture the critical dimensions of gender, race, and ethnicity in hiring practices in U.S. academic anthropology. Based on a 2013 survey of anthropology departments (American Anthropological Association 2013) in which 117 anthropology degree-granting programs responded, women were shown to represent 45% of faculty overall. Men significantly outnumbered women in the positions of Distinguished, Emeritus, or Full Professor, while near gender parity was found in the ranks of Assistant Professor and Associate Professor. Furthermore, faculty of color only represented 12% of faculty overall, but they were especially underrepresented among Full Professors (6%) and non-tenure-track positions (9% of full time and 8% of part time). Slightly

higher representation of faculty of color were found at the rank of Assistant Professor (17%). Closer examination into the factors determining these distributions is needed. Future research would also benefit from looking into how training and recruitment in anthropology compares with other disciplines across degree levels – from bachelor to doctorate – and how that shapes the future pool of faculty in relation to gender, race, and ethnicity. The significance of GRE scores in our analysis, for instance, indicates the continued use of an evaluation tool that measures a limited band of analytical thinking skills and has been shown to impede the enrollment of a diverse student body (Miller and Stassun 2014).

One challenge not seen in our analysis that Barnett and colleagues (2010) faced was that most of the departments that had granted doctorates to professors of communication were not themselves departments of communication. That discipline is regularly taught by faculty with degrees in sociology, English, library science, and a variety of other humanities and social science fields, all of whom were eliminated from Barnett's analysis. Anthropology presents a different challenge: although most anthropology professors do have degrees in anthropology, over 40% of anthropology PhD graduates who pursue academic careers are employed outside of anthropology departments (Table 4). Therefore, while our model does present a comprehensive view of where PhD-granting anthropology departments hire their tenure-line faculty *from*, it is necessarily incomplete as a picture of where anthropology PhD graduates find employment.

<TABLE 4 HERE>

Adding complexity to the picture, a significant and growing number of anthropologists work in government, NGOs, and the private sector. According to the Bureau of Labor Statistics (2017), there were 6,470 *anthropologists and archeologists* in May 2016, compared to only 5,700 *anthropology and archeology teachers, postsecondary.* Limiting our attention to employed

PhD recipients, in 2013, only 64% were employed at four-year colleges and universities (Table 5), and only 42.7% were working as *postsecondary teachers—social and related sciences,* according to the NSF Survey of Doctorate Recipients. Among PhD students, while tenure-track academic jobs remain the most common goal, over half are also considering nonprofit work, and over 40% are considering government and non-faculty academic jobs (Ginsberg 2016b). On the cutting edge of this trend, some PhD programs, like the University of South Florida, are training their students precisely for careers outside of academia and only offer PhDs in applied anthropology. Other programs are beginning to follow suit.

<TABLE 5 HERE>

Future research would benefit from adopting a mixed-methods approach, including qualitative data from interviews with anthropologists in a broader diversity of programs and at varying ranks. How might graduate students' understanding of the inequalities within the discipline shape their decisions regarding program enrollment and future career paths? Is there variation in faculty understandings of the role that social inequality plays in graduate training and the pursuit of academic careers? How might concern over academic precarity shape different departments' approaches to the future of faculty hiring and graduate training? These and other questions merit investigation.

Conclusions

In a lecture titled "Two Cheers for Equality," the philosopher and legal scholar Kwame Anthony Appiah (2016) argued that we should (and must) demand equality in terms of mutual respect among individuals and in individual's treatment before the law. However, Appiah suggests that certain forms of social inequality may be perfectly acceptable—hence, his "two

cheers for equality" (and not three). He reasons that distinctions given to individuals for excelling in their occupation or field of study create forms of social inequality but ones that he would deem acceptable. The problem, of course, is when individuals gain such distinctions because of biases that "stack the deck" in their favor, as Appiah dutifully notes. So, are graduates from programs like Chicago, Harvard, and Michigan getting a disproportionate number of jobs at PhD-granting programs because they are simply better-trained and have developed path-breaking work in the discipline? Or are faculty serving on hiring committees swayed by their prestigious institutional affiliations and influential graduate advisors that have shaped the discipline? Many anthropologists would argue that U.S. society is most certainly not a meritocracy, as much as some would like to believe so. Perhaps we should also question whether selection of tenure-track candidates is a reflection of demonstrated merit and "fit" for a position, or if implicit bias favoring certain academic pedigrees is playing an outsized role.

If U.S. academic anthropology only relies on 15 programs for the majority of its faculty positions in PhD-granting programs, we should also consider how this homogenizes the discipline intellectually, from the theoretical turns it takes to the authors it canonizes (and even to the methodological approaches it prioritizes). One challenge for 21st century American anthropology is to embrace its broader intellectual diversity, drawing on insights from those beyond the academy's most elite positions.

It is important to underscore that these patterns which favor an elite minority of programs in hiring networks are not unique to academic anthropology but are observed across many disciplines. It will be helpful to look further into how these hiring inequalities intersect with other forms of socio-economic inequality and exclusion. What we do know is that where a graduate gets their PhD considerably influences the likelihood of getting a tenure-track faculty

position at a PhD-granting program. And one's ability to gain acceptance to an elite PhD program is most certainly shaped by factors beyond sheer intellectual potential. The reliance on GRE scores for graduate admissions, for example, is one area of evaluation that demands reconsideration, especially as recent scholarship has argued that the quantitative portion of the exam is a better indicator of gender and ethnicity than academic ability (Miller and Stassun 2014).

The selection of the majority of tenured and tenure-track faculty from a very limited pool of programs will also contribute to the continued lack of diversity in academic anthropology if those programs do not actively recruit and retain scholars from diverse racial, ethnic, and socio-economic backgrounds. Anthropology and other fields in the social sciences and humanities need to consider how embracing more diverse academic backgrounds can help build more diverse departments at all ranks. By not doing so, the exclusionary tendencies of Historically White Colleges and Universities will continue to be reinforced and people historically underrepresented in the academy will remain so (Sensoy and DiAngelo 2017).

Some readers may wonder about the other ways programs can use this information for purposes of training future students or maneuvering within U.S. academic anthropology's social network. A common response has been to focus on training graduates for employment beyond academia, including careers in government, NGOs, and the private sector. Greater emphasis on interdisciplinary training, pairing anthropology degrees with specializations in ecology, engineering, media studies, or public health may be another route, and one that many programs are entertaining seriously. Of course, a significant number of anthropology PhDs will continue to find careers in academia, but the common bias in training for faculty positions in R1 programs[9] neglects the importance of preparation for other academic careers, including ones that are more

teaching intensive or those that require translating anthropological knowledge and methods into different fields. While we cannot offer a roadmap for the best path forward for anthropology graduate programs, if you are a faculty member in one of them, presuming that your students are destined for a tenure-track position in an R1 anthropology department requires major re-evaluation. For faculty in undergraduate programs, this analysis should also help to inform discussions regarding future faculty hiring and mentorship of students looking to enroll in graduate programs.

Finally, we hope this article can be useful for spurring new conversations within anthropology departments about graduate training and its objectives, as well as employment within the academy and beyond it. While this call has been made before, we believe it is a crucial time for anthropologists at various career stages and positions to debate academic reproduction in our discipline.[10]

Acknowledgements

First, we thank Editor-in-Chief Deborah Thomas and four anonymous reviewers for their many useful suggestions that enhanced the overall quality and clarity of the manuscript. The fourth reviewer, Alisse Waterston, later revealed her identity and encouraged us with her enthusiastic support. An early draft of this paper was presented at the 2016 AAA Meeting in Minneapolis. Several individuals gave helpful comments on that paper, including Matthew Wolf-Meyer, Lizzy Hare, Matt Watson, Diane Austin, Michael Chibnik, Taylor Nelms, Jeanne Sept, Luisa Cortesi, Jordan Kraemer, and Matan Kaminer, as well as several audience members who made it to our 8AM session (on a Sunday no less). *Cultural Anthropology* offered a space to share a short essay based on this work in the forum on "Academic Precarity." Many thanks to

Marcel LaFlamme for his editorial support there. Lastly, Joe Feldman and Sydney Silverstein provided substantive feedback that motivated much-needed improvements to the original manuscript, including the discussion of citational practice and social reproduction in academic anthropology. Any remaining errors are, of course, our own.

Notes

1. For specific analysis on academic reproduction and job placement in the subfield of archaeology, see the recent study by Speakman and colleagues (2018).
2. To be sure, a number of anthropologists have scrutinized the discipline's history and turned their critical gaze to the social, political, and economic history of its emergence in the United States (see, for example, Stocking 1992; Nader 1997; Price 2016).
3. We excluded Rensselaer Polytechnical Institute from this study because its PhD program is focused exclusively on Science and Technology Studies. We did the same for Michigan Tech because it only has a specialized program in industrial heritage and archaeology. Lastly, the California Institute of Integral Studies was excluded because faculty for the Social Movement and Anthropology program did not hold PhDs in anthropology.
4. Only 82 of the anthropology graduate programs in the U.S. received NRC rankings. Stanford received two rankings: one for its cultural anthropology program and another for the anthropological sciences program. Since those programs were once separate but have since been reunited, we chose to use the rankings from the cultural program, which had a larger number of faculty and graduate students. Michigan was also given two rankings: one for its anthropology program and another for its "anthropology and history" program.

Since the latter program is a small subset of the anthropology program, it was disregarded. For further information regarding the methodology used by the NRC, see Ostriker et al. 2010.

5. All of these data were derived from the NRC rankings report. Average citations were calculated based on the annual average of the number of allocated citations in the years 2000-2006 to papers published between 1981-2006. For example, the number of citations for a faculty member in 2003 is found by taking the 2003 citations to that faculty member's publications between 1981 and 2003. Those counts were summed over the total faculty in the program and divided by the sum of the allocated publications to the program in 2003. For average number of publications, books and articles were counted going back to 1996, giving books a weight of five and articles a weight of one. For awards, the committee compiled a list of honors and awards from 224 scholarly societies for all fields and differentiated between "highly prestigious" awards, which received a weight of five, and other awards, which received a weight of one. See Ostriker et al. 2010 for further information on the methodology used by the NRC.
6. This includes the University of Rochester, which once had a PhD program that is no longer active—8 faculty from the network received their PhDs there, but have been excluded. Florida State is another similar example, with one faculty member in the network.
7. Johns Hopkins is the other program, which placed one of its graduates on the faculty at Chicago but received none (as of 2015).
8. These measures capture the precision of the model. Root mean square error is the standard deviation of the residuals (i.e. measures of how far from the regression line data

points stand) while mean squared error simply measures the average of the square of the errors or deviations.

9. This is a designation from The Carnegie Classification of Institutions of Higher Education. For Doctoral Universities, the three classifications are: R1 (highest research activity), R2 (higher research activity), and R3 (moderate research activity). For more information, see: http://carnegieclassifications.iu.edu/classification_descriptions/basic.php

10. In recognizing the limits of the analyses presented here, we hope that others interested in these data can explore them independently. To this end, we have uploaded our network data for all 103 PhD-granting programs to a publicly-available Google Fusion Table: https://goo.gl/2U8uLC. The dataset consists of 1,778 faculty placements (excluding the 140 faculty placements by non-anthropology programs and those outside the U.S.). Users can zoom in and out of the network, choose the number of nodes displayed based on network importance, and click on individual nodes to observe their ties in the network (for more information, visit this webpage provided by Google: https://support.google.com/fusiontables/answer/2566732?hl=en).

    While the functionality of Google Fusion Table Network Graph is somewhat restricted, it offers those without any experience with network analysis the opportunity to explore the data rather easily. For those who want to conduct their own analyses of the network data, we have shared a supplemental data table as well.

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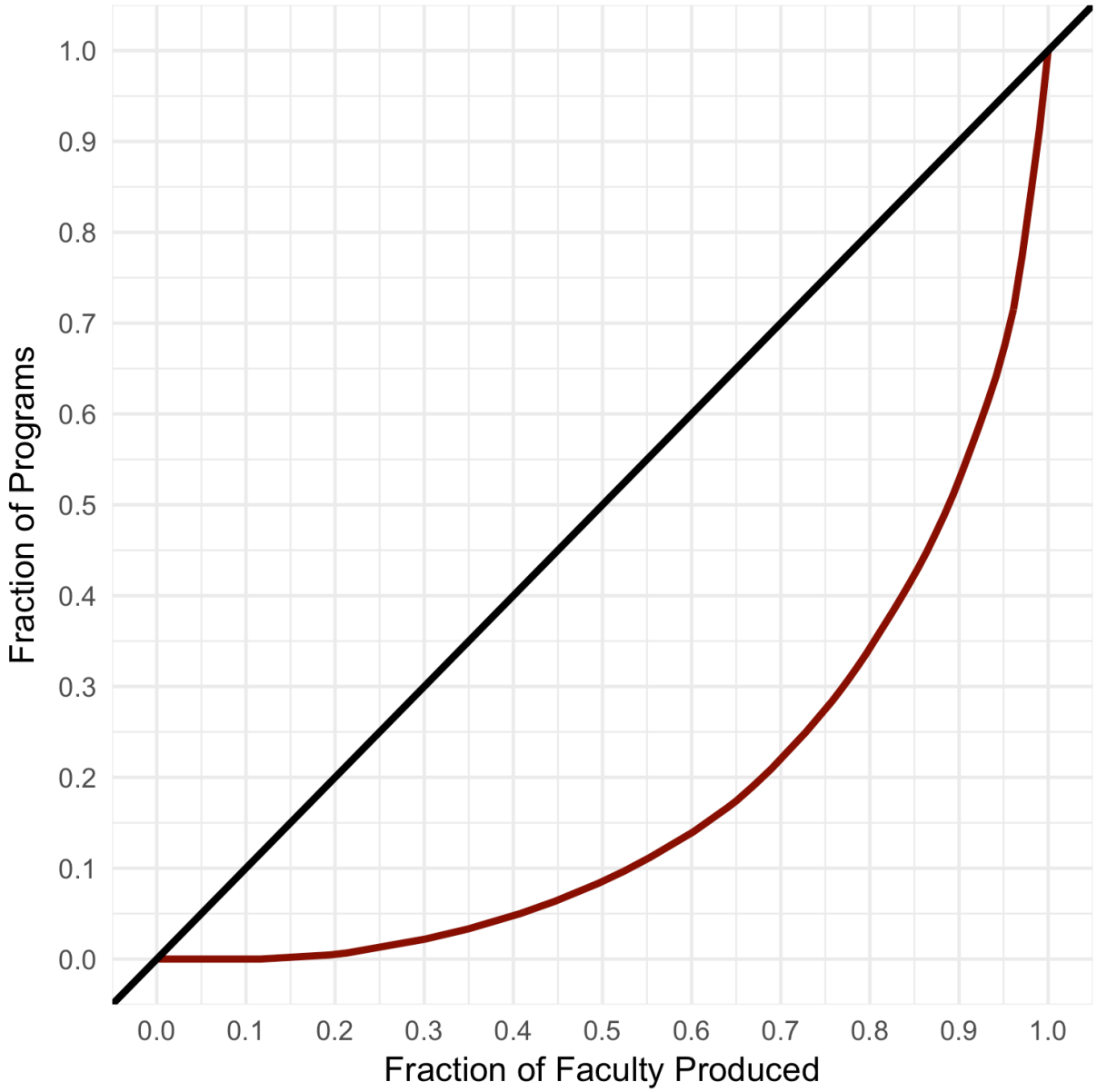

Figure 1. The Lorenz curve, which is used to calculate the Gini coefficient, illustrates the fraction of all faculty produced as a function of producing programs. Note that around 10% of PhD-granting programs is responsible for half of the faculty in all 103 PhD-granting programs (excluding placements by non-anthropology programs and those outside the U.S.).

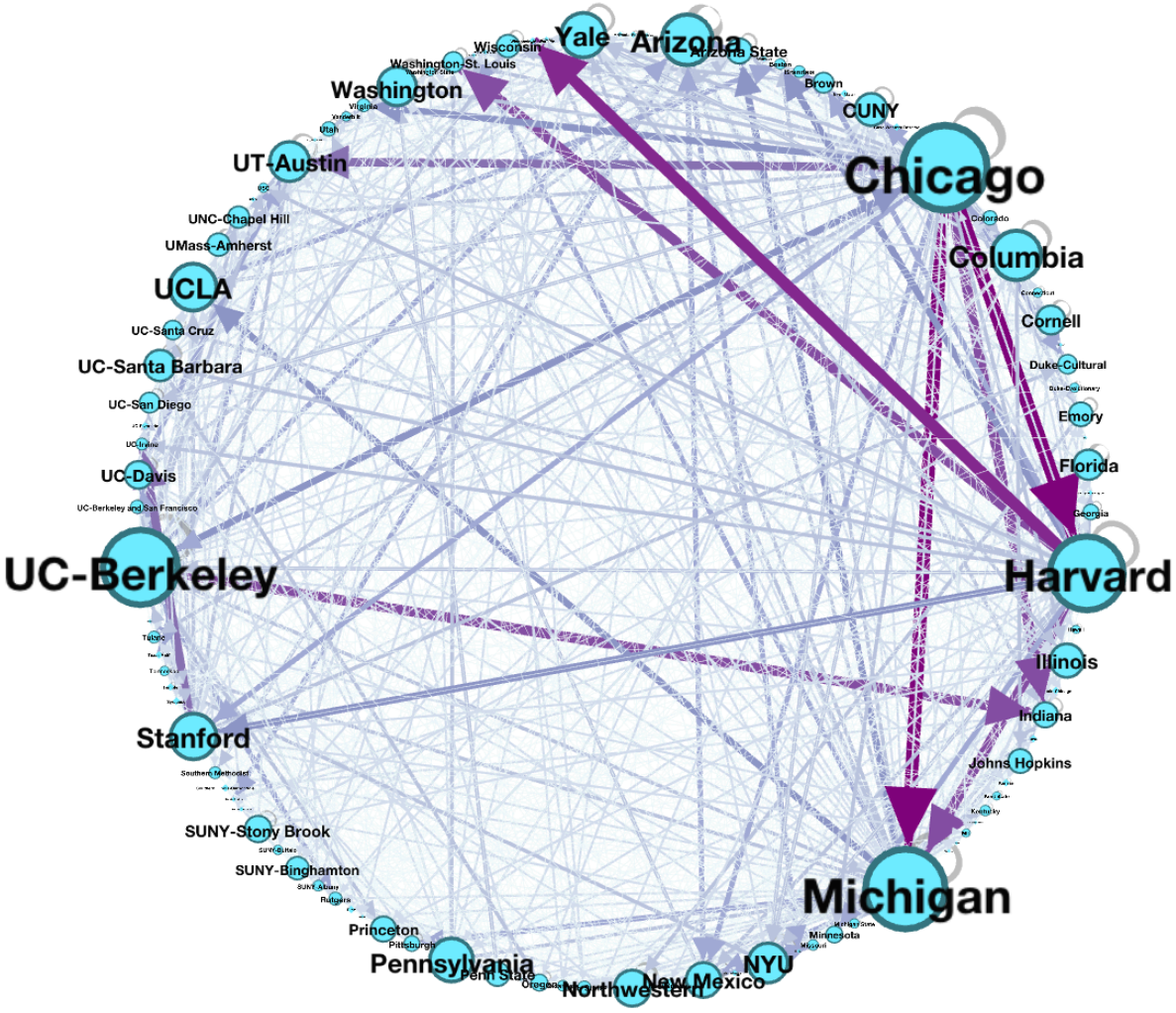

Figure 2. Chord graph of the hiring network of PhD-granting anthropology programs in the U.S. (nodes sized by "out-degree" or the number of other programs in which faculty are placed in the network; placements by non-anthropology programs and those outside the U.S. were excluded).

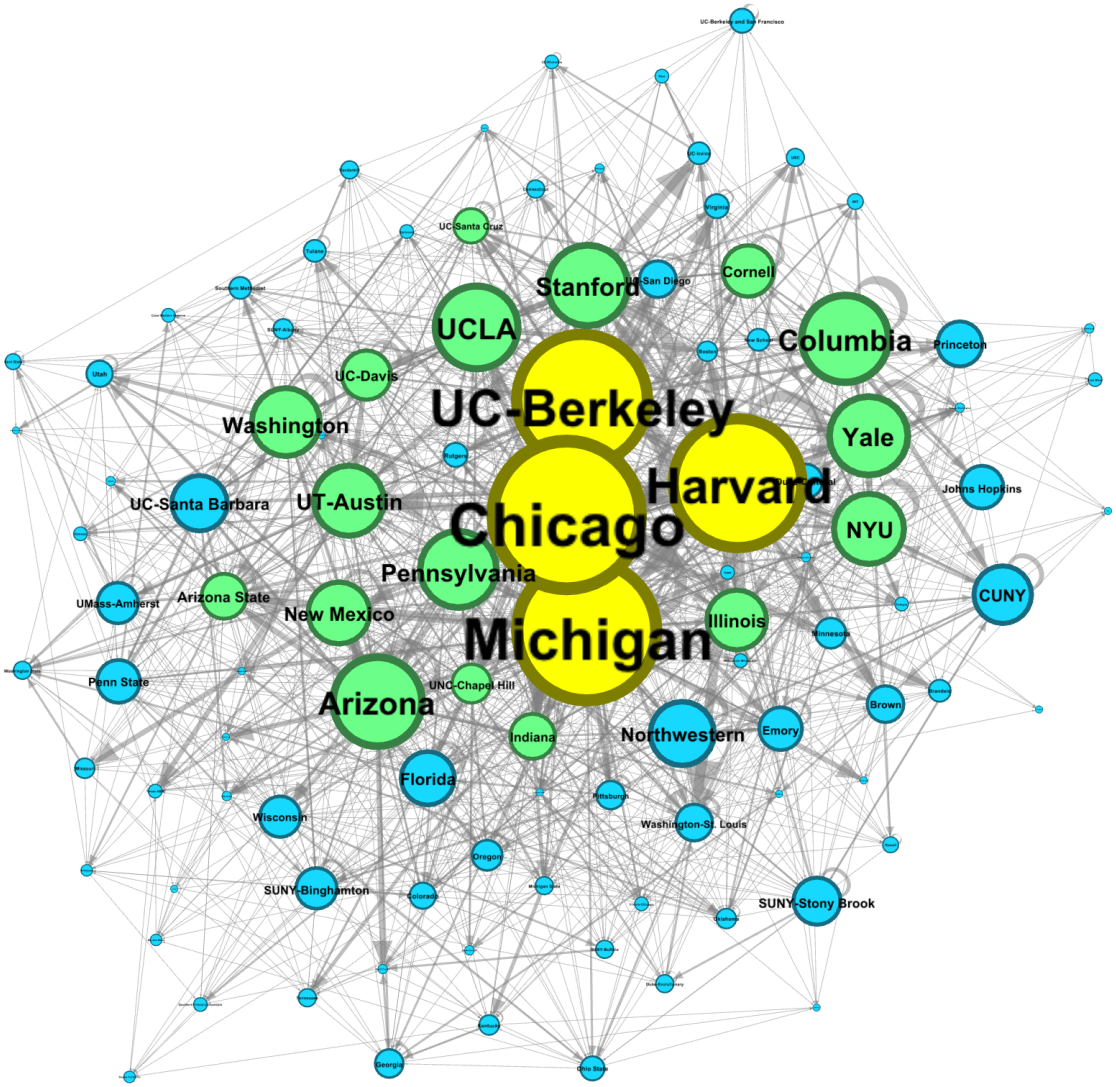

Figure 3. The hiring network of PhD-granting anthropology programs in the U.S. with nodes colored based on results from the continuous core model (yellow) and categorical core model (yellow and green nodes). Nodes and labels are sized by "out-degree."

Table 1. Attributes of the top 15 PhD-granting anthropology programs in the U.S. ranked by tenured and tenure-track faculty placements in other PhD-granting anthropology programs.

Anthropology PhD-Granting Program	**Faculty Placements**	**Current Faculty**	**Current Grads**	**Avg. # PhDs graduated* (2002-2006)**	**Avg. GRE scores of grads***	**University Endowment (in billions USD)**
Chicago	154	21	173	16.20	655	6.539
Harvard	126	26	86	13.00	693	36.429
Michigan	122	46	112	14.60	682	9.604
UC-Berkeley	104	27	110	13.60	676	3.731
Arizona	70	45	165	13.20	649	0.761
Stanford**	61	24	85	5.40	670	21.466
Columbia	51	24	137	8.20	645	9.223
UCLA	48	37	70	12.20	704	3.002
Pennsylvania	46	17	78	8.80	711	9.582
Yale	45	28	92	7.20	663	23.859
UT-Austin	43	32	85	16.60	579	3.377
New Mexico	39	30	158	12.40	603	0.429
NYU	36	31	96	9.40	677	3.435
Washington	35	27	92	9.20	659	2.915
UCSB	32	17	46	6.00	635	0.333

*See Ostriker et al. 2010 for the methodology used to gather these data.

**At the time of the NRC study, Stanford had two distinct anthropology programs: one that was focused on "cultural and social anthropology" and another that centered on "anthropological sciences." In our analysis, we used the data from the cultural program, which was the larger of the two.

Table 2. Network measures for top 15 PhD-granting anthropology programs in the U.S. ranked by tenured and tenure-track faculty placements in other PhD-granting anthropology programs.

Anthropology PhD-granting Program	**Faculty Placements**	**OutDegree Non-Symmetric**	**InDegree Non-Symmetric**	**Degree Centrality**	**Betweenness Centrality (normalized)**	**Eigenvector Centrality**	**Coreness Score**
Chicago	154	0.985	0.152	67	2.841	0.375	0.559
Harvard	126	0.982	0.145	58	2.574	0.324	0.396
Michigan	123	0.894	0.227	69	4.644	0.349	0.309
UC-Berkeley	104	0.982	0.179	59	2.577	0.245	0.331
Arizona	70	0.778	0.378	48	5.485	0.188	0.126
Stanford	61	0.875	0.225	40	1.383	0.185	0.161
Columbia	51	0.854	0.293	43	1.611	0.133	0.158
UCLA	48	0.744	0.359	19	3.99	0.161	0.16
Pennsylvania	46	0.853	0.235	38	0.959	0.122	0.152
Yale	45	0.795	0.256	41	1.61	0.148	0.125
UT-Austin	43	0.737	0.342	17	1.21	0.162	0.118
New Mexico	39	0.632	0.395	39	3.598	0.144	0.092
NYU	36	0.828	0.345	34	2.322	0.116	0.148
Washington	35	0.694	0.417	39	2.289	0.11	0.08
UCSB	32	0.731	0.346	20	1.054	0.068	0.026

Table 3. Components of final model of total PhD graduate placements

Parameter	**Estimate**	**SE**	**Pr(>|z|)**	**Variable Importance**	**mean***	**sd***
(Intercept)	7.207	0.005	<0.001	---	---	---
PhDGrad	0.549	0.007	<0.001	100	5.84	3.63
AwaFac	0.139	0.011	<0.001	36.23	1.04	1.15
Endowment	0.089	0.008	<0.001	33.75	3.8	63.5
AvCit	0.052	0.007	<0.001	25.12	1.12	0.58
GRE	0.024	0.006	0.052	16.76	634	47
AvPubs	0.002	0.008	0.588	0	0.21	0.15

*Mean and standard deviation of variables were used in the final model across programs.

Table 4. Primary appointment of faculty with anthropology PhDs (Source: American Anthropological Association, 2016 Membership Survey).

Department	N	%
Social Science	**565**	**79.8**
Anthropology	410	57.9
Anthropology / Sociology	131	18.5
Other social science	24	3.4
Humanities	**74**	**10.5**
Area studies	29	4.1
History	9	1.3
Women's & gender studies	8	1.1
Religious studies	7	1.0
Other humanities	21	2.9
Professional	**36**	**5.1**
Medicine / Public Health	16	2.3
Education	10	1.4
Other professional	10	1.4
Other	**33**	**4.7**
STS and natural sciences	7	1.0
Other	26	3.7
Total	**708**	

Table 5. Detailed employment sector of employed anthropology and archaeology PhDs (Source: NSF, 2013 Survey of Doctorate Recipients).

Employment sector	N	%
Academic	**7,400**	**66.7**
Four-year or university	7,100	64.0
Two-year or pre-college	300	2.7
Private	**1,600**	**14.4**
For-profit company	1,000	9.0
Self-employed, non-incorporated	600	5.4
Government	**1,300**	**11.7**
Federal	800	7.2
State / Local	500	4.5
Nonprofit	**800**	**7.2**
Total	**11,100**	