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Peer Identification as Social Stratification: Comparing Media and Network Measures of Status in US Universities

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This research investigates the extent to which peer group identification serves as a measure of university status. Examining Association of American Universities (AAU) member institutions reveals that university peer groups exhibit many of the same stratification qualities as social networks. Specifically, higher-status universities tend to have more reciprocal ties with one another while lower-status universities, in addition to having more reciprocal ties with institutions of similar status, have more one-way ties with higher-status institutions. These findings are then used as a basis to illustrate how peer group networks can be used as an alternative measure of university status. Network-based measures are then compared with media rankings to illustrate a surprising disconnect between network-based status and media status.

Keywords: social networks; peer identification; organizational status

Introduction

External media reports of university prestige have been increasingly important to university programs. In management, business program rankings such as those developed by U.S. News, Business Week, and the Princeton Review have increased in their prominence. Such media rankings have become increasingly controversial as such measures are more widely used by the university administration. Empirical analysis of Business Week rankings, for instance, has found that such rankings are stable over time (Morgeson & Nahrgang, 2008). This is a particularly troubling trend since, as Morgeson and Nahrgang (2008) point out; it is highly unlikely that, given the over 500 business programs, a program can be ranked in the top 30. Moreover, despite the slim chances of being highly ranked, most business schools participate in the ranking process (Corley & Gioia, 2000).

Such participation is particularly the case for highly ranked programs that want to maintain their rankings for fear of losing status and/or identity (Elsbach & Kramer, 1996). For lower-ranked programs, moving up in the rankings poses the possibility of increased visibility, higher quality applicants, improved recruiting (Gioia & Corley, 2002), and higher prestige job placement for graduates (Bedian et al., 2010).

Some scholars have been critical of ranking systems. Tayar (2017), for instance, argues that national rankings evaluating LGBT equity and inclusion programs are largely based on superficial changes, not substantive efforts toward increasing LGBT inclusion in organizations. These types of ranking systems legitimize only one version of acceptable practices that can be difficult for small organizations to implement and can encourage symbolic conformity to ranking principles rather than a true commitment to the practices espoused by the ranking organization. Gioia and Corley (2002) argue that media rankings, because of their superficiality, drive universities to pursue image management rather than more substantive endeavors. Zemsky (2008) finds that such rankings do not place the development of true indicators of university quality as a priority, despite what readers of such rankings are led to believe. Glick (2008) argues that such measures, particularly those of business schools, increase focus on measures of GPA, GMAT scores, and student/faculty rations without understanding their inherent dynamics. Moreover, some of the characteristics of these rankings, such as reputation and length of existence, are factors that are sticky at best and incapable of change at worst. As a result, university rankings remain mostly stable over time. Indeed, Morgeson & Nahrgang (2008) found that very few institutions drop out of the rankings.

Because of such criticisms; calls have been made for improvements in media rankings. Glick (2008), for instance, has called for the improved validity of the data used to develop media rankings. In this paper, we propose that an additional measure of status can be developed by examining university peer groups. Such an approach is rooted in empirical research in institutional theory and social networks that examines the stratification effect of social exchange. Such an approach to assessing status, we argue, can address some of the identified shortcomings of media-based measures, as well as those that draw on limited network measures (Sauder et al., 2012).

Peer groups can be used as a measure of organizational status because of the stratifying quality of social exchange. Building on the premise that economic activity is embedded in social relations (Granovetter, 1985), scholars have shown that network ties among organizations serve as transmitters of information, standing, and legitimacy (Owen-Smith & Powell, 2008). Network relations can also serve as status signals by serving as sources of distinction among categories of organizations (Davis & Greve, 1997; Benjamin & Podolny, 1999). Such status signals serve to create various positions of standing within the institutional context in which homogeneous organizations interact, also known as *organizational fields*. Regarding the importance of organizational fields, Sharkey and Bromley (2015) have shown how the number of firms in an industry that have a third-party rating increases the competitive and isomorphic pressures for unrated firms in the industry to conform to the guidelines reflected in those rankings. This is further supported by Tayar's work (2017) which supports the idea that institutional isomorphism acts as a powerful impetus for firms to conform to a ranking system that is adopted by multiple peer organizations.

Organizational fields are shaped by rules and conventions and are composed of various positions of standing. Such positions are created and reinforced by cognitive and social processes (Anand & Watson, 2004) that occur between organizations. Some positions within organizational fields are perceived as more attractive than others (Owen-Smith & Powell, 2008). Variation in position attractiveness is due to perceptions of legitimacy as well as status that stem from, among other things, organizational ties and affiliations (Podolny, 2001). Organizational ties between organizations can be based on reputation as well as status (Podolny, 2001). Such ties can reinforce or enhance organizational standing among other organizations (Owen-Smith & Powell, 2008). Accordingly, network ties among

organizations may stem from similar status positions. As a result of the interplay between status processes and ties, organizational networks can shape possibilities of interaction as they pull organizations into positions within an organizational field (Owen-Smith & Powell, 2008). Such positions are defined by conceptions of legitimate action and social standing. As a result of the stratifying quality of networks, the basic composition of organization field structure may be determined by examining social ties among organizations within a particular field. To the degree that they are embedded in university peer groups, such ties can be used to examine groups of organizations (e.g., universities) to reveal status orderings.

This study has two primary purposes. Firstly, it aims to illustrate how university peer group identification can be used to examine organizational field stratification. Secondly, this research aims to develop a measure of university status based on peer group identification by applying network analysis methodology. We begin by developing hypotheses that aim to explain how network ties can serve as status signals. A review of data and methods follows. We explain our methodology which aims to examine how peer networks are based on conceptions of media ranking of universities. We then build on our data analysis by considering peer identification as an independent measure of university status.

Theoretical Background and Hypotheses

The conception of peer identification as a source of university status is rooted in social network theory as well as institutional theory. Such work has used an organizational field level of analysis to examine the nature of interactions among organizations. Organizational fields consist of organizations that engage in common activities and are subject to similar social and political pressures. For example, the realm of higher education, and organizational fields may consist of business schools that are AACSB accredited, whereby the Deans of these organizations routinely interact at various accreditation events and share information related to the operational best practices.

Organizational fields have various positions of standing with some being perceived as more attractive than others (Owen-Smith & Powell, 2008). Such perceptions are forged by various social processes such as certification contests and tournament rituals. Examples of certification contests include tests of organizational performance such as automobile speed tests (Rao, 1994); while examples of tournament rituals include award ceremonies such as the Oscars or Grammy Awards Ceremonies (Anand & Watson, 2004). These processes reinforce field positions by defining legitimate action and organizational standing with those organizations earning the most "victories" being considered examples of legitimate behavior. Organizational networks within fields shape possibilities of interaction as they pull organizations into positions with the field. These positions will vary in terms of legitimacy and status depending on the ties that characterize such positions (Podolny, 2001). Status is generally regarded as shared social perceptions that people who belong to one social group are more esteemed and competent than those who belong to another social group (Webster & Foschi, 1988). Status is a relational component of social structure that is based on perceptions of various organizational outcomes applied to an organization by other organizations (Washington & Zajac, 2005). An organization's status may be conceptualized as an intangible resource, in that it contributes to performance differences, and it is rare, complex, and difficult to trade or imitate (Barney, 1991; Peteraf, 1993). Scholars have primarily relied on media measures and rankings of status (Bedian et al., 2010; Wade et al., 2006; Washington & Zajac, 2005). Such external measures of status are indeed conferred upon organizations by external actors such as other organizations and media organizations. We argue that in addition to such measures, status is composed of behavioral factors such as peer identification.

Podolny and Phillips (1996) extended the notion of status as an indicator of quality to include organizational affiliation. They found support for the hypothesis that being affiliated with other high-

status organizations improves organizational status. This finding leads to the conclusion that status is, in fact, partially related to the networks of a target firm. Moreover, in illustrating how ties with high-status organizations can improve a focal organization's status, Podolny and Philips (1996) allude to the "leakiness" of status in which a high-status organization cannot engage in exchange relations with a low-status actor without possibly diluting status. Because of the leakiness of status, we hypothesize that reciprocal ties among high-status and low-status universities will be unlikely. For example, organizations of high status will not routinely reference low-status organizations. Instead, such ties will be one way stemming from lower status to higher status universities as lower status universities attempt to enhance their status by identifying higher status universities as peers.

H1. One-way peer identification will more likely stem from lower status to higher status Universities

The conception of status has been synthesized with research in organizational fields and social networks to explain how status contributes to field structure (Owen-Smith & Powell, 2008). Networks involve interconnected social relations that offer opportunities in terms of information sharing as well as setting standards of practice (Cattani et al., 2008; Brass et al., 2004). Such association is more likely among organizations of similar status (Podolny, 2001; Ring & Van de Ven, 1992). Moreover, network centrality, the possession of numerous reciprocal ties (i.e., mutual ties between low-status and high-status organizations), has been conceptualized as a measure of organizational status whereby organizations with such ties are viewed within the organizational field as having higher status (Wasserman & Faust, 1994, Contractor et al., 2006). As a result of such association, distinct network clusters of organizations can form among organizations of similar status. Status variation in networks shapes stratification processes by creating distinct processes of association among actors of similar status (Owen-Smith & Powell, 2008). These network associations can become rule-like structures as practices by organizations can be driven by the actions of their peers (Galaskiewicz & Burt, 1991). Conceptions of legitimacy as well as the logic of practice can be transmitted within these networks to form distinct patterns of behavior among peer organizations (Davis & Greve, 1997). Accordingly, we hypothesize that universities of similar status and category will likely be characterized by reciprocal ties.

H2. Reciprocal peer identification will occur among Universities of similar status.

H3. Reciprocal peer identification will occur among Universities of similar categorical dimensions.

AAU University Peer Identification

AAU was founded in 1900 by fourteen of the United States' leading Ph.D. granting institutions at a conference held at the University of Chicago. The organization was created as a forum for discussion on matters relating to graduate study and with the ultimate goal of improving the reputation that the then-young American research universities. A lack of standards on what constituted the requirements for Ph.D. studies and degrees was weakening the international opinion of the American educational system. An additional concern was that the American system was unregulated and more decentralized than its European counterparts. The AAU is a merit-based invitation-only organization that initially consisted of eleven private and three public universities (Speicher, 1990).

Through the years, the AAU has expanded to sixty U.S. and two Canadian institutions. This total number is composed of thirty-six public and twenty-six private institutions. Of the fourteen original institutions, twelve are still members. The current sixty-two universities represent the nodes in the network created for this study. The list of university nodes in this network, their date of joining the AAU, and their public or private status are listed in Appendix A.

Peer identification among universities is said to be driven, in part, by the need for developing organizational performance criteria. Accordingly, peer selection is based on university conceptions of resource needs, financial needs, and performance measurement (Hurley, 2002). Selection is, thus, shaped by determining both conceptions of one's institution as well as where the institution wants to be in terms of financial resources and performance. Research examining the nature of peer groups has developed four types of peer group types based on the above needs: competitor, peer, aspiration, and jurisdictional (Brinkman & Teeter, 1987). All, but jurisdictional, which is based on location, relies on the university conception of identification (who is like us?) and aspiration (who do we want to be?).

Method

Social Network Analysis

We apply social network analysis to illustrate how social ties among institutions in the form of peer identification can serve as a measure of status. Social network analysis has been used to study multiple relationships between multiple actors in many situations. At the heart of this analysis is the representation of data in a network form that can be illustrated by using network graphs (Wasserman & Faust, 1994). In network graphs, the actors in a network (e.g., people, places, or organizations) are considered nodes in the representation; most often as a circle with a title. The relationships between these nodes (e.g., friendship, or identified peers) are drawn as lines between the nodes, which are called links or edges. When appropriate, these lines will have arrowheads on one or both ends that represent the relationship link as either a one-way link or a reciprocal link.

Many statistical measures can be made on a social network graph. There are individual node measures, such as the number of links at that node (called degree for the total number of links, indegree for links into the node; or outdegree for links out of the node), the betweenness of a node (connecting people as in a broker arrangement), and closeness of a node to another node (via the shortest path of links). Additional measures exist when considering a dyadic pair of nodes or a triadic triple of nodes. The network as a whole can have measures of network density (the ratio of the actual number of links to the theoretical maximum number of links), network centralization (the extent to which some actors have higher betweenness than the other actors in the network, e.g., organizations with tall hierocracies are more central), network components (a maximal subset of mutually reachable actors), and network cliques (a subset of actors that are completely connected, there is a link between every pair of nodes in the subset).

Network representation is also shared with other physical networks such as roads connecting cities or the URL links connecting websites. Using the metrics above, it is possible to create a ranking system for the nodes that can indicate the prestige of each node as determined by the linkages between all the nodes in the system. A premier example of this ranking is the page rank algorithm used by Google to rank an individual web page's value for information of a given search term. This page rank algorithm is based upon eigenvector centrality, which uses an adjacent matrix of the network to determine the centrality value that corresponds to the prestige of the node. In this way, the prestige of each of the nodes is conserved in an iterative way to weigh the values of the incoming links to determine the final node prestige value.

Sample and Data Collection

The sample used for this study consisted of the 62-member universities in the Association of American Universities (AAU). This sample of organizations was considered ideal for this study for many reasons. First, AAU organizations have been present in the marketplace for many years and have a relatively high level of resilience to external pressures, such as economic fluctuations, that might confound the study of organizational status. Second, these institutions had readily available data

related to the nature of the relationships between member organizations in the AAU. Third, these organizations are similar to other organizations in the marketplace in that they have an established culture, a diverse network of stakeholders, an international customer base (i.e., students), and unique mission statements.

A network of universities was created by identifying those institutions which the universities in the sample considered as peers. These data were collected by doing an internet search using keywords that would deliver electronically available documents that give a listing of peer institutes as determined by the node of interest (i.e., the ego node). For example, the search term "peer institutes University of Illinois" produced a link to the University of Illinois Office for Planning and Budgeting's "Data and Research: Links of Interest" page. This webpage contains a list of peer institutions for the University of Illinois, Chicago, Urbana-Champaign, and Springfield. This list of institutions was then used to create links between the ego node and other nodes included in the dataset. Links to peer institutes that were not current members of the AAU were not used in this network.

Finding a formal listing of peer institutions compiled on one webpage was rare and thus other university documents were used to obtain a list of peer institutions for the ego node. Many times these documents were found using the same search as described above, but the list of peers was listed in a written document available on the university's websites or implied from web pages. An example of the former is the use of minutes from meetings for various concerns (e.g., committee reports on diversity or educational issues) and the latter is a webpage of links to peer institution web-accessible databases. In many of these cases where there was not a formal online peer listing, there were several documents that listed a consistent set of peers; we were able to triangulate our data. Finally, in a few cases, one of the authors e-mailed or called the office of institutional studies, explained the study being conducted, and requested a list of institutional peers. This listing of peer institutions for all of the AAU universities was compiled over three months from July to September 2008.

In all cases, peer institutions that were identified that were not a member of the AAU were not used in creating the network for this study. For example, Rice University identifies James Madison University (JMU) as a peer, but since JMU is not a member of the AAU, a node for JMU was not included and the link from Rice University was dropped. In this way, the resulting network was a completely self-contained set of nodes and links.

Measures

Status

The concept of status was measured using the US News and World Reports rankings of best colleges (www.colleges.usnews.rankingsandreviews.com/best-colleges). The media status of each AAU school was determined by assigning their US News ranking (e.g., Harvard is ranked number 1, and the University of California, Berkeley is ranked number 21). In the case of ties for our resulting ordinal list, the school with the highest network eigenvector centrality value was ranked higher (e.g., Princeton was tied for number 1 with Harvard, but was assigned a ranking value of 1.1 due to a lower centrality score). Eigenvector centrality gives a measure of the importance of a node in a network and is the basis of the page rank measure used by Google. In two cases (the University of Toronto and McGill University) AAU schools were not listed in the US News ranking. In these cases, the two schools were placed at the bottom of the media status list following the same ordering rules using network centrality. While using this popular press ranking is not our preferred measure of status (our recommendations will come later), this is a generally accepted university ranking and one that is available to universities, which may influence their choice of peer schools.

Using this resulting ordered status ranking, three levels of status were created: high, medium, and low. The top 16 schools were assigned a high status, the next 22 schools were assigned a medium status, and the final 24 were assigned low status. The cut points that determined the split of the 62

universities into groupings of 16, 22, and 24 versus a more even number of schools in each status category were done with the distribution of the ranking among these schools. The eigenvector centrality measures the mean plus or minus one-half standard deviation to determine the number in the middle-status category (22 schools). These cutoff values were chosen to represent the schools that represent the middle of the status category and were chosen over a simple middle one-third count methodology, which would be appropriate for a uniform distribution. By using the distance from the mean of the distribution of eigenvector centrality measures, the resulting middle-status category has been adjusted for the actual distribution of values.

School Type

The type of school – public or private – was used to assign a categorical dimension to the universities.This classification was obtained from the AAU listing of member universities and is shown in Appendix A. The two Canadian universities were assigned to the public category (AAU places them in the Canadian category).

One-way and Reciprocal Peer Links

To determine the one-way and reciprocal links for each university, a 62 by 62 matrix was created with a value of 1 placed in a cell when the university on the row indicated that that university in that column was a peer; all other cells received a value of 0. This created an asymmetric matrix representing all of the university-reported peer schools **P**. Transposing this matrix and doing an entry-by-entry multiplication of the two matrices resulted in a new matrix that had a value of 1 for reciprocal ties and 0 in all other cells ($R_{i,j} = P_{i,j} \times P_{j,I}$). This resulting matrix could then be subtracted from the original matrix to obtain a matrix of only one-way links (**O** = **P** – **R**). To obtain counts of within-status links, the sum of links in the appropriate square partition of the reciprocal tie matrix divided by two was used. For the links across status groups, off-diagonal rectangular partitions were used (partitions containing the high-to-medium, high-to-low, and medium-to-low links); the cell values were summed only in the upper diagonal of the reciprocal matrix **R** (since only half the matrix was used, no division by two was needed to obtain this count; the lower diagonal has symmetric and redundant entries). The resulting counts are shown in Table 1. A similar procedure was done after ordering the reciprocal link matrix by the public and private categories, which resulted in 63 reciprocal links between public universities, 32 reciprocal links between private universities, and 8 reciprocal links between public and private universities.

Table 1 – Reciprocal Link Count using US News Ranking

Status		High	Medium	Low
	High	26	13	1
Status	Medium		19	22
	Low			22

To determine the one-way links from lower to higher status schools, the one-way link matrix **O** was sorted by the US News modified ranking. Next, the one-way links in each column below the ego

school were summed to create the count of one-way links from lower-status schools ($\sum_{i=E+1}^{62} O_{i,E}$, where E is the row of the ego school). This value was subtracted from the total number of one-way links to a school (the sum of the entire column), thus obtaining the one-way links from higher schools. Using this procedure, there were a total of 91 one-way links from higher-status schools to lower-status schools and 422 one-way links from lower-status schools to higher-status schools.

Sub-networks

The complete AAU network was parsed into two networks based on membership in the private and public university categories. This was done by deleting all of the public university nodes and their corresponding links into and out of these nodes to produce the AAU private university network. This resulted in a network with an edge density of 0.2754, with 26 nodes and 179 total links. Of these links, 32 were reciprocal links. A similar procedure was used to create the AAU public university network resulting in a network density of 0.3349 with 422 links of which 63 were reciprocal. The original AAU network had a density of 0.1901 with 719 total links with 206 being reciprocal.

Results

A Chi-squared test of independence was performed on the resulting link counts. This test assumed that in a random matrix of links that there should be an equal probability of forming a link or not forming a link. The resulting matrix has expected values of reciprocal links between one status class and another or within a status class that is proportional to the total possible reciprocal links. For the three levels of the status model with 16 nodes in high, 22 nodes in medium, and 24 nodes in low status, there are 596 possible within status reciprocal ties and 1264 possible between status reciprocal ties. For the one-way links from higher to lower status or from lower to higher status, the expected value for the entire sample would be 1891 from low to high and 1891 from high to low. This follows since the determination is relative to the ego node; for the entire network, there is an equal chance from high to low as from low to high. The expected values of links within and between the categories of public and private were also determined by the total possible links: there are 924 links within the category and 936 ties between categories.

Hypothesis H1 proposes that one-way peer identification will more likely stem from lower-status Universities to higher-status Universities. To verify hypothesis H1 we found that there were 91 one-way links from a higher to lower status and 422 one-way links from a lower to a higher status. The test resulted in Chi-Squared = 213.569, $p< 0.001$, and thus supported hypothesis H1.

Hypothesis H2 proposes that Reciprocal peer identification will occur among Universities of similar status. To verify hypothesis H2 we found that there were 67 within status reciprocal links and 36 across status reciprocal links. The expected number of ties was 34.4 within status reciprocal links and 68.8 across status links. This test resulted in Chi-Squared = 47.267, $p< 0.001$, and this supported hypothesis H2. Hypothesis H3 proposes that Reciprocal peer identification will occur among Universities of similar categorical dimensions. To verify hypothesis H3 we found there were 95 within classification reciprocal links and 8 across classification reciprocal links. The expected number of ties was 52 within classification reciprocal links and 51 across classification reciprocal links. The test resulted in Chi-Squared = 71.755, $p <0.001$, and thus supported hypothesis H3. Comparison of the sub-network densities was done using an expected equal value and the observed value using a Chi-Squared test of independence and the results were not significant (Chi-Squared = 0.410, $p = 0.522$). Additionally, a categorical variable was created that was equal to 1 when there was a greater than 1.0 graduate-to-undergraduate student ratio and zero when the ratio was equal to or below 1.0. This resulted in within category reciprocal link count of 84 and a between-category count of 19. The expected values based on possible reciprocal links for the 15 schools above one and the 47 schools

below or equal to one are 64.6 between and 38.4 across. The test resulted in Chi-Squared = 15.628, $p < 0.001$, and thus supported hypothesis H3.

A Network-based Measure of Status

This research has examined how affiliation through peer groups can form a basis for field-level stratification. An important extension of this research involves developing the notion of network affiliation into a behavioral measure of status. Status is generally seen as something that does not belong to organizations; rather it is determined by external audiences. Washington and Zajac (2005), for instance, describe status as something that is "conferred" upon an organization. The social processes by which status can be earned by organizations is certainly an area for future research. For instance, status is not necessarily earned when organizations take actions that meet legitimacy criteria. At the same time, particular organizations that meet legitimacy criteria can be considered high status (Anand & Watson, 2004).

The measurement of status is an additional area that merits further consideration. Scholars have relied on various external rankings to measure both individual status (Bedeian et al., 2010) as well as organizational status (Washington & Zajac, 2005). While such methods have their merits, a behavioral approach may be a more dynamic, complementary measure of status (Sauder et al., 2012). We refer to a behavioral approach as one which relies on examining the behavior of the actors whose status is being assessed as opposed to applying external reports of actor status. This also allows for the assessment of power dynamics among and between peer groups, and groups with differing status structures. Hence, examining the institutions which a given set of universities identify as peers is a behavioral approach since it involves examining the behavior of university peer identification. Indeed, it is not what you look like on paper that matters, it is how your peers see you. To illustrate this point, this research has used a peer set of research Ph.D. universities as determined by membership in the AAU, and measured and supported the idea that the behavior of creating organizational peer groups can be consistent with other, external, measures of university status. We propose to take this to the next step and use measures indicating links of who each university considers their peers as the basis for creating a new and different status ranking.

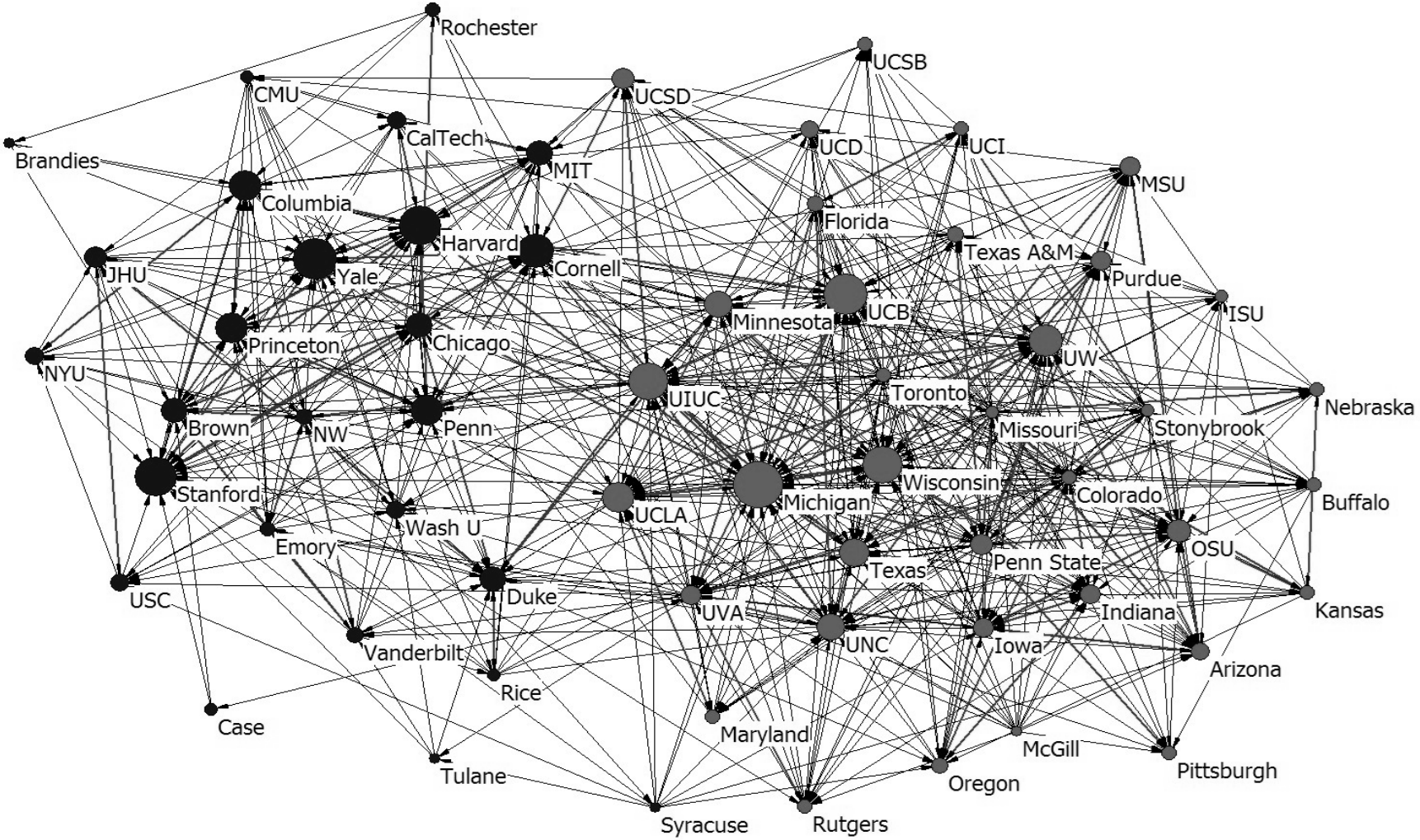
The process of conferring status upon organizations is illustrated by media rankings of universities. The Business Week rankings of business schools, for instance, rely on an assessment of institutions from corporations and recruiters. Such measures, however, are problematic because of their extreme stability (Morgeson & Nahrgang, 2008). Given the stratification quality of networks; as well as the network-like qualities found among university peer groups, we make the case that university peer group identification can serve as an alternative measure of university status. University peer groups are based on internal university identification as well as aspiration. Thus, rather than an external measure of perceptions of quality, peer group identification is based on internal assessments of who (what) a university is and where it wants to be. Using the same original network of the 62 by 62 matrix, we calculated the eigenvector centrality measure for the directed link network using NETDRAW (Borgatti, 2002). This resulted in the ranking of status that is shown in Table 2 in which the University of Michigan displaces Harvard University as the highest-status school. Using this measure of status, unlike the US News ranking that places private universities at the top of the list (the highest-ranked public university was the University of California, Berkeley at number 21), this new ranking has more balance between public and private schools. The resulting network diagram with the eigenvector centrality represented as size is shown in Figure 1. The resulting network-based rankings illustrate a surprising disconnect between network-based status and media status.

Table 2 – Status and Eigenvector Network Centrality

University Short Name	Eigenvector Centrality	US NewsRank
Michigan	3.74	27
UCB	3.152	21
Yale	3.147	3
Harvard	2.955	1
Stanford	2.944	4
UIUC	2.762	35
Wisconsin	2.747	39
Cornell	2.447	15
UW	2.325	42
Princeton	2.111	1
Penn	2.053	4
UCLA	2.009	24
Columbia	2.004	8
Texas	1.953	47
UNC	1.753	28
Minnesota	1.727	61
Chicago	1.433	8
Brown	1.429	16
MIT	1.429	4
Duke	1.408	8
OSU	1.263	53
Penn State	1.058	47
UCSD	1.052	35
JHU	1.045	14
UVA	1.004	24
Purdue	0.976	61
Indiana	0.935	71
MSU	0.923	71
Iowa	0.898	71
Wash U	0.768	12
USC	0.749	26
CalTech	0.708	4
Arizona	0.698	102
NYU	0.668	32
UCD	0.668	42
Vanderbilt	0.639	17

Oregon	0.627	115
Texas A&M	0.587	61
NW	0.582	12
Florida	0.572	47
Maryland	0.462	53
Buffalo	0.458	121
Rutgers	0.44	66
Colorado	0.437	77
UCSB	0.392	42
Emory	0.381	17
Rochester	0.37	35
UCI	0.347	46
Toronto	0.33	NR
Pittsburgh	0.326	56
Nebraska	0.299	41
Kansas	0.294	96
Missouri	0.275	102
Rice	0.194	17
Case	0.172	41
CMU	0.152	22
Iowa SU	0.144	88
Stonybrook	0.134	96
Tulane	0.093	50
Syracuse	0.051	58
Brandeis	0.033	31
McGill	0	NR

Figure 1 – Network of Peer AAU Universities



Color represents Public (Gray) or Private (Black). Thicker links indicate reciprocal ties. Node size indicates status as determined by directional eigenvector centrality.University names are abbreviated, but full names are listed in Appendix A

Two pairs of counts for testing hypothesis H1 and hypothesis H2 (retesting hypothesis H3 was not needed since the status was not used, rather public or private classification, which did not change) were recalculated. This yielded 119 higher-to-lower one-way ties and 394 lower-to-higher one-way ties (Chi-Squared = 147.417, $p< 0.001$). This also yielded 64 within status and 39 across status reciprocal links (Chi-Squared = 39.027, $p< 0.001$). These results are consistent with hypotheses H1 and H2 above. Additionally, the results, while illustrating some consistency with the results obtained with US News ranking, show several differences in ranking. This determination of status using the behaviorally created links does not completely contradict the determination of status by measures collected by a third party. At the same time, the resulting ranking is distinct enough to merit further consideration of both media measures of status as well as network-derived approaches. For instance, scholars have devised specific measures of media reputation (Deephouse, 2000). The disparity between media measures and network measures illustrated in this research merit further exploration regarding possible differences between media measures of status and behavioral measures such as organizational affiliation.

Discussion

This paper's purpose was to examine how closely university actions of deciding on who and who not to call their peers fit within one highly-visible ranking of status (US News College Ranking) and one categorical classification (public and private). After determining the validity of the links within these two systems, we extend suggestions that a more direct way of determining status can be by social network analysis (Sauder et al., 2012) using the universities' behaviors as the raw source of linkage between these universities. In doing so we have further research in a potentially rich area of exploration regarding how organizational status can be assessed.

One of the primary conclusions of this project is the finding that network affiliations can serve as viable measures of organizational status. Findings support this assertion by illustrating how within-field network affiliations result in similar orderings as those developed by external actors. University status is a valuable measure that can help determine future student enrollment, research funding, and charitable donations. However, much of the determination of this status has been transferred to the third-party popular press, instead of by the members of the network themselves. The proposed measure, a score based on network centrality, assigns each organization a relative position of status. The proposed measure additionally allows one to assess the relative distance among ranked organizations. This has been actualized by Jacquelyn Elias with an online display tool on the chronicle.com website (Elias, 2022). It must be noted at the time of this writing that this online tool is not complete, some universities have not submitted a peer list. Methods using network analysis can be used to augment the current commercial rankings.

This study is not without limitations. The set of 62 AAU schools, for instance, can be extended to include a larger sample of universities. Moreover, the results of this project, while illustrating significant variability in centrality scores among the field of AAU universities, does so for a sample of organizations that, by their membership in AAU, may be considered a higher status group of universities than non-AAU institutions. The nature of peer identification, while many times indicating aspiration, may additionally reflect other factors such as benchmarking. Hence, additional measures of affiliation can be considered in future work. In addition, multiple years, and possible sources, of university rankings may be applied and compared with corresponding peer identification to give provide a more temporal-oriented study. Finally, additional network methodologies can be applied to gain further insights. Future research can explore the temporal qualities of network measures of status. Media rankings, such as those devised by Business Week, are stable over time. While we suspect that our measure is likely to exhibit variation over time, future research can explore the extent of such variation. Additional research can apply this conception of status to either a broader sample of

institutions such as all accredited universities, or specific kinds of schools, such as AACSB-accredited business schools. Future research can additionally apply the network-based measures of status to other organizational fields such as investment banks and/or government agencies. Research has investigated affiliation among firms in terms of social identity (Rao et al., 2000) as well as the degree to which affiliation facilitates joint ventures (Lu, Ma; 2009). Future research can, thus, examine how firm affiliation in conjunction with behavior serves as a measure of status. Other factors that can be examined can include the role of university leadership turnover in peer identification as well as the role that proximity/geography play in peer identification.

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Appendix A

List of Current Institution Members of the American Association of Universities

Brandeis University (1985, Private)
Brown University (1933, Private)
California Institute of Technology (1934, Private)
Carnegie Mellon University (1982, Private)
Case Western Reserve University (1969, Private)
Columbia University (1900, Private)
Cornell University (1900, Private)
Duke University (1938, Private)
Emory University (1995, Private)
Harvard University (1900, Private)
Indiana University (1909, Public)
Iowa State University (1958, Public)
The Johns Hopkins University (1900, Private)
Massachusetts Institute of Technology (1934, Private)
McGill University (1926, Canadian)
Michigan State University (1964, Public)
New York University (1950, Private)
Northwestern University (1917, Private)
The Ohio State University (1916, Public)
The Pennsylvania State University (1958, Public)
Princeton University (1900, Private)
Purdue University (1958, Public)
Rice University (1985, Private)
Rutgers, The State University of New Jersey (1989, Public)
Stanford University (1900, Private)
Stonybrook University-State University of New York (2001, Public)
Syracuse University (1966, Private)
Texas A&M University (2001, Public)
Tulane University (1958, Private)
The University of Arizona (1985, Public)
University at Buffalo, The State University of New York (1989, Public)
University of California, Berkeley (1900, Public)
University of California, Davis (1996, Public)
University of California, Irvine (1996, Public)
University of California, Los Angeles (1974, Public)
University of California, San Diego (1982, Public)
University of California, Santa Barbara (1995, Public)
The University of Chicago (1900, Private)
University of Colorado at Boulder (1966, Public)
University of Florida (1985, Public)
University of Illinois at Urbana-Champaign (1908, Public)
University of Iowa (1909, Public)
The University of Kansas (1909, Public)
University of Maryland at College Park (1969, Public)
University of Michigan (1900, Public)
University of Minnesota, Twin Cities (1908, Public)
University of Missouri-Columbia (1908, Public)
University of Nebraska-Lincoln (1909, Public)
The University of North Carolina at Chapel Hill (1922, Public)
University of Oregon (1969, Public)
University of Pennsylvania (1900, Private)
University of Pittsburgh (1974, Public)
University of Rochester (1941, Private)
University of Southern California (1969, Private)
The University of Texas at Austin (1929, Public)
University of Toronto (1926, Canadian)
University of Virginia (1904, Public)
University of Washington (1950, Public)
The University of Wisconsin-Madison (1900, Public)
Vanderbilt University (1950, Private)
Washington University in St. Louis (1923, Private)
Yale University (1900, Private)