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**GENDER COMPOSITION AND SALARY GAPS IN
ASSOCIATION OF RESEARCH LIBRARIES (ARL) INSTITUTIONS**

BY

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BA, Smith College, 1995

MS LIS, Syracuse University, 2005

THESIS

Submitted to the University of New Hampshire

In Partial Fulfillment of

The Requirements for the Degree of

Master of Arts

in

Sociology

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ABSTRACT

GENDER COMPOSITION AND SALARY GAPS IN ASSOCIATION OF RESEARCH LIBRARIES (ARL) INSTITUTIONS

by

Eleta Exline

University of New Hampshire, December 2014

While the presence of information technology (IT) work is ubiquitous in libraries, an increase in the number of male-dominated IT jobs has not increased the percentage of men (37%) working in female-dominated research libraries. Instead, the introduction of IT work may have resulted in a reorganization of librarians into gendered areas of specialization, changing the nature and degree of gender segregation within the occupation and potentially widening the overall pay gap between male and female librarians. Using data from the ARL Salary Survey, gender compositions and salary gaps of library positions between 1985 and 2010 were compared. Twelve of 17 library positions lost male workers, balancing the gain of men in library IT positions and contributing to a reordering of workers by gender into specializations. At the same time, gender segregation based on vertical hierarchy decreased, as did gender salary gaps. While library IT positions are disproportionately male, women are paid slightly more than men. When compared to similar occupations from the Current Population Survey, library IT positions have a higher percentages of female workers and smaller wage gaps.

CHAPTER I

INTRODUCTION

When the first graphical Internet browsers hit personal computer screens in the early 1990s, bringing together text, images, and hyperlinks for the first time, a world of information seemed suddenly at the fingertips of the computing public. Accustomed to the roles of information gatekeeper and guide, librarians were faced with the rapid disintermediation of information access, as information seeking became a self-service activity. Librarians, librarian educators, and professional organizations adapted to this change by attempting to redefine the profession for a new era, in part by emphasizing the role of information technology (IT) in librarian education and professional practice. By the 1990s librarian job ads routinely listed IT qualifications and several new technology-focused specializations emerged in the field (Lynch and Smith 2001). At the same time that library professional practice was becoming more technology focused, the traditional Master of Library Science (MLS) degree, a requirement for most librarian positions, underwent a semantic and programmatic makeover: many “library schools” changed their degree designations to technology-allied Master of Information Science, Master of Library and Information Science, and other variations on this theme (Tennant 2002). The emergence of new programs, such as technically focused digital libraries specializations and certificates at Syracuse

University, Kent University, Drexel University, University of Illinois, University of Wisconsin, and Indiana University, is evidence of this refocusing of librarian professional education on technology.

The underlying assumption of this rebranding strategy was that the addition of in-demand IT skills could improve the long-term prospects of librarianship; if librarians could carve out a legitimate role for themselves in IT development and instruction, they would prove to be of unique value in a growing information economy. Technology training for librarians also filled a very real, practical, and pressing need in libraries for in-house expertise, as library work became increasingly dependent on computer hardware, software, and networks to collect, manage, develop, and deliver library collections and services. A possible side effect of aligning library work and librarian training with technology is increased male participation in the profession. Since librarianship historically has been a female-dominated profession and IT work is male-dominated, the shift of libraries toward technology has the potential to also shift the gendering of library work.

Not all librarians were supportive of this increased emphasis on IT in library education and practice nor the potential for adding more men to the profession. Some warned that this new wave of technological innovation could result in the deskilling of the library profession or the absorption of library work into the IT field, where there would be few roles for women in an occupation so strongly identified with men (Nielsen 1980; Harris and Hannah 1992). The merging of library and information technology/computing divisions at several college and university

campuses did little to calm fears of an imminent IT takeover of librarianship (see Herro 1998 for a summary and analysis of this trend). At the very least, if high-tech librarianship attracted more men to the occupation, it would be at the expense of gender equity in prestige and pay if men disproportionately filled library IT positions (Hildenbrand 1999).

Although the presence of IT work is now ubiquitous in libraries, including ongoing development of library systems and software, a clear expansion of the field beyond traditional librarian roles, engagement with IT has *not* increased the number of men working in libraries overall. Librarianship has been close to 82% female since at least the early 1990s, with a similar composition of students enrolled in library schools. While men are not numerically overwhelming librarianship, there is some evidence of an internal redistribution of men and women within libraries related to the increased emphasis on IT. A limited number of studies suggest that men disproportionately fill relatively new technology positions even though the effect on occupation-level segregation is negligible (Maatta 2003; 2005; 2007; Ricigliano and Houston 2003). Using 1991 and 2001 Association of Research Libraries (ARL) *Salary Survey* data, Ricigliano and Houston found that while men held approximately 36% of librarian positions in ARL libraries overall, they held 53% of Systems Department Head positions. By 2001 the overall number of men had increased only marginally to 37%, but the number of male Systems Department Heads had increased to 66%. The authors also found that while in 2001 there was no gap in pay between female and male

Systems Department Heads, this position was the highest paid of eight department head positions tracked by the survey.

This thesis project investigates temporal trends in ARL library positions in an attempt to answer two important questions: (1) how has the gender composition of professional library specializations changed over time since the 1980s, when IT positions were introduced, and (2) how has the within-position wage gap changed over the same time period? The primary contention is that the introduction of IT work into libraries may have resulted in a reorganization of librarians into gendered areas of specialization, changing the nature and degree of gender segregation within the occupation and potentially widening the overall wage gap between male and female librarians. This paper begins with a summary of foundational sociological work on the nature of gender segregation and the mechanisms of male advantage in the workplace, followed by a review of recent literature discussing technology in libraries, women working in IT, male advantage in feminized professions, and the gender wage gap in libraries and other feminized professions. Data from the ARL *Salary Survey* from 1985 to 2010 will be used to present a descriptive analysis focusing on changes in the gender composition of positions and the gender wage gap. For points of comparison that place library trends within the context of national labor trends, data from the Current Population Survey (CPS) for selected IT positions and feminized professions will be included in the analysis.

CHAPTER II

LITERATURE REVIEW

Sociological Framework

This thesis project draws from the perspective that gender inequalities are rooted in our ideas about gender difference. The literature summarized in this section lays the theoretical groundwork for the gendering of work (Acker 1990), provides a model for understanding how changes in gender segregation of work can happen over time (Reskin and Roos 1990), and describes the specific mechanisms through which male advantage in the feminized professions is enacted (Williams 1992).

Acker (1990:87-89) provides an explanation for occupational and job-level gender segregation based on deeply ingrained ideas about gender difference that might be particularly relevant to the intersection of library and IT work, given the gender stereotypes associated with these professions. Income and status inequalities between men and women are created and reproduced in part from organizational processes that appear to be gender neutral, but are actually gendered. These processes create and maintain divisions of labor based on gender, both within the organizations and within wider society, by systematically preferencing seemingly male attributes and actual male workers. Unfilled jobs within organizations are neutral-appearing abstractions that assume a

hypothetical disembodied *ideal* worker perfectly suited to fill the job's requirements (pp. 87-88). This ideal worker's desirable characteristics, or more precisely lack of undesirable characteristics that might compromise performance of the job, are lack of emotion, lack of sexuality, and lack of ability to bear children. This ideal worker conforms most closely to attributes assumed to be male: rationality, controlled sexuality, and a minimal role in obligations outside the job (p. 89). It is somewhat immaterial that individual men and women vary in their ability to meet the ideal. The assumed confluence between ideal and masculine qualities is what drives the definition of jobs as masculine and feminine. In this schema, the female worker is the opposite of ideal—emotional, highly sexual, and obligated to childbearing/care of the family and home—which justifies women being placed in lower paid, less desirable jobs (p. 89).

While occupational gender segregation is an enduring feature of the U.S. labor market, the number of women increased in some traditionally male occupations during the 1970s. In response, Reskin and Roos (1990) set out to identify the factors that made some occupations open to the entry of women, discover whether or not occupational feminization would result in men and women doing the same kinds of work at the job level, and explore how these changes would contribute to economic gender equality. They explain the persistence of gender segregation across occupations as the result of labor and job queues, where employers rank the desirability of employees' gender, education, race, and perceived commitment to work, and workers rank the desirability of available jobs

based on evaluation of the rewards. While men and women evaluate jobs similarly, employers rank men higher than women, essentially turning labor queues into gender queues that reflect stereotypes about men and women.

The *glass escalator* effect, conceptualized by Williams (1992), is the mechanism by which men within feminized professions are advantaged by pervasive beliefs about what kind of work is legitimate and appropriate for men to perform. Through a series of processes, including preferential hiring and promotion, “tracking” by superiors, subtle pressure from co-workers, and self-selection, men are positioned into more prestigious, higher-paying positions within organizations. Whether pressure takes the form of encouragement for men who want to move up or discouragement of men who voluntarily choose less “legitimate” work, the result is the same: gender-segregated organizations where men disproportionately fill managerial and administrative positions (vertical gender segregation), as well as positions in specialized areas that are perceived as being more “masculine” (horizontal gender segregation). Williams suggests that this segregation into acceptable positions helps men resolve internal conflicts about working in a women’s profession by allowing them to reinforce their masculinity and avoid negative stereotypes (effeminate, homosexual, weak) about men doing “women’s work.” Williams’s findings run counter to Kanter’s (1977) assertion that any group with low representation would suffer discrimination and disadvantage from the majority due to its “token” status. Instead, it appears that

being an object of difference in the workplace has different outcomes for male and female tokens.

Acker informs our understanding of organizations as gendered institutions that preference male workers over female workers by constructing the ideal, disembodied worker as masculine. Reskin and Roos describe a mechanism by which the distribution of men and women across occupations can change over time in response to labor demands and the preferences of both potential employees and employers, but this mechanism also operates in the context of gender stereotyping. Williams's glass escalator hypothesis provides an explanation for how men are moved either up or out into the most prestigious and "masculine" positions, resulting in gender segregation within organizations by level and specialization.

Given our current understanding of how women and men are situated within gendered organizations, it seems unlikely that work in libraries could have been so dramatically affected by the introduction of a masculine-identified specialization, information technology (IT), without also changing how that work is organized and compensated by gender, even if the overall gender composition within the occupation remains unchanged. In Reskin and Roos's terms, the introduction of IT skills to libraries would seem to have the potential to change gender and job queues to favor the entry of more men into the library profession, since technology skills are not only strongly masculine identified but also in demand, yet the number of men entering the profession has not increased.

Instead, there is evidence of internal gender reorganization by position without changing the overall gender composition, suggesting a *glass escalator* effect at work.

Recent Literature

The following section reviews recent literature that explores the various relationships among libraries, technology, and gender and the mechanisms of and measurement of male advantage in feminized professions, including libraries. The purpose of this review is to provide necessary background for understanding the current state of libraries and to inform the specific hypotheses of this thesis project.

Libraries and information technology

While developments of the early to mid-1990s generated the most recent period of intense speculation about the future of librarianship and its relationship to IT, the impact of computing technologies on library processes dates back to at least the 1950s. The 1957 Spencer Tracy/ Katharine Hepburn film *Desk Set*, for example, gives an account of librarian/technology tensions that is surprisingly still relevant—central to the plot is reference librarian Hepburn’s fear that her entire department will be replaced by a computer (Ephron et al. 2004). This review of the literature will be limited to the more recent relationship of librarianship to IT as relevant to this thesis project.

Throughout the decades of the 1980s and 1990s the focus of librarianship shifted from a service oriented profession to a service *and* technology (or service through technology) oriented one in which librarians not only use technology in the performance of their daily work, but are also responsible for developing the IT skills of library patrons (Lynch and Smith 2001). The assumption that IT has been and will be of increasing importance in libraries is pervasive in the library and information science literature. These example statements are typical of those found in the literature dealing with libraries, librarians, and technology:

The single most significant factor in the changing information jobs of the 1990s has been the Internet. It has changed everyone's job, some people's job descriptions, and the job market itself. (Dolan and Schumacher 1997)

Over the past thirty years, technology has become a dominant force in reshaping the nature of academic library work. Its impact has significantly changed role definitions, tasks, services, and organizational structures. (Riccigliano and Houston 2003:1)

We have quickly transitioned from viewing technology-related skills [in libraries] as special or unique to considering them essential. (Goetsch 2008:165)

The profession of librarianship has been characterized by change in the last several decades. The influence of new and emerging technologies, and the new roles that technology has created for information professionals, has forever altered the landscape for professionals working in this field. (Bosque and Lampert 2009:261)

In the 21st century, the digital revolution shows no signs of slowing. To remain relevant, any institution, including one as established as libraries, must evaluate its place in a world increasingly lived online. (American Library Association. Office for Information Technology Policy 2010:3)

While much of the discussion in the library and information science literature assumes that the impact of technology on libraries is obvious and profound, one segment of the literature attempts to systematically document how library work is changing through content analysis of job descriptions in library job postings (e.g. Xu 1996; Lynch and Smith 2001; Croneis and Henderson 2002; Cuesta 2005; Goetsch 2008; Choi and Rasmussen 2009; Park, Lu, and Marion 2009; Yang, Chen, and Sun 2012). Summarizing this work through the mid-2000s, Bosque and Lampert (2009:263) observed:

In the literature, the issue of jurisdiction in librarianship appears as duties that traditionally were in the sole command of librarians and archivists have now begun to cross into fields like information technology, where computing traditionally resided. Since the 1980s, the emphasis on familiarity with tools and technology emerged as ever more ubiquitous skills for job-seekers. This most recent era has raised interesting issues, as the role of the librarian continues to intersect and converge with roles of information technologists, computer scientists, and commercial information providers.

While most librarian positions have changed over time in response to technological change, they have often also retained traditional titles and responsibilities. Pinfield describes these positions as “the old job...plus,” meaning all or most of the components of the traditional job with new technology skills tacked on (Pinfield in Goetsch 2008). Reference librarians, for example, use technology to extend their traditional duties of helping patron locate and use library materials—they search databases and electronic journals instead of printed indexes, use technology tools to communicate, create library web pages

to publish literature guides, answer general technology questions, and instruct patrons in the use of library software and equipment (LeMaistre et al. 2012). Although most library positions now have a significant component of technology use, only a few positions have primary responsibility for technology deployment, maintenance, and development (e.g., Systems Librarians, Digital Librarians, Web Developers, Programmers, and Systems Administrators). These new technology positions are embedded in a profession associated with women but draw on skills that are closely associated with men, setting up the potential for increased gender segregation by specialization as women maintain their presence in traditional library roles and men shift toward that which is new, technology driven, and potentially higher status.

Women in IT

Between 1982 and 2002 the percentage of women earning bachelor's degrees in computer science (CS), a degree that leads to work in the IT field, dropped from 34% to 25%, while during the same period women made educational gains in engineering, physics, and chemistry (Snyder and Hoffman 2004). One contributor to the problem is the persistent perception that computing is a male domain. From her semi-structured interviews with male and female CS students, Wilson (2003) found that most undergraduate CS students understood computing to be strongly stereotyped as male and that women in CS were viewed as "equal but different:" capable of doing the work but preferring to pursue creative and "people oriented" aspects of the discipline rather than coding and

programming. She theorizes that the underrepresentation of women in technology fields and the segregation of women into “soft” technologies within the field are due to a persistent “masculine culture of technology” that includes sex stereotypes and other socially constructed beliefs about gender and technology that exclude women from maintaining an interest or participating fully.

The percentage of jobs IT in the U.S. held by women steadily declined from its peak of 36% in 1991 to 24% by 2008 (Ashcroft and Blithe 2010). By 2012 that figure had increased to 26%, a small, but encouraging gain (National Center for Women and Information Technology 2014). Women who begin IT careers quit at mid-career at nearly twice the rate of men. Bias in promotions and task assignments, lack of role models and mentors, unsatisfactory relationships with supervisors, and competing life demands are cited as the primary reasons for this high attrition rate (Ashcroft and Blithe). The persistent low representation and retention of women in IT education, culture, and work supports the assumption that men will be more likely to fill library technology-focused positions than women.

Male representation in libraries

While female librarians were rare in the 1850s and 1860s, by the turn of the 20th century librarianship had become a feminized profession. Garrison (1972) notes several historical factors that contributed to the initial rapid shift of the profession toward female-numeric domination, including the sharp rise in demand for very well educated, low-paid library workers in the period between 1876 and 1905, during the establishment of the public library system in the U. S.; the

availability of a college-educated female workforce; the prevailing view that libraries as cultural institutions were appropriate workplaces for women and that the work tasks involved complemented “women’s skills;” the resistance met by educated women within more established professions; and the development of library training programs meant specifically to bring women into the occupation. By 1910 more than 78% of librarians were women, a figure that peaked at 90% by 1920 (Garrison 1972; Ladenson in Record and Green 2008). As in other feminized professions, the historical dominance of women in librarianship has had long-term consequences, including depressed salaries relative to the education and skill set required and persisting low male representation (Garrison).

From 1995 to 2006 the *Library Journal Annual Placements and Salary Survey* reported that about 20% of new library program graduates hired in libraries of all types were men (Maatta 2003; 2005; 2007). National statistics indicate that the percentage of male librarians was 15% in 1995, 15% in 2000, and 20% in 2010 (U.S. Census Bureau 2001). Using U.S. Census data and National Center for Education Statistics data, the *American Library Association (ALA) Diversity Counts* study found that of all librarians with ALA-accredited degrees, 22% were men in 1990, a figure that slightly declined to 18% in 2000 (American Library Association. Office for Research and Statistics and Office for Diversity 2007) and, in a follow-up study dipped further to 17% in 2009-2010 (American Library Association. Office for Research and Statistics and Office for Diversity 2012). One possible explanation for this decline in male librarians from

accredited programs is that fewer men are obtaining the traditional library degree prior to library employment. While the gender composition statistics for libraries may vary slightly from year to year, there is not a clear increase or decrease in the proportion of male librarians over the past several decades, but the educational qualifications of librarians might be changing over time, and possibly changing more quickly for male librarians.

ARL survey data reports male representation among full-time ARL library professionals (whether or not they hold an MLS degree) at about 37%, which has been approximately steady since 1981. That men are overrepresented in ARL libraries suggests a degree of gender segregation by library type, with more men employed in research libraries than public and school libraries, but it is difficult to find recent, reliable figures to quantify this assumption. While librarians are employed across a range of library types, including school (elementary and secondary), academic (college and university), public (municipal), special (corporate or private institutions), and government libraries, the occupation is coded under a single category in the Standard Occupational Classification System, making it difficult to differentiate between library types using government labor statistics. While internally ARL libraries are probably the least feminized type of libraries, they may be increasingly gender segregated, assuming the addition of male-dominated IT specializations without additional male workers may have drawn men away from other specializations.

Male advantage in feminized professions

Williams (1992; 1995) uses nursing, elementary school teaching, librarianship, and social work as examples of professions that have low male participation, 5.5%, 14.8%, 16.7%, and 31.8%, respectively. In interviews with a nonprobability sample of 76 men and 23 women, Williams found that men experienced a consistent advantage over women in hiring, promotions, position assignments, and pay, and were placed in the most prestigious, most “masculine” positions. Williams (1992) called this pattern of male advantage the *glass escalator*, a metaphor for the invisible forces that move men up the organizational hierarchy.

Subsequent work on the topic of male advantage investigates how the concept operates in job assignments, promotions, and pay within occupations, within organizations, and within specific jobs of various gender compositions.

Using national longitudinal data, Maume (1999) found that men’s chances of being promoted increased as the number of women in an occupation increased, while the opposite was true for women, generally supporting Williams’s *glass escalator* hypothesis. An increase in the percentage of black workers in the occupation also decreased women’s chances of a promotion, perhaps suggesting that a limited pool of promotion opportunities must be shared between several categories of disadvantaged workers. When black men, black women, and white women were promoted into managerial positions, they waited significantly longer than white men for that promotion. Maume concludes that only white men ride the

glass escalator—women and minorities are more likely to hit a *glass ceiling*. That the disadvantage black men face in being promoted mirrors that of women in general points to the conclusion that preference for a certain type of worker (white male) explains occupational gender segregation better than gender differences.

Budig (2002) used national longitudinal data to examine wages and wage growth in female-dominated, male-dominated, and balanced professions. The study found that men's wages were higher in all categories of professions and increased more quickly over time than women's. This effect was uniform across all three categories—there was no extra advantage for men within female-dominated professions. Male-dominated jobs consistently paid more than female-dominated jobs and men were also more likely to be promoted into male-dominated or mixed-gender jobs. This effect was smallest when the prepromotion job was female-dominated, offering little support for the idea that men are able to use female-dominated jobs as unobstructed pathways into male-dominated jobs. This work supports Acker's/Williams's theory of gendered organizations that preference male workers, but not Kanter's theory on the disadvantage of token status, nor earlier single occupational case studies in which men were found to experience greater advantage in female-dominated professions (Fløge and Merrill 1986; Heikes 1991). In essence, Budig found that regardless of the gender composition of the occupation, all men ride the same *glass escalator*.

Combining occupation-level data on occupational gender composition from the Swedish census with Swedish national survey data, including information on

job transitions, Hultin (2003) found that while men have better chances for promotion than women in female-dominated professions, women were not disadvantaged in male-dominated professions. Obstacles for women's advancement seemed to exist primarily in female-dominated and balanced professions. The findings generally support Williams' theory about male advantage in female professions, but counter Kanter's findings that women would suffer negative discrimination for their token status in male-dominated professions. Hultin suggests that women's best chances for economic improvement are in male-dominated occupations, where overall opportunities for advancement are greater, but notes that the study did not measure the ability that women have to enter these professions.

Huffman (2004) uses a detailed definition of jobs (local occupation-industry cells) that includes information about the jobs' position in local wage hierarchies to explore gender wage differentials at the job level. The model is meant to be an improvement over models that use aggregated national occupation and industry data because it captures local variations in labor markets, such as in the gender composition of particular jobs and in wage setting. Huffman found that although wages declined for everyone as the percent female of a job increased, the decline was greater for women, and that men do receive better pay in female-dominated jobs. The gender wage gap increased in higher-ranking positions because men received larger pay increases as they moved up the hierarchy of positions. Huffman notes that the study results conflict with those Budig, which is cause for

further investigation of the various data modeling techniques available. The author also notes that the data used in the study are not detailed enough to determine underlying mechanisms for wage inequalities in local markets, and although qualitative case studies cannot be used to describe general patterns across individual organizations and markets, the more specific contexts of these studies might tell more about underlying processes at work.

Bygren and Kumlin (2005) examine how organizational factors, such as recruiting practices, reproduce existing gender segregation within occupations. Using organization-level data from 1,460 Swedish organizations, the study found that the most significant factors in reproducing gender segregation in organizations were the gender composition of the occupations from which employees were recruited and the gender composition of the hiring organization. Large and expanding organizations tended to make more sex atypical hires, allowing for greater possibilities for shifts in gender composition.

More recent work puts increased emphasis on horizontal gender segregation as an important feature of female-dominated professions. Studying a small nonprobability sample of registered nurses, Snyder and Green (2008) found that while women and men were found in representative proportions in administrative and managerial positions, suggesting an absence of vertical segregation, they were sorted by gender into specializations based on perceived masculine and feminine attributes of those specializations. Male nurses were overrepresented in operating room, emergency, and intensive care positions, specializations thought

to be faster paced, more technical, and more autonomous, while women were overrepresented in post-anesthesia, labor and delivery, general medical-surgical, home care, and hospice care, specializations with more emphasis on the caregiving role of nursing. Overall, men had a higher mean hourly wage, with much variability for both men and women based on particular specialization. The authors concluded that in nursing, gender segregation is more likely to take on a horizontal than vertical form and suggest that a relatively high number of lateral specializations may need to be present in an occupation to see this effect. Snyder and Green also theorize that in organizations having flattened hierarchies or bottom-heavy structures, the sorting of women and men into respectively feminine and masculine areas of specialization will be more pervasive than vertical gender segregation that comes from overrepresentation of men in upper levels of the hierarchy. Since libraries tend to have horizontal structures, with a few top-level positions and many laterally positioned specializations, this research would suggest that there is increased potential for specialization-based horizontal gender segregation in libraries.

Gender wage gap in libraries¹

In a 1988 survey of 513 librarians from 17 ARL member institutions, Dowell (1988) found a female-to-male earnings ratio of .82. Using the same population, the annual *Association of Research Libraries Salary Survey* reported an

¹ Figures in these surveys were originally reported in various formats. I have converted them to female-to-male earnings ratios for ease of comparison.

increasing earnings ratio from .87 in 1981 to .96 in 2006 (Association of Research Libraries 2001; 2007). The 2006 figure represents a markedly smaller gender wage gap than the national average for fulltime workers in either 2003 or 2012 (based on weekly earnings), where the earnings ratios were .79 and .81, respectively (Table 1) (U.S. Census Bureau 2004; 2013). Wage gap figures for other library types or for the library occupation could not be located.

Table 1 shows female-to-male earnings ratios and percent female for selected female-dominated professions and IT specializations. Registered Nurses and elementary/middle school teachers are two of the largest women's professions in the United States (U.S. Bureau of Labor Statistics. The Editor's Desk 2011), and were included along with librarians in Williams's initial work on the *glass escalator* (1992, 1995). The paralegal profession was selected for inclusion in this list because it has a gender composition very similar to that of librarians. The two IT specializations were included as examples of technology jobs that might be present in library organizations. The earnings ratios increased slightly between 2003 and 2012 in all the selected professions except elementary/middle school teachers, where the ratio decreased. The largest increase was among software developers. The percent female stayed the same or decreased slightly in all professions except software developers but changed by no more than two percent in either direction. The percent female for librarians in 2012 falls between that of registered nurses and elementary/middle school teachers, but the earnings ratio reported in the above-referenced ARL survey (.96

in 2006) is somewhat higher than either. Of the selected professions, the earnings ratio among librarians is most similar to, but slightly higher than, that of paralegals in 2012 (.94). The recent librarian gender wage gap, at least in research libraries, appears to be quite small.

Table 1: Female-to-male earnings ratios, full-time workers, based on median weekly earnings

Occupation	2003		2012	
	Ratio	% Female	Ratio	% Female
Registered Nurses	.88	90	.91	89
Paralegals and Legal Assistants	– ²	87	.94	85
Librarians	– ²	86	– ²	84
Elementary and Middle School Teachers	.90	81	.82	81
Network and Computer Systems Administrators	– ³	25	.84	25
Software Developers	.75	22	.81	20
Overall	.79	44	.81	44

2003 and 2012 Household Data Annual Averages, Current Population Survey, U.S. Census Bureau

² Not calculated - earnings for men not reported because fewer than 50,000 in base.

³ Not calculated - earnings for women not reported because fewer than 50,000 in base.

The *Library Journal Annual Placements and Salary Survey* collects statistics on the female-to-male earnings ratio among recent MLS graduates in their first post-MLS jobs. In 1996 the earnings ratio was reported as .95, but this was a decline from a relatively steady .98 to .99 over many years (Carson and Nelson 1996). In the 2000s the *Library Journal* figure vacillated in a narrow range between .96 and .92 with no clear trend in either direction. (Maatta 2003; 2005; 2007; 2009; 2011). Since the gender wage gap in libraries has historically been relatively small and stable, any sustained widening of the gap could be evidence of disruption in how work in libraries is gendered.

IT specialization in libraries

Throughout the 2000s the *Library Journal* figures for new graduate placements within IT-related library jobs varied more widely than for library placements overall, with the earnings ratio at a low of .83 in 2010 and a high of 1.07 in 2011, when women's starting salaries were actually *more* than men's (Maatta 2011). The 2006 *Library Journal* survey reported that starting salaries for "Information Science"-focused jobs were 18.2% more than for "Library Science"-focused jobs (Maatta 2007), but the study did not define the difference between Information Science and Library Science and it is difficult to guess how a respondent would have interpreted the question.

Mentioned above, Ricigliano and Houston (2003) found that male librarians were overrepresented in Systems Department Head positions in 1990 and again in 2001. Over that decade the percentage of male department heads increased

from 53% to 66%, while the percentage of male librarians in ARL libraries increased only by 2%, from 35 % to 37%. Department head positions with the largest increases in female representation were Rare Books, Circulation, and Cataloging. While in 2001 there was no gap in pay between female and male Systems Department Heads, this position was the highest paid of eight department head positions tracked by the survey. In a separate email survey of 172 librarians reported in the same paper, of those respondents reporting working in a technology-based specialization, 40% were male and 21% female, although overall returns were 63% female. Respondents were asked to rate the amount of technology work in their positions; the most highly rated jobs were in Systems and the lowest in Archives and Manuscripts.

Project Description and Rationale

Using aggregated longitudinal data from the annual Association of Research Libraries (ARL) *Salary Survey* and contextualizing data from the *Current Population Survey (CPS)*, this thesis compares the gender composition and salary of librarian positions over a twenty-five-year period, from 1985 to 2010. This time period covers much of the slow ramp-up of desktop computing and digital networked access through the 1980s and early 1990s; the introduction of the *Mosaic* graphical interface browser in 1993; and the rise of blogging, social networking, and the use of handheld mobile devices in the 2000s. While earlier technologies gradually changed the way work in libraries was performed, they generally left library specializations intact. This more recent period of technology

innovation immersed librarians in a digital/networked environment that changed the nature of their work enough to spur the creation of new specializations in the profession and increased demand for workers with IT skills.

A comparison of library salary data and gender distribution by position for selected years (1991 and 2001) was previously reported by Ricigliano and Houston (2003) and ARL published a table comparing female to male earnings ratios from 1980 to 2000 in its 2000-2001 *Salary Survey* report (2001). Both of these publications predate the collection of position-level data for Functional Specialist positions in 2005 and cover narrower time spans and fewer time intervals than the proposed project. While it seems clear from previous research that men are overrepresented in library technology-intensive positions, it is less clear how the ratio of men and women in these positions has changed over time, or how the introduction of these positions may have influenced the composition of other positions at the same level or in higher and lower levels. Since the overall proportion of male and female librarians in ARL member libraries (35-37%), and in the occupation in general (16-18%), has varied very little, it seems mathematically inevitable that as IT positions gained men, other library specializations would lose them, effectively increasing the level of gender segregation, either horizontally across positions or vertically across levels of the hierarchy. There is some evidence that IT positions in libraries receive higher pay than non-IT specializations, and the *glass escalator* model would predict that the most feminized library specializations are paid the least. If there is no salary gap

between men and women within a given specialization, higher salaries in male-dominated specializations and lower salaries in feminized specializations could contribute to an increased gap in pay between male and female librarians overall. Knowing which positions have gained and lost in overall numbers (in terms of percentage of library professional staff) and the general salary structure could help place any changes in the distribution of librarians in the context of overall change in libraries.

This thesis will attempt to demonstrate that apparent stability of gender composition at the occupational level can obscure small but important changes in how work is organized by gender within an occupation. Hultin points to a lack of job-level longitudinal data covering multiple workers at multiple workplaces in the study of gender segregation and Huffman suggests occupational case studies as having the potential to help unravel the mechanisms at work in wage inequality. Through a primarily descriptive analysis of library gender composition and salary data by specialization, this study will make a potentially interesting contribution to the occupational case study literature concerned with gender composition, segregation, and wage inequality. In particular, this project may contribute to our understanding of how the insertion of stereotypically “masculine” work into a feminized or female-dominated profession affects both gender segregation by job specialization and the gender wage gap within that occupation over time. Findings will also help to identify specific library specializations that contribute most to gender inequality, providing a focus for future data collection and analysis.

Hypotheses

H1. Horizontal gender segregation: As the number of male-dominated IT positions in libraries increases over time, the proportion of men in other library specializations will decrease.

Since the overall gender composition of ARL libraries is consistent over the period being studied, and there is evidence that IT positions are increasing both in number and percentage of male workers (Ricigliano and Houston 2003), other positions will become more female-dominated over the same time period.

H2. Vertical gender segregation: As the number of male-dominated IT positions in libraries increases over time, the proportion of men in lower organizational levels will increase.

Snyder and Green (2008) found that in nursing horizontal gender segregation was a more prevalent feature than vertical gender segregation. Since three of four library IT positions are in nonmanagerial roles, an increase in their number would be more likely to contribute to horizontal gender segregation than vertical.

H3. Library gender salary gap: As the number of IT positions in libraries increases over time, the overall gender gap in average salary in ARL libraries will also increase.

Williams' *glass escalator* model would predict that male-dominated specializations are paid more than female-dominated specializations. If male-dominated IT positions in libraries are paid better than female-dominated positions, then the overall salary gap between female and male workers could increase as the number of IT positions increases.

H4. Gender composition of IT positions: IT position in libraries will have a similar gender composition to the IT occupation overall.

Bygren and Kumlin (2005) found that one determining factor for the gender composition of jobs is the composition of the occupation from which new hires are recruited. While support for H3 could suggest that library IT hires come from the larger IT occupation, it could also suggest that similar factors contribute to the gender composition of IT positions, regardless of location.

H5. Gender pay gaps in IT: the salary gap for library IT positions will be larger than IT positions overall.

Huffman found that while all workers in female-dominated jobs received lower than typical pay, the effect was less for men than for women, which would increase the gender pay gap in these jobs. While library IT positions are probably not better paid than other IT positions, they might have a higher gender pay gap due to being located within an overall female-dominated occupation.

CHAPTER III

METHODOLOGY

ARL Data

The Association of Research Libraries (ARL) is a nonprofit organization of U. S. and Canadian libraries within institutions designated by the *Carnegie Classification of Institutions of Higher Education* (2005) as *Research Universities with high or very high* research activity (Association of Research Libraries 2009). The *ARL Salary Survey* collects salary and demographic information from the libraries of ARL member institutions about individuals filling professional positions within those libraries. Reporting libraries are instructed to use local criteria for determining which positions are “professional,” including positions that do not specifically require a Master of Library Science (MLS) or equivalent library or information science degree, but may require other specific education or training. Data from the survey are compiled each year and published as a series of tables with a written report.

The bulk of data for this thesis project (Appendix A) is taken from the annually published table “Number and Average Salaries of ARL University Librarians” from the surveys for fiscal years between 1985 and 2010 in five-year increments (Association of Research Libraries 1985, 1990, 1995, 2000, 2005, 2010). This table (Figure 1 is an example from the 1985 *Salary Survey*) shows

the total number of professional positions, the number of men and women in each of 18 positions, and average salaries by gender in each position. The survey instrument and instructions are included in the appendix of each survey report.

TABLE 13: NUMBER AND AVERAGE SALARIES OF ARL UNIVERSITY LIBRARIANS, FISCAL YEAR 1985¹

POSITION	Number of Staff			Average Salaries		
	Total	Men	Women	Combined	Men	Women
1. Director	94	75	19	\$63,427	\$63,742	\$62,183
2. Associate Director	114	55	59	45,219	46,349	44,166
3. Assistant Director	209	108	101	40,166	40,493	39,815
4. Branch Head	527	198	329	30,348	32,004	29,351
5. Subject Specialist	673	311	362	26,870	28,116	25,799
6. Functional Specialist	331	158	173	27,370	28,373	26,455
7. Dept. Head:Reference	112	48	64	31,515	31,522	31,510
8. Cataloging	110	30	80	32,899	34,239	32,397
9. Acquisition	104	44	60	30,990	31,360	30,718
10. Serials	67	18	49	29,793	29,228	30,000
11. Doc./Maps	110	42	68	28,462	28,274	28,578
12. Circulation	91	40	51	27,266	27,054	27,432
13. Spec. Coll'n.	100	68	32	33,870	35,417	30,581
14. Computer	41	29	12	35,598	37,033	32,131
15. Other	632	250	382	29,453	31,175	28,325
16. Reference:Over 15 yrs. exp.	329	102	227	27,588	28,287	27,274
17. 10 - 15 yrs. exp.	233	67	166	25,370	24,964	25,535
18. 5 - 10 yrs. exp.	277	88	189	21,884	22,242	21,718
19. Under 5 yrs. exp.	231	73	158	18,874	18,785	18,915
20. Catalog: Over 15 yrs. exp.	384	103	281	27,556	28,255	27,300
21. 10 - 15 yrs. exp.	177	53	124	24,559	25,274	24,254
22. 5 - 10 yrs. exp.	206	58	148	21,839	22,059	21,752
23. Under 5 yrs. exp.	221	52	169	18,490	18,851	18,379
24. Other: Over 15 yrs. exp.	307	93	214	29,212	31,447	28,241
25. 10 - 15 yrs. exp.	180	56	124	25,782	27,090	25,191
26. 5 - 10 yrs. exp.	199	61	138	22,199	23,142	21,782
27. Under 5 yrs. exp.	203	50	153	19,154	19,089	19,175
ALL POSITIONS	6,262	2,330	3,932	\$27,935	\$30,242	\$26,568

¹ Excludes Chicago and staff in law and medical libraries. For statistics related to law and medical library salaries, refer to tables 22-27.

Figure 1: Example data table from ARL Salary Survey, Fiscal Year 1985.

For comparisons between Functional Specialist IT positions and related CPS occupational classifications, annual data from 2005 to 2012 was used (Appendix B).

Each institution's library system may include branch libraries and medical and law libraries in addition to a main library. Medical and law library salary figures are reported separately in ARL *Salary Survey* reports, with the mean salaries for many positions containing too few individuals (four or fewer) to be included in the published reports. Because these omissions in the data would make it impossible to accurately combine figures for medical and law libraries with other academic research libraries to calculate mean salaries and gender compositions across all library types, academic medical and law library positions have been excluded from this analysis. Table 2 shows the number of institutions and individual positions reported in each year of the *Salary Survey* included in this project.

Table 2: Number of ARL institutions and library professional positions by fiscal year, excluding medical and law libraries.

Fiscal Year	1985	1990	1995	2000	2005	2010
Institutions	105	107	108	111	113	114
Positions	6262	6963	6920	7121	7823	8512

Since ARL libraries meet certain criteria for inclusion that sets them apart from other libraries, findings generated from these data will not be generalizable to other types of libraries or library positions. Instead, the results will be generalizable to large research libraries, which is meaningful in its own right. These data also do not contain qualitative information, such as detailed position descriptions, that might help explain how librarian job duties or qualifications

might have shifted over time and how such shifts might have contributed to changes in hiring practices. Library Technicians and Assistants, which outnumber librarians by about 1.5 to 1 and are a more quickly growing group, are excluded from the survey (U.S. Bureau of Labor Statistics 2014d). Without access to complementary data on these lower-level positions it is difficult to form a full picture of library staffing changes. For example, if the number of workers in a professional library position decreases over time, it is not clear if that is due to the gradual elimination of the functions of that position or a redistribution of those functions to a lower-level position. Necessarily, analysis will be limited to changes within ARL professional positions as defined by ARL and interpreted by member institutions supplying survey data.

CPS Data

The Current Population Survey (CPS), conducted by the U.S. Census Bureau for the U.S. Bureau of Labor Statistics (BLS), is a monthly survey of U.S. households that collects labor force data, including employment status, earnings, and demographic information. Annual CPS data tables from 1995 to 2012 are available online, while 1985 and 1990 data tables were obtained directly (by email) from the BLS (U.S. Census Bureau 1986; 1991; 1996; 2001; 2006-2013). The methodology for the CPS can be found on the Census Bureau's website (U.S. Census Bureau n.d.). The Occupation Classifications used by the CPS are derived from Census and Standard Occupational Classification and were updated in 1992 and 2002 with the current Census classifications from the 1990 and 2000

Census, respectively. Because of these revisions, data from different time periods may not be strictly comparable but should be sufficiently similar for the purposes of this study.

Likewise, since the ARL and CPS methodologies for collection of compensation and demographic data differ significantly, occupational classifications and ARL positions cannot be compared as exactly equivalent. The comparative analysis will be limited to pay gaps and gender compositions over time in related occupational classifications/ARL positions, which will help place the relatively narrowly defined ARL data in a broader context of national trends reflected in CPS data. Using CPS data for points of comparison helps control for variations in ARL data that are better explained by external forces than more localized changes. For instance, labor market forces can explain variations in library gender salary gaps that closely mirror those in the national gender wage gap. Anomalies in library data when compared with national data are more likely to have their root cause in libraries or their parent institutions. While establishing that libraries have changed apart from national trends does not establish causality, the particulars of those changes help point to possible explanations internal to libraries that can be explored further in future research.

Units of Analysis

My units of analysis are ARL positions and occupational classifications used in the CPS, which will be treated as roughly comparable in that they are both aggregates of individual positions categorized by function. The following ARL

positions, as described in the 2010 *Salary Survey*, are inclusive of all professional positions in ARL university libraries (Table 3). For parts of the analysis, the positions have also been grouped into three larger categories roughly reflecting a three-tiered hierarchy of administrative, supervisory, and nonsupervisory professional positions, although actual organization of individual institutions may vary widely, being either more vertical or more horizontal. While this hierarchy is not described as such in the *Salary Survey*, it is implied in the instructions about how to classify particular jobs as ARL positions. Since Library Technicians and Assistants are excluded from the *Salary Survey*, within these library organizations one or more “tiers” of library workers exist below these three.

Since libraries vary in how they are organized, the ARL positions reflect typical library activities, roles, and departments rather than specific organizational structures and actual position titles (ARL 2010:89). Over the life of the survey the position names have been updated to reflect current terminology and practice but still refer to the organizational roles first delineated in the 1976 survey. The categories are listed as they appear in the 2010 survey instructions (p. 88-90), but department head position titles are inverted and often shortened throughout this text—*Systems Department Head* is used instead of *Head, Library and Computer Systems*, for example. The Systems Department Head is the only of these positions specifically responsible for technology.

Table 3: ARL positions organized by three-tiered hierarchy.

Positions	Tier
Director	Administrative
Associate Director	
Assistant Director	
Head, Acquisitions	Supervisory
Head, Cataloging	
Head, Circulation	
Head, Library and Computer Systems	
Head, (Government) Documents and Maps	
Head, Rare Books/Manuscripts	
Head, Reference	
Head, Serials	
Head, Other Department	
Functional Specialist	Nonsupervisory
Subject Specialist	
Cataloger	
Reference Librarian	
Other Librarian	

Most of the positions would be well understood by those working in libraries, so little explanation of them is given in the survey instructions except for the “other” and “specialists” positions. The Other Department Head includes heads of departments not listed elsewhere, as well as assistant department heads and other positions with significant supervisory responsibility. The inclusion of lower-level supervisory positions could reduce the mean salary in the Other Department

Head position relative to positions containing only Department Heads. Other Librarian includes nonsupervisory positions that deal directly with the public, other than Reference librarians, positions that purchase and process library collections, other than Catalogers, and administrative support services, such as communications, fund raising, and financial management. Since position descriptions are non-existent or very brief, it is not possible to determine from the survey how the functions of positions might have changed over time nor how these changes might relate gender norms or expectations.

The two “Specialists” positions share the attribute that “they may not be, strictly speaking, professional librarians (i.e., have an MLS),” unlike, presumably, most other positions. Subject Specialists can have duties in collection selection, cataloging, and reference services, but within specific academic subject areas; this position often requires a graduate degree in the academic subject specialization in addition to or instead of the MLS. The Functional Specialist position is described as “media specialists or experts in management fields such as personnel, fiscal matters, systems, preservation, etc.”—a diverse group of functions that don’t fit neatly into the other ARL positions. Based on this description, the Functional Specialist position includes subpositions that require specialized skills and training that draw from outside the traditional librarian skill set. In both the Other Librarian and Functional Specialist positions, aggregating multiple unlike subpositions into a single ARL position tends to minimize the differences among the subpositions. This becomes clear when the Functional

Specialist “breakdown,” a section of the ARL *Salary Survey* that reports on Functional Specialist subpositions, becomes available beginning in 2005. That the Functional Specialist positions are subpositions rather than the same level as the others ARL positions is somewhat arbitrary and tied to the history of the *Salary Survey* and its internal data structure. Since the Functional Specialist position was quite small (and probably less diverse) early in the survey, accounting for about 3% of library professional positions in 1980, a single category made sense. By 2005 this positions accounted for about 18% of professional ARL positions and the breakdown was created, but the original position was maintained for consistency and comparability. Within the Functional Specialist breakdown are three positions with specific IT responsibility (italicized):

Archivist/Curator

Budget/Fiscal/Business Manager/Facilities

Human Resources/Training/Staff Development

Information Technology Systems

Information Technology Web Development

Information Technology Programing/Application Development

Media/Multimedia (including graphics)

Preservation/Conservation

Other Functional Specialist

The following CPS occupational classifications are used as comparators to ARL positions (IT occupations italicized):

Network and Computer Systems Administrators

Computer Programmers

Web Developers

College Teachers

Registered Nurses

Secondary School Teachers

Network and Computer Systems Administrators, Computer Programmers, and Web Developers were chosen to represent IT occupations because they are roughly equivalent to the ARL positions IT Systems, IT Programmer, and IT Web. College Teachers was chosen because ARL professionals by definition are embedded in colleges and universities – a study analyzing ARL institutional data from 1989 to 1998 found that 33% of ARL institutions grant librarians faculty status and 44% offer tenure (some in nonfaculty status positions) (Lee 2008). College Teachers will provide some basis for determining whether or not academic librarian positions follow more general trends in higher education. Registered Nurses and Secondary School Teachers are included to represent feminized occupations requiring professional training, although both have lower minimum education requirements than those for librarians (Associate's and Bachelor's degrees, respectively) (U.S. Bureau of Labor Statistics 2014a; U.S. Bureau of Labor Statistics 2014e).

Independent Variables

Year

The analysis for this project includes survey data from 1985 to 2010 in five-year increments. In some figures, data from 1980 are also included as an earlier reference point, but positions variables were not defined consistently between 1980 and 1985, so more granular comparisons exclude 1980. In addition to matching the time frame of network computing developments, as described in the *Project Description and Rationale*, the start date of 1985 has a practical basis. The ARL survey did not begin collecting information on gender or specializations until 1977, when it added supplemental data on administrators, Subject and Functional Specialists, and the seven most common categories of department heads. The Computer Department Head position (later renamed Systems Department Head) was added to the list of department heads in 1985 and is the only addition to that list to date. The Systems Department Head is also the only separately reported position with specific IT responsibilities until the Functional Specialist position was further broken down into specializations in 2005.

Gender

While gender is not used as a separate independent variable in any part of this analysis, it is embedded throughout the data. All salary/wage figures and number of workers are reported by gender, i.e., the salary variable is reported as mean female and male salary for each position, and the number of workers is

reported as female workers and male workers per position. These figures then contribute to calculating the salary gap and gender composition (percent male) variables. That there is a difference in the gendering of positions in “feminized” and “masculinized” professions is an underlying tenet of this thesis.

Dependent Variables

Salary

ARL *Salary Survey* salary figures are annual (fiscal year, starting July 1) gross salaries that do not include benefits or other types of compensation. These figures are reported as mean salaries by position and by gender. Part-time salaries are included but are multiplied up to full-time levels and reported in the mean salary calculations along with full-time positions. For Canadian institutions, Canadian dollars are converted to United States dollars. While information about temporarily unfilled jobs is collected, these figures do not appear to be included in the salaries reported by position and gender.

Positions

Figures are reported for each year as total number of filled jobs in each ARL position and broken down by gender of current incumbents. The number of part-time positions is not reported, which could result in overestimating staffing levels in some positions.

Percent male

Using ARL data, *percent male* is calculated from the number of male workers (W_m) and the total number of workers (W_t) in each position and expressed as a percentage:

$$(W_m/W_t)*100$$

When using CPS data, the annual average numbers of male full-time workers (W_m) and total full-time workers (W_t) by occupational classification are used.

Gender pay gap

The mean salary for male (P_m) and female (P_f) position incumbents is used to calculate the gender pay gap for individual positions and various groupings of positions, and is expressed as a percentage:

$$[(P_m-P_f)/P_m]*100$$

The resulting figure is the difference between men's and women's pay as a percentage of men's pay. That is, if the pay gap for a position is 5%, then women earn 5% less than men in that position on average. A negative pay gap indicates that women earn more than men.

When using CPS data, the annual averages of mean weekly earning of full-time and salaried workers, male (Pm) and female (Pf), are used.

Methodology

The goals of this thesis are to determine (1) how the distribution of men and women in various positions has shifted over time after the library IT specializations were introduced, (2) how the gender gap in average salary changed in those positions over time, (3) how gender distribution of ARL IT positions compare to similar occupations, and (4) how the salary gaps in ARL positions compare to similar occupations. The data analysis consists largely of descriptive ARL *Salary Survey* data presented graphically and in tables that visually explore temporal trends of various ARL positions categories/CPS occupational classifications in relationship to one another.

To create a new longitudinal data set, mean salaries and number of positions by gender and position were transcribed from ARL *Salary Survey* reports for selected years (1980, 1985, 1990, 1995, 2000, and 2010) into a Microsoft Excel spreadsheet. Summary calculations (total numbers of positions and overall weighted mean salary) for each year were compared between the published reports and new datasets to confirm that figures were transcribed accurately. Data for the Reference Librarian and Cataloger positions were listed in subcategories by incumbent longevity – these figures were combined into single positions to normalize them.

Percent male and salary gap were calculated for each position for each year, and added to the dataset. Number of workers in positions, mean salary, percent male and salary gap for individual ARL positions and various groupings of categories were plotted over time to uncover evidence of changes in overall salary structure, mean library or position size, gender distribution, and salary gaps. When means are presented for groupings of multiple positions the calculations are weighted by the number of workers in each position.

Percent male and salary gaps were plotted alongside related CPS occupational classification percent male and wage gaps in order to compare ARL trends with national trends. Wage gaps for CPS occupational classifications are simple calculations using the mean salaries for men and women in the occupation. When the ARL salary gap is compared to the CPS wage gap, it is calculated in the same way. The occupational salary gap for ARL positions is higher than the weighted mean by several percentage points.

Pearson's correlations and paired t-tests (two-tailed) were run in SPSS 21 to confirm changes and differences observed in the graphed data and establish statistical significance at a level of $p < 0.05$.

CHAPTER IV

FINDINGS

Despite modest growth in the number of ARL professional positions over the 25-year period from 1985 to 2010, the mean percentage of male workers has not changed substantially since at least 1985, measuring 37%, plus or minus a few tenths of a percent, for that entire period of time. During the same time period, the ARL salary gap has gradually declined, roughly approximating the decline seen across the labor market nationally, though the ARL salary gap is somewhat lower than the national wage gap. Together these two figures give the appearance of a state of stasis in ARL libraries, where these libraries are subject to the influence of national trends, but otherwise remain unchanged in composition. Despite this stable appearance, the gendered characteristics of positions are not uniform, the gender composition in certain positions has changed significantly, and the salary gap has declined unevenly across positions. Across the years included in this study, the salary gaps in individual ARL professional positions have ranged from 16% to -14%, and the percentage of male workers has ranged from 80% to 24%. Differences among positions and changes over time can be measured simply, but the relationship between positions—how the loss of male or female workers in one position may balance the gain in another or how salary gaps are relative—is best understood by looking

at these variables within the context of position hierarchies and types of specialization.

In the following sections, the gender composition is measured as the percentage of male workers in a position (percent male). Salary is gross fiscal year salary as reported by ARL. The salary or wage gap is the difference between men's and women's pay as a percentage of men's pay. That is, if the salary gap for a position is 5%, then women earn 5% less than men in that position on average. Salary and wage gaps can be positive or negative, with a negative gap indicating that women earn more than men, on average. Mean percentages of male workers and salary gaps given for multiple ARL positions are weighted means that take into account the number of individual workers per position. When measuring the gain or loss of workers in a position, the number of workers per institution is given, rather than total number of workers across ARL institutions, to control for the changing number of ARL institutions. A second measure, percent change of the position, measures the change in relationship to the original size (number of workers) of the position but can vary widely depending on the starting size of the position; a small change in a small position is a much bigger percent change than a small change in a large position.

ARL Hierarchy, Growth, and Salary Structure

In previous research on feminized occupations, one piece of evidence of male advantage is seen in the disproportionate numbers of men found in higher-level positions that are presumed to be more prestigious and better paid than

lower-level positions, contributing to gender segregation of work and increasing wage gaps. Understanding the ARL position hierarchy, the salary structure that comes from it, and overall growth helps place changes in gender composition and salary gaps in the context of change in ARL library institutions.

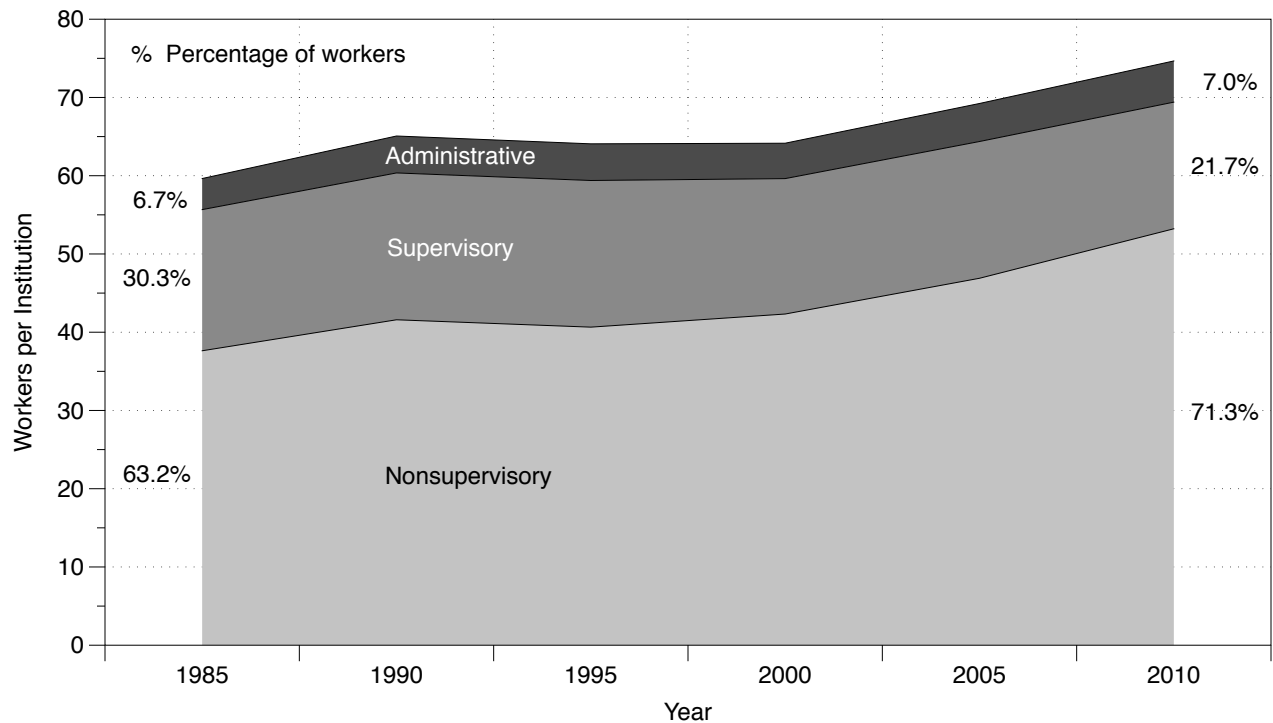


Figure 2: Number of workers in ARL professional positions per institution by year, 1985 to 2010.

The number of workers in ARL in professional positions increased from 1985 to 2010 but unevenly across the position hierarchy. Figure 2 shows the total number of workers per year during this time period grouped by Administrative, Supervisory, and Nonsupervisory positions, as described above in Table 3. The percentage share of all workers in each grouping for the years 1985 and 2010 is

shown along either side of the graph. Within these hierarchical groupings, the Administrative group gained a small number of workers and the Supervisory group lost a small number. The Nonsupervisory group was the most changed in size, gaining 15.59 workers per institution, an increase in percentage share from 63.2% to 71.3% and a percent change of 29%.

The salary structure of ARL positions, that is, how positions are paid relative to one another, changed surprisingly little from 1985 to 2010. Table 4 shows the positions for those two years in order from highest to lowest salary and color-coded by location in the hierarchy. The position salaries listed are means, so they do not reflect actual lowest and highest salaries within the positions. Included in the table is the number of workers for each position, to give a sense of the distribution of positions within the hierarchy and salary structure, and the “multiple of the minimum” salary for each position, where the multiple of the minimum is the mean position salary divided by the lowest mean position salary for that year.

The hierarchy of positions generally aligns closely with the salary structure: the highest salaries apply to Administrative positions, the lowest salaries to Nonsupervisory positions, and Supervisory positions fall somewhere in between. Supervisory positions make approximately 1.15 to 1.50 times as much as the lowest paid position, while lower-level administrators make about 1.70 times as much as the lowest paid position. In 1985 the highest paid Nonsupervisory position was about 1.14 times the minimum mean salary, while in 2010 it was only

1.09 times the minimum. While Supervisory positions are not being paid more relative to the lowest paid position, the Nonsupervisory salaries occupy a narrower range, meaning there is more differentiation between Supervisory and Nonsupervisory salaries. The implications of this change are unclear but suggest that recent compensation schemes might be more closely tied to the hierarchy than in the past.

Table 4: Position, number of workers, average salary, and multiple of the lowest average salary in 1985 and 2010.

1985				2010			
Position	No.	Salary	Mult.	Position	No.	Salary	Mult.
Director	94	\$63,427	2.67	Director	114	\$196,930	3.27
Associate Dir.	114	\$45,219	1.90	Associate Dir.	316	\$117,372	1.95
Assistant Dir.	209	\$40,165	1.69	Assistant Dir.	170	\$102,639	1.71
DH Systems	41	\$35,598	1.50	DH Systems	73	\$89,808	1.49
DH Rare Books	100	\$33,869	1.43	DH Rare Books	90	\$82,479	1.37
DH Cataloging	110	\$32,899	1.39	DH Branch	487	\$79,673	1.32
DH Reference	112	\$31,515	1.33	DH Reference	108	\$78,331	1.30
DH Acquisitions	104	\$30,990	1.31	Other DH	654	\$77,383	1.29
DH Branch	527	\$30,348	1.28	DH Cataloging	149	\$74,299	1.24
DH Serials	67	\$29,793	1.25	DH Acquisitions	112	\$73,794	1.23
Other DH	632	\$29,452	1.24	DH Serials	30	\$73,392	1.22
DH Gov. Docs.	110	\$28,462	1.20	DH Circulation	83	\$70,082	1.17
Functional Sp.	331	\$27,371	1.15	DH Gov. Docs.	59	\$68,990	1.15
DH Circulation	91	\$27,266	1.15	Subject Sp.	1133	\$65,480	1.09
Subject Sp.	673	\$26,870	1.13	Functional Sp.	2109	\$63,130	1.05
Other Lib.	889	\$24,651	1.04	Other Lib.	717	\$60,641	1.01
Cataloging	988	\$23,799	1.00	Reference	1348	\$60,339	1.00
Reference	1070	\$23,746	1.00	Cataloging	760	\$60,132	1.00

Administrative	Supervisory	Nonsupervisory
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Although there is generally stability in the number of workers in each position and in the relative salaries between positions in some parts of the hierarchy, a few obvious changes bear further investigation. Most growth is limited to the Nonsupervisory grouping, suggesting that library structures may be becoming more horizontal—an assertion also supported by higher rates of growth nationally in nonprofessional library positions versus librarian positions (U.S. Bureau of Labor Statistics 2014d; U.S. Bureau of Labor Statistics 2014c)—but the absence of data on lower-level *Library Technician* and *Library Assistant* positions in the ARL *Salary Survey* leaves a large gap in our understanding of how professional and supporting positions interact in these particular institutions. The largest difference in the salary structure from 1985 to 2010 is in the Director position, which was paid 2.67 times the lowest paid position in 1985 and 3.27 times in 2010; the average salary for library directors has increased more quickly than for librarians in all other types of positions. One thing that has not changed, but is interesting nevertheless, is that in both 1985 and 2010 the Systems and Rare Books Department Heads were the highest paid Supervisory positions, even though all other Department Head positions had shuffled their locations in the salary structure. This suggests that these two positions are persistently among the most prestigious. The following sections will investigate the relationship between the hierarchy, gender composition, and the salary gap, and look more closely at each of the groupings in the hierarchy for changes in individual positions.

Hierarchy, Gender Composition, and the Salary Gap

In 1985 the vertical hierarchy of positions appears to be an important factor in the level of gender segregation in ARL libraries, with higher-level positions more likely to be disproportionately male and lower-level positions more likely to be disproportionately female. While the three hierarchical groupings began with different percentages of male workers, they change over time at different rates and in different directions (Figure 3). In 1985 the percentage of male workers for the Administrative group was well above the mean for all positions, the Supervisory group was also above but closer to the mean, and the Nonsupervisory group was below the mean. This type of gender segregation is consistent with Williams's (1992; 1995) *glass escalator* hypothesis and findings, in which men are tracked into higher-level positions within feminized occupations and subsequent research finding that men are promoted more readily than women.

Over time the percentage of male workers in the Administrative and Supervisory groups decreased gradually while that in the Nonsupervisory group increased gradually. The vertical hierarchy appears to be of decreasing importance in gender segregation over the study time period – not as many men seem to be riding up the *glass escalator* as they once did. By 2010 all three groups are quite close to the mean of 37%, although the Administrative group is still a few percentage points above.

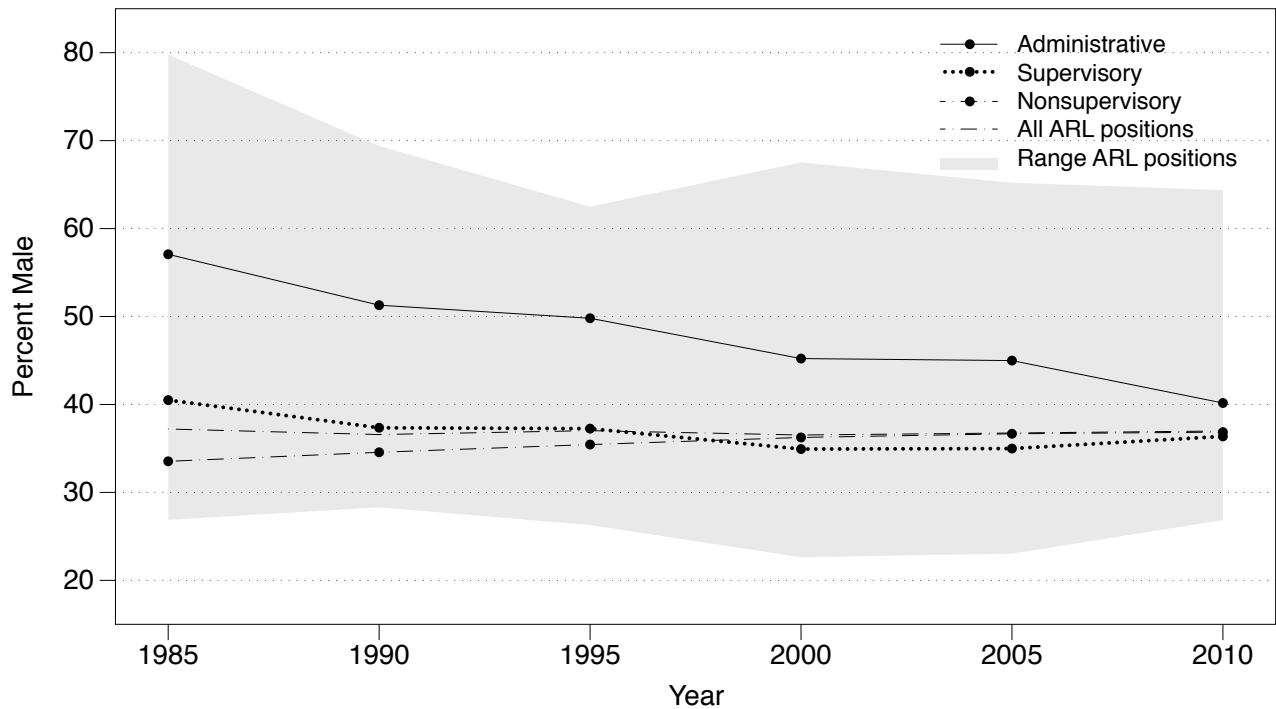


Figure 3: Weighted mean percent male for Administrative, Supervisory, Nonsupervisory, and all ARL professional positions, 1985 to 2010. Shaded area is the range of percent male for ARL positions.

There is little difference in the ARL salary gap based on the hierarchy of positions. The mean position salary gap gradually dropped from a high of 5.8% in 1985 to low of 2.3% in 2010, with the salary gap for Administrative and Nonsupervisory positions generally tracking within a few percentage points just below the mean, and the Supervisory salary gap within a few points just above the mean (Figure 3). While there is little evidence of male advantage in salary that is based on position hierarchy, nevertheless the overrepresentation of men in higher-level positions, especially early in the study time period, shows up in the salary gap for all ARL positions. The salary gap is calculated from the mean salaries for male and female ARL professionals, regardless of position or place in

the hierarchy (the topmost line in Figure 4). That is, even if men are not paid more than women in higher paid positions, the fact that men are more likely to be in those positions contributes to the overall salary gap.

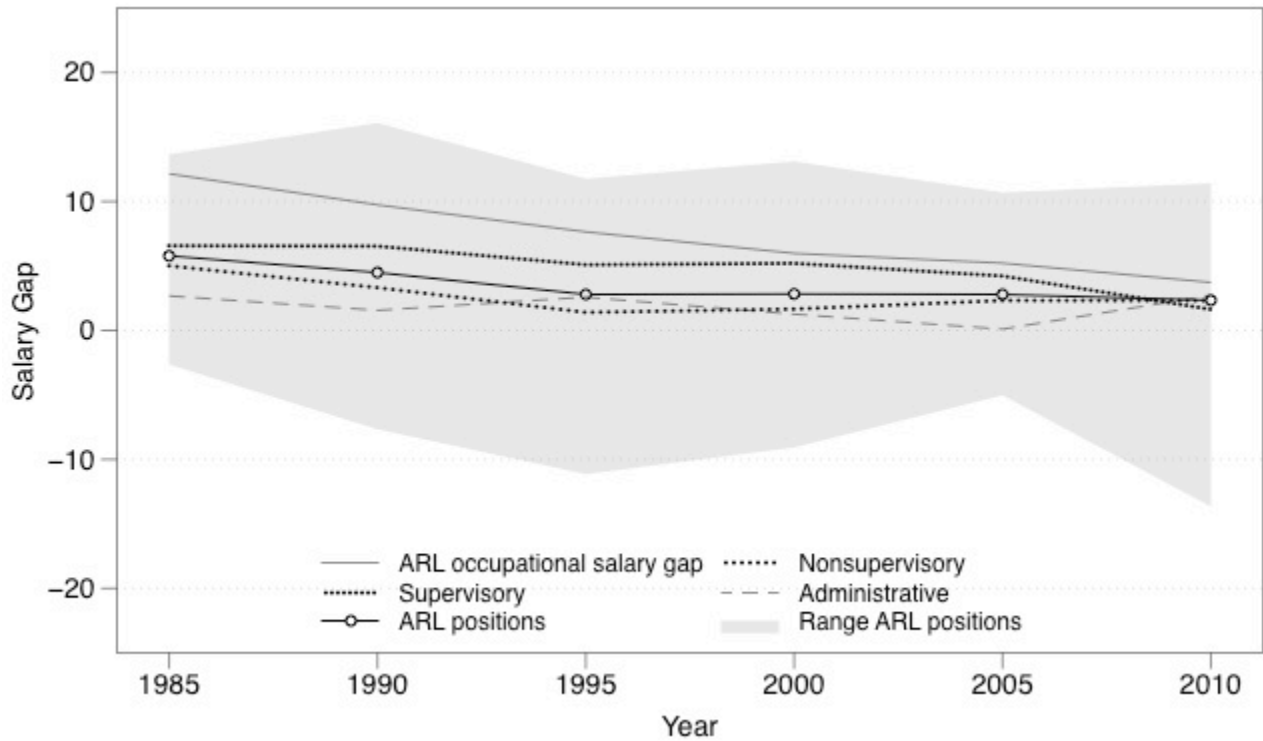


Figure 4: Weighted mean salary gap for Administrative, Supervisory, Nonsupervisory, and all ARL professional positions, 1985 to 2010. Shaded area is the range of salary gap for ARL positions.

Correlation of Variables

Since the hierarchical grouping of ARL positions aligns closely with the salary structure, mean position salary can be used as a proxy for position hierarchy in further investigation of the relationships among hierarchy, gender composition, and salary gaps. Lending support to the assertion that in ARL

libraries hierarchy is a less significant factor in the gender composition of positions than it once was is the relationship between mean position salary and percent male. Figure 5 is a graph of the correlation coefficients for salary and percent male for the years of this study. In 1985 there is a high, statistically significant positive correlation between mean salary and percent male ($r=0.72$). The relationship gradually becomes weaker and is no longer statistically significant in 2000 and later. By 2010 the evidence of male advantage in terms of placements and promotions into higher-level, higher-paid positions is very weak in ARL library professional positions.

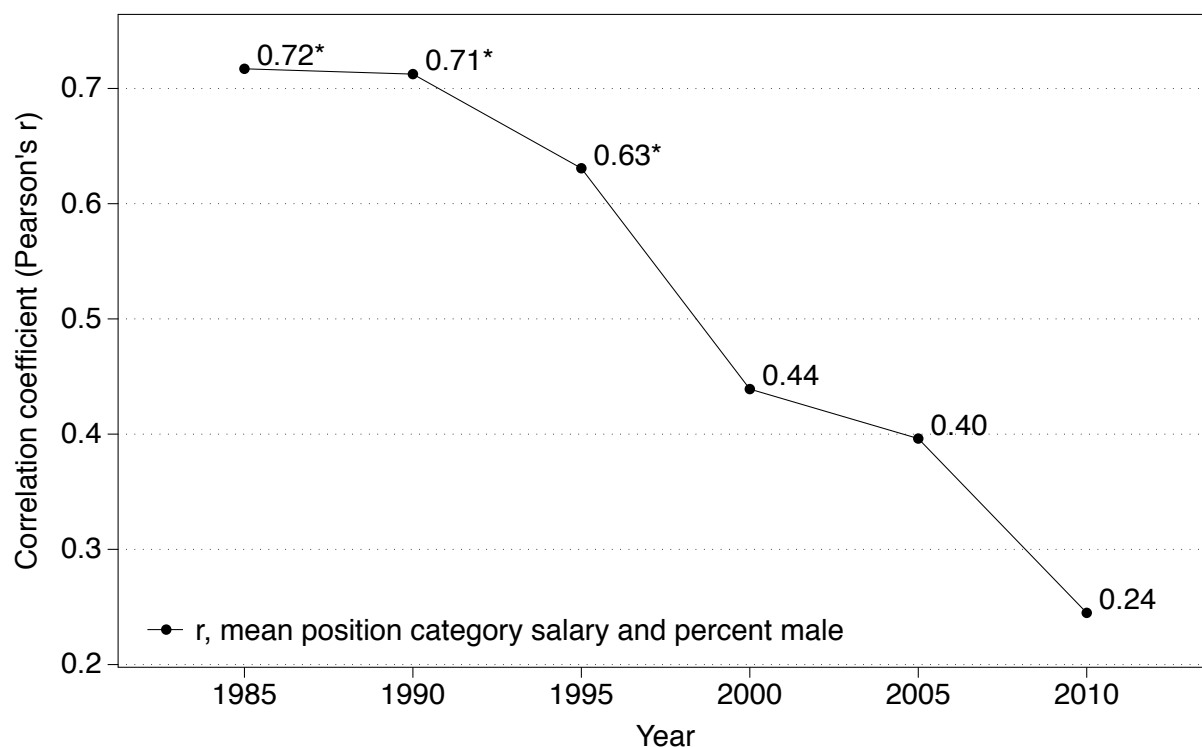


Figure 5: Correlation coefficients for salary and percent male by year, 1985 to 2010.
*statistically significant at a level of $p < 0.05$.

Supporting the assertion that the vertical hierarchy and salary gap are not strongly related in ARL professional positions are the correlation coefficients for the position salary gap and mean salary. For the length of the study time period the correlation coefficient for these two variables was quite small and often near zero. The strongest correlation between these variables was in 2000, when there was a weak negative relationship ($r=-0.27$), but this is not a statistically significant finding. Based on the correlation coefficients over the entire time period, there is no evidence of a sustained linear relationship between salary and salary gap. The hierarchy of positions cannot explain differences in salary gaps between positions.

While there does appear to be some linear relationship between the variables percent male and salary gap, it is neither strong nor statistically significant during the 1985 to 2010 time period. The correlation between these variables was moderately strong and positive in 1980 ($r=0.45$) although not statistically significant at a level of $p<0.05$ (it is significant at a level of $p<0.1$, but subsequent years are not). After 1985 ($r=0.38$) there appears to be little or no linear relationship between these variables, with the possible exception of a weak negative relationship in 2000 ($r=-0.21$), when the salary gap for the Systems Department Head was at its lowest.

Among these three variables, the only strong, statistically significant correlation is between salary and percent male, which is limited to the earlier years (1985 to 1995) of this study. If by 2010 the differences in the gender

composition and pay differentials between positions cannot be attributed to the hierarchy of positions, nor can the salary gap be attributed to the percentage of male workers within individual positions, then perhaps these differences can be explained by other characteristics of these positions.

Administrative Positions

While there is no discernable, shared pattern in the salary gaps of the positions that make up the Administrative group, this group contains the position with the most dramatic change in the percentage of male workers over the study time period (Figure 6). All three categories lost male workers and moved more or less steadily toward the mean of 37%, but the Director position started with the highest percentage of male workers of all 18 ARL positions and dropped most quickly. Considering that the drop in male workers started prior to the current study time period—when the *Salary Survey* was first conducted in 1976, 90.12% of ARL Directors were male—the change in this position is particularly striking.

At the same time that the percentage of male workers in this top-level library position was decreasing, the mean salary was on the rise and increasingly out of proportion to other professional ARL salaries. This is the most visible of library positions and potentially more susceptible to forces outside the library organization than other positions because of that visibility. One possibility is that the change in the gender composition of this position may be the result of a conscious effort in research universities to address gender equity issues by seeking female candidates for higher-level positions. This would be an easy

position for which to find a large pool of highly qualified female candidates, given the number of women working their way through the librarian ranks. Since the Director position is often an administrative Dean, the rise in salary may be due to this position being linked with the salary structures of institutional administrators rather than those of other library workers.

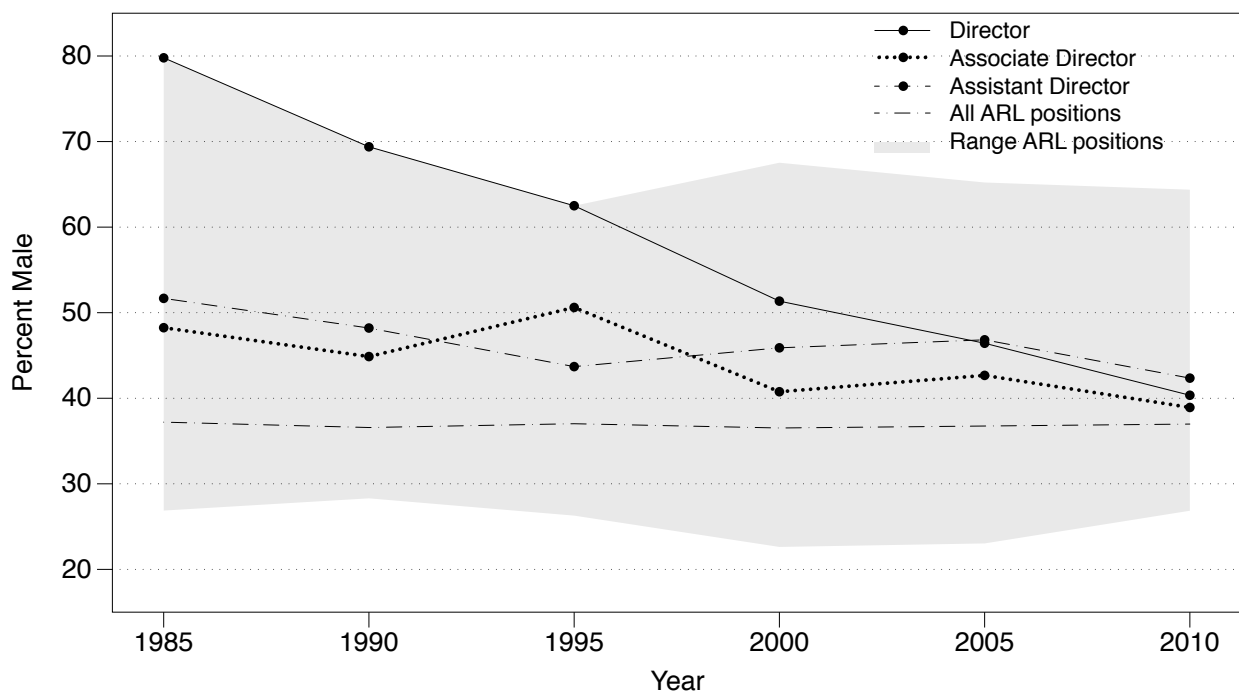


Figure 6: Percent male of Administrative positions from 1985 to 2010.

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Supervisory Positions

While most Supervisory positions follow a similar pattern of change in the percentage of male workers over time, the Systems and Rare Books Department Head positions follow distinct trajectories. In Figure 7 the percentage of male workers for several Supervisory positions is graphed alongside that for the Systems and Rare Books positions, the two positions with the highest percentages of male workers. The next most male-dominated position, not shown on the graph, is the Government Documents Department Head, which is a few percentage points above the mean percentage of male workers. In most other Supervisory positions the percentage of male workers drops quickly below the 37% mean after 1985. The Rare Books Department Head position follows a similar pattern of change but stays far above the mean at all times. The Systems Department Head is quite different: always far above the mean, it follows a

pattern almost inverse to that of the Rare Books Department Head after 1990, increasing between 1990 and 2000, then decreasing only slightly from 2000 to 2010. By 2000 the Systems Department Head has the highest percentage of male workers of all positions, surpassing the quickly declining Director position.

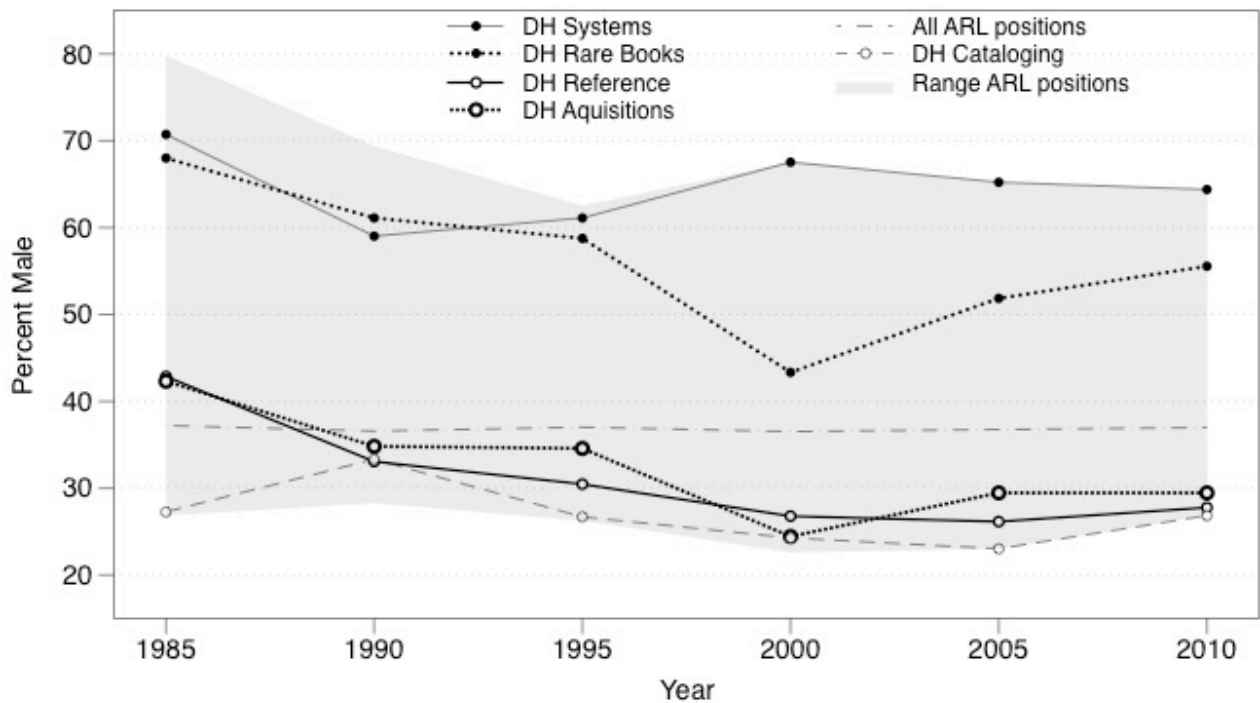


Figure 7: Percent male of selected Supervisory positions from 1985 to 2010. Shaded area is range of percent male for all ARL professional positions.

Together, the Systems and Rare Books Department Heads categories point toward specialization, at least certain kinds of specialization, as an important location of gender segregation in ARL libraries, especially after the influence of segregation by position hierarchy dissipates. While the other Supervisory positions are specialized and the educational routes to librarianship may vary, most specializations are grounded in areas core to librarianship and traditional

librarian education. The Systems Department Head is the newest Supervisory position, the only position in that group to grow in size, and the only one with primary responsibility for IT work, requiring a different set of skills. The very name of the Rare Books Department Head positions signifies its specialness – rare books librarians are responsible for collecting rare or unique and valuable materials. This position requires training in handling and preserving fragile collections, and an understanding of the social and physical history of books. Rare books departments are often physically set apart from other library collections and functions, have separate policies, and may have their own fundraising programs and operating budgets. Programs such as the Rare Book School in Virginia and the California Rare Book School offer supplementary or continuing education opportunities for rare book librarians – such extra training programs are rare for other library specializations except for those focused on IT. The special skills required potentially make these two specializations more difficult to enter and/or more difficult to fill. That they have the highest mean salaries of all Supervisory positions suggests that they are more prestigious than other supervisory positions. That they are disproportionately male may indicate a level of male advantage in terms of prestige.

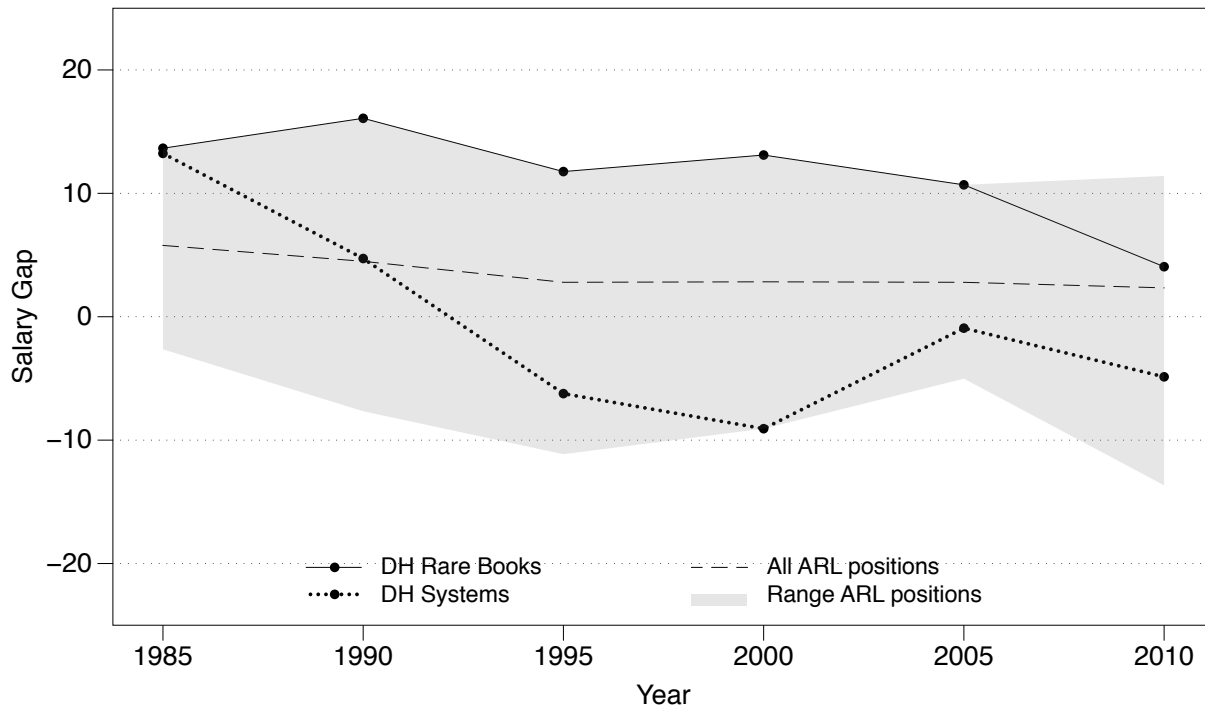


Figure 8: Salary gap of Systems and Rare Books Department Head positions, 1985 to 2010. Shaded area is range of salary gap for all ARL professional positions.

Of these two positions, only the Rare Books Department Head has a higher than average salary gap, and it had the highest salary gap of all ARL positions up to 2005 (Figure 8). In the Systems Department Head position, the proportion of male workers is high, but the salary gap is quite low, and negative after 1990, meaning that after this point women in this position are paid more than men on average. The negative salary gap for the Systems Department Head is not rare for ARL positions, half of the 18 categories have negative salary gaps, but it is the position with the largest decrease in salary gap from 1985 to 2010. Whether higher pay for women in this position is due to a growing preference for hiring women from a predominately male recruiting pool of IT workers or some other factor, such as differences by gender in experience levels or other qualifications,

is unclear. What is clear is that a higher percentage of male workers in a specialization is not inextricably linked with higher pay for men.

Nonsupervisory Positions

Within the Nonsupervisory group, the Functional Specialist and Subject Specialist positions were the fastest growing from 1985 to 2010, while the other three positions decreased in percentage share of all positions (Figure 9). Alone, the Functional Specialist position gained more workers than were gained in the Nonsupervisory group overall.

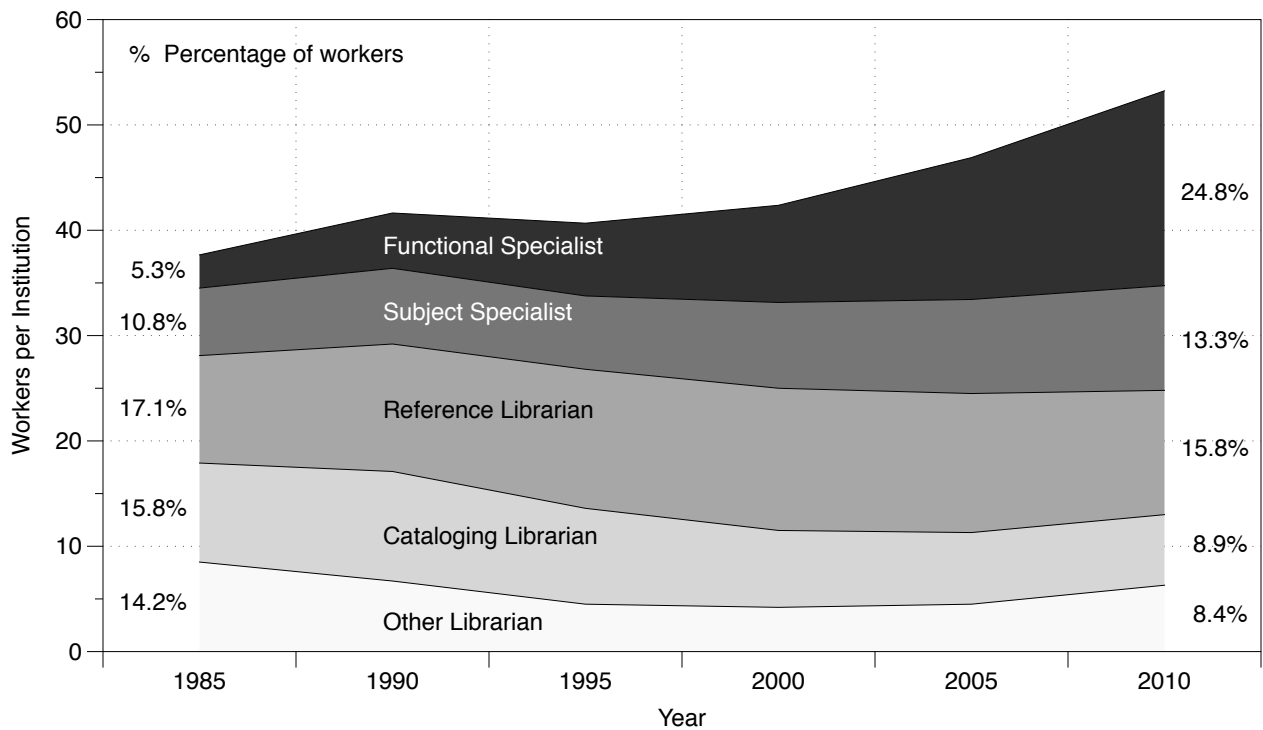


Figure 9: Number of ARL Nonsupervisory positions per institution by year, 1985 to 2010, including the percentage each position is of all workers in 1985 and 2010.

While there is neither a common pattern nor remarkable differences in the salary gaps for Nonsupervisory positions, the Functional Specialist positions have a higher percentage of male workers than average. The Subject Specialist position began with a higher percentage but has lost male workers over time and by 2010 is about the same as the mean of 37% (Figure 10). The three other Nonsupervisory categories have below average percentages of male workers and have had for the entire time period covered by this study.

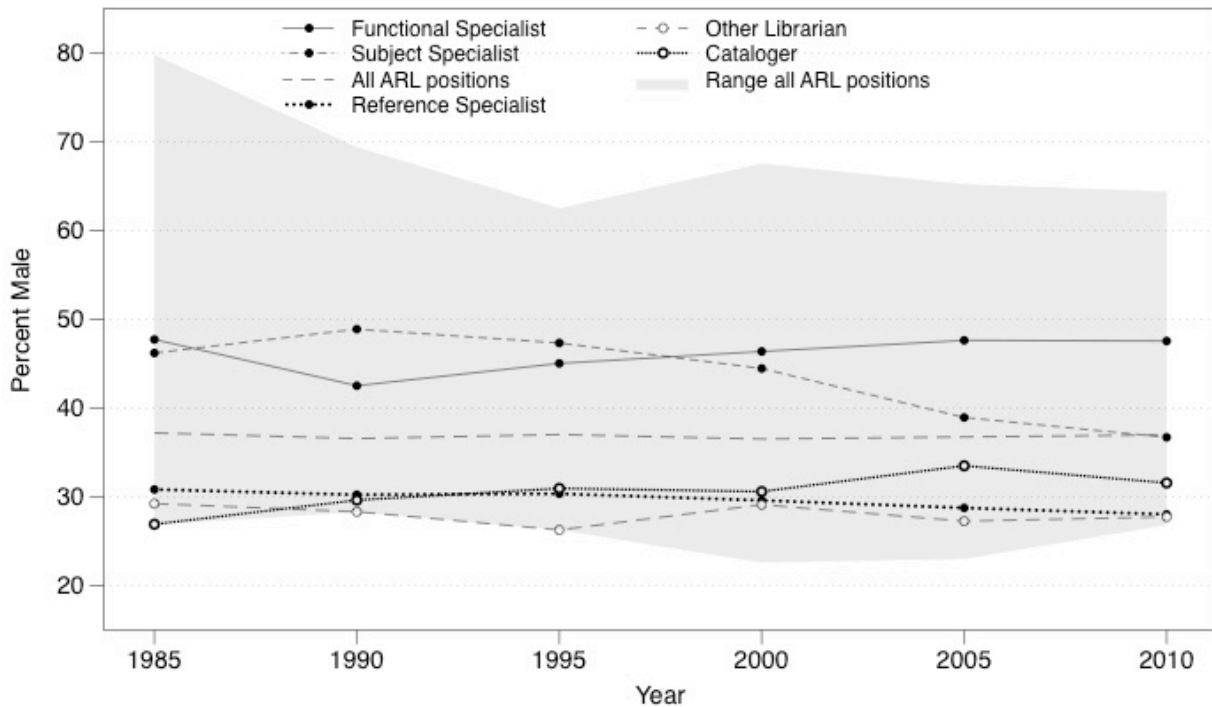


Figure 10: Percent male of selected Nonsupervisory positions from 1985 to 2010. Shaded area is range of percent male for all ARL professional positions.

Like the Systems and Rare Books Departments Heads, the Functional Specialist and Subject Specialist categories are more specialized than other positions in the same group. Subject Specialists need training in an academic

subject or discipline outside of librarianship, which is often in the form of a second advanced degree (Lindquist and Gilman 2008). Based on the position titles included in the Functional Specialist breakdown and the descriptions provided in the ARL survey instrument, many Functional Specialist subpositions do not specifically require an MLS or equivalent degree but instead may sometimes require education or experience in nonlibrary areas of expertise. The growth in the Subject and Functional Specialist positions suggests an increase in the level of specialization present in professional library positions and more diversity in the educational profile either accepted or required for professional library work.

The Reference and Cataloging positions, specializations core to librarianship and traditional librarian training, were previously the largest groups in the library, but their shrinking size relative to other positions suggests that they may have become less important over time, although the Reference position did grow in absolute size (actual number of workers per library). The Cataloging position shrank the most in absolute size of all ARL positions. One possibility for this change is deskilling related to technological development, to which cataloging processes have long been considered susceptible. The potential of deskilling was a primary concern of librarians attempting to predict the impact of technological change on libraries in the 1980s and 1990s. Since there was actually slight growth in the number of Cataloging Department Heads, it seems that cataloging work is either being accomplished by fewer people or has been pushed to lower levels in the organizational hierarchy.

The Functional Specialist Breakdown

The Functional Specialist position, the primary driver of growth over the time period being studied and the largest single position by 2010, is the only position in the ARL *Salary Survey* to be broken down into subpositions, beginning in 2005. This breakdown allows for a more in-depth analysis of this position, exposing differences between subpositions that are obscured by the mathematical averaging that occurs when multiple unlike positions are grouped into a single position. Figure 11 shows the overall growth in the Functional Specialist position, which accounts for nearly a quarter of workers in all ARL professional positions by 2010.

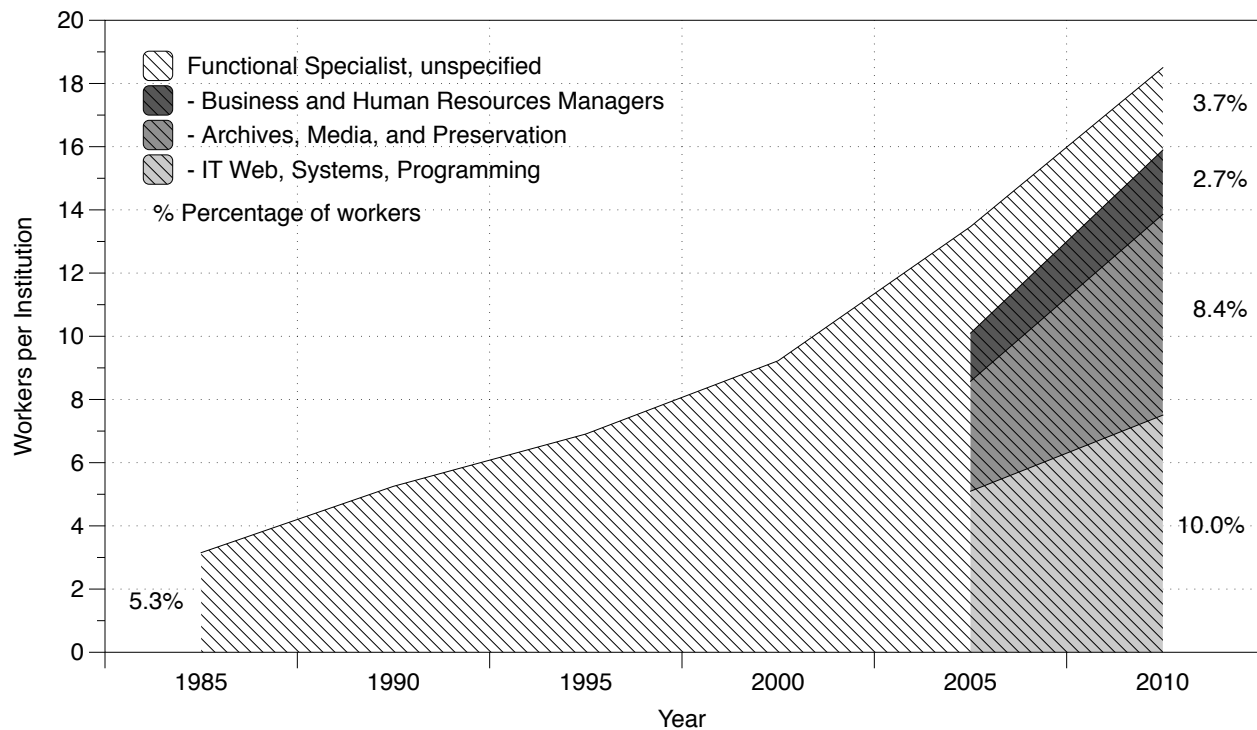


Figure 11: Number of ARL Functional Specialists per institution by year, 1985 to 2010.

The Functional Specialist position is a somewhat artificial composite of subpositions and the location of three out of four library IT specializations, the fourth being the Systems Department Head. What the Functional Specialist subpositions have in common is that they lay at least somewhat outside the conceptual boundaries of traditional librarian roles, as viewed through the mid-1970s lens of ARL, when the *Salary Survey* was developed. While integral to library work now, these positions are still highly specialized, with responsibility for narrowly defined segments of library collections or functions. All of the Functional Specialist subpositions increased in size from 2005 to 2010, with the exception of the “Other” subpositions, suggesting that their importance in libraries continues to grow. The largest increases in number of workers were in the Archivist, the three ITs, and the Media Specialist subpositions. Four subpositions gained male workers, the three ITs and Human Resources, and the other five subpositions lost male workers (Table 5).

Table 5: Functional Specialist subcategories, percent male by year, 2005 to 2010.

Position	2005	2006	2007	2008	2009	2010	% change 2005–2010
IT Web	69	68	72	74	74	70	1.2%
IT Systems	62	62	58	61	65	65	5.4%
Media Specialist	59	58	60	62	60	56	-5.3%
IT Programmer	53	51	54	53	53	56	5.4%
Business Manager	45	34	37	40	39	37	-18%
Archivist	41	39	41	36	37	37	-7.6%
Other	38	32	34	32	34	36	-6.0%
Preservation	34	34	32	32	27	24	-29%
Human Resources	13	12	9	6	17	17	25%
All Functional Specialist	48	45	46	44	48	48	0%

The percentage of male workers across Functional Specialist subpositions varies more widely than that in ARL positions overall and covers the entire range from very male-dominated (IT Web) to very female-dominated (Human Resources). Figure 12 shows the percentage of male workers for the Functional Specialist breakdown graphed along with that of the Systems Department Head and the means for the Functional Specialist subpositions and all ARL positions. The three IT and Media Specialist subcategories have the highest percentages of male workers, and the IT Systems position, the second most male, is similar in composition to the Systems Department Head.

The range in the salary gap for Functional Specialists is also wider than the range of that for all ARL professional positions, although the mean salary gap for the Functional Specialist position is lower than the mean for all positions until 2010 (Figure 13). In 2005 there is a marked difference in the salary gap between the most male-dominated positions and the least male-dominated positions, where the most male-dominated positions have lower salary gaps, but the difference is less pronounced in 2010. Like the Systems Department Head positions, the three IT positions have negative salary gaps in 2005, although only one is still negative in 2010. By 2010 seven of the eight categories have moved closer to the mean salary gap.

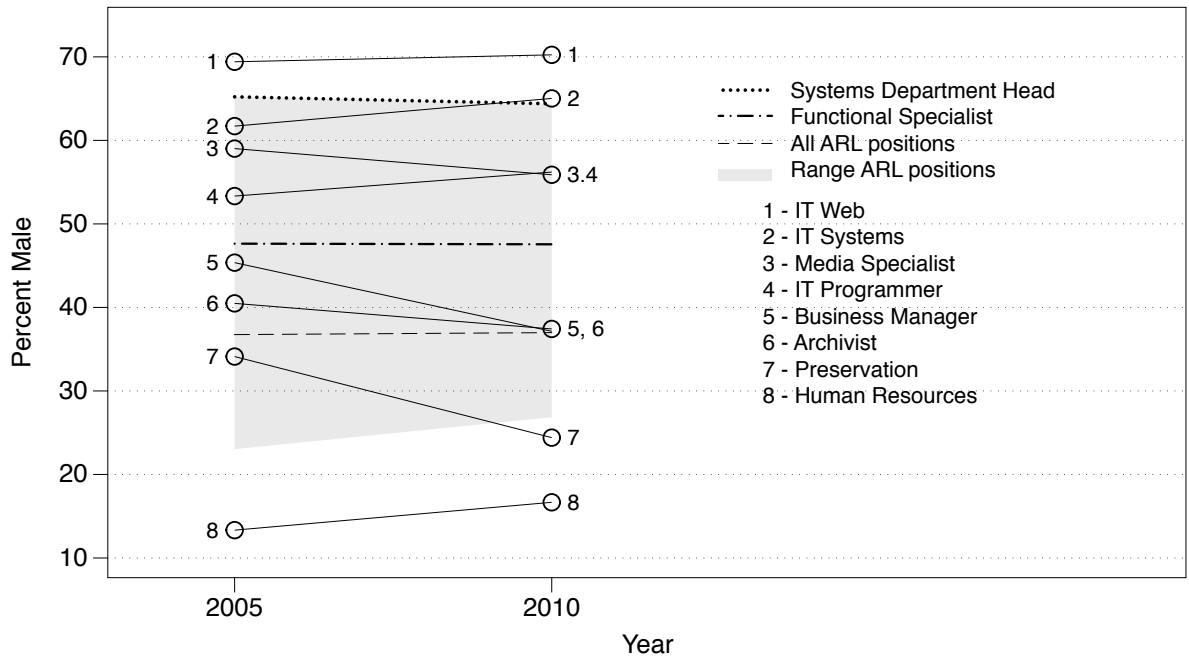


Figure 12: Percent male of selected positions, including Functional Specialist subcategories, 2005 and 2010.

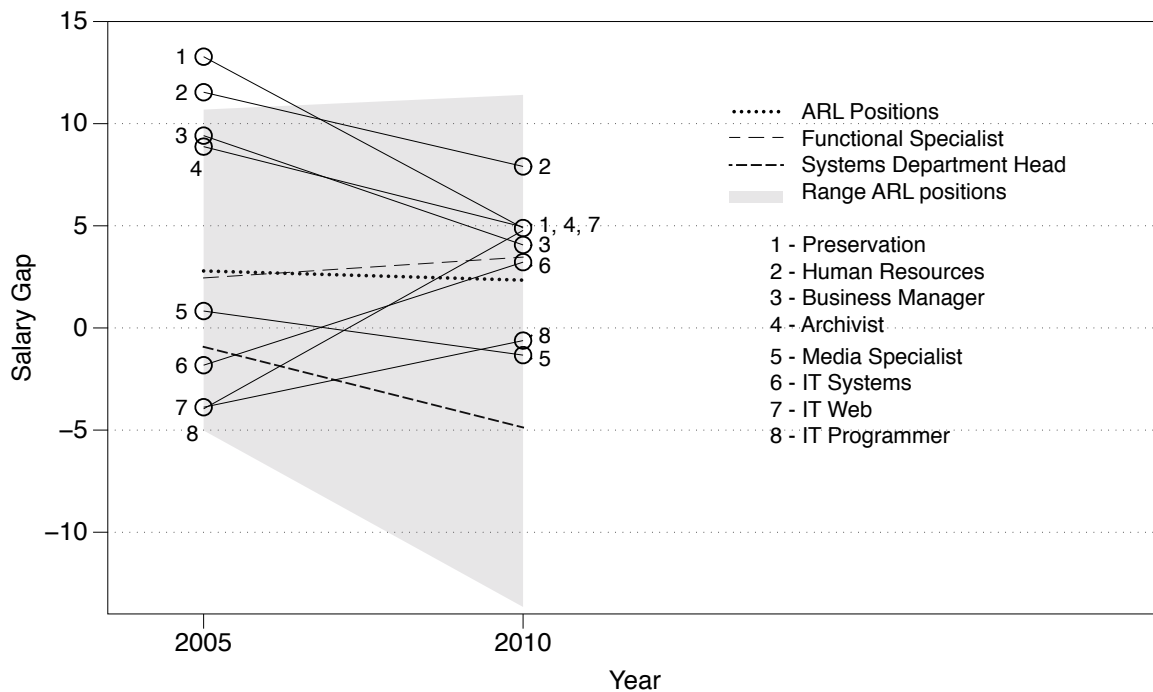


Figure 13: Salary gaps for selected positions, including Functional Specialist subpositions, 2005 and 2010.

Within the Functional Specialist position, the relationship between the variables percent male and salary is very different from that in ARL positions overall, as are other key variable relationships. While by 2005 there was little correlation between mean salary and percent male within ARL position in general, there is a moderately strong negative correlation ($r=-0.61$) between these variables within the subpositions of the Functional Specialist position; higher salaries correlate with lower percentages of male workers, although this result is not statistically significant at a level of $p<0.05$ (although it is at a level of $p<0.1$) and the relationship is weaker by 2010 ($r=-0.44$) (Figure 14). Across ARL positions there is little correlation between salary and salary gap, yet within Functional Specialists, there is a statistically significant, moderately strong positive relationship; higher salaries are associated with higher salary gaps ($r=0.69$, $r=0.67$). In ARL positions there is little evidence of a relationship between percent male and salary gap after 1985, while within the Functional Specialists, there is a statistically significant, strong negative correlation between percent male and salary gap ($r=-0.78$, -0.71); subpositions with higher percentages of male workers have lower salary gaps. Table 6 lists the variables underlying the correlation coefficients graphed in Figure 14, with the highest and lowest figures in each column shaded. The Media Specialist is the lowest paid position and is among the positions with a lower salary gap. The highest paid position is the Human Resources Specialist, which has, by far, the lowest percent male and among the highest salary gaps. These two positions are the most

extreme examples, but the other subpositions align with the general pattern they set.

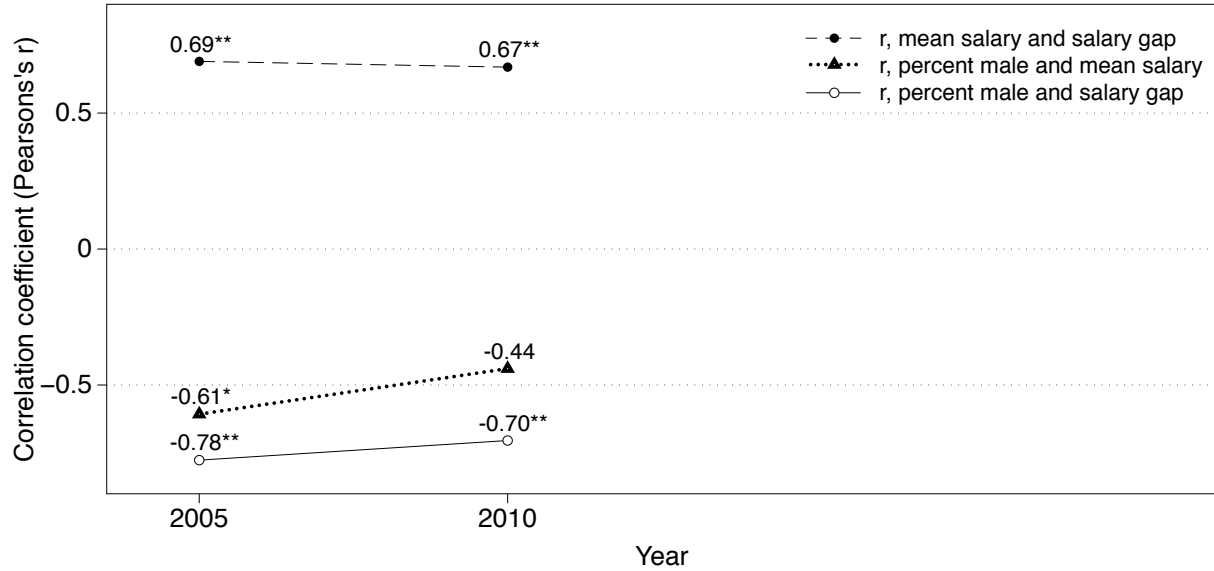


Figure 14: Correlation coefficients for Functional Specialist subpositions: mean salary and salary gap, percent male and mean salary, percent male and salary gap, 2005 and 2010. *statistically significant at a level of $p < 0.1$, **statistically significant at a level of $p < 0.05$

Table 6: Percent male, salary, and subposition salary gap, 1985 and 2010.

Position	1985			2010		
	%male	Salary	Gap	%male	Salary	Gap
IT Web	69	\$58,513	-1.82%	70	\$67,450	3.22%
IT Systems	62	\$52,829	-3.88%	65	\$64,944	-0.62%
Media Specialist	59	\$47,942	0.83%	56	\$54,474	-1.33%
IT Programmer	53	\$51,970	-3.96%	56	\$63,836	4.78%
Business Manager	45	\$61,861	9.41%	37	\$72,629	4.06%
Archivist	40	\$54,878	8.88%	37	\$60,534	4.94%
Other Func. Spec.	38	\$53,277	1.06%	36	\$62,577	3.56%
Preservation	34	\$59,509	13.28%	24	\$65,905	4.89%
Human Resources	13	\$65,623	11.54%	17	\$76,907	7.91%

As in the ARL positions in general, gender segregation in the Functional Specialists appears to be driven by differences in the type of specialization, a difference initially masked by the grouping of diverse functions into a single position. Within Functional Specialists, differences in specialization appear to be linked with salary and salary gaps in a particular ways. This may also be true of other ARL positions likely to contain diverse subpositions. The Subject Specialist position, for instance, may be segregated by gender based on type of subject specialization and the “other” positions could be quite internally diverse, but these details are not available in the data. Gender differences within the Functional Specialists are driven in part by the growing importance of IT in libraries, which translates into actual growth in predominately male IT positions. In gender composition, salary gaps, and increasing size (albeit, slowly) these positions resemble the Systems Department Head position, but unlike the Department Head position, they are not the highest paid in their group. The Media Specialist⁴ position, which is not clearly an IT position, but shares some characteristics with them, is not growing. Although these positions are in a different part of the hierarchy than the Systems Department Head, IT positions and Media Specialists appear to be subject to the same forces that drive the percentage of male workers up and the salary gap down, reinforcing the idea gender difference in library work

⁴ The nature of the Media Specialist subposition is unclear. In libraries the term “media specialist” is used to describe two types of positions: librarians specializing in collections of nonbook media (images, audio recordings, video recordings) and nonlibrarian support staff who are responsible for media equipment to access those media (viewing and listening stations). The low salary suggests that some “nonprofessionals” have been included in this position.

is driven more by specialization than hierarchy. In libraries, the *glass escalator* appears to be more like a moving sidewalk that transports people horizontally to different parts of the organization.

Lower salaries and salary gaps in the subpositions with higher percentages of male workers may in part be explained by structural characteristics of libraries. Simply put, in libraries, perhaps librarians make more than everyone else. Historically, there has been a contraindication against hiring non-MLS-holding individuals in librarian positions. Nevertheless, there is evidence that the hiring of non-MLS professionals in libraries is on the rise and that non-MLS incumbents make less in the same library jobs (Simpson 2008). If IT and Media Specialists are less likely to be hired with an MLS degree, this could result in lower salaries overall in these positions relative to specializations more likely to require an MLS (of this group, the Archivist and Preservation Specialists). If female candidates are more likely to have come to the position with an MLS degree than male candidates, this could result in a pay differential between men and women. Additionally, while the ARL *Salary Survey* classifies IT positions and Media Specialists as professional, library organizations may treat them as nonprofessional support staff. In institutions within which librarians have faculty rank, tenure-track status, or unions, the structures that determine librarian pay and the pay of other library staff are likely to be separate and set by the institution rather than at the discretion of hiring libraries. It seems very possible that if we had access to data about all library employees, not just those loosely defined as

professional, that IT workers would be among the highest-paid “support” staff rather than the lower-paid “professional” staff.

Gender segregation, salary, and salary gaps in the Functional Specialists are driven by the presence of female-dominated specializations as much as by male-dominated IT positions. The characteristics of the disproportionately female positions outside of libraries could help explain the correlation between lower percentages of male workers, higher salaries, and higher salary gaps. In 2010 the ARL Human Resources position is the most disproportionately female Functional Specialist subposition, with only 17% of workers being male, and has the highest salary gap—women make 8% less than men on average. The corresponding CPS occupational classification, *Human Resources, Training, and Labor Relations Specialists*, is also female-dominated (29% male) and has a wage gap (20.6%) much higher than salary gaps found in ARL libraries. Human Resources Specialists are paid more (\$99,720 annually), on average, than the highest paid IT occupational classification included in this study, Web Developers (\$62,500 annually) (U.S. Bureau of Labor Statistics 2014b; U.S. Bureau of Labor Statistics 2014f). As Bygren and Kumlin’s (2005) findings suggest, the occupations from which workers are recruited have a role in shaping the characteristics of those positions within the hiring organizations. In this case, while nonlibrary occupational characteristics are not translated unchanged into the library context, general characteristics such as female or male dominance and relative salary structures are at least partially retained.

Gender composition and changes in position size

One of the goals of this thesis project is to understand how the growth of IT positions, which are disproportionately male, has been balanced by decreases in the number of men in other positions to maintain a stable percentage of male workers across ARL positions: would the loss of men be localized to a few positions or more widespread? The Functional Specialist positions, which contains three of four identified IT positions, has grown the most substantially over the time period of this study while maintaining a higher than average percentage of male workers. The growth in the number men working as Functional Specialists balances the loss of men in other parts of the library, so that the overall gender composition in ARL libraries does not change. Without the Functional Specialist position, the mean percentage of male workers in the remaining positions would gradually have dropped from 37% to 34% by 2010.

The drop in the percentage of male workers in non-Functional Specialist positions occurred not because of a large loss of male workers from one or a few positions but from many small losses of male workers in both disproportionately male and disproportionately female positions—12 of 17 positions lost men. Table 7 shows the net change in male and female workers within ARL positions from 1985 to 2010. The largest loss of men in a single position over 25 years was only 0.73 individual jobs per institution, and since that is in the “Other” Librarian position, it is not clear how many smaller subpositions it may contain, nor how finely divided the effect of this change was across departments or functions. The loss of male

workers was a slow and steady process distributed across library functions.

Seven of the 12 positions also lost female workers, and in some cases the loss of female workers was larger than the loss of male workers. No positions lost female workers without also losing male workers; only positions that decreased in size from 1985 to 2010 had a net loss of female workers. Overall, non-Functional Specialist positions lost only 0.3 workers per library and gained women to balance the loss of men. The positions to gain the most women while gaining few men are Reference and Subject Specialists. This could be because these positions, which most visibly play a “helping” role in the library, are the best fit with gendered ideas that teaching and nurturing are female roles, but could as easily be related to other characteristic of these jobs. For example, these positions may be more likely to be temporary or part-time and therefore less prestigious.

Table 7: Net change in the number of male and female position incumbents, 1985 to 2010, by ARL position. ^F position disproportionately female in 1985, ^M position disproportionately male in 1985.

Position	Net change 1985 to 2010	
	Male	Female
Other librarian ^F	-0.73	-1.45
Cataloging ^F	-0.43	-2.31
Branch DH ^F	-0.42	-0.33
Assistant Director ^M	-0.40	-0.10
Director ^M	-0.31	0.42
Other Dept. Head ^M	-0.23	-0.05
DH Rare Books ^M	-0.21	0.05
DH Government Docs ^M	-0.20	-0.33
DH Reference ^M	-0.19	0.07
DH Circulation ^M	-0.14	0.01
DH Acquisitions ^M	-0.13	0.12
DH Serials ^F	-0.09	-0.28
DH Cataloging ^F	0.07	0.19
DH Systems ^M	0.14	0.11
Reference ^F	0.17	1.46
Associate Director ^M	0.56	1.13
Subject ^M	0.69	2.84
Functional Specialists ^M	7.29	8.05
All positions	5.42	9.61

Comparisons of ARL IT positions and CPS IT occupation classifications

To place the mean salary gap in the broader context of national wage gaps, it was compared with several occupational classifications reported in the Current Population Survey (Figure 15). Over time, the ARL occupational salary gap dropped less quickly than the national mean wage gap, which starts at about 20 points above and ends about 15 points above the ARL salary gap. The ARL salary

gap is below the wage gap for College Teachers, a related professional group that is present in the same intuitions but is quite diverse in itself. Early in the study time period (1985-1995) the ARL salary gap is similar to that for Secondary School Teachers and higher than that for Registered Nurses, both feminized occupations. After 2000 the salary gap for ARL is slightly below that for Secondary School Teachers and Registered Nurses. Overall, the salary gap for ARL libraries is quite low when compared with the wage gap in other occupations that are related in some way.

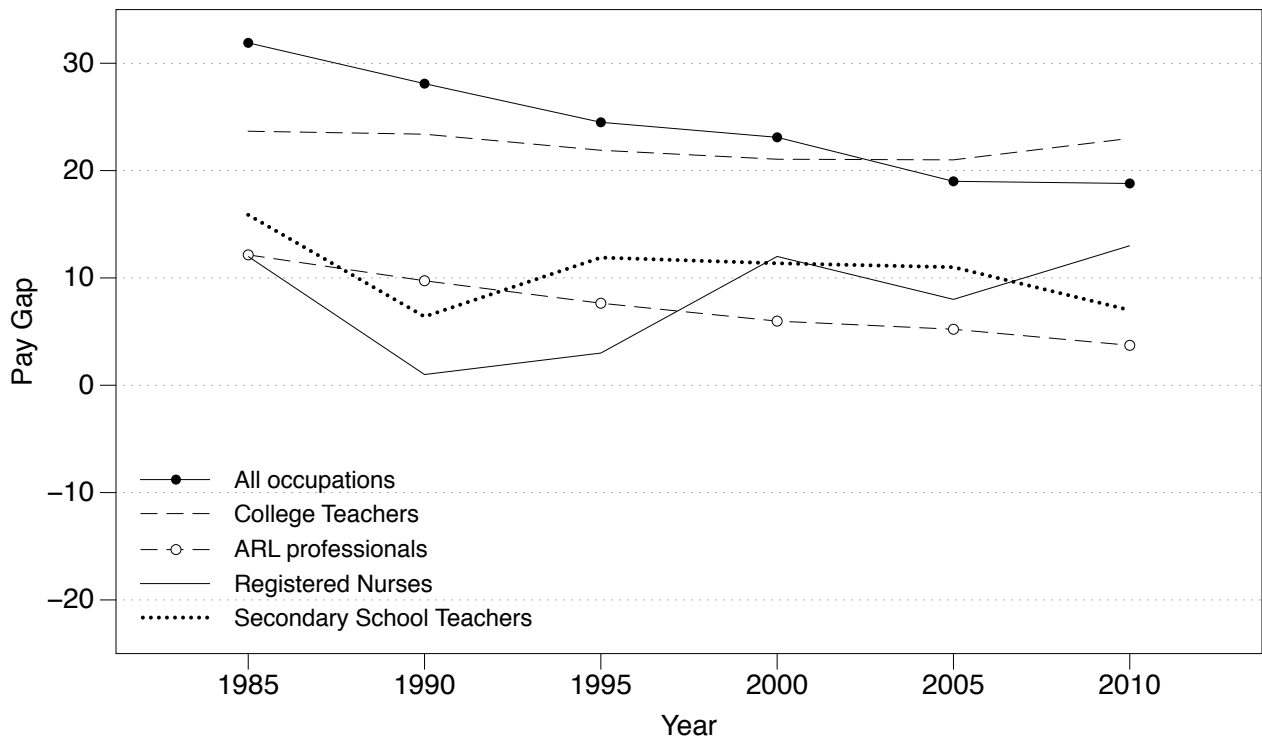


Figure 15: Mean pay gaps for selected CPS occupational classifications and ARL positions, 1985 to 2010.

The following comparisons use Current Population Survey (CPS) data for selected occupations that correspond to ARL IT positions: IT Systems and Network and Computer Systems Administrators, IT Programmers and Computer Programmers, and IT Web and Web Developers. The ARL Systems Department Head position is not included in these comparisons because it could not be matched to a CPS occupational classification. However the percentage of male workers in this position is similar to the ARL IT Systems position, and the salary gap is in the same range as the other ARL IT positions. As with IT positions in the *ARL Salary Survey*, where data is available only from 2005 on, the availability of annual averages for IT occupational classifications covered by the CPS is limited. Where possible, the variables of interest (percent male and wage gap) were calculated for each year from 2005 to 2012, but with gaps: Computer Programmers from 2005 to 2012 for both percent male and wage gap; Network and Computer Systems Administrators from 2005 to 2012 for percent male, but only 2012 for wage gap; and Web Developer, 2011 and 2012 only for percent male. The base of female workers in the Network and Computer Systems Administrators was too small to report wages until 2012. The Web Developer position was not included in CPS reports until 2011, and the base of female workers was too small to report wages in 2011 and 2012.

A comparison of the percentage of male workers for the three ARL IT positions and corresponding CPS IT occupation classifications is shown in Figures 16, 17, and 18. While ARL IT positions are disproportionately male when

compared to ARL professional positions, both ARL IT Systems and IT Programmer positions are less male than the corresponding Computer Programmers and CPS Network and Computer Systems Administrators occupational classifications. The mean difference in percent male between ARL and CPS programmers is 22.57, and that difference is relatively consistent across the time period (Figure 16). Using a paired t-test (two-tailed), this finding is statistically significant at a level of $p < 0.001$.

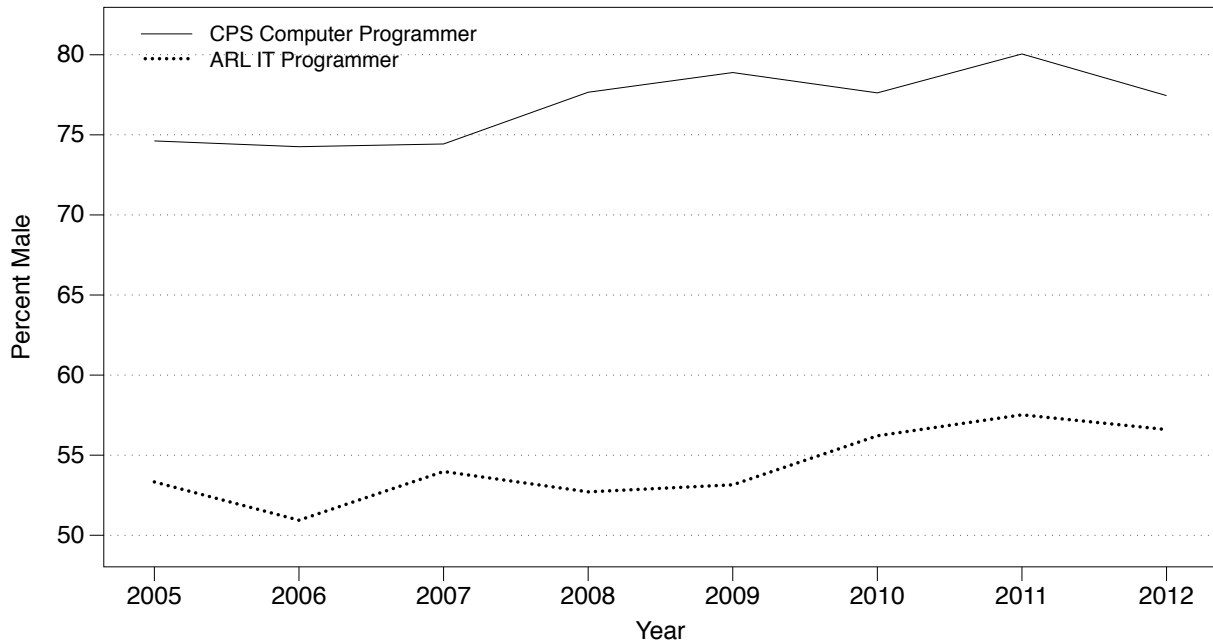


Figure 16: Percent male for CPS Computer Programmer occupational classification and ARL IT Programmer position, 2005 to 2012.

The mean difference in percent male between ARL and CPS systems administrator is 17.08. This difference was greater at the beginning of the time period and lesser toward the end, as the percentage of male workers in the CPS

classifications appears to be decreasing and that for the ARL position appears to be increasing (Figure 17). This finding is also statistically significant at a level of $p < 0.001$.

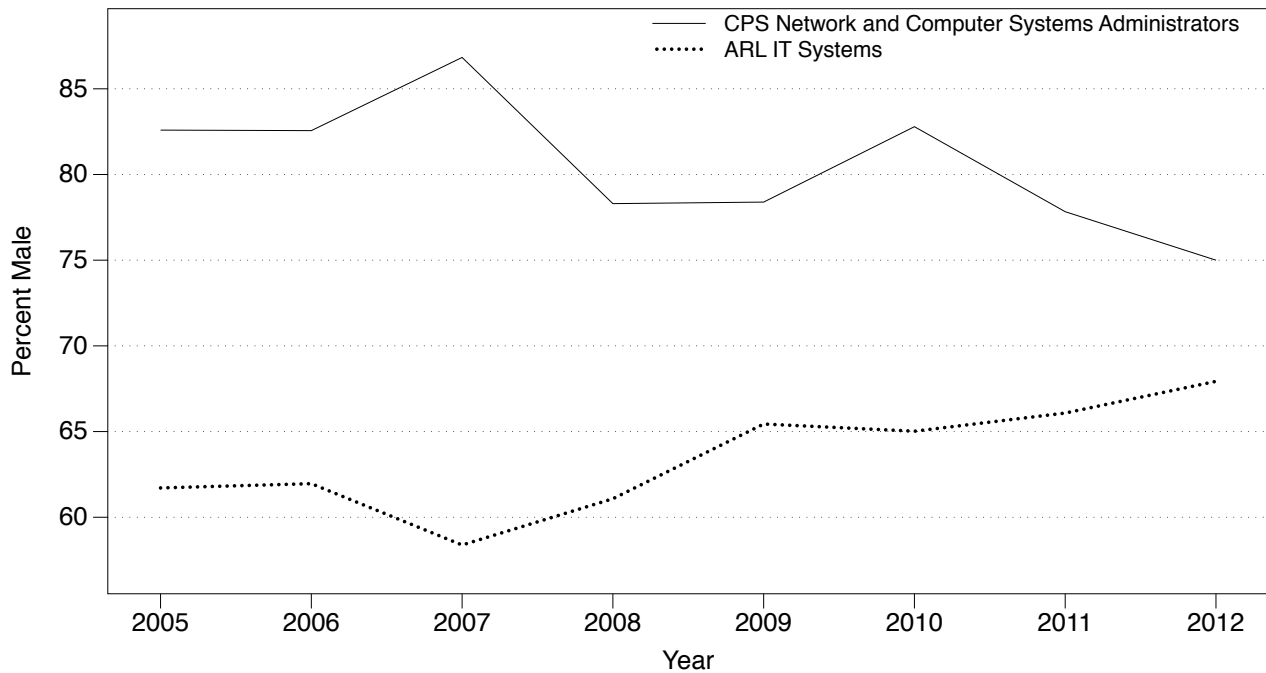


Figure 17: Percent male for CPS Network and Computer Systems Administrator occupational classification and ARL IT Systems position, 2005 to 2012.

The ARL Web position and CPS Web Developer occupation classification have a very similar gender composition in 2011 (Figure 18), with less than 1% difference between them. In 2012 the ARL IT Web position is 10 percentage points more male than the CPS Web Developer occupation, although there is too little consistency and too few data points for a reliable comparison of the means.

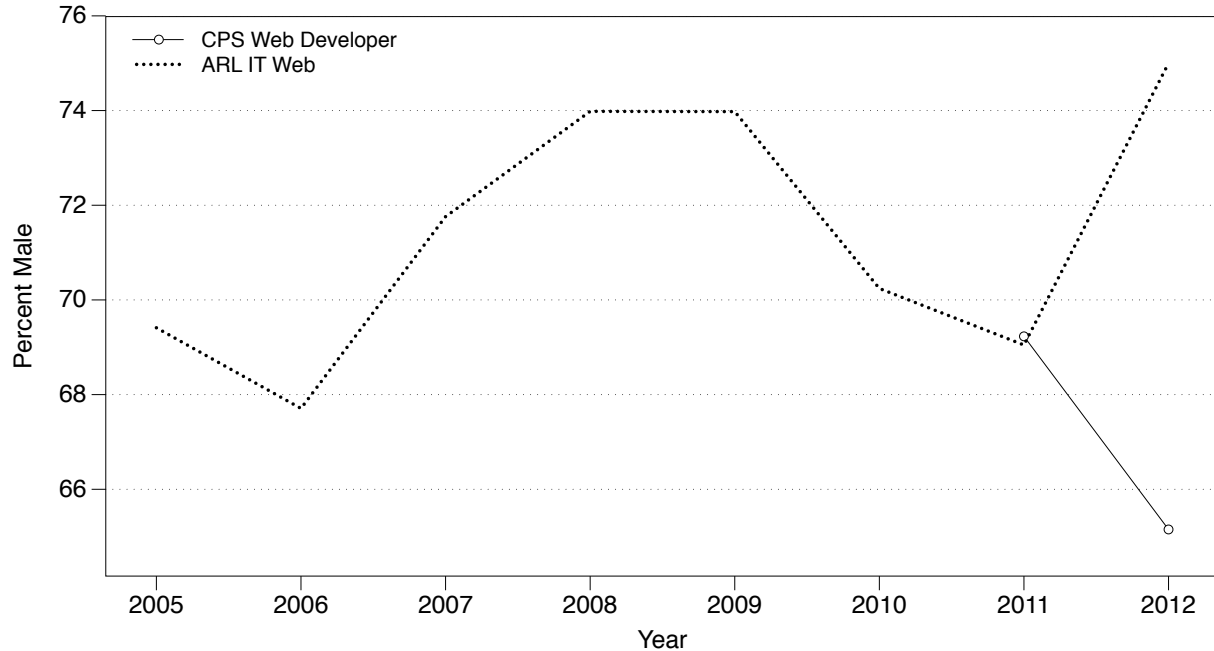


Figure 18: Percent male for CPS Web Developer occupational classification, 2011 to 2012, and ARL IT Web position, 2005 to 2012.

In the ARL IT Programmer and CPS *Computer programmer* categories, which are the only categories for which there is sufficient data for a multiyear comparison of pay gaps, the CPS wage gap is generally higher than the ARL salary gap (Figure 20). The mean difference in the gaps from 2005 to 2012 is 10.21 percentage points, which is statistically significant at the level of $p < 0.05$.

Only one wage gap data point is available for the CPS Network and computer systems administrator occupational classification and it is shown graphed with the ARL IT Systems salary gap data in Figure 21 (see upper right corner of graph). In this single year the CPS wage gap is 18.45 percentage points above the ARL salary gap, which was negative over the course of this eight-year time period.

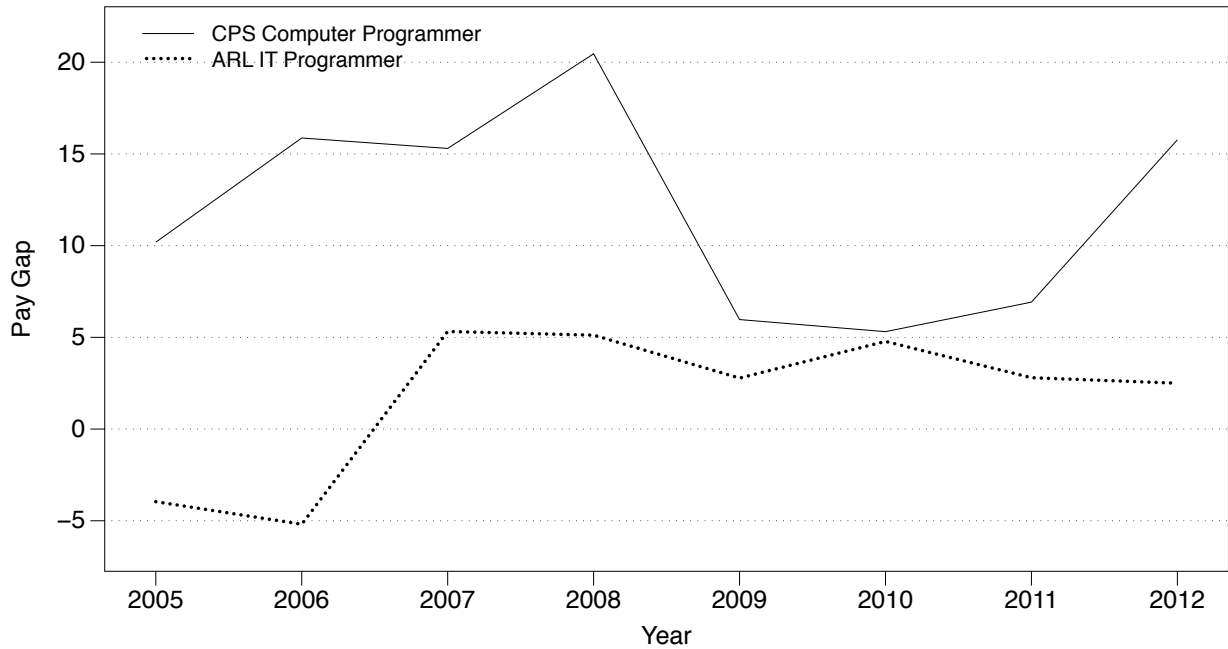


Figure 19: Pay gaps for CPS Computer Programmer occupational classification and ARL IT Programmer position, 2005 to 2012.

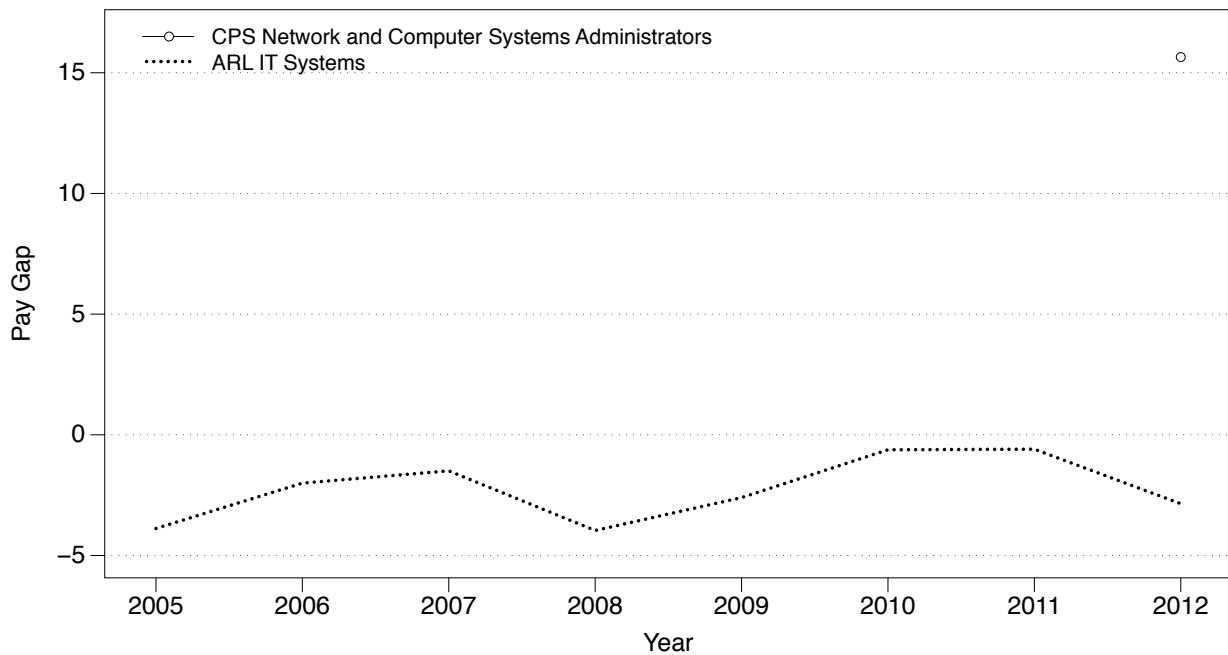


Figure 20: Pay gaps for CPS Network and Computer Systems Administrator occupational classification, 2012, and ARL IT Systems position, 2005 to 2012.

Based on comparisons of ARL and CPS programmers and systems administrators, ARL IT positions have a lower percentage of male workers than comparable CPS occupational classifications. The ARL IT Programmer position has a lower pay gap than the CPS Computer Programmer occupational classification. Both of these findings point toward a degree of female advantage in library IT positions relative to nonlibrary IT positions – women in IT are both more likely to be employed and more likely receive better pay than men within libraries than outside of libraries. What is missing from this analysis is a comparison of compensation levels of IT professionals inside and outside of libraries. Comparable compensation data could help determine whether library IT positions are more or less desirable than IT positions outside of libraries. If library IT jobs are less desirable than nonlibrary IT jobs, that could point to an entirely different conclusion about the gender segregation of IT workers – that women are more likely to be present in library IT positions because the positions are less prestigious than other IT positions. Other factors, such as schedule flexibility, nonmonetary benefits, the specific nature of the work, and other characteristics of workers could come into play in a more complex analysis. Lower pay gaps in library IT positions when compared with positions outside of libraries also point to a preference for female workers within libraries but could be explained by other differences. If female candidates are more likely to have an MLS degree or to be recruited from among those already working in libraries, they might also be paid more, or if men are more likely to work in libraries in temporary

grant-funded positions, which are common, or in entry level positions, they might be paid less.

CHAPTER V

DISCUSSION AND CONCLUSION

This study was undertaken to solve a mystery: while there is broad consensus in the professional literature of librarianship that information technology (IT) has transformed library work over the past several decades and ample evidence that most information technologists are men, there is no indication of a change in the gender composition of professional library workers since about 1980. Framed in the context of relevant sociological concepts and previous research on women in technology and men in feminized professions, this project uses data on gender and salary in Association of Research Libraries (ARL) positions to investigate how the introduction of IT work may have contributed to changes in research library positions over a 25-year period from 1985 to 2010.

Support for Hypotheses

A central assumption of this thesis project is that male-dominated technology positions must have grown in number within libraries as IT work grew in importance, and a static gender composition is masking real changes in the gendering of work in libraries. The growth of IT could have resulted in a redistribution of men and women across library specializations, potentially

changing the nature of horizontal gender segregation if men were lost from other specializations as IT positions were added (Hypothesis 1) and decreasing vertical segregation if IT positions were primarily added to lower levels of the hierarchy (Hypothesis 2). The growth of IT positions could increase the gap in pay between men and women if this redistribution resulted in men occupying more prestigious specializations (Hypothesis 3). Data on related positions from the Current Population Survey (CPS) were used to place changes in research libraries into the context of national trends and to test the predictions that IT positions in libraries would have a similar gender composition to IT positions outside of libraries (Hypothesis 4) but a higher wage gap (Hypothesis 5).

Growth in the four male-dominated ARL IT positions was balanced by losses of men in most other positions, supporting Hypothesis 1, but this was not the only balancing factor. Female-dominated specializations also increased in size. The positions with the largest increases are those most likely to require an educational background different from the standard Master of Library Science professional degree, suggesting that the degree of specialization present in libraries is increasing and now extends beyond those competencies and skills that can be or are being covered in “library school.” Specialization is an important contributor to gender segregation of work within libraries, in part because specialized workers recruited from other occupations reflect the gender compositions of those occupations, which are often more extreme than that of libraries.

Vertical gender segregation was found to be of decreasing importance in research libraries, supporting Hypothesis 2, but not solely due to increases in male-dominated jobs at lower levels of the organizational hierarchy. On the whole, groups of positions in the upper two tiers of the library hierarchy have lost men and reflect the overall gender composition of research libraries much more closely in 2010 than in 1985, when men were concentrated in higher-level positions. The gain in female library directors from 1980 to 2010 is the most dramatic illustration of decreasing vertical gender segregation in ARL libraries.

The salary gap in ARL library positions has decreased over time, not increased; Hypothesis 3 is not supported. The underlying assumption at the start of this analysis was that IT positions would be disproportionately male and higher paid than other positions, contributing to higher gender salary gaps. While the Systems Department Head position is the most male-dominated and highest paid position in the Supervisory Group, it is a relatively small position in terms of workers per library and, after 1990, has a negative salary gap. The Functional Specialist IT positions, though disproportionately male, are neither the highest nor lowest paid Nonsupervisory positions and have lower salary gaps than other Functional Specialist positions. During the period of time when the number of IT positions was increasing, the overall ARL salary gap, already low, was decreasing steadily.

When compared with roughly equivalent CPS occupational classifications, ARL positions have a lower percentage of male workers and lower gender pay

gaps; neither Hypotheses 4 nor 5 is supported. While the data on which these findings are based is limited, especially CPS data on IT occupations, there appears to be some interesting differences in how gender comes into play in IT positions in libraries and outside of libraries.

Future Research

It is possible to draw certain conclusions based on the data presented in this project: wage gaps are low in research libraries; specialization contributes to gender segregation of library positions, while hierarchy has gotten less important over time; and women are slightly better represented and paid slightly better than men in ARL IT positions than in nonlibrary IT positions, even though these positions are male-dominated. However, more context is needed to truly understand these findings in terms of gender equality in work, which suggests several possible avenues for further research.

One possible set of topics that could be explored is specific to understanding how gender inequality operates in library organizations, which would require a more holistic view of both librarian positions and positions adjacent to librarians. An understanding of how gender norms influence specialization beyond a simple female/male, librarian/IT worker dichotomy could provide a more nuanced view of how gender segregation operates in academic libraries. The findings of this study are framed in terms of a “loss of men” from core librarian positions to IT specializations, keeping in mind the *glass escalator* metaphor that men are moved vertically and horizontally away from work

associated with women. However, women also feel the pressure to move toward positions that are assumed to best fit their gender. A reframing of this analysis with a focus on the movement of women could highlight different findings. For example, women beginning in IT positions might feel pressure to move up to managerial positions that employ “soft skills.” How positions interact with one another, who supervises whom, and how gender is enacted in these interactions could be of interest. The boundaries between professional and supporting positions change overtime, and analysis of changes in library organizational hierarchies should include data on lower-level positions. Losses in the Nonsupervisory group, for example, may very well translate into gains in Library Technician and Assistant positions. To really understand how and why women and men shift their locations within library organizations would require data on hiring, promotions, and lateral moves of people between positions, as well as an understanding of the skills required to perform the duties of positions over time.

Research library positions exist in the context of universities that may have recruiting and hiring policies that affect how library jobs are described and classified, where they are advertised, who is qualified to apply, which applications are for considered for advancement in the hiring process, and who is finally hired. Comparing IT positions in university libraries to other university IT positions could help sort out the effects on gender composition and pay that come from those positions being embedded in libraries from effects that come from the university environment in general. At the top end of the library hierarchy, changes in the

gender composition and salary of ARL library directors could be explained by the promotion of these positions to the dean level over time. As mentioned in Chapter IV, hiring female library deans might be seen as an easy way to add women to university administrations and could raise library director salaries by linking them to those of other deans. Data on the classification of library director positions and a comparison of library director salaries with those of deans at the same institutions could confirm this hypothesis or point to alternative explanations originating from within library organizations.

Understanding the broader context of occupations from which library workers might be recruited could be important to understanding how employers might evaluate candidates or how potential employees might evaluate positions. In Reskins and Roos's terms, there are a variety of factors that could influence the ordering of job and gender queues in the labor market. It is unclear from the ARL data how many library professionals consider themselves to be librarians by occupation (regardless of educational background) or what mix of qualifications might be found in the incumbents of a given position. Related research suggests that the occupational boundaries in libraries may be blurring, as workers with various qualifications and professional credentials may be hired into the same positions (Simpson 2008). This question of professional identity is worth considering further and could work on more than one level to influence job and gender queues. In the case of library IT positions, the labels of "librarian" and "IT guy" tap into very different gender stereotypes and different recruiting pools.

Library jobs requiring similar skills may be presented as librarian or IT positions, attracting different candidates, demanding different evaluation criteria, and leading to different hiring outcomes.

If the IT component of library education programs is fulfilling part of the need for skilled IT worker in libraries, it may be that more women are gaining these skills without also gaining an IT title—this points to the need for more research on library school curricula and job placements for those who participate in library technology tracks. Continuing education, important in library work, could also have an important effect on how people are situated in library jobs over the course of their careers. If men and women are encouraged to follow different post-hire professional development tracks, this will cause a differentiation in skills over time, leading to increased gender segregation. There is no reason to assume that the concepts of job and gender queues cannot extend to staffing changes within library organizations outside of hiring, since the decision to hire new staff may take into consideration existing staff skills and experience, as well as the potential for retraining.

Another set of possible research topics, perhaps more broadly applicable than those above to other feminized professions, is related to whether or not findings about the gender composition and salary gaps in ARL positions support the conclusion that women with IT skills are making gains in libraries compared with those outside of libraries. The negative salary gaps in both ARL Systems Department Head and Nonsupervisory IT positions are unexpected and intriguing,

but their significance in terms of gender and work in libraries is unclear without more data on who fills these positions, their occupational histories, and qualifications. If slightly higher salaries for women in these positions result from those women having more experience, education, being more likely to have earned an MLS degree, or staying in library jobs longer due to limited opportunities elsewhere, any apparent gains in gender equality are quickly erased. A comparison of compensation for similar positions inside and outside of libraries is also critical to understanding whether or not women with IT skills really have a small advantage within libraries, or if the presence of more women in library IT work is another example of the glass escalator lifting men out of less desirable jobs.

ARL libraries are among the largest libraries with the most resources, and because they are a well-defined group, they are the most studied. Research including non-ARL libraries could yield different findings. However, findings about ARL libraries may not translate to smaller libraries in a meaningful way. So far in ARL libraries, the addition of specialists has largely resulted in growth, keeping core library functions relatively intact, if slightly smaller and more feminized, while adding to both specialized librarians and nonlibrarians. In smaller libraries (all types) with fewer resources, the need for specialized skills may compete more intensely with the maintenance of traditional librarian roles, eroding this segment of the librarian workforce, leading to loss of prestige and even further feminization.

Conclusion

This thesis project uses research libraries as a case study to investigate a point of confluence and convergence between two occupations, one traditionally female-dominated and one male-dominated, within the same organizations. It contributes to the literature discussing male advantage in feminized occupations by exploring the role of specialization in the reordering of positions by gender over time. This study also provides an example, if not an explanation, of the diminishing role of vertical gender segregation in an occupation and presents a potential case of apparent female advantage in a male-dominated specialization that should be investigated further. These findings could be applied to understanding how male- and female-dominated occupations interact with one another more generally, and what may take place when the lines between gender-segregated occupations become blurred.

The broadest conclusion that can be drawn from this study is that the presence of gender-segregated work within an occupation can be overlooked if only occupation-level data is examined. An occupation that appears to have a particular gender composition may, in fact, have large differences in gender composition among specializations, especially if those specializations draw skills and workers from other occupations with strong gender associations. While this finding is perhaps not new information, it highlights the importance of case study and detailed position-level data in unraveling the mechanisms of gendered

division of labor. Such data would allow us to develop a more nuanced understanding of the potentially complex factors in play.

For libraries and librarians, this research documents a change in the makeup and distribution of professional library workers over several decades—decades during which traditional librarian work became further feminized, while library IT work was defined as a male domain. In 2011, Jeffrey Trzeciak, then University Librarian at McMaster University, publicly asserted that in the future he was likely to hire PhDs and IT specialists to staff the library instead of librarians, the implication being that other professionals would be more capable of performing today's library work than librarians (Trzeciak 2011). This incident, dubbed "McMastergate," provoked a swift and impassioned response from librarians in defense of professional librarianship (partially documented by Dupuis 2011). Librarian's fears about the effect of IT on the profession have not been resolved, and with good reason. The pace of technological change is unrelenting and the outcome for librarians is unpredictable—the boundaries between librarians and library IT workers remain fluid. What libraries do to keep up with change has continuing implications for the gendering of library work and for the future of professional librarianship.

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APPENDIX A

Table 8: Number of incumbents, percent male, mean salary, and salary gap for ARL professionals by position and year, 1985 to 2010.

Position	Year	Number male	Number female	Total number	Per Institution	Percent male	Mean salary male	Mean salary female	Mean salary	Salary gap
Director	1985	75	19	94	0.90	79.79	63742	62183	63427	2.45
	1990	68	30	98	0.92	69.39	87687	89467	88232	-2.03
	1995	65	39	104	0.96	62.50	106118	102689	104832	3.23
	2000	57	54	111	1.00	51.35	123025	131224	127014	-6.66
	2005	52	60	112	0.99	46.43	161370	157630	159366	2.32
	2010	46	68	114	1.00	40.35	196188	197433	196931	-0.63
Assoc. Director	1985	55	59	114	1.09	48.25	46349	44166	45219	4.71
	1990	70	86	156	1.46	44.87	61414	61244	61320	0.28
	1995	83	81	164	1.52	50.61	72255	70835	71554	1.97
	2000	75	109	184	1.66	40.76	86181	82058	83739	4.78
	2005	99	133	232	2.05	42.67	99922	100352	100169	-0.43
	2010	123	193	316	2.77	38.92	116845	117708	117372	-0.74
Assistant Director	1985	108	101	209	1.99	51.67	40493	39815	40165	1.67
	1990	121	130	251	2.35	48.21	54561	52510	53499	3.76
	1995	104	134	238	2.20	43.70	64203	62454	63218	2.72
	2000	95	112	207	1.86	45.89	76051	74243	75073	2.38
	2005	96	109	205	1.81	46.83	87004	87438	87235	-0.50
	2010	72	98	170	1.49	42.35	109862	97331	102639	11.41
Branch Head	1985	198	329	527	5.02	37.57	32004	29351	30348	8.29
	1990	191	374	565	5.28	33.81	43050	38909	40309	9.62
	1995	203	364	567	5.25	35.80	51311	46384	48148	9.60
	2000	184	326	510	4.59	36.08	60812	55661	57519	8.47
	2005	172	346	518	4.58	33.20	72285	65998	68086	8.70
	2010	167	320	487	4.27	34.29	82727	78079	79673	5.62

Acquisitions Head	1985	44	60	104	0.99	42.31	31360	30718	30990	2.05
	1990	39	73	112	1.05	34.82	41355	39613	40220	4.21
	1995	37	70	107	0.99	34.58	47097	46790	46896	0.65
	2000	22	68	90	0.81	24.44	55337	54485	54693	1.54
	2005	33	79	112	0.99	29.46	68445	63987	65301	6.51
	2010	33	79	112	0.98	29.46	70942	74986	73794	-5.70
Reference Head	1985	48	64	112	1.07	42.86	31522	31510	31515	0.04
	1990	42	85	127	1.19	33.07	40814	41141	41033	-0.80
	1995	39	89	128	1.19	30.47	47313	48417	48081	-2.33
	2000	30	82	112	1.01	26.79	55134	56568	56184	-2.60
	2005	34	96	130	1.15	26.15	64658	67903	67054	-5.02
	2010	30	78	108	0.95	27.78	80958	77320	78331	4.49
Cataloging Head	1985	30	80	110	1.05	27.27	34239	32397	32899	5.38
	1990	39	78	117	1.09	33.33	43991	41181	42118	6.39
	1995	47	129	176	1.63	26.70	49919	46719	47574	6.41
	2000	42	131	173	1.56	24.28	55623	54664	54897	1.72
	2005	41	137	178	1.58	23.03	64469	65304	65112	-1.30
	2010	40	109	149	1.31	26.85	74251	74317	74299	-0.09
Serials Head	1985	18	49	67	0.64	26.87	29228	30000	29793	-2.64
	1990	15	38	53	0.50	28.30	38348	40947	40211	-6.78
	1995	18	25	43	0.40	41.86	45924	48138	47211	-4.82
	2000	12	22	34	0.31	35.29	55498	51802	53106	6.66
	2005	10	26	36	0.32	27.78	61508	57968	58951	5.76
	2010	9	21	30	0.26	30.00	69354	75123	73392	-8.32
Gov. Docs. Head	1985	42	68	110	1.05	38.18	28274	28578	28462	-1.08
	1990	45	66	111	1.04	40.54	36984	39818	38669	-7.66
	1995	41	54	95	0.88	43.16	42303	47014	44981	-11.14
	2000	37	48	85	0.77	43.53	51399	51735	51589	-0.65
	2005	32	49	81	0.72	39.51	58252	58720	58535	-0.80
	2010	23	36	59	0.52	38.98	70020	68333	68990	2.41

Circulation Head	1985	40	51	91	0.87	43.96	27054	27432	27266	-1.40
	1990	35	60	95	0.89	36.84	36787	35015	35668	4.82
	1995	26	70	96	0.89	27.08	44820	42968	43470	4.13
	2000	19	65	84	0.76	22.62	49988	52827	52185	-5.68
	2005	26	70	96	0.85	27.08	59235	60001	59794	-1.29
	2010	27	56	83	0.73	32.53	64168	72934	70082	-13.66
Rare Books Head	1985	68	32	100	0.95	68.00	35417	30581	33869	13.65
	1990	66	42	108	1.01	61.11	46909	39366	43976	16.08
	1995	57	40	97	0.90	58.76	53990	47639	51371	11.76
	2000	39	51	90	0.81	43.33	65669	57064	60793	13.10
	2005	42	39	81	0.72	51.85	75505	67435	71619	10.69
	2010	50	40	90	0.79	55.56	83992	80587	82479	4.05
Systems Head	1985	29	12	41	0.39	70.73	37033	32131	35598	13.24
	1990	36	25	61	0.57	59.02	47294	45063	46380	4.72
	1995	44	28	72	0.67	61.11	51408	54611	52654	-6.23
	2000	52	25	77	0.69	67.53	61720	67320	63538	-9.07
	2005	60	32	92	0.81	65.22	76060	76764	76305	-0.93
	2010	47	26	73	0.64	64.38	88277	92577	89808	-4.87
Other Head	1985	250	382	632	6.02	39.56	31175	28325	29452	9.14
	1990	242	417	659	6.16	36.72	40564	37302	38500	8.04
	1995	242	401	643	5.95	37.64	47976	44887	46050	6.44
	2000	234	432	666	6.00	35.14	56775	52205	53811	8.05
	2005	241	410	651	5.76	37.02	66865	63589	64802	4.90
	2010	245	409	654	5.74	37.46	78638	76631	77383	2.55
Subject Specialist	1985	311	362	673	6.41	46.21	28116	25799	26870	8.24
	1990	376	393	769	7.19	48.89	38118	34734	36389	8.88
	1995	356	396	752	6.96	47.34	45089	43016	43997	4.60
	2000	402	502	904	8.14	44.47	51454	48698	49924	5.36
	2005	393	616	1009	8.93	38.95	58689	56845	57563	3.14
	2010	416	717	1133	9.94	36.72	67459	64332	65480	4.64

Reference Spec.	1985	330	740	1070	10.19	30.84	23892	23680	23746	0.89
	1990	392	904	1296	12.11	30.25	31992	31511	31656	1.50
	1995	432	991	1423	13.18	30.36	37307	37288	37294	0.05
	2000	443	1053	1496	13.48	29.61	43030	42630	42748	0.93
	2005	430	1065	1495	13.23	28.76	50921	49354	49805	3.08
	2010	378	970	1348	11.82	28.04	60240	60378	60339	-0.23
Cataloging Spec.	1985	266	722	988	9.41	26.92	24472	23551	23799	3.76
	1990	329	781	1110	10.37	29.64	32378	31330	31641	3.24
	1995	304	678	982	9.09	30.96	37082	37176	37147	-0.25
	2000	247	560	807	7.27	30.61	43638	44390	44160	-1.72
	2005	257	510	767	6.79	33.51	51032	50820	50891	0.41
	2010	240	520	760	6.67	31.58	61186	59646	60132	2.52
Other Librarian	1985	260	629	889	8.47	29.25	26184	24017	24651	8.27
	1990	202	511	713	6.66	28.33	33169	31738	32144	4.31
	1995	128	359	487	4.51	26.28	39924	38478	38858	3.62
	2000	136	331	467	4.21	29.12	45898	43323	44073	5.61
	2005	138	368	506	4.48	27.27	51878	51369	51508	0.98
	2010	199	518	717	6.29	27.75	60564	60670	60641	-0.18
Func. Spec.	1985	158	173	331	3.15	47.73	28373	26455	27371	6.76
	1990	239	323	562	5.25	42.53	34280	34690	34516	-1.20
	1995	336	410	746	6.91	45.04	39594	39012	39274	1.47
	2000	475	549	1024	9.23	46.39	45790	45643	45711	0.32
	2005	725	797	1522	13.47	47.63	54819	53477	54116	2.45
	2010	1003	1106	2109	18.50	47.56	64299	62070	63130	3.47
All ARL Prof.	1985	2330	3932	6262	105	37.21	30242	26568	27935	5.78
	1990	2547	4416	6963	107	36.58	39533	35684	37092	4.49
	1995	2562	4358	6920	108	37.02	46189	42659	43966	2.79
	2000	2601	4520	7121	111	36.53	53129	49954	51114	2.83
	2005	2881	4942	7823	113	36.83	62005	58770	59961	2.79
	2010	3148	5364	8512	114	36.98	71953	69277	70267	2.34
Position	Year	Number male	Number female	Total number	Institutions	Percent male	Mean salary male	Mean salary female	Mean salary	Salary gap

APPENDIX B

Table 9: Number of incumbents, percent male, mean salary, and salary gap for ARL Functional Specialists by position and year, 2005 to 2012.

Position	Year	Number male	Number female	Total number	Per institution	Percent male	Mean salary male	Mean salary female	Salary gap
Archivist	2005	100	147	247	2.19	40.49	54878	50007	8.88
	2006	121	186	307	2.72	39.41	56100	53753	4.18
	2007	142	206	348	3.08	40.80	57139	56020	1.96
	2008	149	260	409	3.62	36.43	60019	56733	5.47
	2009	169	290	459	4.06	36.82	61830	57605	6.83
	2010	183	306	489	4.33	37.42	60534	57541	4.94
	2011	172	304	476	4.18	36.13	62798	58579	6.72
	2012	170	319	489	4.29	34.76	65083	60157	7.57
Business Manager	2005	44	53	97	0.86	45.36	61861	56037	9.41
	2006	35	67	102	0.90	34.31	65399	59140	9.57
	2007	41	71	112	0.99	36.61	66672	62616	6.08
	2008	51	78	129	1.14	39.53	68418	65462	4.32
	2009	52	80	132	1.17	39.39	73035	68834	5.75
	2010	52	88	140	1.24	37.14	72629	69677	4.06
	2011	54	94	148	1.30	36.49	69483	71545	-2.97
	2012	55	91	146	1.28	37.67	71995	73141	-1.59
Human Resources	2005	10	65	75	0.66	13.33	65623	58051	11.54
	2006	10	72	82	0.73	12.20	71029	62906	11.44
	2007	7	75	82	0.73	8.54	70544	65248	7.51
	2008	10	158	168	1.49	5.95	77154	68929	10.66
	2009	18	86	104	0.92	17.31	76080	72464	4.75
	2010	15	75	90	0.80	16.67	76907	70826	7.91
	2011	13	70	83	0.73	15.66	76836	73821	3.92
	2012	13	63	76	0.67	17.11	75746	72837	3.84

IT Systems	2005	195	121	316	2.80	61.71	52829	54879	-3.88
	2006	202	124	326	2.88	61.96	56767	57903	-2.00
	2007	202	144	346	3.06	58.38	60056	60952	-1.49
	2008	248	158	406	3.59	61.08	61503	63941	-3.96
	2009	267	141	408	3.61	65.44	65009	66700	-2.60
	2010	264	142	406	3.59	65.02	64944	65346	-0.62
	2011	263	135	398	3.49	66.08	67104	67504	-0.60
	2012	269	127	396	3.47	67.93	68759	70721	-2.85
IT Programmer	2005	48	42	90	0.80	53.33	51970	54028	-3.96
	2006	54	52	106	0.94	50.94	54827	57675	-5.19
	2007	61	52	113	1.00	53.98	58638	55519	5.32
	2008	68	61	129	1.14	52.71	60647	57542	5.12
	2009	76	67	143	1.27	53.15	63819	62047	2.78
	2010	86	67	153	1.35	56.21	63836	60787	4.78
	2011	88	65	153	1.34	57.52	65032	63210	2.80
	2012	90	69	159	1.39	56.60	65744	64102	2.50
IT Web	2005	118	52	170	1.50	69.41	58513	59580	-1.82
	2006	130	62	192	1.70	67.71	61321	60746	0.94
	2007	155	61	216	1.91	71.76	63499	62303	1.88
	2008	182	64	246	2.18	73.98	65882	63411	3.75
	2009	199	70	269	2.38	73.98	67909	66235	2.47
	2010	203	86	289	2.56	70.24	67450	65278	3.22
	2011	203	91	294	2.58	69.05	69418	66506	4.19
	2012	213	71	284	2.49	75.00	71675	71006	0.93